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Environmental Study for the Modification of the Project's EIA:

CO_2 Storage Unit in Prinos

Date: 18/08/2025

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ABBREVIATIONS - ACRONYMS

Abbreviation – Acronym	Explanation
Α/Κ	Uneven Junction
ΑΑ	Urban Waste
ΑΕ	Waste Oils
ΑΕΚΚ	Excavation, Construction, and Demolition Waste
ΑΕΠ	Gross Domestic Product
ΑΕΠΟ	Decision on Approval of Environmental Terms
ΑΗΗΕ	Waste from the Decontamination of Electrical and Electronic Equipment
ΑΗΣΣ	Waste Electrical Batteries & Accumulators
ΑΛΕ	Waste Lubricating Oils
ΑΜΛΕ	Independent Project Accountability Mechanism
ΑΠΕ	Renewable Energy Sources
ΑΣ	Packaging Waste
ΑΣΑ	Municipal Solid Waste
ΑΣΕΔ	Individual Alternative Management Systems
ΑΣΘ	Sea Level Rise
ΑτΘ	Greenhouse Gases
ΑΥ	Recyclable Materials
ΒΑ	Biowaste
ΒΕΑ	Industrial Hazardous Waste
ΒΙΟΠΑ	Industrial Park
ΒΙΠΕ	Industrial Area
ΓΚΠΔ	General Data Protection Regulation
ΓΠΣ	General Urban Plan
ΓΠΧΣΑΑ	General Framework for Spatial Planning and Sustainable Development
ΓΥΣ	Army Geographical Service
ΔΑ	International Value
ΔΑ	Waste Management
ΔΕ	Municipal Unit
ΔΕΔΔΗΕ	Hellenic Electricity Distribution Network Operator
ΔΕΠΑ	Public Gas Corporation
ΔΕΣΜΗΕ	Greek Electricity Transmission System Operator
ΔΕΥΑΚ	Kavala Public Water Supply and Sewerage Company

Abbreviation – Acronym	Explanation
ΔΙΠΑ	Directorate of Environmental Licensing
ΔΟΕ	International Labour Organization
ΔΠΑ	Regional Competitiveness Index
ΔΣΑΠΔ	International Covenant on Civil and Political Rights
ΔσΠ	Sorting at Source
ΕΑ	National Value
ΕΑΑ	National Observatory of Athens
ΕΑΥΜ	Hazardous waste from healthcare facilities
Εγκ	Circular
ΕΓΥ	Special Secretariat for Water
ΕΔΕΥΕΠ	Hellenic Hydrocarbon and Energy Resources Management Company
ΕΕΔΑ	Hellenic National Commission for Human Rights
ΕΕΛ	Wastewater Treatment Plant
ΕΕΣΔΕ	Greek National Action Plan against Desertification
ΕΖΔ	Special Conservation Area
ΕΚ	European Community
ΕΚΑ	European Waste Catalogue
ΕΚΠΑΑ	National Centre for Environment and Sustainable Development
ΕΛΣΤΑΤ	Hellenic Statistical Authority
ΕΜΠ	National Technical University of Athens
ΕΜΣΥ	National Register of Water Supply Points
ΕΜΥ	National Meteorological Service
ΕΟ	National Road
ΕΟΑΝ	Hellenic Recycling Agency
ΕΠΕ	Environmental Impact Assessment
ΕΠΠ	Environmental Monitoring Report
ΕΠΠΔΑ	National Waste Prevention Program
ΕΠΧΣΑΑ	Special Frameworks for Spatial Planning and Sustainable Development
ΕΣΔΑ	National Waste Management Plan
ΕΣΔΕΑ	National Hazardous Waste Management Plan
ΕΣΔΚΕ	National Action Plan to Combat Desertification
ΕΣΕΚ	National Energy and Climate Plan
ΕΣΠΚΑ	National Strategy for Adaptation to Climate Change
ΕΤΑΑ	European Bank for Reconstruction and Development
ΕΧΠ	Special Spatial Framework
ΕΧΣ	National Spatial Strategy

Abbreviation – Acronym	Explanation
ΖΒΔΦΠ	Sustainable Natural Resource Management Zone
ΖΔΟΕ	Habitat and Species Conservation Zone
ΖΔΥΚΠ	**Potentially High Flood Risk Zone**
ΖΕΠ	Special Protection Zone
ΖΟΕ	Residential Control Zone
ΖΠΦ	Nature Protection Zone
ΖΥΠ	Animal By-products
ΗΜΑ	Electronic Waste Register
ΗΠΜ	Electronic Environmental Register
ΘΧΠ	Maritime Spatial Planning Frameworks
ΘΧΣ	Maritime Spatial Planning
ΙΟΒΕ	Foundation for Economic & Industrial Research
ΚΑΖ	Wildlife Refuges
ΚΑΠ	Lowest Astronomical Tide
ΚΔΑΥ	Recyclable Material Sorting Centers
ΚΕΣΠΑ	Central Council for Environmental Licensing
ΚΚΠ	Social Welfare Centers
ΚΠΚ	Good Environmental Status
ΚτΠ	Civil Society
ΚΥΑ	Joint Ministerial Decision
ΛΑΠ	Drainage Basin
ΛΘ	Lagoon
ΜΑΑ	Recycling Recovery Units
ΜΑΠ	Mean High Tide
ΜΑΠ	Personal Protective Equipment
ΜΑΡ	Mean High Water
ΜΔΠΠ	Protected Area Management Units
ΜΕΒΑ	Biowaste Treatment Unit
ΜΕΔ	Non-Performing Loans
ΜΕΟ	Used Vehicle Tyres
ΜΕΟΑ	Special Ecological Assessment Study
ΜΚΟ	Non-Governmental Organisations
ΜΚΠ	Average Lower Flood
ΜΜΕ	Mass Media
ΜΠΕ	Environmental Impact Study
ΜΠΕΑ	Small Quantities of Hazardous Waste

Abbreviation – Acronym	Explanation
ΜΠΣ	Average Flood of Conjugates
ΜΡΤ	Average Shallow Squares
ΜΣ	Meteorological Station
ΜΣΔ	**Action Plan for the Protection of the Marine Environment and Coastal Areas of the Mediterranean**
ΜΣΘ	Average Sea Level
Ν	Law
ΝΠΔΔ	Legal Entities under Public Law
ΟΑ	Acid Gas
ΟΗΕ	United Nations
ΟΚΑΑ	Central Markets and Fisheries Organization
ΟΠΕ	Environmental Liability Directive
ΟΠΘΣ	Marine Strategy Framework Directive
ΟΠΥ	Water Framework Directive
ΟΤΑ	Local Government Organization
ΟΦΥΠΕΚΑ	Natural Environment and Climate Change Organization
Π&Κ	Environmental and Social
ΠΑ	Regional Value
ΠΑΜΘ	Region of Eastern Macedonia & Thrace
ΠΑΜ-ΠΣΕΑ	Department of Civil Defense - Civil Emergency Planning
ΠΑΥ	Aquaculture Development Areas
ΠΔ	Presidential Decree
ΠΔΠ	Action Program for the Environment
ΠΔΠΧ	Production, Formation, Supply, and Use
ΠΕ	Regional Unit
ΠΕΣΔΑ	Regional Waste Management Plan
ΠΕΣΠΑ	Regional Environmental Licensing Council
ΠεΣΠΚΑ	Regional Plans for Adaptation to Climate Change
ΠΚΠ	Environmental and Social Standards
ΠΜ	Study Area
ΠΜΧ	Single-Use Plastic Products
ΠΟ	Environmental Conditions
ΠΠΠ	Environmental Monitoring Program
ΠΠΠΑ	Preliminary Determination of Environmental Requirements
ΠΠΧΣΑΑ	Regional Framework for Spatial Planning and Sustainable Development
ΠΣΕ	Draft Participation of Stakeholders

Abbreviation – Acronym	Explanation
ΠΣΜ	Plastic Carrier Bags
ΠΥΣ	Act of the Council of Ministers
ΠΧΠ	Regional Spatial Framework
ΣΑΑ	Recovery and Resilience Plan
ΣΑΥ-ΦΑΥ	**Health and Safety Plan and File**
ΣΒΑ	Sustainable Development Goals
ΣΔΑ	Waste Management Plan
ΣΔΚΠ	Flood Risk Management Plan
ΣΔΛΑΠ	River Basin Management Plans
ΣΔΟΚΠΔ	International Covenant on Economic, Social and Cultural Rights
ΣΕΔ	Alternative Management System
ΣΕΔΕ	Emissions Trading System
ΣΜΠΕ	Strategic Environmental Impact Assessment
ΣΠΔ	Environmental Management System
ΣΠΠ	Important Bird Areas
ΣΠΠΒΘΠΚΘ	Complex Area for the Protection of Marine Biodiversity in the Kavala-Thasos Region
ΣΣΕ	Stakeholder Participation Plan
ΣΣΕΔ	Collective Alternative Management System
ΤΕΕ	Technical Chamber of Greece
ΤΙΦΚ	Landscapes of Outstanding Natural Beauty
ΤΚΣ	Sites of Community Importance
ΤΟΠΣΔΑ	Local Waste Management Plan
ΤΣΔΑ	Local Waste Management Plan
ΤτΕ	Bank of Greece
ΤΧΣ	Local Spatial Plan
Υ/Σ	Substation
ΥΑ	Ministerial Decision
ΥΔ	Water District
ΥΠΕΝ	Ministry of Environment and Energy
ΥΤ	High Voltage
ΥΥΣ	Underground Water Systems
ΦΔΠΠ	Protected Areas Management Agency
ΦΕΚ	Government Gazette
ΦοΔΣΑ	Solid Waste Management Agency
ΦΠΑ	Value Added Tax
ΧΑΔΑ	Uncontrolled Waste Disposal Sites

Abbreviation – Acronym	Explanation
ΧΓΕ	Agricultural Land in Use
ΧΥΤΑ	Sanitary Landfill Sites
AH	Absolute Hazardous
ALARP	As-Low-As-Reasonably-Practicable
ANH	Absolute Non Hazardous
API	American Petroleum Institute
ATEX	Explosive Atmospheres
BioCCS	Bioenergy with Carbon Capture and Storage
BOD	Biochemically Required Oxygen
BOP	Blowout Preventer
BOP	Blowout Prevention Mechanism
BWM	Ballast Water Management
CCH	Critical Cetacean Habitat
CCR	Central Control Room
CCS	Carbon Capture Storage
CCU	Carbon Capture and Utilization
CLC	Corine Land Cover
CM	Cambisols
CO_2	Carbon Dioxide
COD	Chemically required oxygen
COPC	Contaminants of Primary Concern
DACCS	Direct capture and storage of CO2 directly from the atmosphere (Direct Air Capture with Carbon Storage)
DDP	Detailed Drilling Plan
DNV	Insurance organization Det Norske Veritas
EBSA	Ecologically or Biologically Significant Areas
EE	European Union
EMAS	Eco-Management and Audit Scheme
EOR	Enhanced oil recovery
ESDV	Emergency Shut Down Valves
ESP	Electric Submersible Pumps
EU ETS	EU Emissions Trading System
EUOAG	European Union Offshore Oil & Gas Authorities Group
FRA	Fisheries Restricted Areas
GET	Green Economy Transition
GHGs	Greenhouse Gases

Abbreviation – Acronym	Explanation
GIIP	International Industry Best Practice
GOP	Oil Field Best Practices
HP	Horsepower
ICZM	Integrated Coastal Zone Management
IEA	International Energy Agency
IEAGHG	IEA Greenhouse Gas
IFC	International Finance Corporation –
IMMA	Important Marine Mammal Areas
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IPPC	International Plant Protection Convention
ISPS Code	International Ship and Port Facility Security Code
ISRA	Important Shark and Rays Areas
KBA	Key Biodiversity Areas
LAeq	Equivalent Continuous Sound Pressure Level
LER	Local Equipment Room
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LULUCF	Land Use, Land-Use Change, and Forestry
MAP	Mediterranean Action Plan
MEA	Waste Treatment Unit
MH	Mirror Hazardous
MNH	Mirror Non Hazardous
MSAD	Minimum Safe Depth of Disposal
Mt	Million Tonnes
MTPA	Million Tonnes per Annum
NGL	Natural gas liquids
NORM	Naturally Occurring Radioactive Material
NRCC	Northern Rhodope Core Complex
NZIA	Net Zero Industry Act
OEUK	Offshore Energies UK
OHE	United Nations
OPC	Overpressurized Clay Formations
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCI	Project of Common Interest

Abbreviation – Acronym	Explanation
PCT	Polychlorinated Terphenyls
PFI	Private Finance Initiative
POP	Persistent Organic Pollutant
QRA	Quantitative Risk Assessment
RCP	Representative Concentration Pathways
RG	Regosols
ROP	Rate of Penetration
RSS	Rotary Steerable System
SACROC	Scurry Area Canyon Reef Operating Committee
SDS	Safety Data Sheets
SIMOPS	Simultaneous operations
SOP	Standard Operating Procedure
SPA	Specially Protected Areas
SQRA	Semi-quantitative risk assessment
SRCC	Southern Rhodope Core Complex
TDS	Top Drive System
TOP	Top of Pipe
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
VOCs	Volatile Organic Compounds
WDU	Water Softening Unit
WFD	Water Framework Directive
WMP	Weyburn–Midale CO2 Monitoring and Storage Project

1 INTRODUCTION

1.1 GENERAL INFORMATION

This **Technical Report**, together with its accompanying **Annexes**, constitutes the Environmental Study for the amendment of the relevant Environmental Terms Approval Decision (ETAD), which was issued on August 2025 [Decision of the Director General of Environmental Policy of the Ministry of Environment and Energy No. YPEN/DIPA/xxxxxxxxxxxx (ADA: xxxxxxxxxxx)] (hereinafter referred to as **the Amendment Study)** of the Project:

"Carbon dioxide (CO_2) storage facility in Prinos"

The design includes the installation of a full-scale carbon dioxide (CO_2) storage facility in Prinos. The planned $CO_{(2)}$storage site is located within the Prinos basin, in the Gulf of Kavala, in the northeastern Aegean Sea. The area of interest for $CO_{(2)}$storage is located within the Prinos Concession area, where Energean Oil & Gas SA ("Energean"), an affiliate of EnEarth, has held 100% of the interests and management for oil and gas exploration and production activities since 2007. The proposed $CO_{(2)}$storage site is located within the Prinos structure and the underlying aquifer.

This Environmental Study for the amendment of the relevant AEPO of the Project has been prepared in accordance with the applicable Greek legislative requirements, which reflect, where applicable, the European legislative frameworks and relevant international guidelines.

The proposed amendment to the licensed project, which is presented in this document, has been designed based on the requirements of the project's EIA (XXXXXXXXXX), as included in **the** relevant **PO 4.2** , which states the following:

"4.2. Conditions for the design of the facilities

4.2.1. *The final design of the project must consider the complete separation of offshore facilities with CO_2 from the facilities with hydrocarbon extraction wells in Prinos, in order to minimize any potential for unforeseen incidents due to the coexistence of these wells. For this reason, the offshore part of the project needs to be reviewed so that the CO_2 be developed on an independent offshore platform, if possible at a distance of 500 m or more from the existing platforms, and the route of the relevant CO_2 and power supply cables, taking into account the existing routes between the coastline and the existing platform complex, so as to minimize any additional footprint.*

4.2.2. *For the location of the new independent offshore platform, a suitable site should be selected based on geological characteristics for the implementation of the required drilling, soil characteristics of the seabed for the installation of the platform, as well as characteristics of the natural and man-made environment, in order to limit potential adverse effects.*

4.2.3. In this context, the project operator shall prepare and submit to the licensing authority an appropriate environmental study for the amendment of the AEPO of the project in question, documenting the appropriateness of the amendment to the project design based on the requirements of clause 4.2.1 and the criteria of term 4.2.2.

4.2.4. In addition, the above environmental study should include appropriate provisions so that:

4.2.4.1. The feasible mechanism for driving the piles between the pulsed (which is preferable) and the percussive methods, based on the soil conditions of the seabed, is selected.

4.2.4.2. Minimise work in the area of the offshore platform location and the associated environmental impacts by providing for its assembly in as few and as short steps as possible.

4.2.4.3. Ensure that the piles can be extracted from the seabed and removed during the decommissioning phase of the platform.

4.2.4.4. When designing the connections between the new platform and onshore facilities, appropriate provisions shall be made to ensure that:

4.2.4.4.1. Surface equipment and subsea pipelines have a strength suitable for the maximum closed-head pressure of the wells, in order to limit the possibility of corrosion when operating under normal conditions and the consequent possibility of loss of integrity and therefore leakage of $CO_{(2)}$ into the environment.

4.2.4.4.2. The new platform shall be connected to the existing Delta platform or to the project's onshore facilities via an underwater power cable in order to avoid the installation of an autonomous oil-fired generator.

4.2.4.4.3. The water produced by mining will be sent for treatment in appropriate systems, which will have a performance that meets the applicable discharge limits. Water from the surfaces of the platforms (cleaning and rainwater) will be discharged through appropriate treatment systems, in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL).

Based on the above, in accordance with the guidelines of the PO in question, the project design was modified to include the requirements of the AEPO, and this modification is the subject of this study.

The aim of the proposed amendment is to "***completely separate offshore facilities with CO_2injection wells from facilities with hydrocarbon extraction wells in Prinos.***" To achieve this, it is proposed that the equipment and facilities for the project's offshore activities be located on a new independent offshore platform (hereinafter referred to **as the 'OMEGA' platform)** at a distance of more than 500 m from the existing platforms. In addition, the relocation of the project's equipment and facilities will result in the following secondary modifications to the project design:

- Adaptation of the pipeline and cabling networks of the offshore part of the project, which are adapted to serve the new independent offshore platform. These modifications concern the $CO_{(2)}$transfer pipelines and the power supply cabling.

- Installation of a cable to transport the produced water (the water wells on the new platform will be equipped with electric submersible pumps (Electrical Submersible Pumps ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) from the new platform to the existing Delta platform, so that the produced water can be treated and disposed of in accordance with the project's EIA (PO *"1.4.7.2.4.3. The produced water will be treated at the existing Delta platform")*.
- Minor changes to the drilling method and technical characteristics of the drilling works, so that they are adapted to the geographical displacement and geological characteristics of the location of the new OMEGA platform.

1.2 IDENTITY OF THE LICENSED PROJECT

1.2.1 Type and Size of Project

The licensed project, following the addition of the proposed amendment, consists of a full-scale CO_2 storage facility in Prinos. The operation of the facility is planned to be developed in two distinct phases (Phase 1 and Phase 2) for reasons of scalability and adaptation to market conditions. The CO_2 storage formation is located within the Prinos Concession area, in the Prinos basin of the Gulf of Kavala, in the North Aegean Sea.

The facility will be developed in the following two distinct phases based on capacity (Phase 1 and Phase 2) for reasons of adaptation to demand conditions. The subject of the approved EIA and this MT AEPO concerns only Phase 1:

- **Phase 1** (subject of the approved EIA and this MT AEPO): The initial nominal capacity of the project will be up to **one (1) MTPA** for 20 years. The $CO_{(2)}$will mainly arrive via third-party pipelines, while some quantities will also be delivered by truck to the Sigma land facilities via pilot projects.
- **Phase 2** (not covered by the approved EIA and this MT AEPO and mentioned only for the sake of completeness): A gradual expansion of the Project to a final nominal capacity of approximately **three (3) MTPA** is planned. A new EIA must be submitted for the environmental licensing of Phase 2.

In summary, the proposed project description includes the interventions described below.

Installation of a new offshore platform (Omega platform)

A new offshore drilling platform will be installed at the new location and will remain as a permanent installation of the project. The platform can be installed either before drilling commences or after the four (4) wells have been completed. The new platform replaces the Beta platform as the primary CO_2 injection point from the pipeline. The new Omega offshore platform:

- It will consist of a metal jacket,
- Will have 15 wellhead connections,
- Will be founded on 4 piles at a depth of approximately 31 meters,

- Will be installed approximately 1 km south of the existing Delta platform complex.
- The platform will be unmanned and will have the minimum equipment required to receive CO_2 (from the pipeline) and inject it, as well as to transport the produced water to the existing facilities on the Delta platform.

It should be noted that the specific location of the new Omega platform (1 km south of the existing Delta platform complex) is an indicative location within a specific area, which is initially assessed as suitable for the location of the Omega platform (hereinafter referred to as **the Omega Platform Potential Location Area**), as it has no seabed undulations, it is a flat zone with no surface or underground obstacles, and the geological conditions are similar to those of the existing offshore installations. This area extends to a radius of 300 meters from the coordinates of the designated central point, which is the indicative location of the Omega platform (latitude (B) 40° 47.38327' and longitude (A) 24° 29.92146'). The final location of the Omega platform will be determined after investigating and evaluating the exact technical and soil characteristics to find the most appropriate technical solution, which is carried out as the first step in the construction methodology for each new platform.

It should be noted that the entire area in question is included in the study/influence area of the project under consideration in the present study, and any potential impacts from the location of the Omega platform (and the implementation of the corresponding drilling operations) have been assessed in the relevant sections of the present study. Consequently, the final definitive location of the new Omega platform will be specified in the context of the submission of the Final Design Compliance File to the competent environmental authority, as specified in paragraph 7 of Article 11 of Law 4014/2011. A prerequisite for this is the location of the Omega platform (and the implementation of the corresponding drilling operations) within a radius of 300 meters from the coordinates of the specified central point, which is the indicative location of the Omega platform, as described above, for which area the relevant potential E&P impacts have been assessed and evaluated in the context of this document.

Drilling

The implementation of 2 CO_2injection wells and 2 water production wells for the project's operational needs is provided for in the approved EIA for the project. This study includes changes to the drilling method and technical characteristics of the drilling operations, so that they are adapted to the geographical shift and geological characteristics of the location of the new Omega platform.

Consequently, all drilling will be carried out from the seabed at a new location without using other wells as starting points (Donors) from the existing platforms, as provided for in the initial project design that was environmentally licensed with the approved EIA for the project. The wells initially target the "B & C" formations of the reservoir and below for water production and $CO_{(2)}$injection,as the Prinos reservoir has been drilled numerous times and the pressures and geological formation are well known.

Rerouting of the CO_2pipeline

The CO_2 transport pipeline will be installed using a pipeline laying barge, in accordance with the methodology approved in the project's approved EIA. A large-diameter 12-16" pipeline will be installed for the maximum

capacity of Phase 1, which will also be sufficient for Phase 2 (1500#, material: CS, WT: 0.5", 3mm LPP coating, design pressure: 240 barg, design temperature: -46 °C).

The main difference in the present case is the extension of the pipeline by approximately **1.3–1.6 km from the centroid** (indicative location of the new platform, as described in **the** previous **section**) **or the less favorable location of the new platform**, respectively (at the farthest point of the Omega Platform Potential Location Area), so that it can be connected to the new Omega platform. The total length of the final $CO_{(2)}$transfer pipeline is **19-19.3 km.** In addition, with the proposed amendment, the route of the pipeline in question is maintained, with a minor modification so that instead of ending at the Beta platform, it bypasses it.

Pipeline for transporting the produced water

The water produced from the two water production wells (the water wells on the new platform will be equipped with electric submersible pumps (Electrical Submersible Pumps ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) from the new platform will be transported via an underwater pipeline to the existing Delta platform, so that the produced water can be treated and disposed of in accordance with the project's EIA (PO *"1.4.7.2.4.3. The treatment of the produced water will take place at the existing Delta platform")*. The total length of the subsea pipeline for transporting the produced water for the indicative centric location of the new platform is approximately 1 **km (0.96 km),** while for the most unfavorable case of platform location at the furthest point of the Omega Platform Potential Location Area, the length will be 1**.3 km.**

Power supply cables

The operation of the Omega platform (and the related project equipment) requires a power supply, which will be covered by the existing submarine network that supplies the existing platforms of the Prinos complex. Therefore, an undersea power cable needs to be installed to connect the new Omega platform to the existing Delta platform. The total length of the power cable from the indicative centric location of the new platform is approximately 1 **km (0.96 km),** while in the worst-case scenario of locating the platform at the furthest point of the Omega Platform Potential Location Area, the length will be 1**.3 km.**

The licensed project, following the addition of the proposed amendment , includes the following:

- Onshore facilities: Intervention in a specific area within the existing Sigma plant site for the construction of the receiving manifold and an unloading and compression area. As has been repeatedly noted, the proposed amendment does not include any intervention in the onshore facilities of the licensed project, which remain unchanged, as described in the approved EIA of the project and licensed by the relevant AEPO.
- Offshore platform: Installation of a new offshore platform (**Omega** platform) to receive CO_2 from the new subsea pipeline and CO_2 cargoes in containers, and injection into the new wells. The new platform replaces the planned (according to the approved EIA for the project) installation of the project's offshore facilities on the existing Beta platform of the Prinos offshore complex.

- Wells: Construction of two CO_2injection wells and two water production wells on the new Omega offshore platform. The construction of these wells is provided for in the approved EIA for the project. This includes minor changes to the drilling method and technical characteristics of the drilling work, so that they are adapted to the geographical shift and geological characteristics of the location of the new Omega platform.
- Offshore CO_2transfer pipeline: The licensed project includes an underwater pipeline connecting the Sigma plant area to the offshore Beta platform, approximately 20 km long. Following the proposed amendment, the route of this pipeline is retained (with a minor modification so that instead of terminating at the Beta platform, it bypasses it) and is extended by approximately 1.3 km to connect to the new Omega platform. The total length of the final CO(2)transport pipeline ( ) is **19 km.**
- Water transfer pipeline: The water produced from the two water production wells (the water wells on the new platform will be equipped with electrical submersible pumps (ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) will be transported from the new Omega platform to the existing Delta platform, so that the produced water can be treated and disposed of in accordance with the project's EIA (PO *"1.4.7.2.4.3. The treatment of the produced water will take place at the existing Delta platform"*). The total length of the produced water transfer pipeline is approximately **1 km**.
- Power supply cables: The operation of the Omega platform (and the related project equipment) requires a power supply, which will be covered by the existing submarine network that supplies the existing platforms of the Prinos complex. Therefore, an underwater power supply cable approximately 1 **km** long will need to be installed to connect the new Omega platform to the existing

1.2.2 Geographical Location and Administrative Affiliation of the Project

1.2.2.1 Project Location

The licensed CO_2storage site is located within the Prinos basin, in the Gulf of Kavala, in the North Aegean Sea.

The deposits in this area have been explored since the 1970s, followed by oil production from three deposits within the Prinos Concession and natural gas production from the South Kavala Concession since the 1980s.

The environmentally licensed onshore facilities of the CO_2storage project are located within the Energean Sigma facilities, on the outskirts of the municipality of Kavala, approximately 2.4 km east of the village of Nea Karvali. The existing environmentally licensed offshore facilities of the Prinos complex, as well as the corresponding facilities proposed in the context of this amendment, are located in the Gulf of Kavala, west of Thasos and south of the Kavala coastline.

The following **figure** presents the details of the Project in a satellite image.

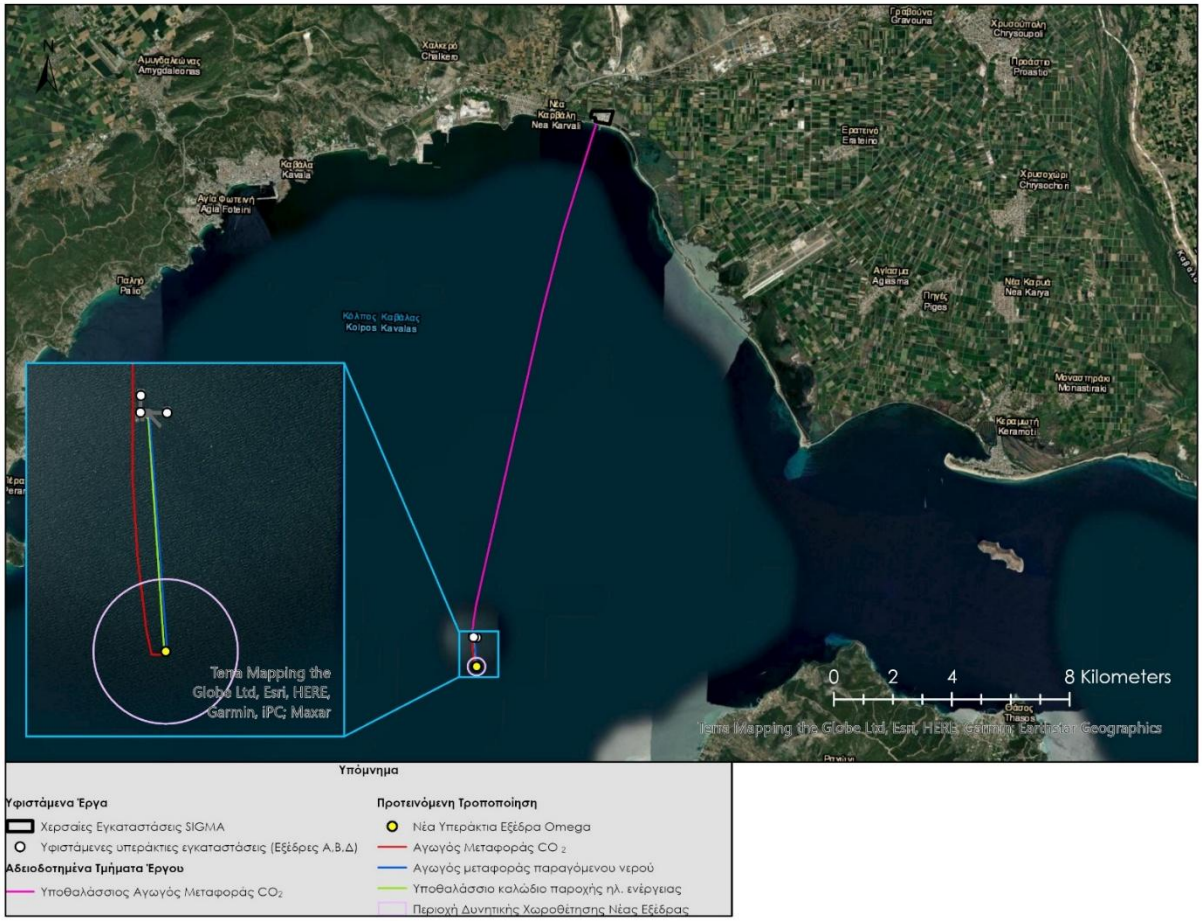


Figure 1 –1 : Satellite Image of the Project

1.2.2.2 Administrative Classification of the Project

The environmentally licensed onshore facilities of the CO_2 are located within the Energean Sigma facilities and administratively belong to the Municipality of Kavala in the Regional Unit of Kavala, Region of Eastern Macedonia and Thrace, on the border with the Municipality of Nestos (in accordance with Law 3852/2010 (A' 87) of the "Kallikratis" Program), as shown in **the** following **Figure.**

The existing environmentally licensed offshore facilities of the Prinos complex, as well as the corresponding facilities proposed in the context of this amendment, are located in the Gulf of Kavala.

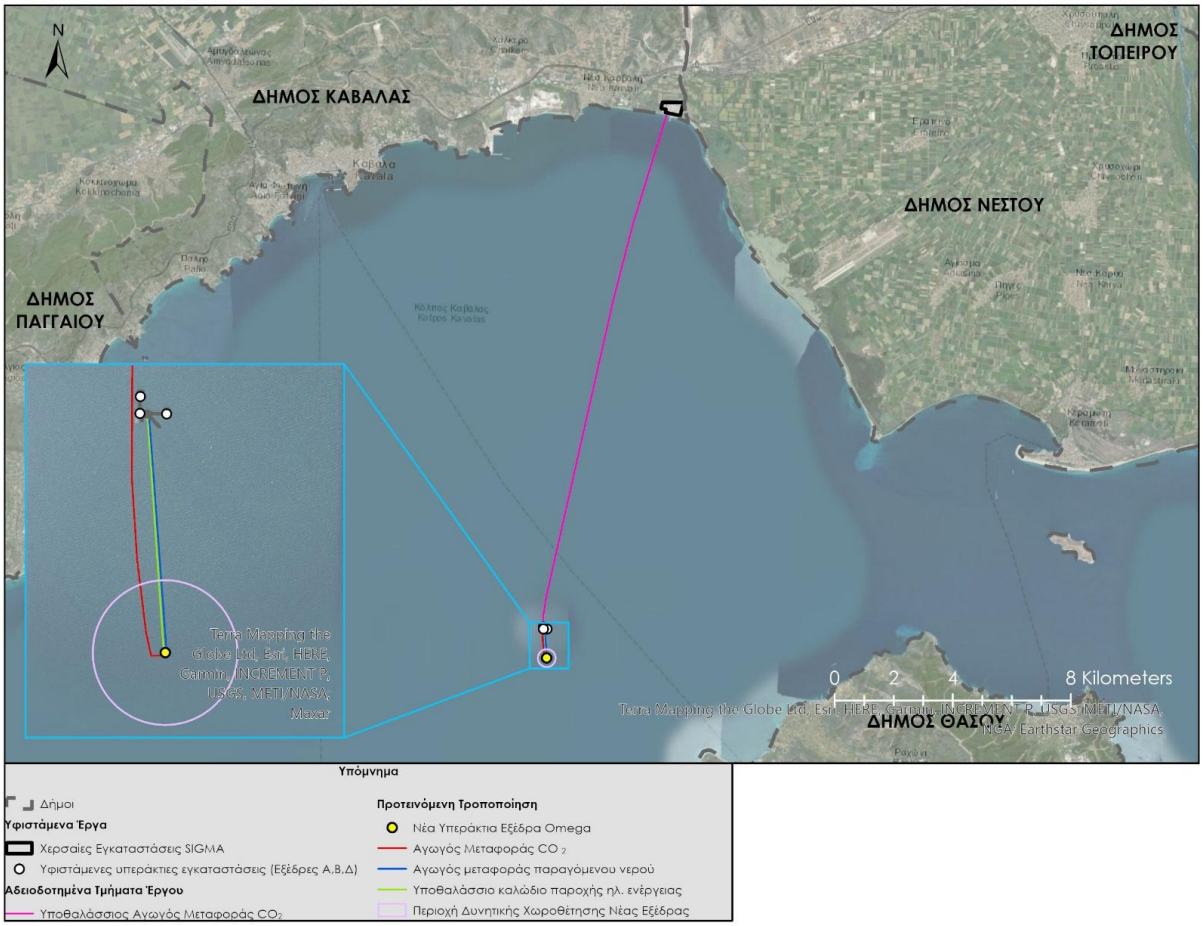


Figure 1 –2 : Administrative affiliation of the Project

1.2.3 Geographical coordinates of the project

The coordinates of the facilities existing of the CO_2storage complex in Prinos, the licensed infrastructure of the project, and the proposed interventions within the framework of this amendment are presented in the following tables.

It should be noted that for the land facilities of the Project, the coordinates were extracted centrally from the site, for the platforms from the central point of each platform, and for the linear elements of the project (pipelines and cables) from the beginning, middle, and end of these.

Table 1 –1 : Coordinates of the CO_2storage complex in UTM Zone 35N and WGS 84

UTM Zone 35N		WGS 84	
X	Y	Lat (oN)	Lon (oE)
279453	4512372	40.732752	24.388267
277020	4509345	40.704857	24.360561
271165	4513610	40.741631	24.289770
270546	451636	40.766258	24.281436

UTM Zone 35N		WGS 84	
275694	4518510	40.786972	24.341597
278502	4520077	40.801835	24.374287
282475	4522958	40.828824	24.420334
284177	452427	40.841099	24.440044
285451	4525453	40.852062	24.454734
286197	4526041	40.857549	24.463374
287328	4525784	40.85553	24.476868
288558	4525629	40.854453	24.4915
290269	4525124	40.850348	24.51195
293368	4522358	40.82624	24.549599
293598	4518334	40.790081	24.553655
292650	4515169	40.761356	24.543479
290556	4513167	40.742807	24.519363
288786	4511682	40.72899	24.49892
287305	4509419	40.708241	24.482166
286657	4507571	40.691442	24.475131
286593	4506115	40.678322	24.474869
281658	4507241	40.687164	24.41614
279506	4507795	40.691577	24.390504
281466	4511071	40.721581	24.412536
279453	4512372	40.732752	24.388267

Table 1 –2 : CO_2 storage site coordinates (Storage Complex) in UTM Zone 35N and WGS 84

UTM Zone 35N		WGS 84	
X	Y	Lat (oN)	Lon (oE)
282179	4521234	40.813231	24.417429
282460	4520425	40.806025	24.42104
289570	4514682	40.756191	24.507186
290106	4515480	40.76351	24.513262
291607	4517969	40.786293	24.5302
291708	4519568	40.80071	24.530863
289462	4522144	40.823321	24.503392
286651	4522616	40.826843	24.469928
284123	4521177	40.813232	24.440476

Table 1 –3 : Coordinates of existing offshore platforms of the Project in WGS84 UTM Zone 35N, WGS 84, and EGSA 87

	UTM Zone 35N		WGS 84		EGSA 87	
	X	Y	Lat (φ)	Lon (λ)	X	Y
Delta Platform	288869.28	4519413.33	40° 47′ 54.94′′N	24° 29′ 50.26′′E	541801.85	4516232.65

Table 1 –4 : Coordinates of the location of the new Omega platform in WGS84 UTM Zone 35N, WGS 84, and EGSA 87

	UTM Zone 35N		WGS 84		EGSA 87	
	X	Y	Lat (φ)	Lon (λ)	X	Y
Omega platform	288958	4518424	40.789717	24.498691	541924	4515247

Table 1 –5 : Coordinates of the Project's new submarine pipeline in WGS84 UTM Zone 35N, WGS 84, and ETRS87

	UTM Zone 35N		WGS 84		EGSA 87	
	X	Y	Lat (φ)	Lon (λ)	X	Y
Start *	288823	4519612	40.80036545	24.49667549	541897	4516715
Average	288840	4519010	40.79495621	24.49708748	541935	4516115
End **	288946	4518419	40.78966522	24.49853706	542061	4515528

*The starting point is taken as the point where the pipeline enters the licensed onshore CO_2storage facilities.

** The end point is taken as the point where the pipeline connects to the new Omega platform.

Table 1 –6 : Coordinates of the subsea pipeline for transporting the produced water in WGS84 UTM Zone 35N, WGS 84, and EGSA 87

	UTM Zone 35N		WGS 84		EGSA 87	
	X	Y	Lat (φ)	Lon (λ)	X	Y
Start *	288964	4518450	40.78990936	24.49874115	542,077.875	4515555.5
Average	28892	45189	40,794	24.4981575	542,025.9375	4516031
End **	288892	451940	40.79848862	24.49757385	541974	4516507

*The starting point is taken to be the entry point of the pipeline into the proposed new Omega platform.

** The end point is taken as the connection point of the pipeline to the existing Delta platform.

Table 1 –7 : Coordinates of the submarine power cable in WGS84 UTM Zone 35N, WGS 84, and EGSA 87

	UTM Zone 35N		WGS 84		EGSA 87	
	X	Y	Lat (φ)	Lon (λ)	X	Y
Start *	288952	4518450	40.78990555	24.49860191	542,066.1875	451555
Average	288919	451892	40.7942009	24.49805069	542017	4516031.5
End **	288886	4519400	40.79849625	24.49750137	541967.8125	4516508

*The starting point is taken as the cable entry point on the proposed new Omega platform.

** The end point is taken as the point where the cable connects to the existing Delta platform.

Table 1 –8 : Criteria for the final depth of the new boreholes, target coordinates, and surface locations

Drilling type	Name	Target			Surface location		
		UTM Zone 35N	WGS 84	EGSA 87	UTM Zone 35N	WGS 84	EGSA 87
CO_2injection	PO C-1	X: 287531 y: 4519696 Z: -2780	Lon: 24.48134903 Lat: 40.8007919	X: 540455 y: 4516469	X:288959 y:4518425	Lon: 24.49869105 Lat: 40.78972111	X: 541924.5 y: 4515248
CO_2injection	PO C-2	X: 288070 y: 4520006 Z: -2620	Lon: 24.48762732 Lat: 40.80372111	X: 540982 y: 4516797	X:288959 y:4518425	Lon: 24.49869105 Lat: 40.78972111	X: 541924.5 y: 4515248
Water production	PO W-1	X: 289901 y: 4517635 Z: -2772	Lon: 24.51011152 Lat: 40.78285248	X: 542892.5 y: 4514491	X:288959 y:4518425	Lon: 24.49869105 Lat: 40.78972111	X: 541924.5 y: 4515248
Water production	PO W-2	X: 290290 y: 4517087 Z -2967	Lon: 24.51490137 Lat: 40.77801978	X: 543300 y: 4513957	X:288959 y:4518425	Lon: 24.49869105 Lat: 40.78972111	X: 541924.5 y: 4515248

Table 1 –9 : Coordinates of the Project's licensed land facilities centered on WGS84 UTM Zone 35N, WGS 84, and EGSA 87

	UTM Zone 35N		WGS 84		EGSA 87	
	X	Y	Lat (φ)	Lon (λ)	X	Y
Proposed Land Facilities	293090.229	4536912.162	40,957159 (° N)	24,541461 (° E)	545418.79	4533856.91

1.2.4 Brief History of the Project

Energean Oil & Gas - Aegean Energy Hydrocarbon Exploration and Production Company (hereinafter "Energean"), an affiliate of EnEarth, holds, among other things, the rights to explore and exploit hydrocarbons in the offshore area of the Prinos oil fields pursuant to the agreement dated 23.11.1999 with the Greek State, as ratified by Law 2779/1999 (Government Gazette A 296/30.12.1999) and as currently in force.

Following the initial agreement and its ratification, a number of legal acts were carried out in order to reflect a number of changes from the original agreement. These acts are presented in **the table** below.

Table 1 –10 : Legal acts governing the concession contract

Legal act	Reference number	Subject
Law 2779/1999	Government Gazette 296/30.12.1999	Ratification of the Agreement of 23.11.1999 between the Greek State and Kavala Oil S.A. and Annexes I and II for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4135/2013	Government Gazette 69/19.3.2013	Ratification of the first amendment agreement dated 31.10.2012 between the Greek State and the contractors Kavala Oil S.A. and Energean Oil & Gas SA for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4296/2014	Government Gazette 214/2.10.2014	Ratification of the second amendment agreement dated 30.12.2013 between the Greek State and the contractors Kavala Oil S.A., Energean Oil & Gas SA, and HELLENIC PETROLEUM for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4296/2014	Government Gazette 214 / 2.10.2014	Ratification of the third amendment agreement dated 11.09.2014 between the Greek State and the contractors Kavala Oil S.A. and Energean Oil & Gas SA for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4409/2016	Government Gazette 136 / 28.07.2016	Ratification of the fourth amendment agreement dated 22 November 2015 between the Greek State and the contractors Kavala Oil S.A. and Energean Oil & Gas SA for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4585/2018	Government Gazette 216 / 24.12.2018	Ratification of the fifth amendment agreement dated 20.11.2018 between the Greek State and the contractors Energean Oil & Gas SA and Kavala Oil A.E. for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4952/2022	Government Gazette 130 / 07.07.2022	Ratification of the sixth amendment agreement dated 19.06.2024 between the Greek State and the contractor Energean Oil & Gas SA for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 5115/2024	Government Gazette 98 / 01.07.2024	Ratification of the seventh amendment agreement dated 15.03.2024 between the Greek State and the contractor Energean Oil & Gas SA for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).

In the context of the long-standing execution of Petroleum Operations (exploration and exploitation) within the Prinos Exploitation Area (as defined in the Agreement of 23 November 1999 of Law 2779/1999, as

amended and in force), Energean has collected geological, geophysical, and drilling data for the Prinos geological basin and, in particular, for the Prinos and Epsilon structures, which demonstrate that these structures are, in principle, eligible as CO_2 .

Therefore, as part of its activities in the region, Energean proceeded with the design and licensing of a **CO_2 Storage Unit in Prinos,** making use of Article 173 of Law 4964/2022. More specifically, according to Law 4964/2022 (Government Gazette A 150/30.07.2022) entitled *"Provisions for the simplification of environmental licensing, establishment of a framework for the development of Offshore Wind Farms, tackling the energy crisis, protecting the environment and other provisions",* and more specifically on the basis of Article 173 thereof, the entities to which the Greek State (pursuant to Law 2289/1995 (A' 27)) has granted the right or license to explore and exploit hydrocarbons in a specific area, and which have sufficient data (in particular geological, geophysical, and drilling data) to document the eligibility in principle as a carbon dioxide (CO_2), geological formation or formations located in the subsoil of the concession area (onshore or offshore), shall acquire (under the conditions of that article) **the right to continue and complete the investigation of the specific area in order to determine its suitability for CO(2) storage**.

Based on the above, Energean requested EDEYEP on 31.08.2022 to activate the right to continue and complete the investigation of the structures of the Prinos, Epsilon fields and the underlying aquifer (the "Area") in order to determine their suitability as CO(2)storage sites.This request was accepted by the **Decision to Activate the Right to Investigate CO_2 Storage** (as approved by Decision No. 14577/29.09.2022 of EDEYEP (Government Gazette 5247/B/11.10.2022)), which approved the eligibility in principle of the storage site, which is located within the boundaries of the Prinos concession and includes the structures of the Prinos, Epsilon fields and the underlying aquifer, as well as approving the continuation and completion of the investigation of the Area as a storage site for a period of twenty-two (22) months, starting on October 1, 2022, by Energean.

In accordance with paragraph 5 of Article 173 of Law 4964/2022, after the completion of the suitability investigation and before the expiry of the right to complete the investigation, the interested party shall submit an application to EDEYEP in order to determine the suitability of the geological formation as a CO(2)storage site and to activate the party's storage right. An interested party is defined as either the holder of the right to continue and complete the investigation (in this case, Energean) or an affiliated company whose sole purpose is CO(2)storage (in this case, EnEarth).With the progress and completion of the procedures for investigating the Area as a CO_2storage site,EnEarth, as an affiliate of Energean, submitted an application on 30.06.2024 to determine the suitability of the geological formation as a CO_2 and to activate the operator's storage right in accordance with paragraph 5 of Article 173 of Law 4964/2022.

EnEarth then prepared and submitted the relevant Environmental Impact Assessment (EIA) for the project to the competent licensing authority (DIPA) (Ref. No. 130047/9051/27.11.2024), which was registered under Ref. No. 130047/9051/27.11.2024 and PET 2408001614. This EIA was approved by the DIPA in accordance with the Environmental Terms Approval Decision

According to Ministerial Decision ΔΙΠΑ/37674/10-8-2016, as amended by Ministerial Decisions 2307/2018 and ΥΠΕΝ/ΔΙΠΑ/ 17185/1069/2022 (Government Gazette 841/B` 24.2.2022) and in force, the Project belongs to Category 11 "Transport of energy, fuels and chemicals", No. 6 "Infrastructure for the

transport and storage of carbon dioxide streams in geological formations, pursuant to Directive 2009/31/EC:

- Transport pipelines, including associated pressure boosting stations,
- Storage sites
- Sequestration facilities for storage in geological formations"

and is classified in **Subcategory A1**.

Subcategory A1 includes projects that may have significant effects on the environment, and therefore:

- A detailed Environmental Impact Assessment (EIA) is required in accordance with the specifications set out in Annex 2 of Joint Ministerial Decision 170225/2014.
- The competent authority for issuing the permit is the Ministry of Environment and Energy (YPE), and specifically the Environmental Licensing Directorate (DIPA) in accordance with Law 4014/2011.
- The licensing procedure for a subcategory A1 project is defined in Article 3 of Law 4014/2011.
- The consultation principles during the EIA process are defined in Joint Ministerial Decision 1649/45/2014 "*Specification of the procedures for issuing opinions and informing the public and the participation of the interested public in public consultation during the environmental licensing of projects and activities of Category A of the decision of the Ministry of Environment, Energy and Climate Change No. 1958/2012 (Government Gazette 21/A), in accordance with the provisions of Article 19(9) of Law 4014/2011 (Government Gazette 209/A), as well as any other relevant details*."
- The EIA will include forms T and Y, which define the identity of the activity to be environmentally licensed, as well as information on the environmental licensing activity in accordance with Ministerial Decision 167563 (Government Gazette 964/B/19-04-2013) "*Specification of procedures and specific criteria for the environmental licensing of projects and activities under Articles 3, 4, 5, 6, and 7 of Law 4014/2011, as defined in Article 2, paragraph 13, the specific forms for the above-mentioned procedures, as well as any other matter related to these procedures*."

The environmental licensing procedure for the Project is determined by Law 4014/2011, as amended by Law 4685/2020 "Modernization of environmental legislation, transposition into Greek law of Directives 2018/844 and 2019/692 of the European Parliament and of the Council, and other provisions" (Government Gazette 92/A/7.5.2020). The content and level of detail of the Environmental Impact Study are specified in Joint Ministerial Decision (JMD) 170225/2014.

1.3 PROJECT PROMOTER

The Project Promoter (Administrator) is **EnEarth Greece Monoprosopi S.A.** (Address: 32 Kifissias Avenue, Postal Code 151 25, Marousi, Telephone: 2108174200)**.** EnEarth is a Greek public limited company whose main purpose is to develop CO_2 storage activities in Greece and, in particular, to develop the Project. EnEarth belongs to the Energean group of companies and is an affiliate of Energean Oil & Gas S.A., which

manages the Prinos, North Prinos, and Epsilon deposits in the Gulf of Kavala, which are the only sources of hydrocarbon production in the country.

The people responsible for the EIA on behalf of the Project Promoter are:

Vasilis Tsetsoglou	HSE Director of ENERGEAN Group
Vasilis Zenios	Head of Facilities Projects - Egypt, Italy, Greece, Croatia, UK
Eleni Halasti	Junior Process Engineer
Paschalia Kiomourtzi	Subsurface Lead, Greece
Efstathios Skarvelas	Well Delivery Manager
Kostas Angelidis	Head of Technical Inspection & Energy Projects
Kostas Dimotzikis	Technical Services Superintendent
Yannis Karagiannis	Environmental Engineer
Katerina Athitsou	Legal Counsel
Theodora Charalambidi	Legal Counsel

The Energean Group, based in London, is active in hydrocarbon exploration and production and focuses on the sustainable development of the Mediterranean's natural resources, with an emphasis on natural gas. It is committed to net zero emissions by 2050 and seeks to implement the 17 UN Sustainable Development Goals through its daily operations and a wide range of corporate social responsibility actions.

Energean (LSE: ENOG, TASE: אנאג) is an independent hydrocarbon exploration and production company based in London, focused on the sustainable development of the Mediterranean's natural resources, with a focus on natural gas.

The company is committed to achieving net zero greenhouse gas emissions by 2050 and seeks to implement the 17 UN Sustainable Development Goals through its daily operations and a wide range of corporate social responsibility activities.

With an excellent track record in Health, Safety and the Environment in hydrocarbon production, development and exploration, and with top ESG ratings, Energean has 1.115 billion barrels of proven (2P) oil equivalent reserves, of which 83% are gas.

The group's production comes from Israel, Egypt, Italy, Greece, Croatia, and the United Kingdom. In 2023, production reached an average of 123 thousand barrels of oil equivalent (kboe) per day , while in the first quarter of 2024, a further increase to 142 kboe per day was recorded, with 82% of this being natural gas. On June 20, 2024, the company announced a strategic agreement to sell its assets in Egypt, Italy, and Croatia to Carlyle for between $820 million and $945 million, more than triple the acquisition cost four years ago.

In Greece, Energean manages the Prinos, North Prinos, and Epsilon fields in the Gulf of Kavala, which are the country's only source of hydrocarbon production. Given the market conditions, Energean has implemented a restructuring and modernization program for Prinos, with the aim of gradually reducing its

dependence on oil price fluctuations and further reducing its environmental footprint through carbon dioxide storage (CO_2).

As part of its long-standing oil (exploration and exploitation) within the Prinos Exploitation Area (as defined in the Agreement of 23.11.1999 of Law 2779/1999, as amended and in force), Energean has collected geological, geophysical, and drilling data on the Prinos geological basin and, in particular, on the Prinos and Epsilon structures, which demonstrate that these structures are, in principle, suitable as CO_2 . Consequently, as part of its activities in the area, Energean proceeded with the design and licensing of a CO_2 Storage Unit in Prinos, making use of Article 173 of Law 4964/2022. More specifically, according to Law 4964/2022 (Government Gazette A 150/30.07.2022) entitled "Provisions for the simplification of environmental licensing, establishment of a framework for the development of Offshore Wind Farms, tackling the energy crisis, protecting the environment and other provisions", and more specifically on the basis of Article 173 thereof, the entities to which the Greek State has granted (pursuant to Law 2289/1995 (A' 27)) the right or license to explore and exploit hydrocarbons in a specific area, and which have sufficient data (in particular geological, geophysical, and drilling data) to document the eligibility in principle as a carbon dioxide (CO_2), geological formation or formations located in the subsoil of the concession area (onshore or offshore), shall acquire (under the conditions of that article) the right to continue and complete the investigation of that area in order to determine its suitability for CO_2 storage.

Based on the above, Energean requested EDEYEP on 31.08.2022 to activate the right to continue and complete the investigation of the structures of the Prinos, Epsilon fields and the underlying aquifer (the "Area") in order to determine their suitability as CO_2storage sites.This request was accepted by the Decision to Activate the Right to Investigate CO_2Storage (as approved by EDEYEP Decision No. 14577/29.09.2022 (Government Gazette 5247/B/11.10.2022)), which approved the eligibility in principle of the storage site, which is located within the boundaries of the Prinos concession and includes the structures of the Prinos, Epsilon fields and the underlying aquifer, as well as the continuation and completion of the investigation of the Area as a storage site for a period of twenty-two (22) months, starting on October 1, 2022, by Energean.

In accordance with paragraph 5 of Article 173 of Law 4964/2022, after the completion of the suitability investigation and before the expiry of the right to complete the investigation, the interested party shall submit an application to EDEYEP in order to determine the suitability of the geological formation as a CO_2storage site and to activate the party's storage right. The interested party is either the holder of the right to continue and complete the investigation (in this case, Energean) or an affiliated company whose sole purpose is CO_2storage (in this case, EnEarth).

With the progress and completion of the procedures for investigating the Area as a CO_2storage site, EnEarth, as an affiliate of Energean, submitted an application on 30.06.2024 to determine the suitability of the geological formation as a CO_2 and to activate the operator's storage right in accordance with paragraph 5 of Article 173 of Law 4964/2022. Energean, as the operator with the right to continue and complete the investigation, has co-signed the above application.

Furthermore, in accordance with paragraph 5(e) of Article 173 of Law 4964/2022, facilities used by the operator for the purpose of hydrocarbon exploration and exploitation may be used for CO_2storage activities.EnEarth and Energean have included in the above application a detailed description of the facilities (existing and new) to be used for CO_2storage activities.

Following the issuance of the decision confirming the suitability of the geological formation as a CO_2 storage site and the activation of EnEarth's storage right in accordance with paragraph 5 of Article 173 of Law 4964/2022, Energean will transfer to EnEarth those facilities (onshore and offshore) from among its existing facilities that are necessary for the development of CO(2)storage activities. At the same time, Energean will provide technical support to EnEarth through its human resources.

1.4 ENVIRONMENTAL CONSULTANT

This Study was prepared by **LDK Consultants S.A. – Environment and Water Department.**

The company's contact details are presented in **the table** below.

Table 1 –11 : Details of consulting companies

Company	LDK Consultants S.A.
Address	21 Thivaidos Street, Postal Code 145 64, Kifissia
Telephone:	+30 210 8196700
Email	env@ldk.gr
Web:	www.ldk.gr
Contact person:	Kostis Nikolopoulos, Head of Environment and Water Department, LDK

The interdisciplinary team that participated in the preparation of this Environmental Study for the Amendment of the Project's AEPO, as well as the supporting studies (MEOA, SDA, etc.), is presented in **the table** below.

Table 1 –12 : The Study Team LDK

Name	Specialty
General project coordination	
Kostis Nikolopoulos	MSc Environmental Engineer, Project Manager / Environmental Licensing of Infrastructure Projects
Environmental Study Team for the Modification of the Project's AEPO – MEOA and accompanying studies	
Diamantis Saliaris	MSc Biologist / Study Coordinator, natural environment, impact assessment, environmental management
Eleni Avramidi	MSc Environmental Engineer, Marine Biology Researcher / MEEA Coordinator, Natural and Marine Environment, Environmental Management of Protected Objects
Mina Paidousi	MSc Chemical Engineer / natural biotic and abiotic environment, impact assessment, environmental management
Katerina Boutzikou	MSc Chemical Engineer / Waste Management
Chagios Fotis	MSc Civil Engineer / Water, project vulnerability, climate change
Elena Ioannaki	MSc Environmental Engineer / MEEA, natural environment, impact assessment
Konstantina Kousta	MSc Mining Engineer, abiotic environment, environmental management

Name	Specialty
Petros Vitalis	MSc Environmentalist – GIS, environmental management
Melina Mikelis	MA International Comparative Law/Sociology/Socio-economic Impacts
Chrysanthi Synodinou	MSc Economist
Jakob Fric	Physicist / MEOA – birdlife – chiroptera
Panagiotis Mendrinos	PhD Biologist / MEOA – marine environment – marine mammals
Kimon Koemtzopoulos	MSc Biologist / MEOA – marine environment – marine mammals

2 DESCRIPTION OF LICENSED PROJECT

2.1 GENERAL INFORMATION

The licensed Project is a full-scale CO_2storage facility in Prinos. The operation of the facility is planned to be developed in two distinct phases (Phase 1 and Phase 2) for reasons of scalability and adaptation to market conditions.

- ***Phase 1*** is expected to have an initial nominal capacity of up to 1 MTPA for 20 years (starting at the end of 2025 and beginning in early 2026). $CO_{(2)}$ will be supplied mainly in bulk, via a pipeline reaching the boundaries of the onshore facility under suitable conditions for injection. Small quantities of $CO_{(2)}$ will also be delivered to the Sigma onshore facilities by truck through $CO_{(2)}$ capture pilot projects.
- During ***Phase 2***, an expansion to the final nominal capacity of up to 3 MTPA is planned. The facility will be modified to accept liquefied CO_2, which will be delivered by sea to a newly built pier.

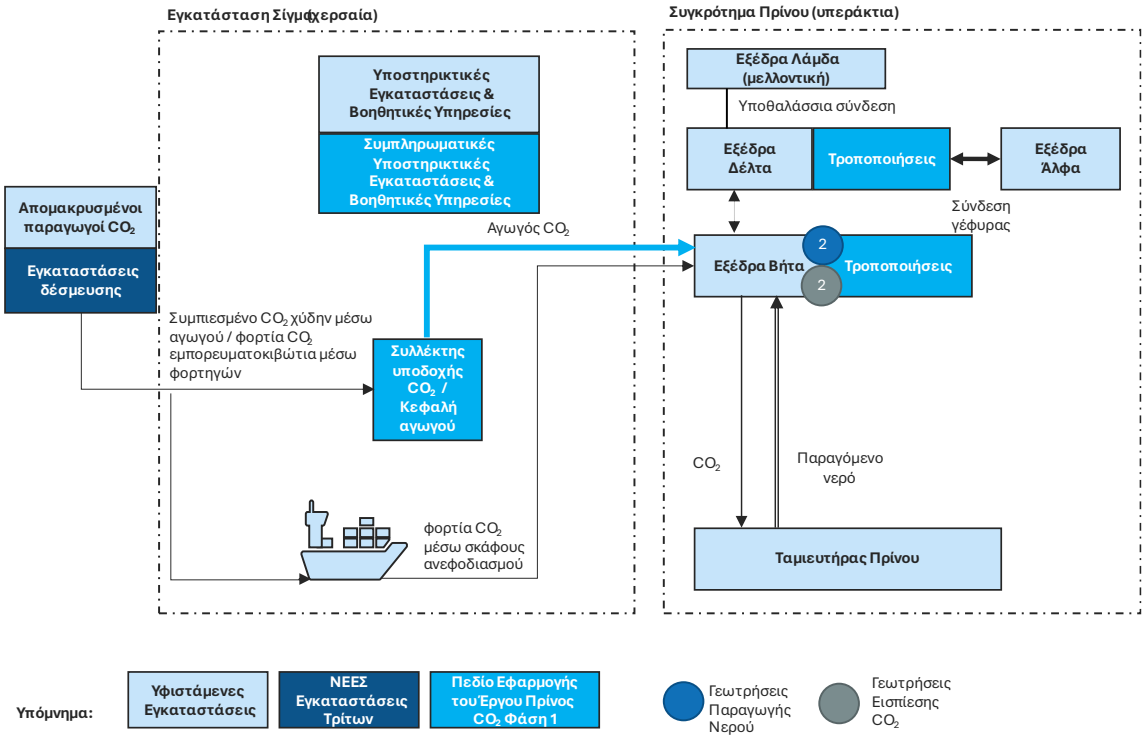
The licensed project concerns **Phase 1 of the facility**. The CO_2sources and main host processes during Phase 1 operation will be as follows:

- **Bulk CO_2 supply via pipeline**: An onshore station within the Sigma facility, consisting of the manifold of the onshore CO_2 pipeline, will receive up to 1 MTPA of compressed CO_2 . The $_{CO_2}$ stream will then be transported via a new dedicated pipeline to an existing offshore platform, where the $_{CO_2}$will be injected through special injection wells.

The CO_2stream will come from remote producers and is expected to be supplied at pressure and temperature conditions suitable for injection into the wells . The $CO_{(2)}$ receiving collector will route the $CO_{(2)}$ stream to the Prinos offshore facility complex via a 12-16" pipeline, 20 km long. The $CO_{(2)}$pipeline will initially have a capacity of up to 1 MTPA of compressed $CO_{(2)}$,but has been designed to be sufficient for the future planned capacity of the Project (3 MTPA $CO_{(2)}$). The vertical riser connecting the platforms for the $CO_{(2)}$pipeline will have emergency shut-off valves (ESDV) for isolation. In addition, to prevent low temperatures in the pipeline and the formation of hydrates/salts in the area near the well, an electric start-up heater and a methanol injection system will be installed.

- **CO_2cargo reception**: Cargo will be delivered by truck to the Sigma land facilities and delivered in ISO containers. The containers will be loaded onto supply vessels or barges using cranes, transported and unloaded at the existing Beta platform of the Prinos offshore facilities via a flexible hose system (manifold). This unloading process involves connecting the ship and supplying $CO_{(2)}$ to the platform's pipelines, where, with the appropriate treatment, the $CO_{(2)}$ stream will be brought to the appropriate conditions for injection into the well. The appropriate conditions for injection (pressure 101 barg, temperature 20°C) will be achieved on the platform in accordance with the preliminary design study (pre-FEED) . The main processing equipment, including a pump station/compressors, will be located on the open deck of the Beta platform. In addition, the ship may have integrated pumps/compressors to increase the pressure of the $CO_{(2)}$stream,facilitating flow through the flexible hose from the ship to the platform. It should be noted that there will also be provision for the direct

injection of CO(2) loads into the onshore manifold via a compression station during unloading from trucks.



2 –1 : Schematic diagram of the licensed project (Phase 1 of the CO_2 storage project in Prinos)

The new facilities and boreholes planned for the operation of the CO_2storage project include:

- Onshore facilities: modification of a certain area within the existing site at the Sigma plant for the construction of the receiving collector and an unloading and compression area.
- Offshore pipeline: an underwater pipeline connecting the Sigma plant area to the Beta offshore platform, approximately 20 km long.
- Offshore platform: modification of the existing offshore facilities at Prinos to receive CO_2 from the new subsea pipeline and CO_2 loads in containers, and injection into the new wells.
- Wells: 2 CO_2injection wells and 2 water production wells on the existing Beta platform of the Prinos offshore complex.

2.2 DETAILED DESCRIPTION OF LICENSED PROJECT

2.2.1 Existing Energean Facilities Related to Project Operations

2.2.1.1 Sigma Facilities (Onshore)

Description of Sigma Activity

The Sigma onshore industrial unit (see **Figure** below) includes facilities for the desalting and stabilisation of crude oil produced (at the offshore facilities), the separation of sweet gas from the sour gas produced (at the offshore facilities), the production of liquid sulfur, as well as the necessary facilities for the safe storage and handling of the crude oil, natural gas, and sulfur produced. The Sigma unit also has the necessary auxiliary facilities (e.g., steam production and distribution, air compression and dehumidification, nitrogen storage, deionized water production, flare) as well as facilities for the collection, temporary storage, and treatment of waste produced at each stage of the production process and of the staff's domestic wastewater.

2 –2 : View of the Sigma factory from south to north

According to Joint Ministerial Decision 1958/2012, as amended by Ministerial Decision ΔΙΠΑ/οικ. 37674/10-8-2016 and Ministerial Decision οικ. 2307/14-02-2018, the Sigma land-based industrial unit belongs to **Group 9hGroup**: Industrial activities and related facilities and is classified overall in **Subcategory** A1 . According to the table classifying industrial activities by degree of nuisance in Joint Ministerial Decision

No. 3137/191/F.15/2012, as currently in force (Government Gazette 1048/B/2012), the project involves activities of high and medium nuisance.

In addition, the Sigma land-based industrial unit is classified as a higher-tier facility in accordance with Joint Ministerial Decision 172058/2016 complying with Directive 2012/18/EU (Seveso III), as it includes land-based storage facilities for stabilized crude oil and liquid fuel gas.

Finally, the Sigma onshore industrial plant includes the following activities according to NACE Rev.2 / STAKOD 2008:

- 20.13 Manufacture of basic inorganic chemicals by chemical transformation
- 20.13 Manufacture of inorganic chemicals by simple mixing or hydration of components
- 52.10 Land-based storage facilities for petroleum, liquid fuels, and chemical products
- 52.10 Storage of gaseous fuels
- 52.24 Cargo handling

The plant has been in operation since July 1981, with a short interruption in 1998–1999 and 2021–2023. Every three years, operations are suspended for approximately 15 days as part of the planned preventive maintenance of the facilities. The plant is supplied with crude oil and sour gas (raw materials for the production process) produced by offshore production facilities via subsea pipelines in accordance with the relevant AEPO No. 8413/24-04-2018.

The project operator, within the framework of AEPO No. 213450/05-12-2013 (ADA: ΒΛΓΨ0-ΒΦ7) of the project and the company's Health, Safety & Environment policy, has established an Environmental Unit within the facilities with an Environmental Engineer in charge. Environment policy, has established an Environmental Unit within the facilities with a Responsible Environmental Engineer. A Waste Management Plan (WMP), a Ship Waste Management & Ship Waste Reception Plan, Emergency Pollution Response Plan, and Health and Safety Plan and File (HSP-HSPF). The project operator complies with the specifications and requirements of Joint Ministerial Decision 172058/2016 (Directive 2012/18/EU-Seveso III), as well as the specifications of the International Ship and Port Facility Security Code (ISPS Code) of the International Maritime Organization (IMO).

The Sigma facilities cover an area of **204,059 m²** and the total floor space of the buildings is **3,874 m² .**

A total of 184 people are employed on a permanent basis (daily and shift work) at the Sigma land-based industrial unit. The technical staff consists of production operators, electricians, equipment technicians, welders, lifting equipment operators, and mechanical equipment maintenance technicians.

The main characteristics of the Sigma plant are presented in **the** following **table**.

Table 2 –1 : Key characteristics of the Sigma onshore industrial unit

TYPE OF ACTIVITY:	• Processing - stabilization - storage - handling of crude oil • Acid gas processing • Production - storage - distribution of liquid natural gas (NGL) • Production - transportation of sulfur in solid or liquid form • Electricity generation

	• Production of drilling mud
PRODUCTION CAPACITY:	• Crude oil: 27,000 (bbl/d) • Fuel gas mixture with a volume content of 67.78% methane and 32.2% other components: 333,000 (Nm^3/d) • Sulfur: 478 (MT/d) • Electricity: 17.67 (MW) • Liquefied natural gas - NGL (264 m^3/d) • Drilling mud: 135 m^3

The Sigma industrial unit, as environmentally licensed under No. 213450/05-12-2013 AEPO, includes the following processing and production lines, as shown diagrammatically in **the** following **Figure**:

- **Line 1**: Crude Oil Processing/Stabilization (Stabilized crude oil production capacity: 27,000 bbls/d).
- **Line 2**: Processing of sour gas produced from offshore facilities (desulfurized gas production capacity 333,000 Nm^3/d).
- **Line 3**: Production of sulfur in liquid or solid form (production capacity 478 MT/d):
- **Line 4**: Production of electricity for own consumption using a combination of 2 gas turbines and 1 steam turbine (production capacity 17.67 MWe).
- **Line 5**: Production of liquid fuel gas - NGL (Production capacity 264 m^3/d).

The raw materials that feed the plant's production process are crude oil and sour gas produced at Energean's offshore facilities and transported to the Sigma onshore facilities via the offshore project's subsea pipelines. According to the most recent data (2023) and its aforementioned licensed capacity, the final products per processing and production line of the Sigma plant are presented in **the** following **table**.

2 –2 : Products produced in 2023 by the existing Sigma facilities (2023 production data)

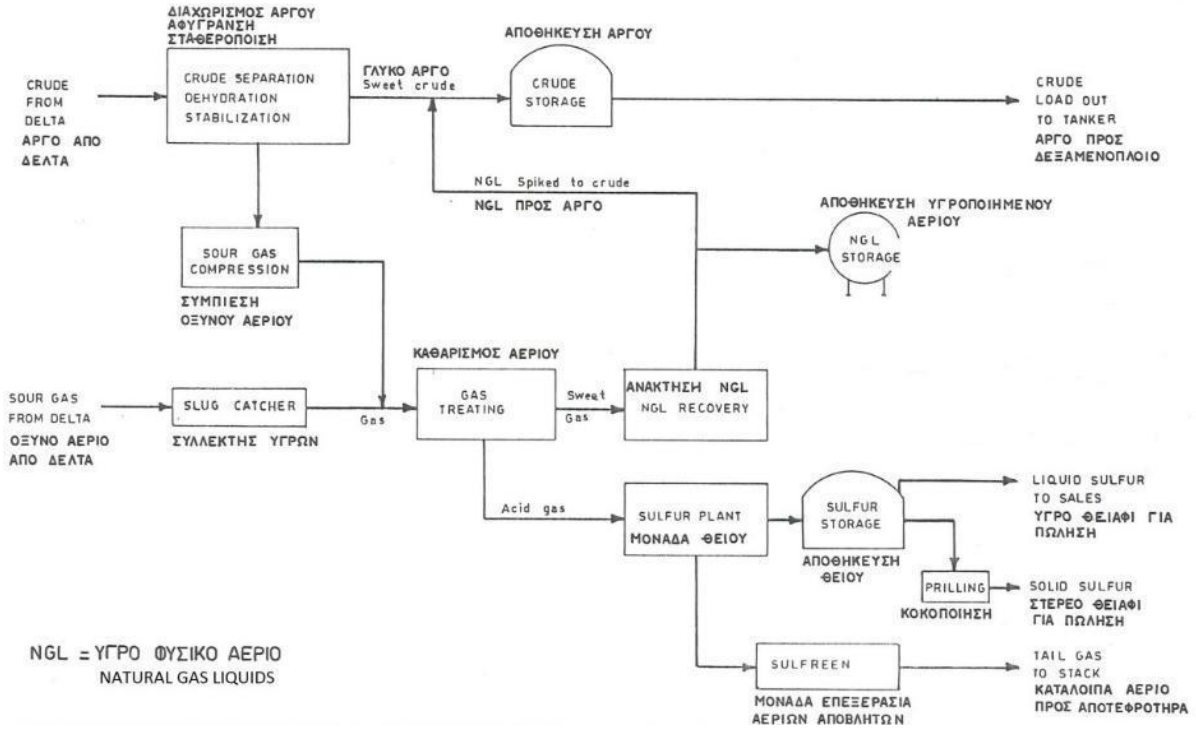
Production line	Product	Production quantity
Line 1	Stabilized crude oil	51,598 Mt
Line 2	Fuel gas mixture with a volume content of 67.78% methane and 32.2% other components)	2,120,472 Nm^3
Line 3	Sulfur (liquid)	4,601 Mt
Line 4	Electricity	0 GWh
Line 5	Liquefied natural gas (NGL)	1,102 m^3

For safety reasons (as well as economic viability), the liquid natural gas (NGL) produced is not stored but is mixed in its entirety with the stabilized crude oil. In addition, the section of Line 3 that deals with solid sulfur production is not operational.

The natural gas produced (i.e., the gas remaining after the treatment of sour gas) is used as fuel for the operational needs of onshore and offshore facilities. Approximately 200,000 $Nm^{(3)}$ /day of natural gas is recirculated from the onshore to the offshore facilities, injected into the well pipes to support crude oil

extraction at the offshore facilities, and returned to the onshore facilities mixed with the produced sour gas. In the future, with the planned expansion of offshore extraction facilities as licensed by AEPO No. 8413/24-04-2018, the natural gas produced by the unit will supply the natural gas network of DEPA SA.

The crude oil produced is sold to BP Oil International in accordance with the relevant contract between the operator and that company. The liquid sulfur produced is transported to ELFE SA Fertilizer and Chemicals Industry in accordance with the relevant contract.



2 –3 : Flow chart of the Sigma Factory production process

The main and supporting facilities of the industrial unit, as licensed by No. 213450/05-12-2013 AEPO, include:

- **Main facilities:**
  - Crude oil processing and stabilization unit with a capacity of 27,000 bbl/d.
  - Acid gas processing unit with a capacity of 333,000 Nm^3/d.
  - Liquid sulfur production units with a capacity of 478 MT/d.
  - Solid sulfur production unit with a capacity of 10 t/h, which is currently not in operation.
  - Liquefied natural gas (NGL) recovery unit with a capacity of 264 m^3/d.
  - Three above-ground floating roof crude oil storage tanks with a total capacity of 59,622 m^3 and a backup spherical tank with a capacity of 1,590 m^3 used for the temporary storage of crude oil that does not meet handling specifications.
  - Spherical storage tank for liquid natural gas (NGL) with a capacity of 556 m^3
  - Three tanks (1 above ground and 2 underground) for storing liquid sulfur, with a total capacity of 3,008 m^3 .

- Tanks and containers for storing chemicals.
- Open storage tanks for drilling cuttings and oil sludge, with a total capacity of approximately 3,700 m^3 .
- Outdoor asphalt-paved storage area for solid sulfur with a surface area of 4 acres.
- A combined heat and power plant with a nominal electrical capacity of 17.67 MWe and steam boilers with a thermal capacity of 49.04 MW.
- High Voltage (HV) 150 kV substation within the site for connecting the project facilities to the Hellenic Electricity Distribution Network (HEDNO) grid, which is extended with an additional transformer gate.

- **Supporting facilities:**
  - Pressure relief network – Torch.
  - Water softening unit with a capacity of 30 m^3 /h.
  - Acid water treatment unit with a capacity of 43.2 m^3 /h.
  - Spherical acid water storage tank with a capacity of 858 m^3.
  - System of 4 parallel oil separators (gravity and agglomeration type), each with a treatment capacity of 68.1 m^3/h.
  - Drilling mud preparation system with a capacity of 135 m^3 to support the company's offshore facilities.
  - Ballast storage tank - oil-contaminated water 11,924 m^3 .
  - Closed cooling water network with seawater heat exchangers.
  - A pier with a total length of 240 m and an area of 1,024 m^2 south of the site, which is used for loading and unloading materials for offshore mining facilities.
  - Offshore crude oil loading station with anchorage in open sea area 24 m deep, 3 km from the coast, for loading crude oil onto tankers via a 24" subsea pipeline 3 km long.
  - 16" submarine pipeline for transporting ballast from tankers from the offshore crude oil loading station to the TK-661 oil-water collection and storage tank, with a length of 3 km and an operating pressure of 6 - 8 barg.
  - 8" subsea pipeline for transporting dehydrated sour crude oil from the Delta platform to the onshore crude oil loading facilities, with a length of 18 km and an operating pressure of 25-30 barg.
  - Secondary treatment plant for urban wastewater with a capacity of 11 m^3 /d within the site, with the treated liquids being discharged into a neighboring canal/ditch and ultimately into the sea.
  - External 6" underground pipeline connecting to the DEPA natural gas network with a total length of 7.5 km and a pressure of 30-40 bar.
  - Internal road, water supply, sewerage, storm water drainage, and electricity networks, parking area.

The facilities are equipped with the necessary systems and equipment for the prevention and management of accident risks in accordance with current legislation, such as safety basins for crude oil storage tanks, corrosion protection systems, pressure relief network – flare, fire, hydrogen sulfide, and explosive gas detection systems, emergency shutdown systems, fire safety network, storage areas for personal protective

equipment, rescue and first aid equipment, escape gates and entrance guardhouse, monitoring and data collection networks. The following **diagram** shows the existing facilities at the Sigma factory.

2 –4 : Satellite view of existing project facilities (Bingmaps background, 2019)

THE FOLLOWING **FIGURE** SHOWS THE LOADING AND UNLOADING ANCHORAGE AND THE SUBSEA CRUDE OIL PIPELINES

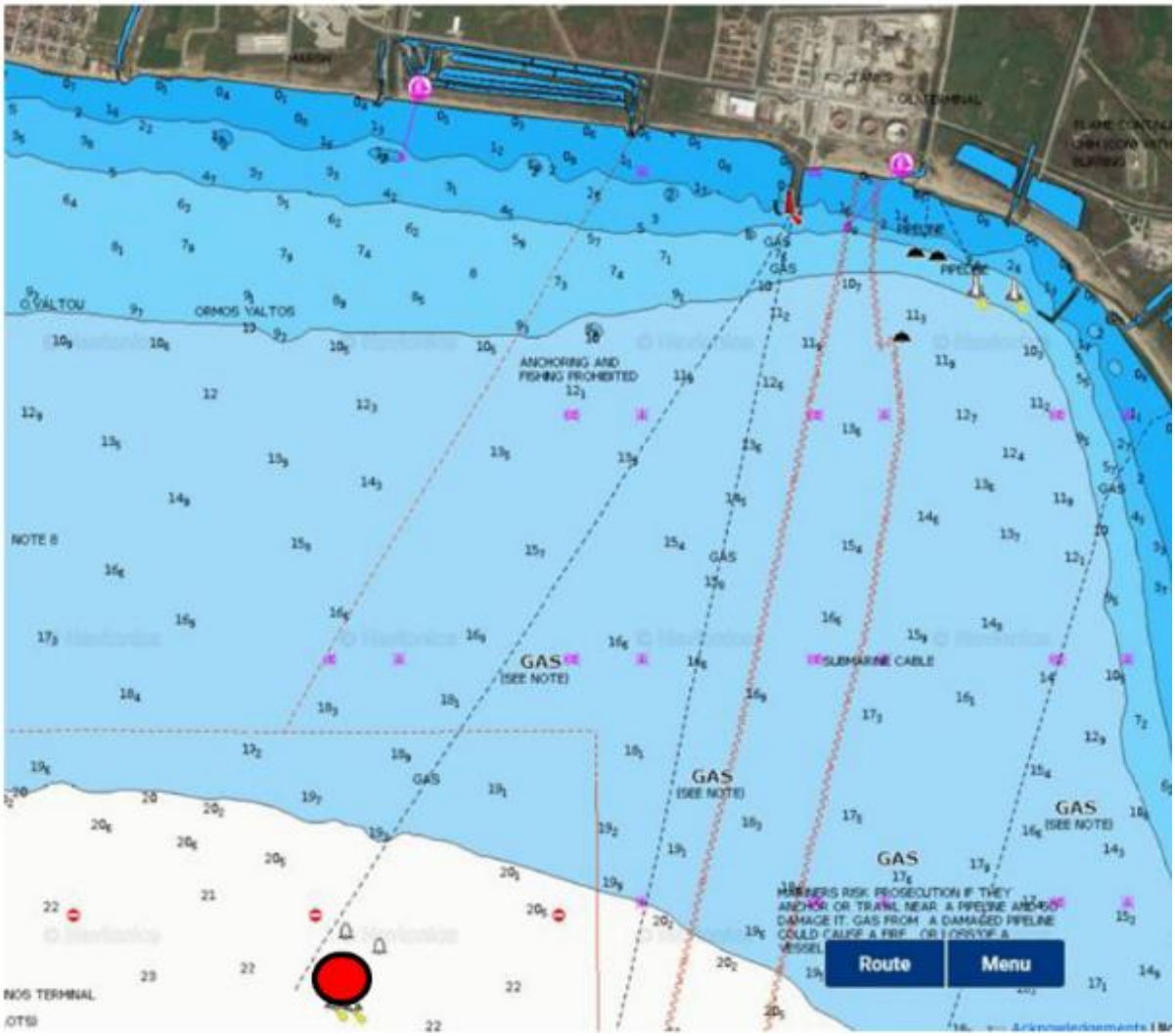


Figure 2–5: Θέση υφιστάμενου αγκυροβολίου φορτοεκφόρτωσης αργού πετρελαίου σε δεξαμενόπλοια (σημειώνεται με κόκκινο) και των υποθαλάσσιων αγωγών 24" και 16" του έργου (υπόβαθρο Navionics, 2020, Copernicus, 2020)

Figure2 –6 : Location of the existing crude oil loading and unloading anchorage for tankers (marked in red) and the project's 24" and 16" subsea pipelines (Navionics background, 2020, Copernicus, 2020)

2.2.1.2 Prinos facilities (offshore)

According to the current ΑΕΡΟ DIPA/8413/24.04.2018 (ADA: ΨΓΛ14653Π8-Ζ79), the Prinos Offshore Development project concerns the existing offshore oil and gas extraction facilities located in the Gulf of Kavala, in the northeastern Aegean Sea, and its expansion with two new platforms, one of which is long-term. The total production capacity is 27,000 barrels/day of stabilized crude oil.

2 –7 : Prinos offshore facilities

The key elements of the Prinos Offshore Development project are summarized as follows:

- Existing offshore project, consisting of the following individual facilities (which remain essentially unchanged during the project, with only minor modifications to the Prinos Delta platform to connect planned and potential future platforms):
  - The **Kappa** platform, located in the sweet natural gas field, not derived from an oil field, in South Kavala.
  - A 12 km, 6" pipeline (8-12 barg operating pressure) that transports sweet natural gas and condensate from South Kavala (Kappa platform) to the Delta platform in Prinos.
  - The **Alpha** and **Beta** production platforms, each with twelve drilling heads, which are part of the Prinos complex, are connected by bridges to the Delta platform and are designed to accommodate drilling rigs.
  - **Delta** processing platform containing all offshore initial processing facilities, which to date receives oil, natural gas, water, and condensate produced from the Prinos, North Prinos, Epsilon, and South Kavala fields. The Delta platform is connected by bridges to the Alpha and Beta platforms as well as to its flare. New vertical connection pipes (risers) are added to the Delta platform to enable the reception of fluids produced by the Lambda platform (and possibly the Omicron platform) and to send natural gas (gas lift) and water for injection to the Lambda

platform. A vertical protective pipe is also being added for the installation of the multi-carrier cable that will carry power, data, communications, and auxiliary fluids to the Lambda platform.

- Prinos platform complex **flare**.
- 18 km, 12" pipeline (8 barg operating pressure) for the transport of sour natural gas from the Delta platform to the onshore facilities.
- 18 km, 8" pipeline (20-40 barg operating pressure) for transporting crude oil from the Delta platform to the onshore facilities.
- 18 km, 5.3" pipeline for transporting sweet natural gas (gas lift) from the onshore facilities to the Delta platform.
- Two submarine power cables, each with a capacity of 10 kVA, from the onshore facilities to the Prinos platform complex.

- Immediate expansion project, which includes the installation of a new Lamda satellite platform (currently under construction) and the drilling of 5 to 9 new production wells from this facility. The key elements of the planned expansion project are summarized as follows:
  - New **Lamda** platform **(currently under construction)** approximately 3.5 km northwest of the existing Prinos platforms. Five to nine wells will be installed on the Lamda platform to produce from the Epsilon reservoir. The platform is designed to be unmanned. All fluids produced are transported to the Delta platform in Prinos, where the existing equipment and processes are used to perform the initial separation of oil, produced water, and natural gas.
  - Three subsea pipelines (currently under construction) connect the Lambda platform to the Delta platform. These include a 10" pipeline for transporting all fluids produced from the Lambda platform to the Delta platform and two 6" pipelines pipelines for transporting injection water to the reservoir and natural gas for gas lift, respectively, from the Delta platform in Prinos to Lamda.
  - Five to nine wells will be drilled from the Lambda platform to the Epsilon reservoir, which will initially be completed as producers, and then two to four of them will be converted for water injection. The final number of wells will be determined after confirmation of recoverable reserves. The new platform is equipped with 15 well slots. The initial wells will be drilled using a suitable partner drill rig, after which the Energean Force drill rig will be installed on the platform and its barge will be moored at eight anchor points.
- Future expansion project for the further development of the North Prinos and Kazaviti fields with the installation of a second new drilling platform, similar to Lambda, which will be called Omicron and will be located between the North Prinos and Prinos fields. Kazaviti will be drilled with the third sidetrack from the Alpha platform in Prinos, in order to substantiate the decision on its development viability.

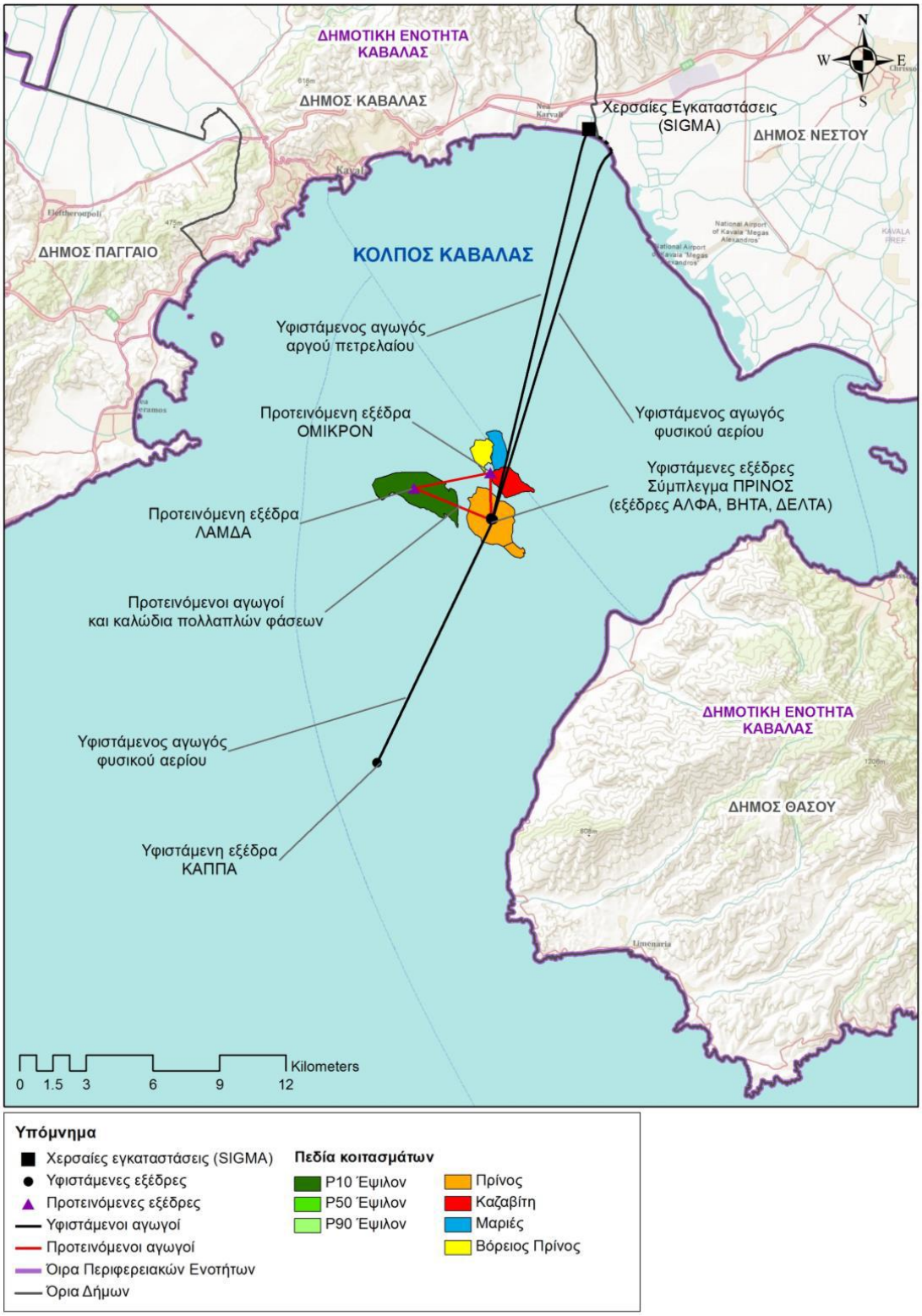


Figure2 –8 : Location of Prinos offshore facilities (existing, planned, and potential future)

The coordinates of the central points of the platforms of the Prinos Offshore Development project in WGS 84 are presented in **the** following **Table**.

Table2 –3 : Coordinates of the central points of the Prinos platforms

Platform	Coordinates (Lat, Lon)	
Delta	24°29′ 50.40′ ′ E	40°47′ 54.92′ ′ N
Alpha	24°29′ 49.62′ ′ E	40°47′ 57.62′ ′ N
Beta	24°29'54.41"E	40°47′ 55.36′ ′ N
Kappa	24°26'34.95"E	40°42'03.74"N
Lambda	24°27'12.97"E	40°48'33.55"N
Omicron	24°29′ 45.17′ ′ E	40°47′ 06.71′ ′ N

2 –9 : Alpha platform

2 –10 : Beta platform

2 –11 : Delta Platform

Water treatment at the Delta platform

Special reference is then made to the water treatment carried out at the Delta platform, as these facilities will also be used to treat water from the new water wells of the licensed CO_2storage project at the Beta platform.

The water produced by separators V-101 A/B and V-107 is transferred to oil separator M-111. This is a horizontal tank (1,850 mm in diameter and 7,625 mm long) that performs the following functions:

- Separation and removal of small amounts of gas and hydrogen sulfide produced as the water expands from the high pressure of the separators to the atmospheric pressure of the oil separator.
- Separation of oil droplets from water by gravity and with the aid of special plastic coalescing nets.
- Collection of oil and removal to the M-166 oil collector.
- Removal of water and transfer to the second oil separator M-111 B in series.

The part of the oil separator where agglomeration takes place provides a large contact surface where oil droplets join together, rise to the surface, and form an oily layer. The oil is collected and transferred to the M-166 oil collector and then to the V-133 oily water and oil collection tank.

When a sufficient amount of liquid has been collected, the automatic level monitoring system activates one or both of the P-133 A/B pumps, which return the liquids from the V-133 to the inlet of the V-101 A/B separators.

The water from the part of the oil separator where agglomeration takes place is transferred to the settling zone at the rear of the tank, where any oil droplets are separated by gravity, and then transferred to the V-111 hydrogen sulfide stripper.

Although the first oil separator M-111 usually achieves complete oil retention, a second oil separator M-111 B (2,700 mm in diameter and 6,650 mm in length) operating at zero pressure, is of similar design but with significantly greater capacity. The second oil separator ensures the quality of the discharge water in the event of malfunction of the upstream equipment. In normal operation, no oil is removed from this tank.

The capacity of the two oil separators in series is 164 m³/hour (³,936 m³/day). The two oil separators can also operate in parallel with a total capacity of 238 m³/hour (5,712 m³/day).

The V-111 hydrogen sulfide stripper is a 30 m high tower with 35 discs operating at almost zero pressure and a temperature of 77°C. In this tower, the remaining hydrogen sulfide is removed from the produced water.

The removal of hydrogen sulfide is achieved through the flow of sweet natural gas. The addition of hydrochloric and citric acid at the inlet of the stripper contributes to the removal of hydrogen sulfide and prevents the formation of salts inside it.

The stripper is designed for a maximum water production of 100 m³/hour (2,400 m³/day). If 100 m³/hour is exceeded (which has not been observed), the excess is directed to the M-164 tubular oil separator after passing through the M-111 and M-111 B oil separators.

The high capacity and good oil separation performance at the Delta platform (M-111, M-111 B) means that the water after the oil separators – which then enters the skimmer V-111 – contains minimal hydrogen sulfide residue, which in turn can be removed in the tubular oil separator (skim pile) M-164 and the subsea sedimentation tank TK-164, where the treated water ends up. This allows the skimmer V-111 to be avoided when the water flow is low.

The produced water treatment system is designed to reduce the oil concentration in the water to 10 ppm. Regular sampling is carried out to ensure this water quality. The actual concentration in the water discharged into the sea is slightly below this level due to the residence time in the tubular oil separator and the subsea settling tank. In addition, oil droplets coalesce and the separated oil in the settling tank is pumped back to the platform.

2 –12 : M-111 ejector

2 –13 : Stripper M-111B

2 –14 : Stripper V-111

2 –15 : M-164 degreaser

2.2.2 New Facilities

2.2.2.1 Storage Location

2.2.2.1.1 Activation of CO_2 Storage Rights

Energean holds, among other things, the rights to explore and exploit hydrocarbons in the offshore area of the Prinos oil field pursuant to the agreement dated 23.11.1999 with the Greek State, as ratified by Law 2779/1999 (Government Gazette A 296/30.12.1999) and as currently in force. Consequently, as part of its activities in the area, Energean proceeded with the design and licensing of a CO_2 Storage Unit in Prinos, making use of Article 173 of Law 4964/2022. More specifically, according to Law 4964/2022 (Government Gazette A 150/30.07.2022) entitled "Provisions for the simplification of environmental licensing, establishment of a framework for the development of Offshore Wind Farms, tackling the energy crisis, protecting the environment and other provisions", and more specifically on the basis of Article 173 thereof, the entities to which the Greek State has granted (pursuant to Law 2289/1995 (A' 27)) the right or license to explore and exploit hydrocarbons in a specific area, and which have sufficient data (in particular geological, geophysical, and drilling data) to document the eligibility in principle as a carbon dioxide (CO_2), geological formation or formations located in the subsoil of the concession area (onshore or offshore), shall acquire (under the conditions of that article) the right to continue and complete the investigation of the specific area in order to determine its suitability for CO_2 storage.

Based on the above, Energean requested EDEYEP on 31.08.2022 to activate the right to continue and complete the investigation of the structures of the Prinos, Epsilon fields and the underlying aquifer (the "Area") in order to determine their suitability as CO_2storage sites.This request was accepted by the Decision to Activate the Right to Investigate CO_2 Storage (as approved by EDEYEP Decision No. 14577/29.09.2022 (Government Gazette 5247/B/11.10.2022)), which approved the eligibility in principle of the storage site, which is located within the boundaries of the Prinos concession and includes the structures of the Prinos, Epsilon fields and the underlying aquifer, as well as approving the continuation and completion of the investigation of the Area as a storage site for a period of twenty-two (22) months, starting on October 1, 2022, by Energean.

The Area is defined by the coordinates presented in **the** following **Table** (WGS84 UTM Zone 35N geographic system).

Table2 –4 : Coordinates of CO_2storage site $_{in}$Prinos

X	Y
282179	4521234
282460	4520425
289570	4514682
290106	4515480
291607	4517969
291708	4519568
289462	4522144
286651	4522616
284123	4521177

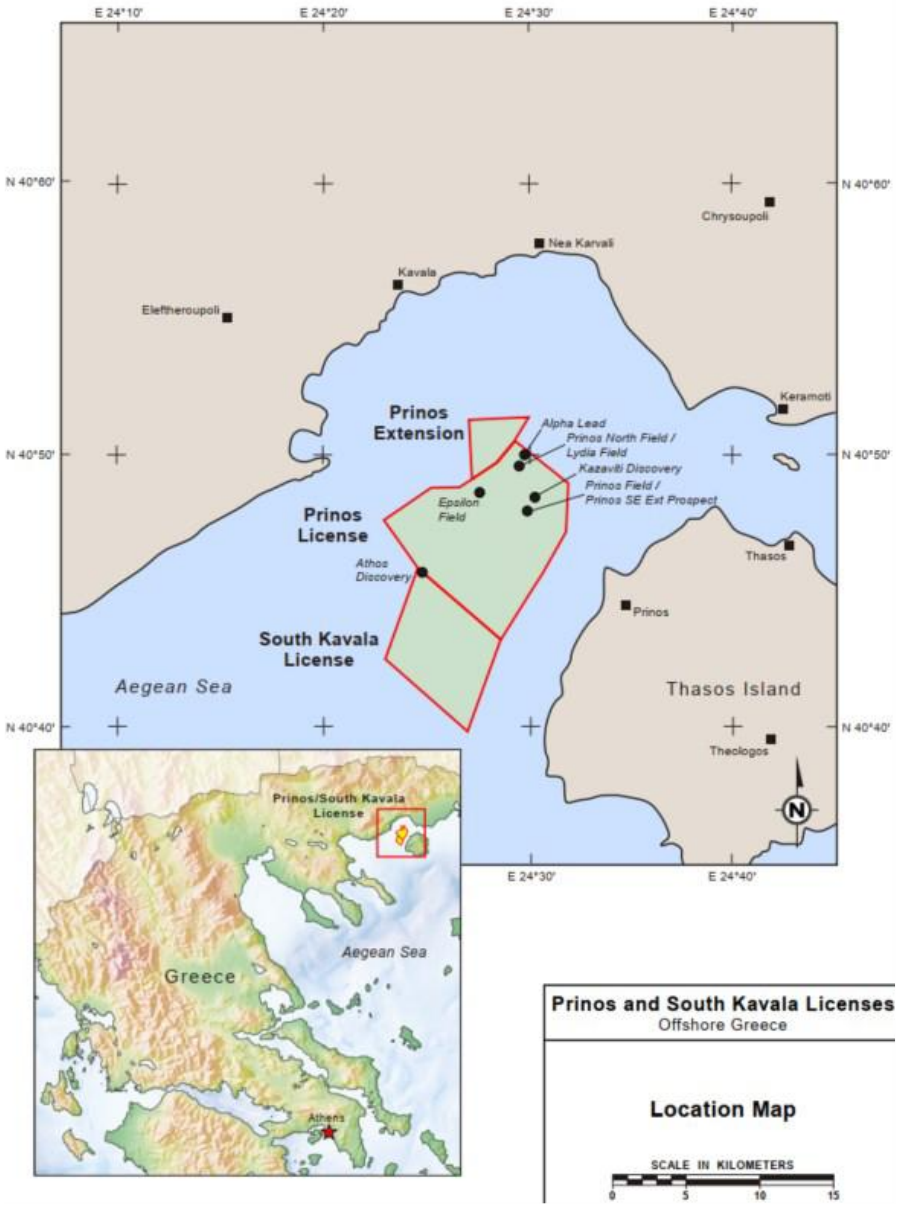
The area extends from a depth of 1900 to a depth of 4200 m, with the defined volume of the storage space set at 93.4 km^3.

In accordance with paragraph 5 of Article 173 of Law 4964/2022, after completion of the suitability investigation and before the expiry of the right to complete the investigation, the interested party shall submit an application to EDEYEP in order to determine the suitability of the geological formation as a CO_2 and to activate the operator's storage right. Under this Law, the interested party may be either the holder of the right to continue and complete the investigation (in this case, Energean) or an affiliated company whose sole purpose is $_{CO_2}$ storage (in this case, EnEarth).

With the progress and completion of the procedures for investigating the Area as a CO_2storage site, EnEarth, as an affiliate of Energean, submitted an application on 30.06.2024 to determine the suitability of the geological formation as a CO_2 and to activate the operator's storage right in accordance with paragraph 5 of Article 173 of Law 4964/2022. Energean, as the operator with the right to continue and complete the investigation, has co-signed the above application.

2.2.2.1.2 Key Characteristics of the CO_2Storage Site

The CO_2storage site under study is located within the Prinos basin, in the Gulf of Kavala, in the North Aegean Sea. The deposits in this area have been explored since the 1970s, and oil production has been developed from three deposits within the Prinos Concession, as well as natural gas production from the South Kavala Concession (see **Figure** below), since the 1980s.



2 –16 : Map of the Prinos Basin with active Concessions

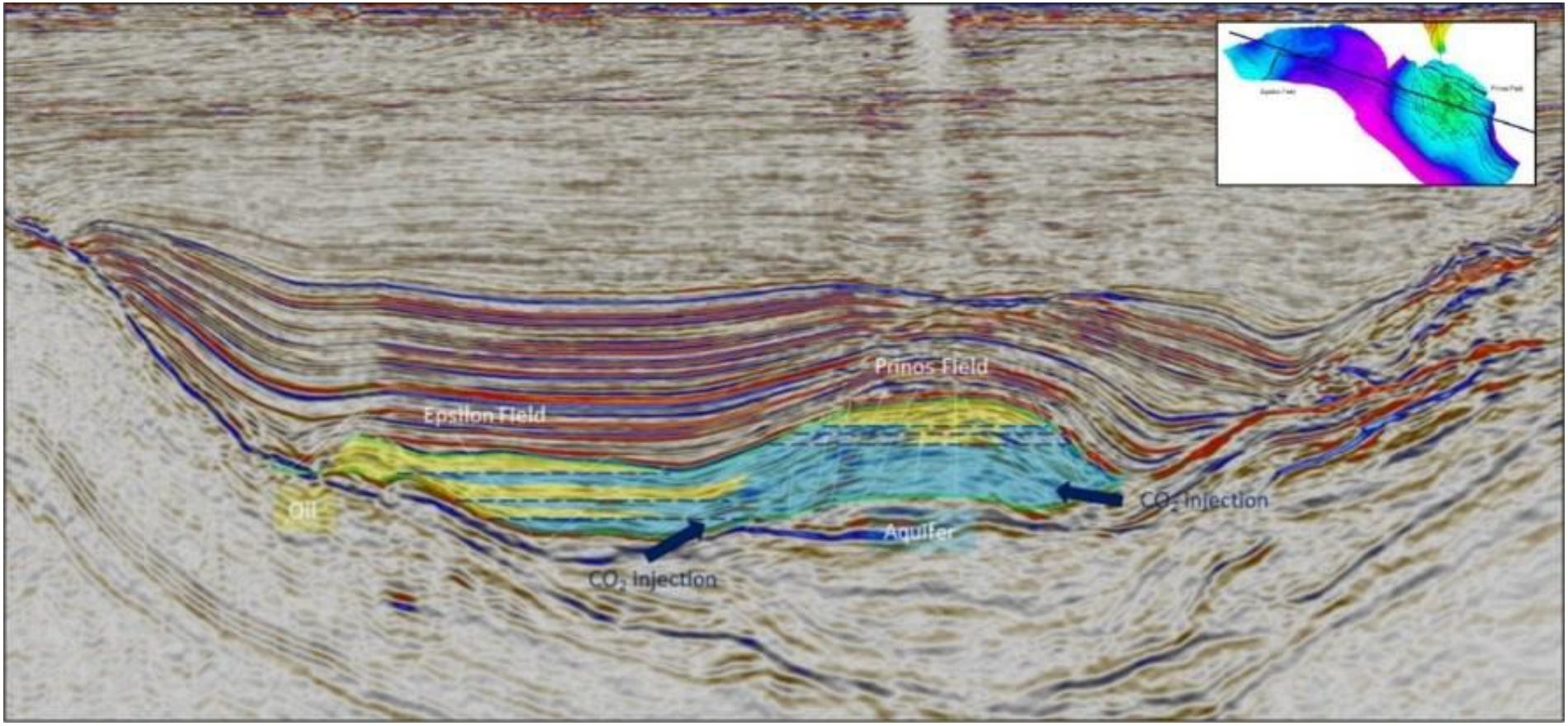
The area of interest for CO_2storage exploration is located within the Prinos Concession, where Energean has held 100% of the interests and management of oil and natural gas exploration and development activities since 2007.

As studies for the Project matured, it was determined that it would be most effective to limit CO_2 storage to the Prinos structure.

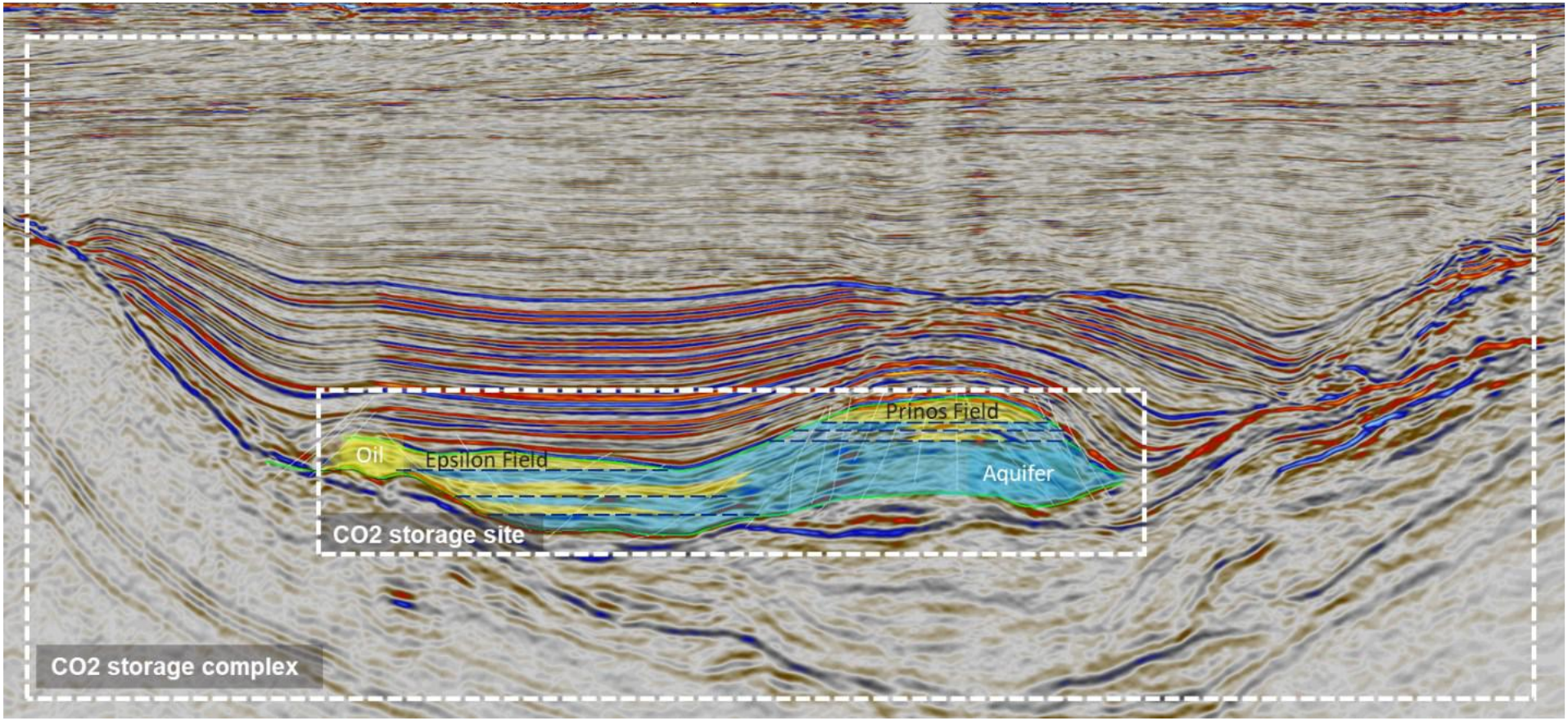
The potential CO_2storage site is located within the Prinos structure, as shown in **the** following **figure**.

In order for this area to be classified as suitable for CO_2 storage (on a reservoir scale), the wider surrounding area is assessed as a storage complex (on a basin scale),

covering a wider area of the required minimum radius of 1 km around the storage site, as shown in the following Figure..



2 –17 : Cross-section of a potential CO_2 storage site in the Prinos structure (the oil layer is marked in yellow, the aquifer in blue, and the CO_2 reservoir in white). $CO_{(2)}$injection wells are shown in green and water production wells in blue.



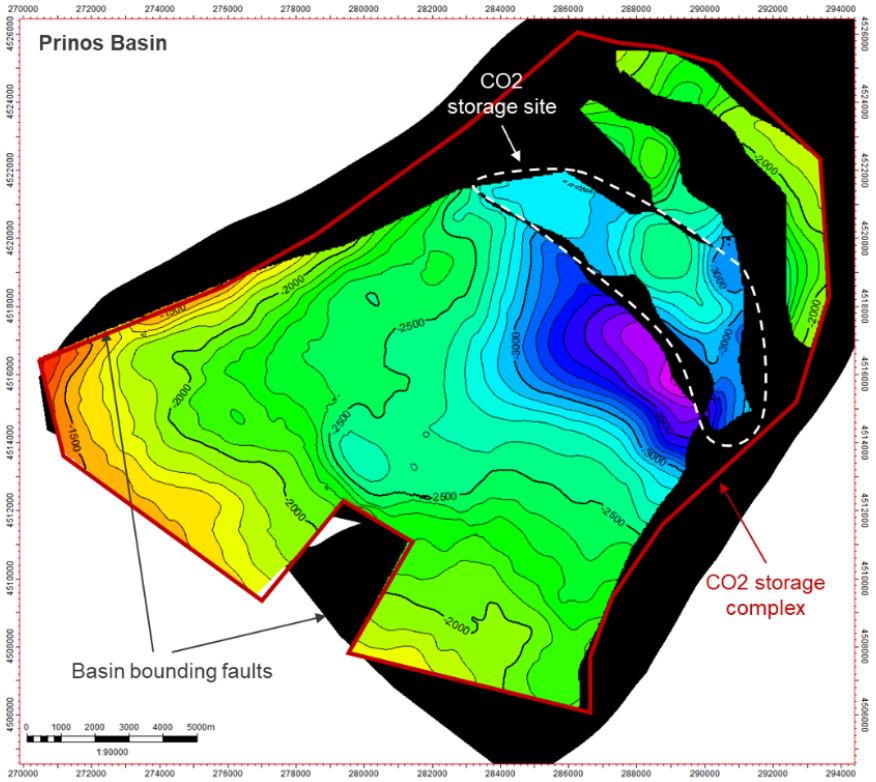
2 –18 : Cross-section of a potential CO_2storage site and storage complex as included in the exploration license. Following the assessment of the area, the Epsilon field was excluded from the $CO_{(2)}$injection and storage area.

CO_2Storage Site and CO_2Storage Complex

The concept of a storage complex is broader than that of a storage site, as shown in **the** following **figure**. It includes the storage site as well as the surrounding geological formations, the nature of which is decisive for the effectiveness and safety of $CO_{(2)\ storage}$. These formations contribute to the overall storage capacity and integrity of the CO_2 storage project.

The storage site refers to a specific volume within a geological formation that is selected and prepared for the purpose of CO_2 storage. It is designed to receive the injected CO_2 and ensure its long-term storage. The site is supported by infrastructure for injecting CO_2into the geological formation and surface infrastructure, which includes the necessary equipment and facilities for monitoring, controlling, and maintaining the storage.

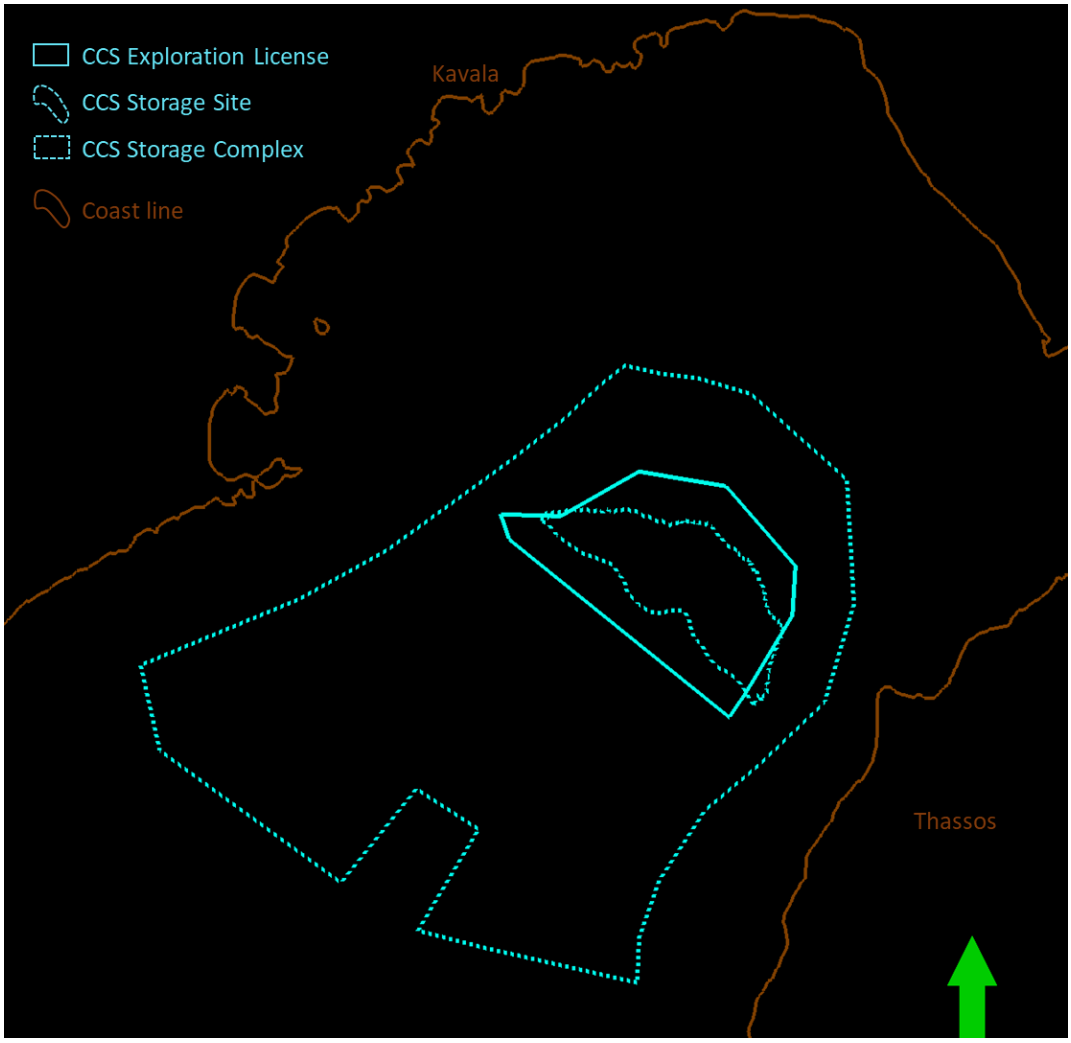
The continuous presence of impermeable caprocks throughout the storage complex is essential for its integrity and safety. These sealing formations provide a secure containment mechanism, reducing the risk of $CO_{(2)}$leakage or migration to the surface or other subsurface areas. Their continuity is a critical factor in the identification and characterization of a storage complex.



2 –19 : Plan view of the polygons of the complex and the CO_2 storage site in Prinos, with the reservoir formations in the background

The storage complex area has therefore been selected due to the continuity of the geological formations within the basin, as well as the boundaries of the Prinos basin in all directions (delimited by faults in the NE, SW, NW, and SE). It should also be noted that the adequacy of data from oil and natural gas exploration and development activities carried out over the last 40 years reinforces the safety of the site and storage complex assessment.

The following **figure** shows the storage complex and the extent of the storage area, as well as the polygon of the CO_2 Storage Exploration License within the Prinos basin.



2 –20 : Plan view of the surface storage complex area (large polygon with dashed line), the storage site area (small polygon with dashed line) and the polygon of the exploration permit (solid line). The coastline is shown in brown.

The storage complex covers an area of approximately 256.86 km^2 , with a perimeter of approximately 72.99 km. The storage site covers an area of approximately 20.16 km^2 with a perimeter of 26.77 km.

The coordinates of the CO_2 storage complex are listed in **the table** below.

Table2 –5 : CO_2storage complex coordinates

X	Y
279453	4512372
277020	4509345
271165	4513610
270546	4516366
275694	4518510
278502	4520077
282475	4522958
284177	4524272
285451	4525453
286197	4526041
287328	4525784
288558	4525629
290269	4525124
293368	4522358
293598	4518334
292650	4515169
290556	4513167
288786	4511682
287305	4509419
286657	4507571
286593	4506115
281658	4507241
279506	4507795
281466	4511071
279453	4512372

The main sections of the Prinos reservoir selected for CO_2 storage consist of saline aquifers in equivalent zones A1, A2, B, and C. These aquifers have favorable rock quality, with a clean to mixed ratio exceeding 66%, average porosity of 14% and average permeability of 250 mD (with a maximum of approximately 6 Darcy). The top of the structure is at a subsea depth (TVDSS) of -2475 m, the deepest parts of the structure are approximately -3615 m TVDSS, and the formations of the storage site have an average thickness of approximately 285 m.

To ensure the integrity of the storage site, multiple seals are being considered. The primary seal consists of the clay layer covering the storage formations, which is defined by the seismic horizon of the lower saline bottom, extending throughout the area and having a thickness of 10-20 m. In addition, the evaporitic sequence overlying this impermeable clayey rock contains several layers of salts alternating with clastics, further contributing to the containment potential. The effectiveness of the impermeable formations' cover is

also supported by the fact that they have effectively retained hydrocarbons over the geological time scale. The shales present in each of the four distinct sections of the reservoir can be considered as secondary caps (as evidenced by the oil production history of the last >40 years) or at least as potential barriers to vertical flow, allowing and enhancing CO_2sequestration.

Oil production from zones B and C of the Prinos field will be completed before CO_2 storage begins. Production from zone A, as well as the Epsilon Field Development Plan (FDP), will continue until 2035. CO_2 injection will target zones B and C of the reservoir, with two injection wells during the period 2025-2035 and two water wells, and will then be extended to the entire reservoir by the end of the Project.

The following **figures** show the location of the injection and water production wells.

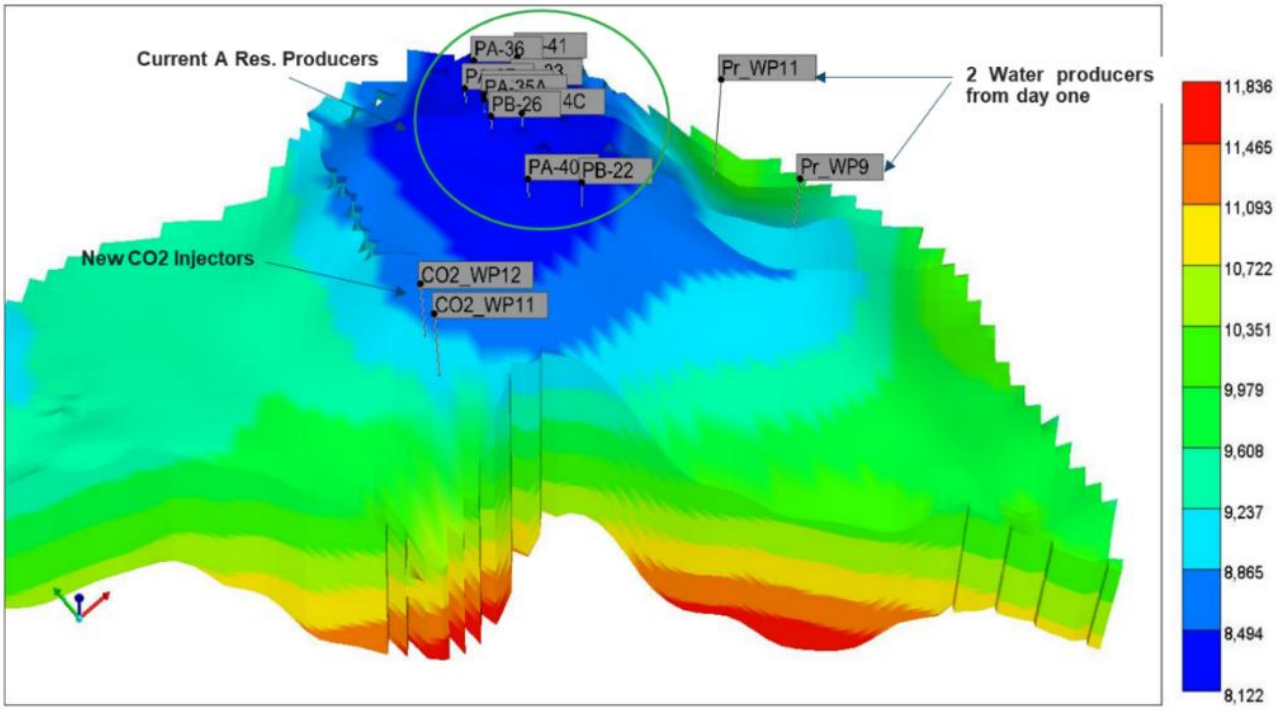
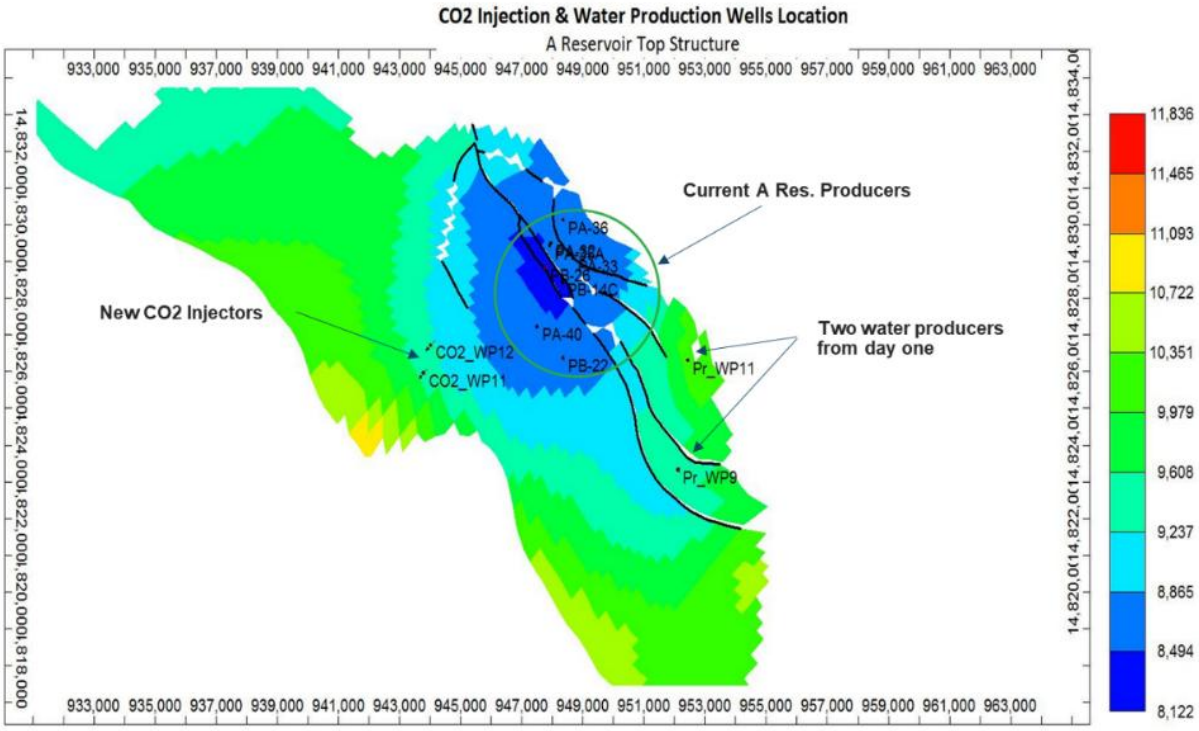


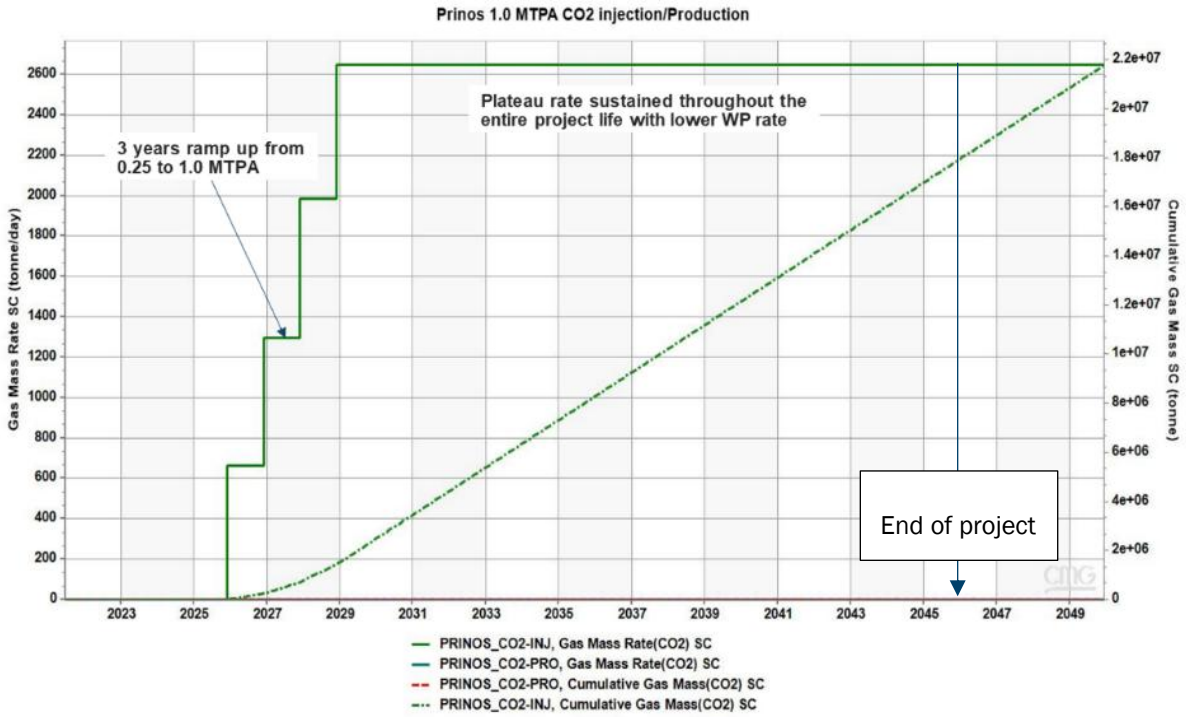
Figure2 –21 : Location of boreholes at the storage site (3D view)



2 –22 : Location of boreholes at the storage site (plan view)

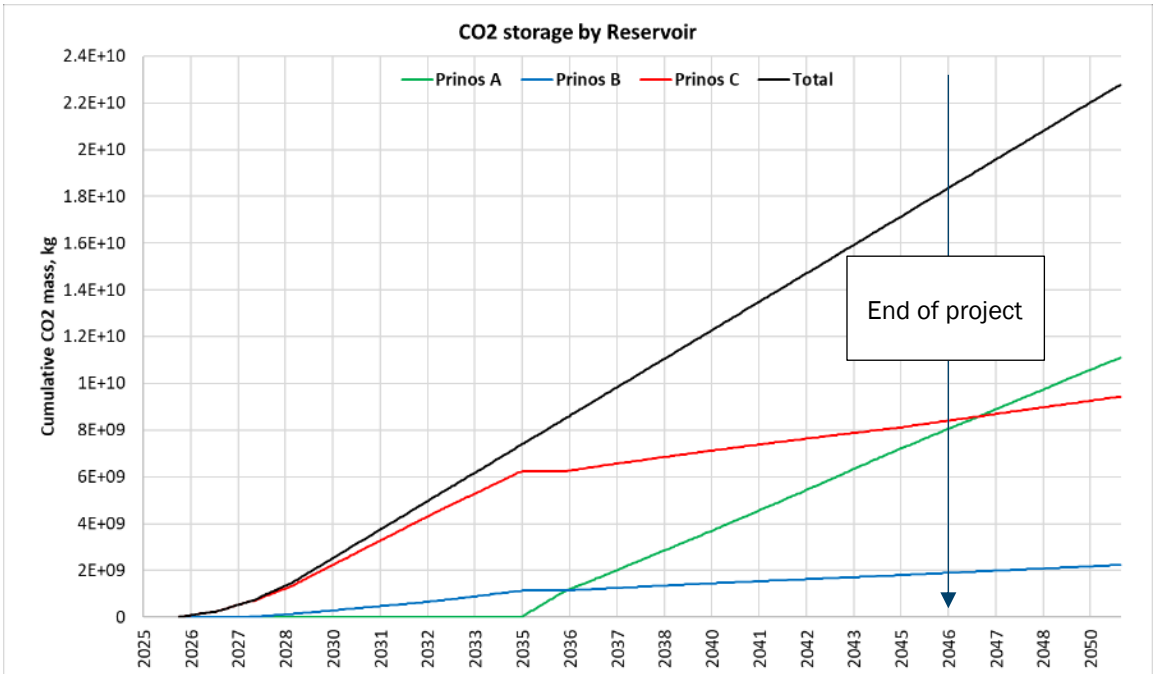
2.2.2.2 Estimated capacity of the CO_2storage site

The CO_2storage site operation scenario includes a gradual increase in the injection rate through the two wells in reservoirs B and C, starting at the end of 2025 and beginning in 2026 . The $CO_{(2)}$injection rate starts at 0.25 MTPA and gradually increases to 1 **MTPA within the first three years.** The maximum injection rate for the two wells is 0.5 MTPA per well. According to the results of the geomechanical study of the formation, a maximum flow pressure at the bottom of the wells (max FBHP) of 7000 psi has been set. To manage reservoir pressure, the two water wells produce water from the aquifer of reservoirs B and C at a maximum rate of initially 7.5 kbwpd, and then (in 2035) at 9 kbwpd. The total $CO_{(2)}$storage capacity of this baseline scenario is estimated to reach 18 MT by the end of 2045 (20 years) and 22.8 MT by the end of 2050 (see **Figure** below).



2 –23 : Projected CO_2injection rates (mass) and cumulative injection/production quantities for the 1MTPA scenario

The distribution of CO_2 storage capacity per reservoir zone A, B, and C is shown in **the** following **Figure.** Specifically, the $CO_{(2)}$storage capacity of reservoir A is estimated to reach 7.7 MT by the end of 2045 (starting in 2035 for 10 years) and 11.1 MT by 2050. Similarly, the $CO_{(2)}$storage capacity of reservoir B is estimated to reach 1.9 MT by the end of 2045 (20 years) and 2.2 MT by 2050, while the CO_2 of reservoir C is estimated to reach 8.3 MT by the end of 2045 (20 years) and 9.4 MT by 2050. The lower storage capacity of reservoir B is related to the lower quality of the rocks in zone B compared to the underlying reservoir C.



2 –24 : Distribution of CO_2 storage capacity per reservoir zone A, B, and C for scenario 1 MTPA

As part of the investigation into the suitability of the Storage Site under study, the total volume of resources in the Prinos reservoir was calculated at 460 Mm^3 , which is equivalent to 313 MT of final CO_2 storage capacity (assuming an in situ density of 680 kg/m^3 CO_2). Taking into account the permeability simulation modeling, the final theoretical $CO_{(2)}$storage capacity is estimated at up to 100 MT, with the plume remaining within the storage site in the long term.

2.2.2.3 Suitability and Long-Term Safety of the CO_2Storage Site

This **section** presents the modeling results for investigating the suitability of the Prinos geological formation for use as a storage site, following the characterization and evaluation of the potential CO_2complex and the surrounding area, in accordance with the criteria set out in Annex I of Joint Ministerial Decision 48416/2037/E.103 (Government Gazette 2516/B/4.11.2011) "*Measures and conditions for the storage of carbon dioxide in geological formations—Amendment of No. 29457/1511/2005 (B' 992) Joint Ministerial Decision, Presidential Decree 51/2007 (A' 54) and Presidential Decree 148/2009 (A' 190), in compliance with the provisions of Directive 2009/31/EC*."

2.2.2.3.1 Spatial and Temporal Evolution of CO_2Storage

Based on the Project design, CO_2injection will target zones B and C of the reservoir with two injection wells during the period 2025-2035 and will then be extended to the entire reservoir by the end of the Project. As shown in **the figures** below**,** there is no migration of CO_2 migration from zones B and C to zone A, so all stored CO_2 remains in zones B and C until 2035, while oil continues to be produced from zone A of the reservoir until then.

After 2035, the plume migrates smoothly through all reservoirs as expected, moving from the top and eventually towards the water production wells that create the pressure difference.

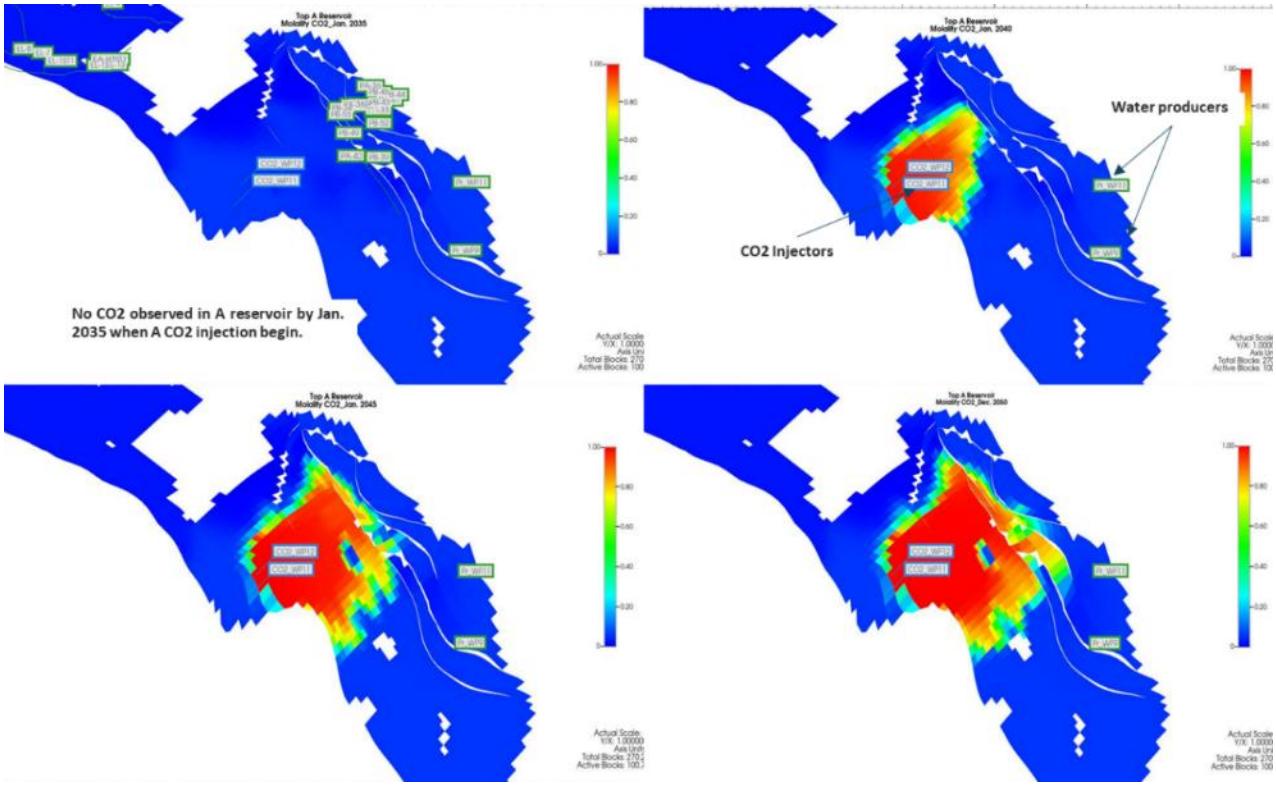


Figure2 –25 : Migration of CO_2plume in reservoir A (2035, 2040, 2045, 2050)

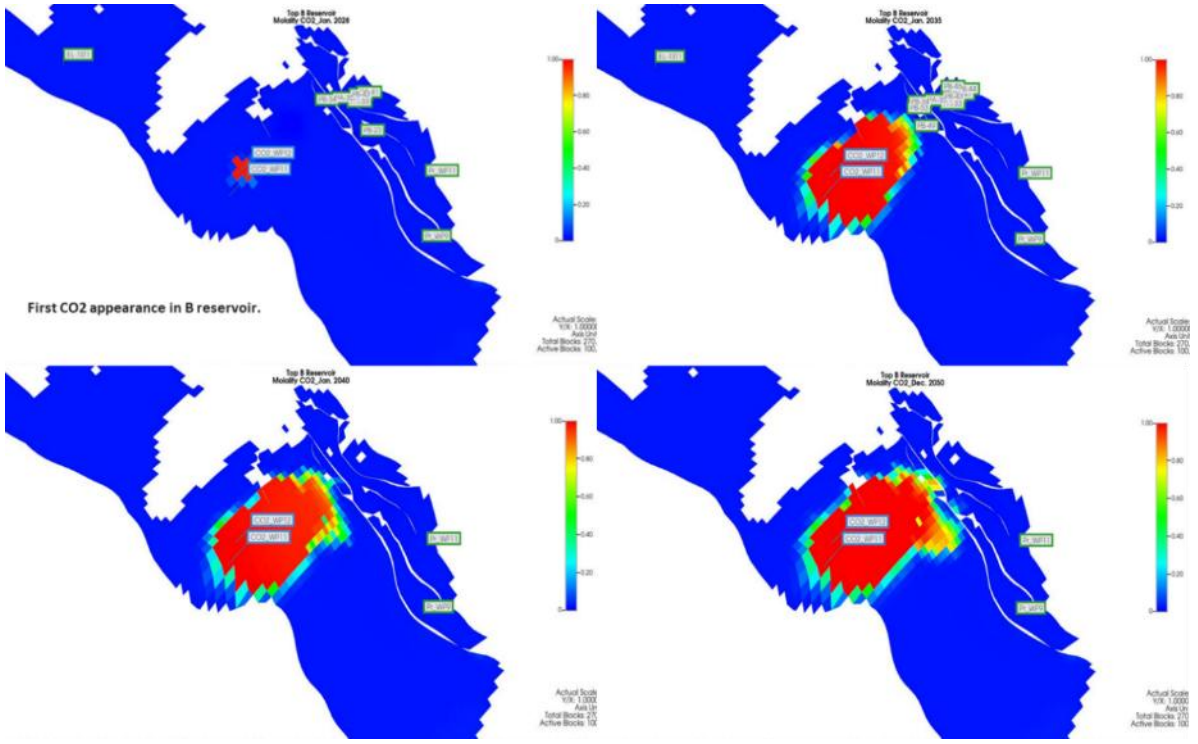


Figure2 –26 : Migration of the CO_2plume in reservoir B (2035, 2040, 2045, 2050)

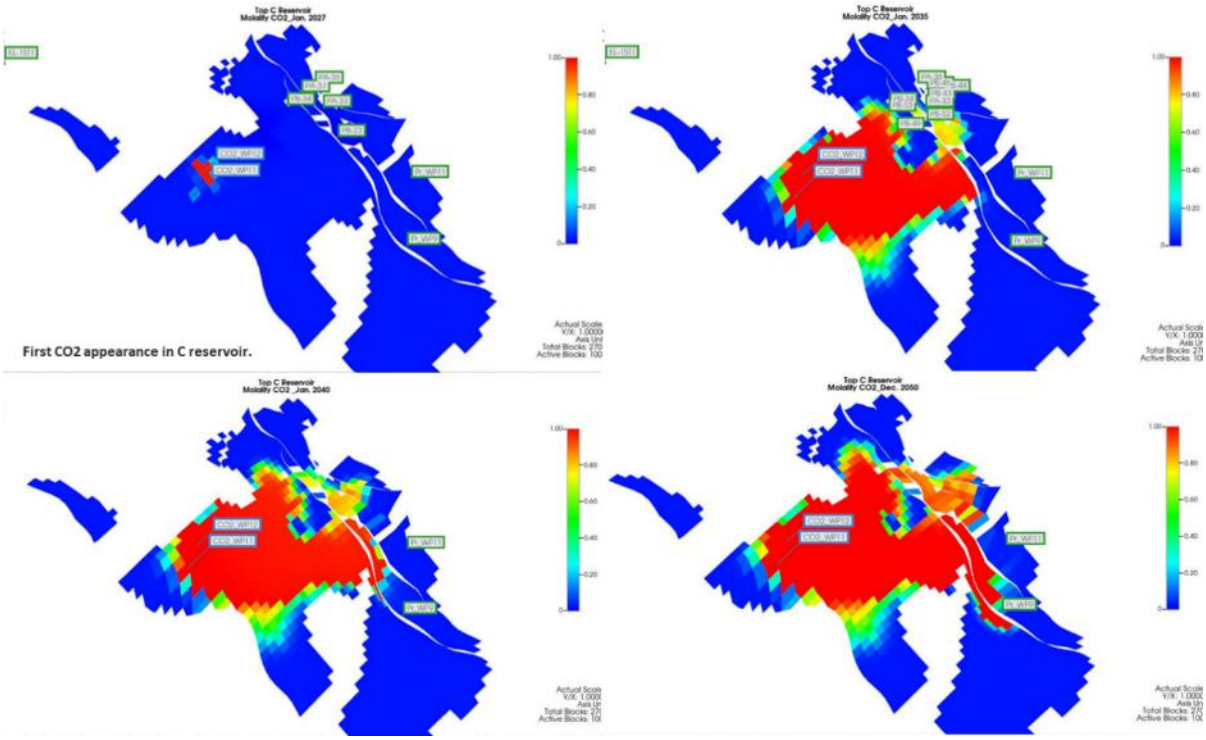
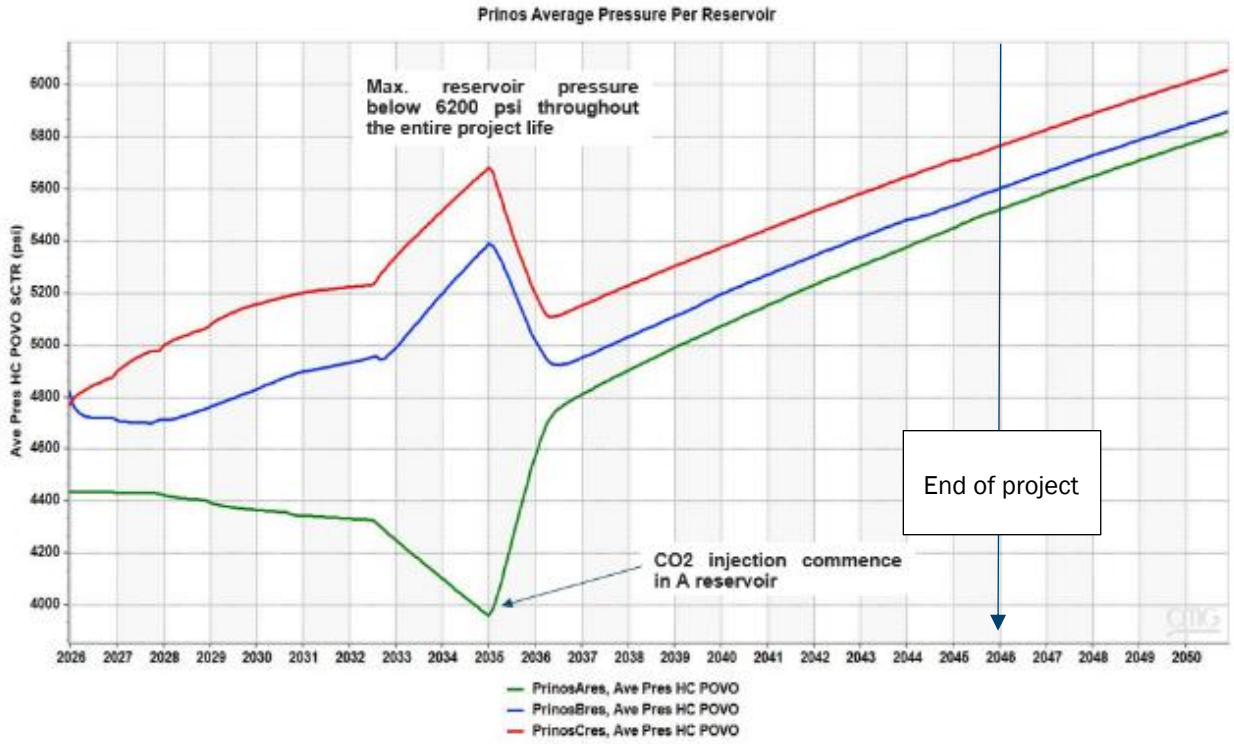


Figure2 –27 : Migration of the CO_2plume in reservoir C (2035, 2040, 2045, 2050)

The pressure in the reservoirs reaches acceptable levels and in any case remains below the limit values resulting from the geomechanical study (<7000 psi) and the well integrity study (<6200 psi). $CO_{(2)}$is limited

only to reservoirs B and C until 2035, **without interacting with oil production** in reservoir A, which is also confirmed by the different pressure profiles in each reservoir, as shown in **the** following **figure.**



2 –28 : Average pressure in reservoirs A (green), B (blue), C (red)

2.2.2.3.2 Trapping through mineralization (long-term)

Mineralization renders CO_2immobile. It is enhanced by CO_2trapping in the pores of the formation and trapping due to dissolution. The mineralization trapping mechanism is evaluated in a special 1000-year simulation. The results of this mechanism are expected to contribute a small percentage to the total stored co_2compared to other trapping mechanisms.

CO_2 will react with specific minerals that form the reservoir rocks, creating new minerals. Specifically in the Prinos structure, CO_2 will react with existing chlorite minerals, as described by the equation:

Fe-Mg chlorite (ripidolite) + CO2 = siderite + magnesite + smectite (beidellite)

CO_2will also react with existing water and kaolinite minerals, as described by the equations:

$CO_2 + H_2O = HCO_3^- + H^+$
K-astrite + kaolinite + H+ = illite + quartz + K+
albite + kaolinite + H+ + K+ = illite + quartz + Na+

Due to the lack of minerals that react with CO_2 within the Prinos reservoir, the effect of trapping through mineralization is expected to be insignificant. This process, even after a significant period of time, results in an increase in the porosity of the reservoir rock to 0.19% over a period of 30 years, reaching up to 1.29% over a period of 1000 years.

2.2.2.3.3 Characterization of Dynamic Behavior During Storage

Three-dimensional modeling of various scenarios for the PrinosCO_2 storage project investigated, among other things, the nature of CO_2 flow in the reservoir, its phase behavior, and its trapping mechanisms.

The movement of the CO_2 plume in the short to medium term is governed by structural and stratigraphic confinement, and therefore depends on the location of the CO_2 wells and the injection rate. In general, the CO_2 plume$_2$ plume rises to the top of the reservoir anticline and accumulates there, remaining under supercritical conditions. Residual trapping in the formation's pores and solubility trapping, which render the CO_2 immobile, are approximately 5.5% and 7.1% respectively of the total CO_2 stored during this period, as shown by the dynamic simulation of the three-dimensional model. The high temperature and salinity of the water in the geological formation reduce the dissolution of $CO_{(2)}$.The miscibility of $CO_{(2)}$ in hydrocarbons (oil phase) is an additional trapping mechanism.

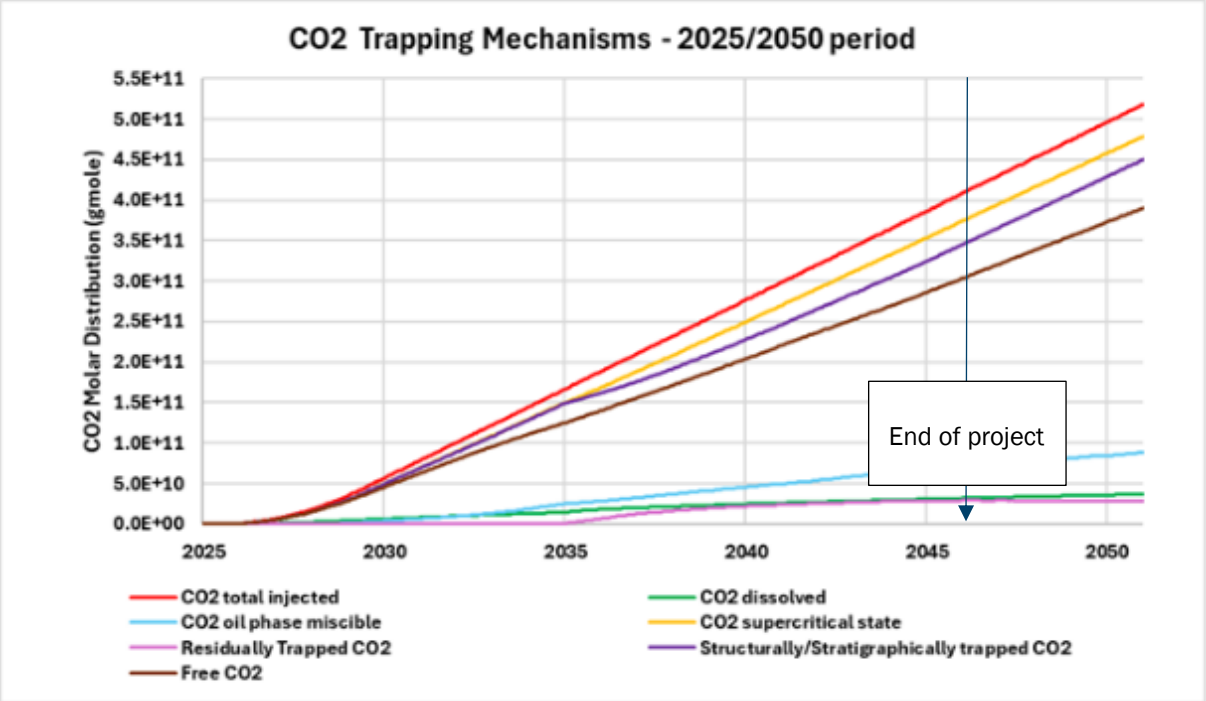
By targeting the boreholes towards the aquifer and distributing the injection flows at various locations, local high-pressure phenomena are avoided, while at the same time providing the CO_2 with the hypersaline water of the aquifer, leading to greater dissolution and sequestration of CO_2 .

In the long term, especially after injection has ceased, the above mechanisms of sequestration and solubility increase to approximately 22% and 10% respectively. Within 500 years after injection, $CO_{(2)}$ continues to dissolve in water, increasing its density and **settling at the bottom** of the reservoir as a heavier "fluid." This phenomenon increases the safety of CO_2 storage $_{by}$introducing long-term **"sequestration" rather than "storage,"** ensuring that $CO_2$is trapped as immobile molecules rather than mobile molecules (which retain a risk of leakage depending on the available leakage pathways). A further sequestration mechanism is also apparent, that of CO_2 mineralization,which also renders CO_2immobile and permanently sequestered in the rock.

A simulation scenario with an injection rate of 1MTPA was used to assess the CO_2 plume sequestration mechanisms.

The results from the simulation for the **period 2025-2050** (see **Figure** below) show that most of the stored CO_2remains in supercritical conditions within the reservoir, mainly structurally/stratigraphically trapped, while the CO(2) trapped in the formation's pores is a fraction of the order of 1/15 of the structurally/stratigraphically trapped $CO(2)$.The miscible CO_2 in the oil phase is a fraction of the order of 1/4

of the mass of free CO_2,although it is constantly increasing. A small portion of $CO_2$is dissolved in water, with a continuously increasing volume, while CO_2in the liquid phase is almost zero.

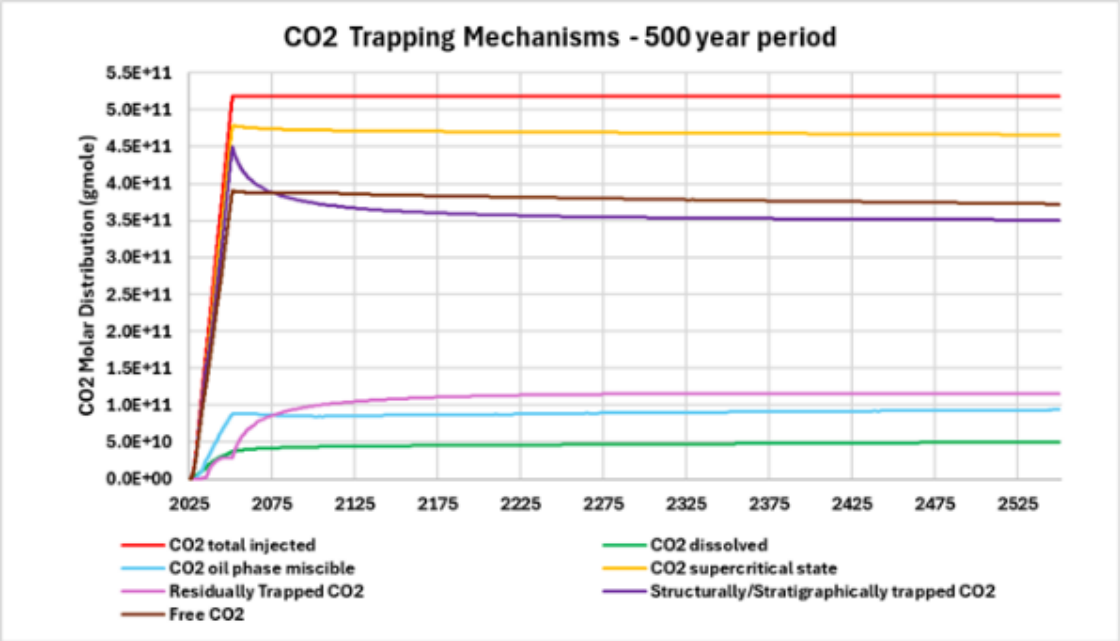


2 –29 : CO_2capture mechanisms – Short-term results

The main relationships between these forms of CO_2 are listed below for clarity and reference, using the same color as in the graph above:

- Supercritical CO_2= Trapped in pores CO_2+ Structurally/stratigraphically trapped CO_2
- Stored CO_2 = dissolved CO_2+ pore-trapped CO_2+ structurally/stratigraphically trapped CO_2
- Supercritical CO_2 = free CO_2 + dissolved in oily phase CO_2

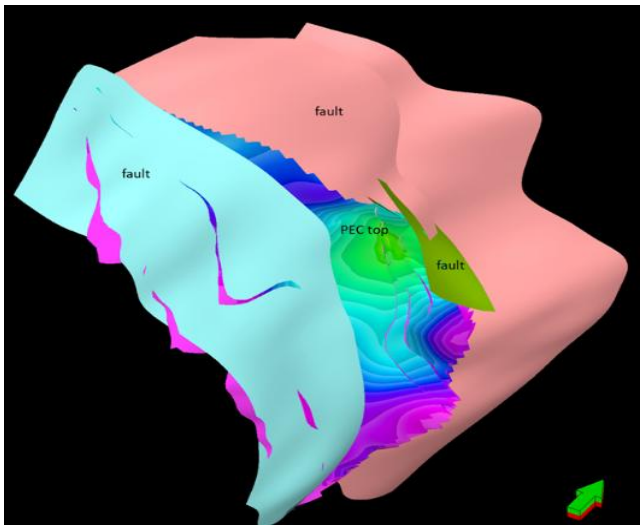
As shown in **the** following **figure**, **in the long term** there is a steady slow decrease in the mobile supercritical phase of CO_2 over a period of 100 years (yellow line), while at the same time the immobile phases of stored CO_2 , i.e. the trapped and dissolved phases (magenta and green lines respectively) are constantly increasing.



2 –30 : CO_2trapping mechanisms – long-term results: 500 years after injection

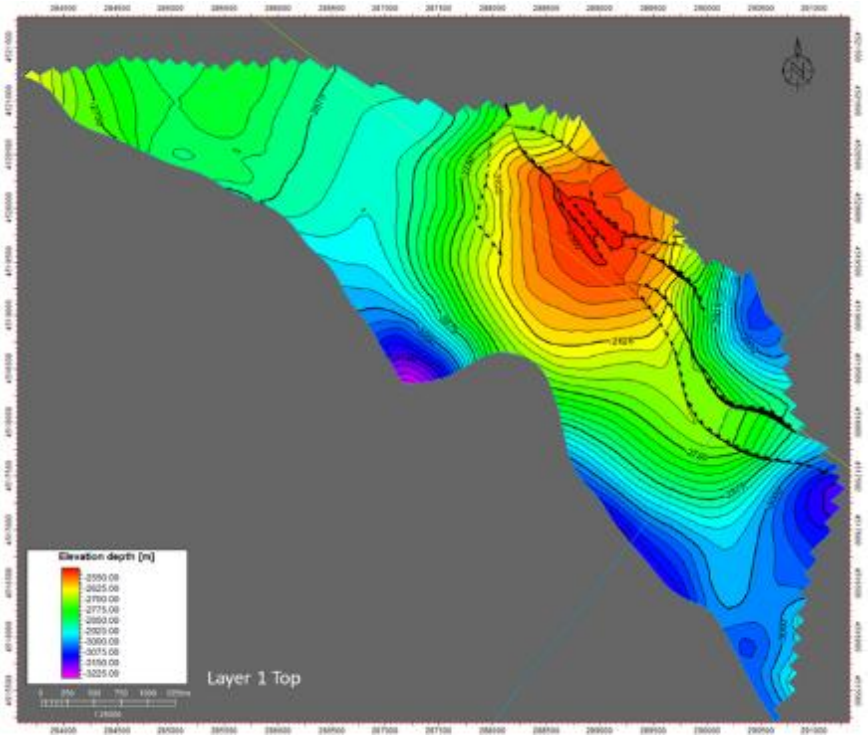
2.2.2.3.4 Potential CO_2leakage points

The CO_2storage site under study in Prinos is a closed system, as it is surrounded by faults or layer wedges, as shown in **the** following **figure.**



2 –31 : Three-dimensional representation of the upper and lower surfaces of the storage site and surrounding faults

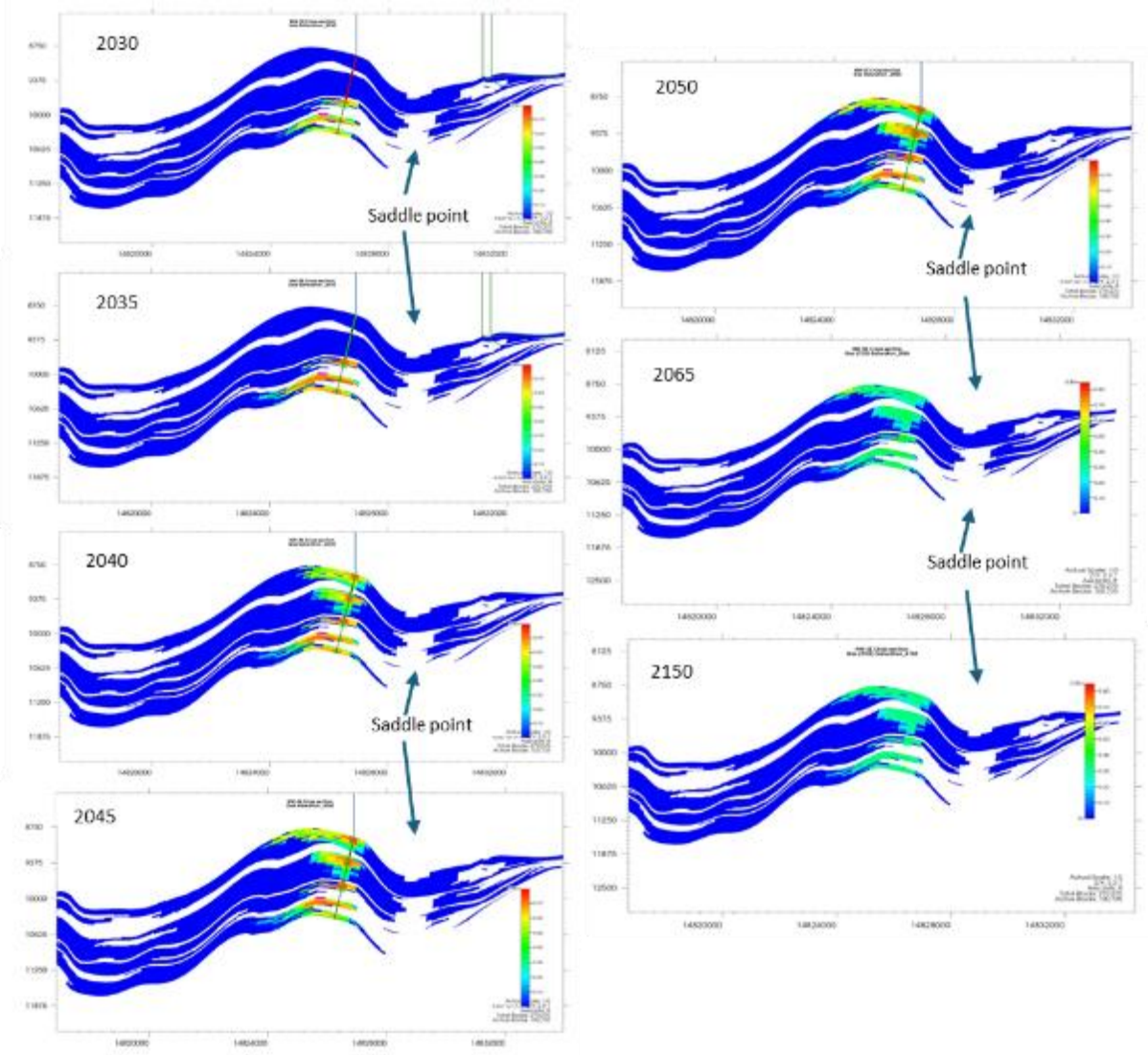
Given that the Prinos reservoir is part of an extensive closed structure that includes the Epsilon reservoir, there is no significant risk of CO_2 leakage. The only (low probability) risk is the migration of CO_2 from the Prinos reservoir to the Epsilon reservoir through the outlet point separating the two (see next **figure**), which has been identified as a possible side leakage path (L1).



2 –32 : Top view of the storage site model – zone A roof map. The deepest area (possible vent point) between the Prinos and Epsilon structures is shown on the map.

However, for the given CO_2injection rate of 1MTA, all simulations performed during the sensitivity analysis phase indicate that 100% of the injected CO_2remains within the Prinos anticline. Consequently, there is no realistic possibility of CO_2 migrating after injection to the discharge point and then leaking into the Epsilon reservoir. The following **figure** shows an indicative cross-section along the Prinos and Epsilon structures, indicating the area of the possible discharge point. Based on the 1 MTPA base case scenario, the CO_2 migrates over time towards the top of the Prinos anticline, moving away from the Epsilon area and the discharge point, and appears to remain at the top even 100 years after injection.

During the injection period, the density of supercritical CO_2 remains lower than that of the hypersaline water in the aquifer and the oil. Since the injection points are located in areas of the structure's downslope that favor the movement of the CO_2 plume toward the top of the Prinos anticline, most of the injected CO_2 will ultimately be retained below the top of the structure, except for quantities trapped by various other mechanisms. The only possibility for downward migration of CO_2 is through its diffusion into the hypersaline water of the aquifer, which increases the density of the CO_2-saturated hypersaline water by a small percentage (approximately 2-3%). If this happens, the denser CO_2-saturated hypersaline water will settle instead of migrating laterally.



2 –33 : Cross-section along the Prinos and Epsilon structures. The deepest area (outflow point) is indicated in the cross-sections. The CO_2plume migrates over time towards the top of the Prinos anticline, moving away from the Epsilon area and the point of possible outflow. The CO_2plume remains at the top of the structure even 100 years after injection.

2.2.3 Modifications to Existing Facilities

2.2.3.1 Modification of the Beta Platform

The existing Beta platform has sockets for 12 wells and is connected to the Delta processing platform (see **figure** below).

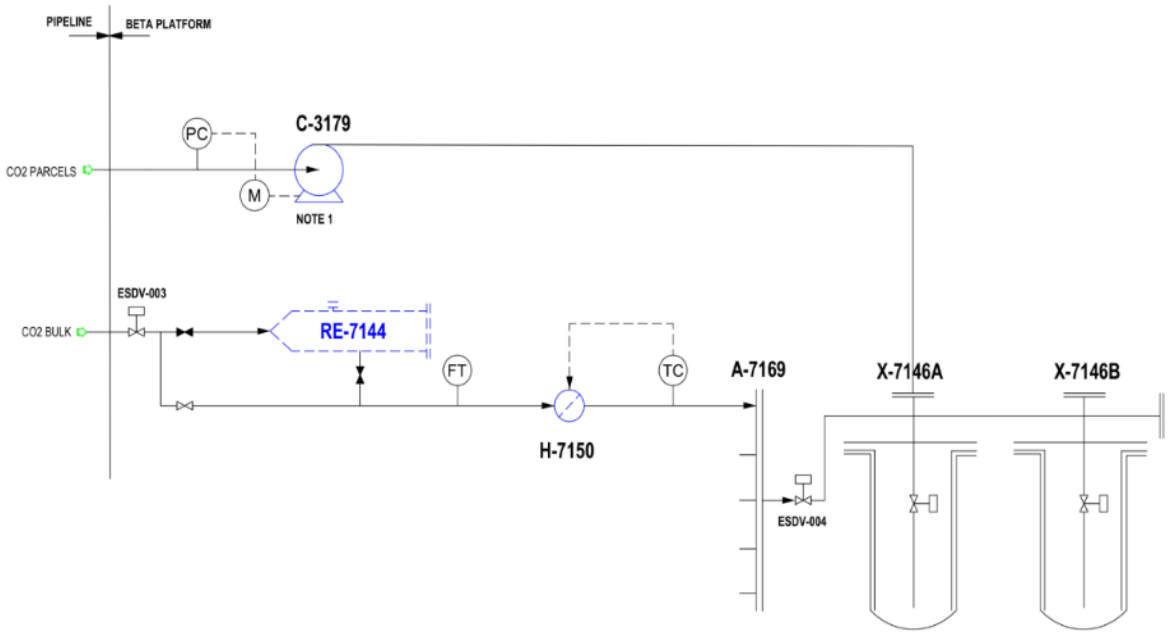
Modifications will be made to the Beta platform to include the necessary CO_2injection facilities. It will be equipped with a hoist, a manifold, equipment for processing CO_2 cargoes,while the auxiliary facilities may be upgraded to accommodate the new activities. Two $CO_{(2)}$injection wells and two water production wells will be drilled by diverting existing wells on the Beta platform. Prior to diversion, the existing wells will be sealed and abandoned. The two water wells will operate Electric Submersible Pumps (ESP) to produce the required water, which will then be managed at the existing treatment facility on the Delta platform.

Four of the 12 wells will be used for the two new CO_2injection wells and the two new water production wells.

2 –34 : Beta and Delta platforms

The work will be carried out safely and with SIMOPS work permits currently in place as part of Prinos' operating procedures.

The following process flow diagram illustrates the equipment required from the top of the riser to the injection well (see **Figure** below).



2 –35 : Flow diagram from the CO_2pipeline to the CO_2injection wells

The additions/modifications to the equipment on the Beta platform will be as follows:

- Pipes for connecting the new CO_2pipeline to a temporary connection point to the well.
- Piping related to the required start-up heater and compressor.
- Pipe connections to the "Christmas tree" and the injection wellhead.
- Safety valves and shutdown systems.
- Electrical interconnection and equipment for monitoring and communication with onshore control stations.
- Pipes from the water production wells and connection pipes to the existing water treatment plant on the Delta platform via the existing bridge.

2.2.3.2 Modification of Delta Platform

The modification of the Delta platform will involve a comprehensive upgrade of the auxiliary facilities, the water treatment and distribution unit, and the control and safety systems, so that the water produced for reservoir pressure management purposes can be treated using the existing facilities. This integrated approach optimises the use of resources while enhancing the operational performance of the platform, environmental management and ensuring the protection of the marine environment.

It is expected that the water produced from the storage project will undergo the same treatment as that of the current operation. However, this will be further investigated at the start of the Project's operation by taking water samples from the aquifer at the storage complex.

2.2.4 CO_2 Management Facilities (Reception - Transport - Injection)

2.2.4.1 Land Facilities - Site Configuration

The basic infrastructure for reception at the Sigma plant site during Phase 1 of the Project will be a reception station, consisting of the reception manifold of the CO(2) land pipeline$_2$ and a compression/pumping station for CO_2 loads.

The area where the bases of the land equipment will be located is estimated at approximately 50 m^2. The estimated excavation area for the land section of the pipeline is 200 ^{m2}.

Road access for the needs of the new Project, and mainly for the delivery of $_{CO_2}$ cargoes by trucks, will be provided from the Central Gate of the Sigma plant (Error! Reference source not found.).

Figure2 –36 : Road access to serve the new facilities (land facilities)

The layout of the Sigma plant and the area designated for the reception and starting point of the pipeline are shown below in red. The area will be approximately 30 m x 30 m and will also serve as the starting point of the subsea pipeline on the coast.

2 –37 : Onshore infrastructure area for CO_2reception and transport

The main service roads will serve all units for operation/maintenance/construction and emergency access, ensuring vehicle traffic in and out of the facility in both directions. Internal service roads will ensure flexible movement around the facilities for operations and maintenance.

The access road to the plant from the existing western road to Kavala will be paved and will have vehicle speed limit signs for approaching the plant. The main entrance gate for vehicles and personnel to the plant is located centrally on the western perimeter fence.

2.2.4.2 CO_2Reception and Management Equipment

The onshore CO_2management facilities (receipt, processing, and pumping to the storage site) are located within the Sigma facility.

The type and nature of these facilities will be based on standard industry practices for transporting gas from onshore to offshore facilities.

The basic equipment, the technical specifications of which are presented in accordance with the results of the preliminary design study (pre-FEED) , includes:

- A gathering pipeline with appropriate flange outlets. Design pressure: 240 barg, Design temperature: -46°C (operating conditions 90 to 220 barg).
- Portable pig launcher/receiver for the subsea pipeline. Design pressure: 240 barg.
- 12-16" onshore pipeline with welded connection to the subsea pipeline. Design pressure: 240 barg, Design temperature: -46°C (operating conditions 90 to 220 barg).
- Monitoring equipment, safety valves, control room.

The manifold and all equipment required for the supply of liquid CO_2 through pipelines shall be installed in such a way as to minimize interaction with the existing installation.

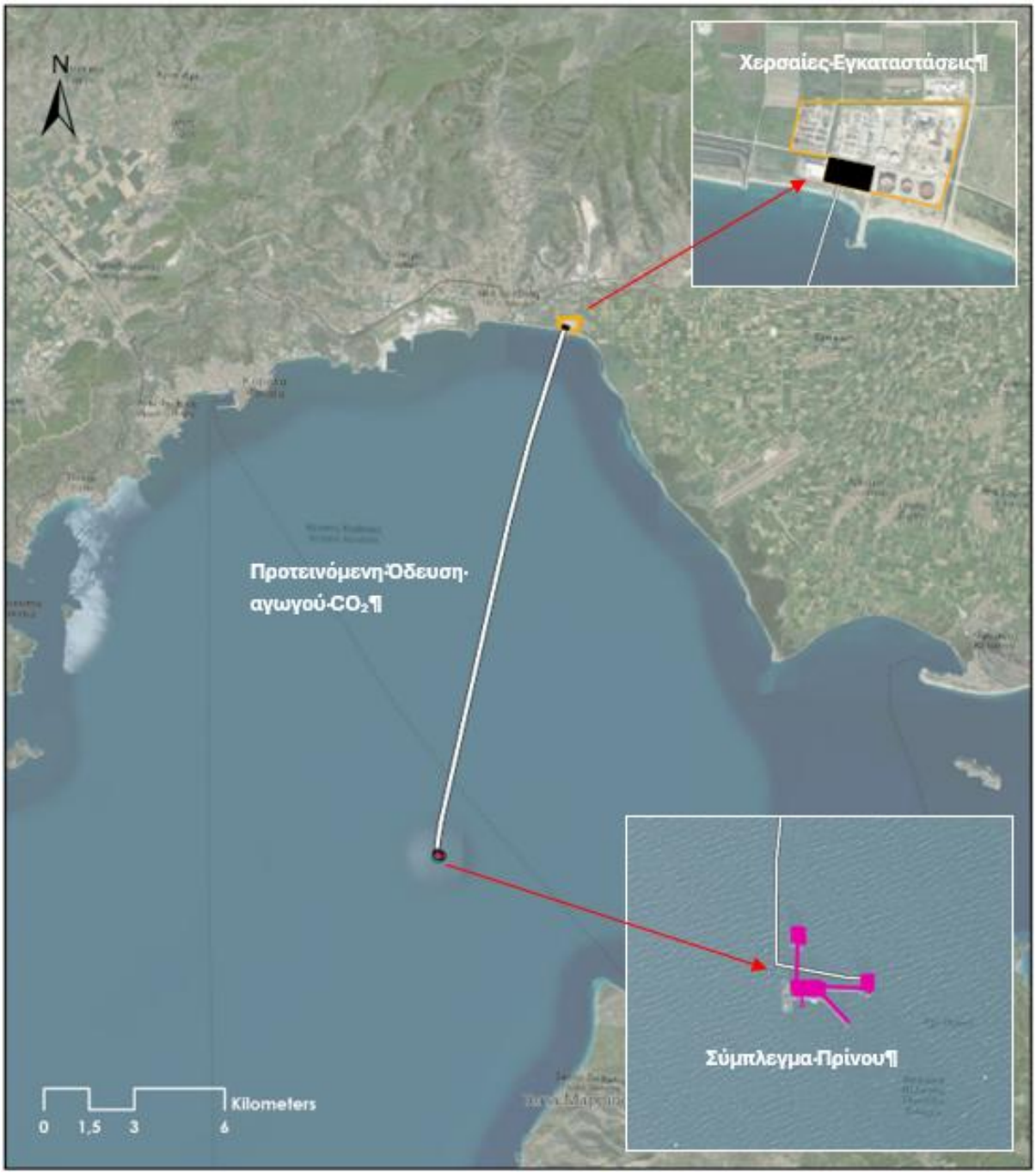
The piping will be designed to minimize flanged connections. All valves will be installed in such a way as to allow access for operation and maintenance, taking into account their duration and frequency of use.

CO_2loads will be transported to the Sigma dock and loaded onto supply vessels or the barge that will transport them to the offshore facilities at Prinos.

2.2.4.3 CO_2 Transfer Pipelines To Storage

A large-diameter 12-16" pipeline will be installed for the maximum capacity of Phase 1, which will also be sufficient for Phase 2 (1500#, material: CS, WT: 0.5", 3mm LPP coating, design pressure: 240 barg, design temperature: -46 °C).

The pipeline will run from the Sigma plant's onshore area to an arrival point on the Beta platform (see **Figure** below).



2 –38 : CO_2pipeline route

The main characteristics of the pipeline, according to the preliminary design study (pre-FEED) completed in 2022, are as follows:

- **Length**: 20 km, within the existing Prinos pipeline corridor.
- **Size**: 12-16" OD, 3 mm anti-corrosion coating, 30 to 50 mm thick concrete overlay.
- **Corrosion protection**: Anodes at appropriate intervals to provide a 30-year service life.

- **Installation**: The pipeline will be buried along its entire length to protect it from trawling activities in the area. In the first 500 m of the coastline, the burial depth from the top of the pipeline will be 2 m, and in the offshore section, the burial depth will be 1 to 1.5 m.
- **Maximum water depth**: 32 m at the platform location.

2.2.4.4 CO_2 injection wells and water production wells

Two CO_2injection wells and two water production wells are planned to be drilled in the Prinos reservoir. All wells must be drilled within zones B and C of the Prinos reservoir in order to inject $CO_{(2)}$ and simultaneously produce water from the aquifers located below zone A of the reservoir. The targets for each well (as summarized in **the** following **table)** have been determined based on the geomechanical model mapping the boundaries of the reservoir.

2 –6 : Final Drilling Depth Criteria (UTM zone 35N)

Type of drilling	Name	Start drilling	New drilling start depth (m)	Target	Surface location
CO_2injection	PBC-1	PB-17A	1,000	X:287725.69 y:4518803.72 Z:-2779.95	X:288963.21 y:4519413.86
CO_2injection	PBC-2	PB-24	1,000	X:287778.73 y:4519015.54 Z:-2718.38	X:288963.21 y:4519411.57
Water production	PBW-1	PB-22	1,000	X:290192.01 y:4517931.73 Z:-2741.54	X:288967.79 y:4519416.15
Water production	PBW-2	PB-23A	1,000	X:290060 y:4518995 Z:-2840	X:288965.50 y:4519413.86

The drilling stages for each section up to the final measured depth of 3,700 m include, in summary:

- 16" diameter drilling to a measured depth of up to ~ 2,200 m (vertical depth 1,850 m).
- 12-1/4" diameter drilling to a measured depth of up to ~ 3,150 m (vertical depth 2,667 m).
- 8-1/2" diameter drilling to a measured depth of up to ~ 3,700 m (vertical depth 2,800 m).

2.2.4.4.1 CO_2 injection wells

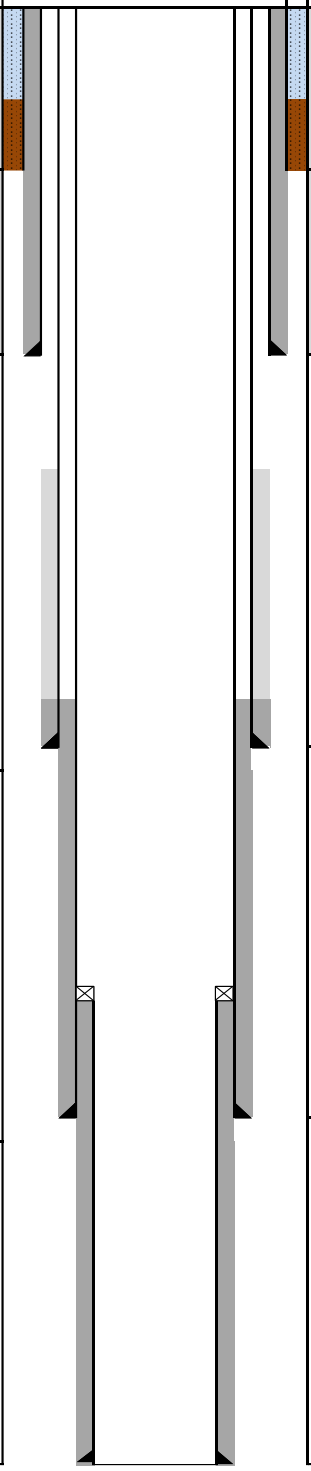
During the first 3 years of operation of the storage site, the CO_2injection rate will gradually increase from 0.25 to 0.5, then to 0.75 and finally to 1.0 MTPA.

CO_2injection will target zones B and C of the reservoir with two injection wells during the period 2025-2035 and will then be extended to the entire reservoir by the end of the Project.

The **figure** below shows a schematic diagram of the injection wells in their expected form based on the preliminary design. The final depth and exact operating parameters will be finalized at a later stage of the design.

CCS injector Well Status Diagram: Rev A

HOLE SIZE	DEPTH MDBRT	DEPTH TVD RT	INC	Conn OD	Min ID / Drift	CASING DESIGN MDBRT	CASING DESIGN Description
						30.5 m	MSL
Drive						62.0 m	Sea bed
	91	91	0	24.000	22.500	91 m	24" Conductor
22"					17.755" (Casing ID) 17.568" (Drift ID)		
	349	349	3°	18.625	17.568	349 m	18 5/8" Surface Casing
16"					12.415" (Casing ID) 12.259" (Drift ID)		
	2,200	1,850	45°	14.252	12.259	2,209 m	13 3/8" Intermediate Casing
12 1/4" x 13 1/2"					8.535" (9 5/8" ID) 8.500" (9 5/8" Drift ID)		9 5/8" casing from surface to above 13 3/8" shoe, 9 7/8" across open hole
					8.539" (9 7/8" ID) 8.500" (9 7/8" Drift ID)	3,950 m	Top of 7 5/8" Production Liner & 9 5/8" x 9 7/8" XO
	3,150	2,667	68°	10.984	8.500	4,003 m	9 7/8" x 9 5/8" Production Casing
8 1/2" x 9 1/2"					6.375" (Casing ID) 6.25" (Drift ID)		
						0 m	Top of 4 1/2'' slotted liner
Well TD	3,700	2,837	83°	7.811	6.250	4,984 m	7 5/8" Production Liner



2 –39 : Schematic diagram of CO_2injection wells

2.2.4.4.2 Water Production Wells

The water wells will be equipped with electrical submersible pumps (ESPs) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure. The produced water will be piped to the water treatment facilities on the existing Delta platform, from where the treated water will ultimately be discharged to the sea.

The evolution of water well operations is expected to be as follows, according to simulation studies:

- The two water production wells will operate at a production rate of up to 7,500 bwpd each during the period 2025-2030 (6 years).
- Water production will increase to 9,000 bwpd per well in 2031 and until the end of the Project.
- The capacity of 7,500 bwpd/well is achieved by operating the electric submersible pump (ESP) at 83% of its capacity, while the 9000 bwpd/well capacity is attributed to the operation of the electric submersible pump (ESP) at 100% of its capacity.

The water well layout will be similar to that of the CO_2 injection wells.

2.2.5 Auxiliary Facilities

The existing auxiliary facilities at Prinos include steam and electricity generation, seawater desalination, air network, fuel systems, closed cooling system, open cooling system with seawater, nitrogen supply, firefighting network, and flare system.

The **table** below shows the excess capacity of the available auxiliary (land-based) facilities:

Table2 –7 : Available capacity of auxiliary systems land-based facilities

Auxiliary system	Unit	Available capacity
Steam @ 20.6 barg	t/h	40
Steam @ 4.8 barg	t/h	40
Power	MW	1 (estimate)
Cooling water @ 4.8 barg	m3/h	1700
Air @ 6.9 barg	Nm3/h	400

The facility's air network provides up to 1,575 m^3 /h of dry air at 6.9 bar.

The auxiliary systems available at the Prinos offshore facilities are:

- Chemicals - demulsifier and corrosion inhibitor, biocides, etc.,
- Dehydration of sour natural gas with triethylene glycol (TEG),
- 3 air compressors (total capacity 1,000 Nm^3 /hour),
- 4 seawater pumps (135 m^3/hour each),
- Diesel,
- Drinking water,
- Communication network.

2.2.5.1 Electricity network

The Sigma facilities are connected to the 150 KV DESMIE network via a ring connection from the Kavala and Iasmos branches. The two high-voltage power lines from Kavala and Iasmos are connected to the outdoor substation at the 150 KV busbar located in the northwestern area of the Sigma facilities.

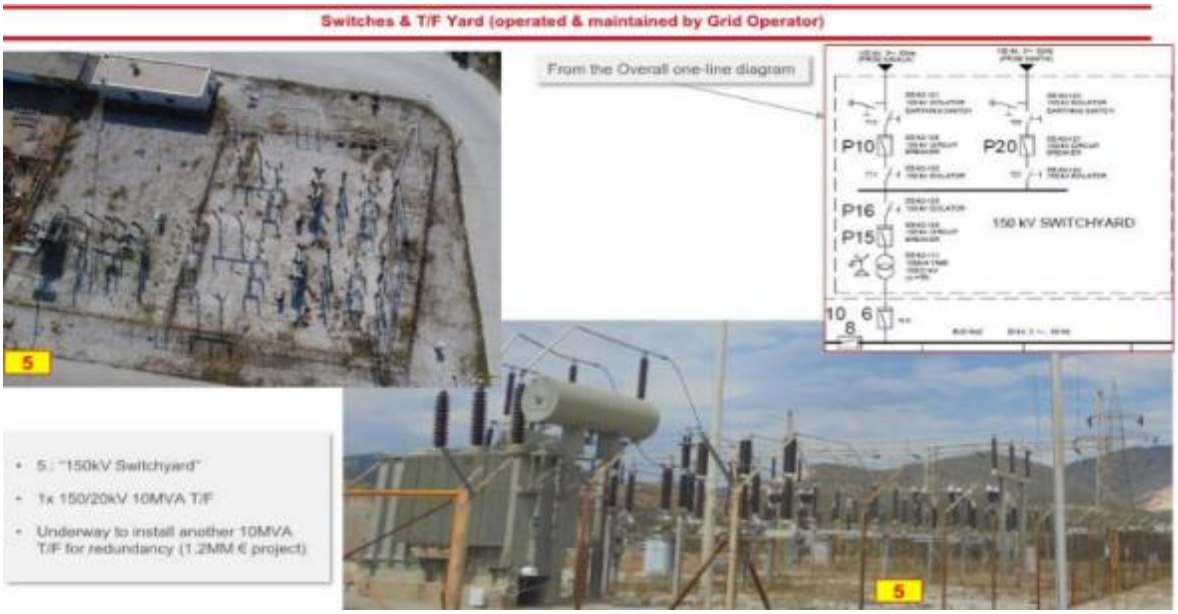
The facilities have a combined heat and power plant consisting of two gas turbines and one steam turbine for power generation, with a total capacity of 17.67 MWel. The power units consist of a pair of steam turbines - 5.5 MW generator with steam extraction of 20.7 bar and 4.8 bar and two 5.5 MW gas turbines with two 7,150 MVA generators.

There is also a 1,200 KVA backup diesel generator for starting the gas turbines in the event of a complete power failure from the Hellenic Electricity Distribution Network (HEDNO). A 250 kW G-625 backup generator is available to power the emergency lighting system and the battery chargers (UPS system).

The current energy demand is approximately 6 MW (based on the maximum monthly average energy consumption during the period 2016-2022), of which energy consumption at offshore facilities is approximately 4 MW.

The location of the main electrical and control installations at the Sigma onshore facilities is shown in **the** following **figure**, while the **next figure** shows the electrical substation (open type).

2 –40 : Location of the main electrical and control installations at the Sigma facilities



2 –41 : Connection of the Sigma facilities to the electrical grid

Electricity is supplied to the Delta platform from the onshore facilities via 20 km of submarine cables (2 x 3C-120 mm² , 20 kV), which currently provide up to ~ 4 MW of power.

In relation to the **needs of the new facilities**, no increase in energy demand is expected for the **onshore facilities**, as no processing is planned for either CO_2 loads or the quantity delivered by pipelines.

The following main electrical installations are planned for **the offshore facilities** during Phase 1:

- Two Electric Submersible Pumps (ESPs) with a capacity of approximately 0.5 to 1 MW each are planned for pumping the water produced from the water wells on the Beta platform. Power will be supplied to the pumps via power cables fed by variable speed drives (VSDs) located in the electrical room of the Beta platform. Subsequent phases of development will require the installation of additional water wells and corresponding submersible pumps and drive systems, with a corresponding increase in power requirements.
- Heating and pumping/compression equipment will operate on the upper deck of the Beta platform to process CO_2 to the conditions required for injection.
- The required control, power supply, and hydraulic systems will be installed on the "Christmas tree" surface valves from the hydraulic power unit and the head control panel.

2.2.5.2 Natural Gas Network

The natural gas fuel used at the Prinos facilities and the Sigma plant is a mixture of three types of sweet natural gas, as it comes from the Prinos deposits, the South Kavala deposit and the DEPA S.A. network via the PFIC Ltd (formerly VFL) fertilizer plant.

The points of natural gas consumption are the glycol furnace (Delta platform), the acid water stripper (Delta platform), and, at the onshore facilities, the B-611/B-612 steam boilers, the GT-1/GT-2 gas turbines, the H-

611 steam superheater, the sulfur unit incinerator, the ME-649 flare pilots, and the H-504 Sulfreen unit regeneration furnace.

2.2.5.3 Steam Production

Steam for the operational needs of the Sigma facilities is produced as follows:

- Two 36.6 t/h combustion boilers and two 22.7 t/h waste heat boilers (sulfur plant) produce 79.9 t/h of saturated steam at 41.4 bar.
- A 79.4 t/h superheater produces 41.4 bar steam at 420°C.

Part of the 41.4 bar superheated steam (at 420°C) is used in the steam turbine of the G-624 electric generator, from where it is fed into the 20.7 bar and 4.8 bar steam systems. The rest is superheated to 371°C with boiler feed water in the two DSV-603 A/B superheaters. This steam is then used in the steam turbines of engines, pumps, compressors, and blowers necessary for the operation of the facilities.

2.2.5.4 Cooling Systems

The open seawater cooling system (one-through) consists of two 2,497 m^3/h pumps at 4.8 bar (one standby) that supply water to the heat exchangers.

The closed-loop (fresh water) cooling system consists of a seawater-cooled heat exchanger and two 79.5 m^3/h (one standby) for supplying water at 3.45 bar to compressors, turbine and pump bearings, and other equipment requiring fresh water cooling.

2.2.5.5 Nitrogen supply

There is a special liquid nitrogen storage tank at the Sigma plant's onshore facilities, equipped with special evaporators to supply nitrogen gas to the plant's distribution network. There are also portable nitrogen gas supply systems (arrays) for the use of nitrogen in the land facilities as needed.

2.2.5.6 Fire, Hydrogen Sulfide, and Explosive Gas Detection System

The Sigma factory's land facilities are covered by a dense network of detectors of various types, depending on the requirements of the areas they protect. In the factory's central control room, there is a special panel that displays visual (indicator lights with coded colors) and audible (buzzers) signals indicating the area and the cause of the detectors' activation. The installation includes:

- Smoke (ionization), heat, explosive gas, hydrogen sulfide, hydrochloric acid, chlorine gas detectors,
- Building pressure loss detectors,
- Manual fire, hydrogen sulfide/gas leak alarm switches,
- Light repeaters,
- Local fire/danger alarm buzzers,

- Portable gas and hydrogen sulfide detectors.

Existing offshore facilities operate flammable gas, H_2S, and fire detection systems, which are connected to the fire and gas control panel in the Delta platform control room.

For the purposes of the new CO_2storage project, systems will be installed to prevent CO_2leakage, in accordance with the specific Monitoring Plan.

2.2.5.7 Emergency Shutdown Systems

In the event of an emergency, the operation of the Sigma plant's onshore facilities can be stopped manually or automatically. Specifically, there are:

- Manual emergency shut-off switches that stop the flow in the subsea argon and acid gas pipelines (in the control room and at the gate).
- Manual emergency hold switches for the U-500 sulfur production unit and equipment
- An automatic emergency shutdown system with fire and flammable gas detectors in the gas turbine unit.
- Emergency shutdown system for the facilities in case of operational malfunction (high/low pressures or levels).
- The basic equipment also has local manual emergency stop switches for selected units.

In **the new** bulk CO_2receiving **facilities** under study, the import riser for the CO_2pipeline to the offshore facilities will have emergency shut-off valves (ESDV) for isolation.

2.2.5.8 Firefighting Network

Seawater is used in the fire safety network of the Sigma plant's onshore facilities. The required amount of water is provided by two supply pumps, each with a capacity of 681 m(3) /h at a pressure of 8.6 bar, the main one being electrically powered and the backup one being diesel-powered. The pressure in the fire safety network is maintained by a Jockey pump, which has a supply of 28.4 m^3/h at a pressure of 7.9 bar. The three pumps draw water from the seawater intake basin on the premises. The seawater pumps for the factory's operational needs (equipment cooling) are installed in the same area as the fire safety pumps. There are two of these pumps, each with a supply of 2,497 m^3/h each (one is a backup) at a pressure of 4.8 bar. There is a provision for a permanent 8" connection from the cooling pumps to the discharge of the fire safety pumps in the unlikely event of failure of both fire safety pumps. The fire safety water distribution network consists of an underground 12" diameter pipe circuit and is divided into loops with 25 valves, so that water can flow from two different directions and any part of the network can be isolated in the event of a failure.

Four seawater pumps (135 m^3 /hour each) are installed on the Delta platform. The firefighting system supplies the required firefighting water (seawater) to all Prinos platforms, either manually or automatically,

based on the activation of two fire detectors. The firefighting water (with a supply of 455 m^3/hour) is supplied by a diesel pump and an electric firefighting water pump.

No modification of these systems is expected to be required for the needs of the new Project.

2.2.5.9 Drinking water supply and network, water softening unit

The drinking water system of the Sigma factory's land facilities includes:

- A 6" water supply pipe from Paradisos, 1 km long, from the 16" Paradisos - VFL main water pipe.
- P-631A supply pump with a capacity of 5.7 m^3 /h at 4.8 bar (used only when the pressure of the central pipeline of Paradisos is low).
- V-630 pressure tank with a capacity of 1.9 m^3 supplying the distribution network (offices, workshops, chemical laboratory, control room, changing rooms, guardhouse) and the LV-601A automatic supply valve. The pressure in the V-630 tank is achieved with trapped air. An increase in pressure (3.5 barg) means an increase in the tank level and automatically closes the automatic valve, stopping the supply. Conversely, a decrease in pressure (2.0 barg) means a decrease in the level of the container and automatically opens the valve to continue the water supply.
- CH-630 chlorination system for periodic water chlorination.

The water softening unit (WDU), with a capacity of 30 m^3/h, operates with a supply of 5-8 m^3/h Paradisos to compensate for losses in the boiler water supply network. The unit consists of a sand filter, cation exchanger, carbon dioxide degasser, anion exchanger, and mixed ion exchange unit.

2.2.5.10 Communication, Monitoring, and Control Systems

The new land-based facilities will be monitored and controlled from the existing Central Control Room (CCR) and Local Equipment Room (LER) at the Sigma plant.

The VHF and telecommunications network infrastructure is available at existing offshore facilities, which are connected to onshore facilities via high-frequency links. The activities of the new $CO_{(2)}$storage project in Prinos will use the existing communications network.

2.2.6 Construction Phase

2.2.6.1 Onshore Facilities - Structural Works and Layouts, CO_2Reception and Management Equipment

The planned equipment will be prefabricated off-site and delivered by truck to the construction site, where it will be unloaded by crane. The construction work for the onshore facilities will include the following:

- Geotechnical sampling and data collection.

- Site preparation for equipment foundations.
- Concrete work 0.5 m thick for the foundation of base plates. The excavation area will be limited to the points where the bases of the land equipment will be placed and is estimated at approximately 50 m². The estimated excavation area for the land section of the pipeline is 200 m(2) ·with a depth of 3 m.
- Once the pipeline area has been excavated, the area will be backfilled with the same material.
- Installation of pipe assemblies and welding. The pipes will be installed in the ground on the new foundations, without the need for protective covers, as is customary for pipes in land installations.
- Connection and testing of electrical network and instruments.

2.2.6.2 CO_2 Transport Pipelines To Storage

General Information

The subsea pipeline will be buried along its entire length to protect it from fishing activities (trawlers) in the area. On the land section, the burial depth will be 2 m from the **top of the pipeline (Top Of Pipe - TOP)** for the first 500 m, and 1 to 1.5 m (TOP) for the offshore section.

The pipeline construction work will be carried out in five phases:

- **Phase 1:** Geophysical and geotechnical surveys along the pipeline route (1 month).
- **Phase 2:** Works to bring the pipeline to shore, with dredging of a 500 m section from the coastline, in the area of the pipeline head at the Sigma plant. The trench will be approximately 3 m deep along its entire length and will end at sea floor level at the end of the 500 m zone (6 months).
- **Phase 3**: Installation of subsea pipeline and hydraulic testing using a specialized pipe-laying vessel (2–3 weeks).
- **Phase 4:** Installation of a riser pipe on the existing Beta platform and diving operations to connect the riser to the end of the subsea pipeline (1 week).
- **Phase 5:** Final testing and commissioning (1 month).

The above phases are described in more detail in **the** following **sections**.

2.2.6.2.1 Phase 1: Geophysical and geotechnical surveys

Prior to the commencement of works and in order to determine the final route of the pipeline, a series of geophysical and geotechnical surveys will be carried out in accordance with standard industry practices.

- **Geophysical Survey**: A small 15 m long vessel equipped with seabed scanning equipment will be used to provide basic data within the pipeline corridor, such as bathymetry, any objects, existing pipelines, cables, and soil profiles up to 5 m below the seabed. After processing the results, the final route will be determined.
- **Geotechnical Survey**: After processing the results of the geophysical survey, soil samples will be taken with a grab and **core sampler (Box-corer),** which will be sent to laboratories for analysis of soil data, strength, friction coefficients, and grain size distribution.

2.2.6.2.2 Phase 2: Works for Approaching the Pipeline to the Coast

Before starting to lay the pipeline in the section of the pipeline route near the coast, a 500 m open trench must be excavated. The equipment used to excavate the trench will be standard dredging equipment for port works, such as a grab on a barge and a buck for the deeper parts of the trench (see the following **figure** for a typical example).

2 –42 : Trench excavation equipment

The excavated material will be kept at the side of the trench for subsequent backfilling after the pipeline has been laid in the trench, so that the pipeline is completely covered in its final state. The volume of excavated material from the seabed is expected to be approximately 7,500 m(3).

The excavators will complete the trench in the section of the route near the coast, up to the point of connection with the onshore pipeline.

Prior to the start of pipeline laying operations, a 300 Te winch will be installed at the designated pipeline termination area onshore. The winch wire will be placed in the trench, up to a water depth of 12 m, at the end of the trench and marked. The end of this cable will then be used by the vessel to lay the pipeline.

2.2.6.2.3 Phase 3: Installation of Submarine Pipeline

The 20 km pipeline will be installed by **a special pipe-laying and trenching vessel** (see **figure** below), together with two support supply vessels/tugs. The pipeline will be manufactured in a steel pipe factory, transported by ship to the nearby commercial port of Philippos B, and stored in a secure area accessible to the port quay. The pipeline will be loaded by crane onto the support vessels and delivered to the pipe-laying vessel.

2 –43 : Typical pipe-laying vessel (S-lay method)

The **S-lay method** for pipe laying is the oldest and most commonly used method for installing offshore pipelines. It is so named because the pipe takes on an S shape during installation (Error! Reference source n ot found.).

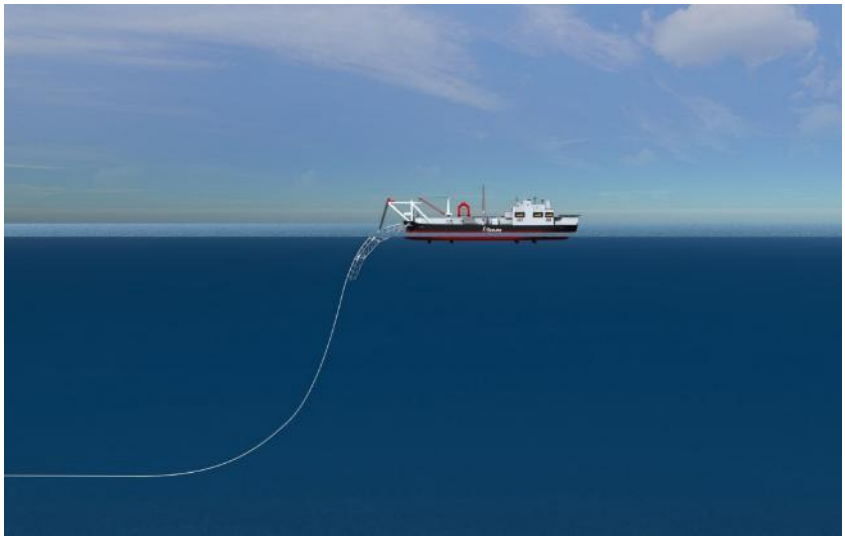


Figure2 –44 : S-Lay Method

When installing the pipeline using the S-lay method, the pipeline is left loose from the stern of the installation vessel as it moves forward. The pipeline is moved into the sea until it reaches the seabed (**touchdown point,**Error! Reference source not found.). Each pipeline joint is welded to the vessel and removed from the v essel. A stern cable, up to 300 ft (~91 m) long, helps support the pipeline as it is transported in the sea. Some installation barges have an adjustable cable.

2 –45 : Schematic representation of the S-Lay method

The S-lay method can be used to lay any size of pipe, making it ideal for water depths of up to 600 m. The pipe is welded horizontally (see **figure** below). Depending on the capacity of the vessel, the pipe can be laid at a speed of up to 2–4 km per day and can be up to 60" in diameter.

2 –46 : Welding of the pipeline to the S-Lay method application barge

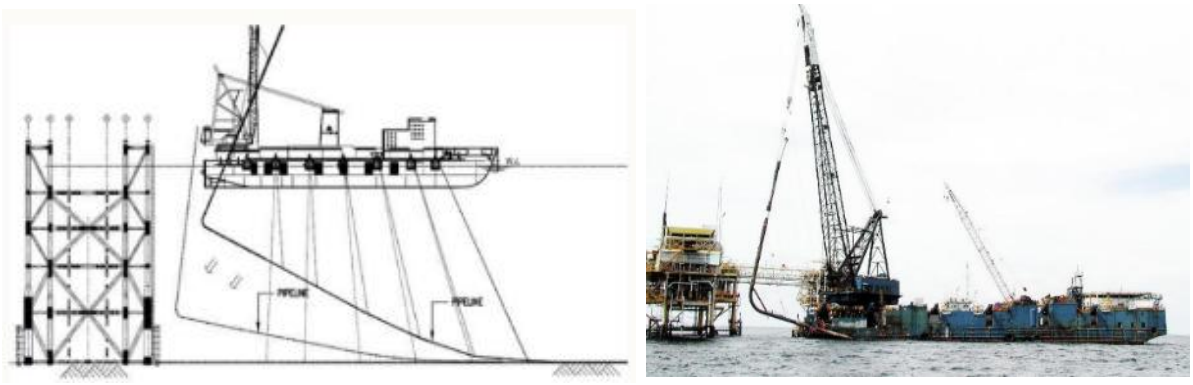
This method requires high longitudinal tension to prevent excessive bending at **the point of contact with the seabed (sag-bend)** and at **the point of removal (over bend)**.

The duration of the pipe laying operations is expected to be approximately 2-3 weeks, during which marine mammal observers will be present on board the vessel. Emissions from this type of vessel are comparable to those from conventional ships. Due to the short duration of the work, waste will be stored on board the ship and disposed of appropriately once the work is complete.

Once the pipeline is installed, it will be filled with chemically treated water and subjected to a hydrostatic test. The test will be conducted at a pressure determined by best practices, which is typically between 1.2 and 1.5 times the maximum design pressure of the pipeline.

2.2.6.2.4 Phase 4 - Installation of Lifting Pipeline on Beta Platform, Connection Works

After installation, the pipeline will be connected to the lifter on the existing Beta platform (see **Figure** below). The connection can be performed either from the pipeline laying vessel or from a special diving support vessel. The existing platform will be prepared by divers, who will install clamps on its infrastructure supports so that the new hoist can be supported. Prior to installation, the new hoist will undergo a hydrostatic test.



2 –47 : Installation of lifting pipe on Beta platform, connection works

2.2.6.2.5 Phase 5 – Trench Excavation and Pipeline Protection, Commissioning

After the pipeline has been installed and connected, it will be buried along its entire length. The process is supported by appropriate equipment and a special work boat.

The following tools can be used for burial:

- A pipe burial excavator (plow), driven by a support vessel, passes over the pipe axis and creates the trench.
- A launch sled, supported by a special boat, with high-pressure jets that pass over the axis of the pipeline and form the trench as it is pulled along the pipeline.
- A hydrofoil, supported by a special vessel, uses an underwater fan to remove the soil beneath the pipeline and form the trench.

Multiple passes may be required to achieve the desired burial depth of the pipeline (1.5 to 2 m TOP), depending on soil conditions. Due to the nature of the soils and the very strong bottom currents in the area, the pipeline trench will be naturally backfilled without additional work.

Excavating the trench before laying the pipeline over a length of 20 km is economically unfeasible, so this option is rejected. In places where backfilling after pipe laying is not possible due to accessibility or proximity to other structures or the platform, the exposed sections of the pipe will be covered with a layer of concrete for additional protection.

After completion of the offshore construction work, the pipeline will be drained of water using a series of pumps from land and the remaining moisture will be removed using chemicals (**monoethylene glycol – MEG)** so that it is completely dry and ready for commissioning. MEG is a recyclable substance included in the

PLONOR list[1] and will be recovered for disposal by a certified company. A special study will be carried out prior to the construction phase to confirm the exact quantities of MEG to be used.

2.2.6.3 Injection Wells and Water Wells

The existing wells on the Alpha and Beta platforms at Prinos will remain operational during the CO_2 storage project under study, except for the four (4) wells that have been selected as **donor wells**.

The activities related to the drilling of four new wells from side wells as starting points are described below. The wells will be drilled using a jack-up drilling rig. All four new wells will be constructed using conventional methods, using telescopic pipes with a size that decreases with depth. The pipes will be cemented in place, and the cement will be located in the annular space between the pipe and the rock wall.

Two of the wells will be used as CO_2injection wells and two as water production wells for the relative pressure equalization of the reservoir, but all will be drilled with **a TDS (Top Drive System) drilling unit** and directed with a combination of mud motors and rotary drilling assemblies, depending on the required angle and inclination. The cuttings will circulate outside the hole, pumping the drilling mud through the drill string out through the nozzles at the cutting edge and then back up into the annular space of the well. The drilling mud will be water-based during drilling through the section up to the formation of the Brown marker[2] , while it will be oil-based in the section of the evaporite cap and reservoir. The weight of the mud varies depending on the pressure of the fluids in the layers to be drilled. Chemicals such as **barite** are used to add weight to the drilling mud.

2.2.6.3.1 Drilling rig

To ensure safe drilling operations, a Jack up type drilling rig with a power of +/- 2,500 hp will be used, with a Top Drive system and 3 high-pressure mud pumps. The drilling rig must have the required storage tank capacity to serve the drilling mud system. The CROSCO Labin unit is an indicative type of drilling rig (Error! R eference source not found.) that can be used in drilling operations, designed and manufactured in accordance with API 4F and the latest European regulations, including low emission standards, fully certified according to ATEX.

[1] OSPAR List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment (PLONOR) – Update 2024 (https://www.ospar.org/work-areas/oic/chemicals)

[2] At the base of the post-evaporitic sequence and at the top of the evaporites, there is a layer that serves as an indicator and is called the "Brown Marker." It is a marl, light to moderately gray, thin, highly moist, calcareous to very calcareous, sometimes solid to very hard with a series of dark clay layers.

2 –48 : Jack up Labin drill rig – Recommended drill rig type for the Project

2.2.6.3.2 Drilling methodology

2.2.6.3.2.1 General Information

Drilling can commence once the drilling rig (Jack up) is connected to the Beta platform. The following sections describe the main elements of the drilling process:

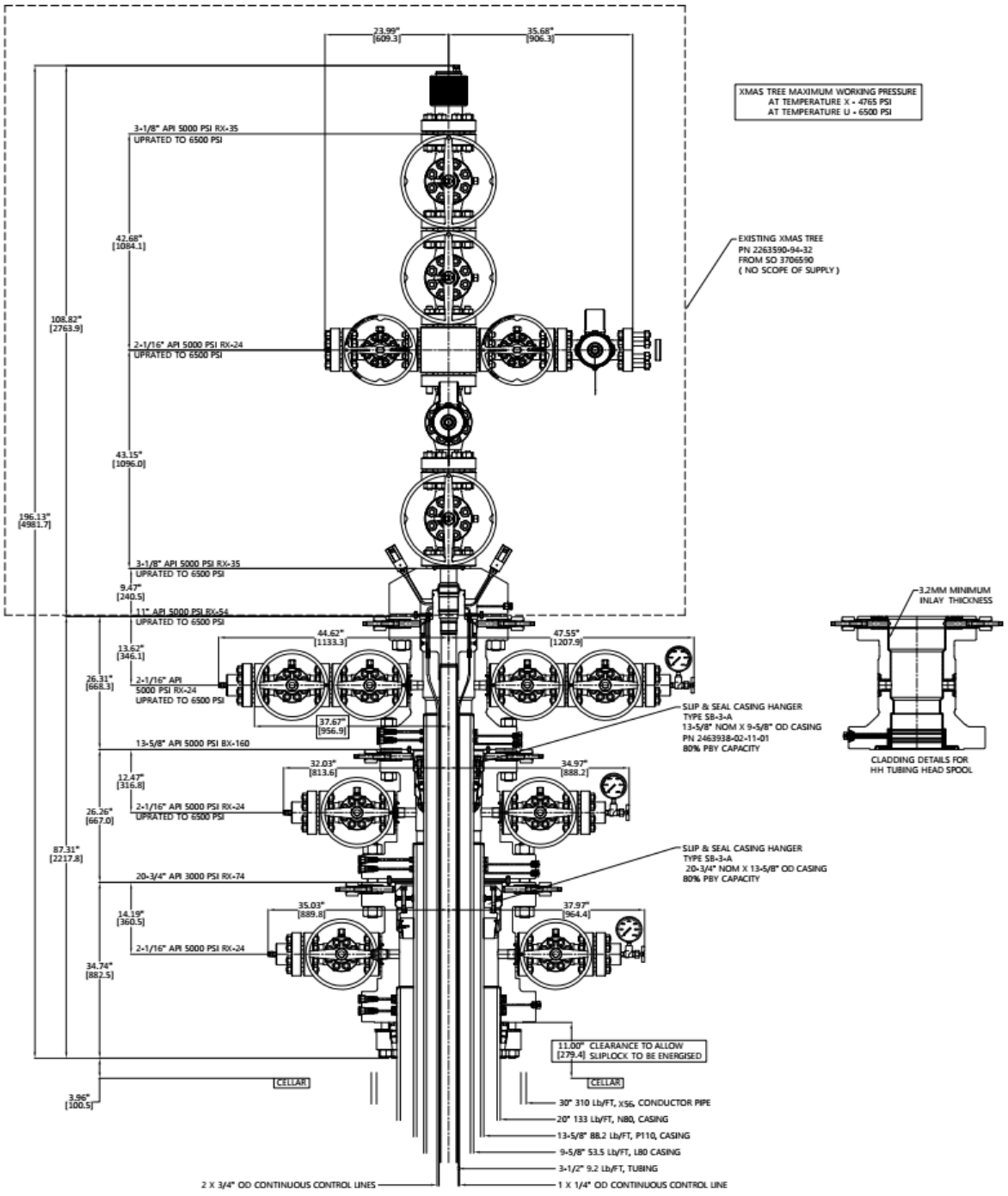
- Drilling mud
- Piping
- **Blow Out Prevention (BOP**) mechanism,
- Drilling, Cementing and Completion,
- Loss management.

The RSS (Rotary Steerable System) method will be used for drilling. The decision to use the RSS technique for drilling 16", 12 ¼" and 8½" cross-sections is justified as follows:

- Increased drilling efficiency is achieved due to higher **penetration rate (ROP)** when correcting verticality, if necessary.
- It is the best way to confirm the position of **the casing shoe** with the possibility of using gamma ray emission instruments near the cutting edge (**near-bit gamma ray**).
- It ensures better control of the drilling direction.
- Smoother correction of the verticality of the drilling is achieved, which facilitates the installation of pipes and the recording of data with wired instruments to the total depth.

- There is reduced total wellbore deviation.
- The risk of differential sticking is reduced since drilling is performed by rotating the entire drill string.

Before drilling begins, a blowout preventer (BOP) will be installed. The BOP is one of the **main barriers** that ensures that fluid entering the well during drilling cannot reach the surface at the level of the drill. In each new well, the BOP is installed when the surface protection pipe has been guided to the required depth. The existing well is initially suppressed, the **Christmas Tree** is removed**,** and the BOP mechanism is attached to the wellhead. In general, BOP valves will be inspected and tested every 14 days. Permission to extend the testing of BOP valves beyond 14 days will be granted by Energean's drilling supervisor.



2 –49 : 6,500 psi wellhead system

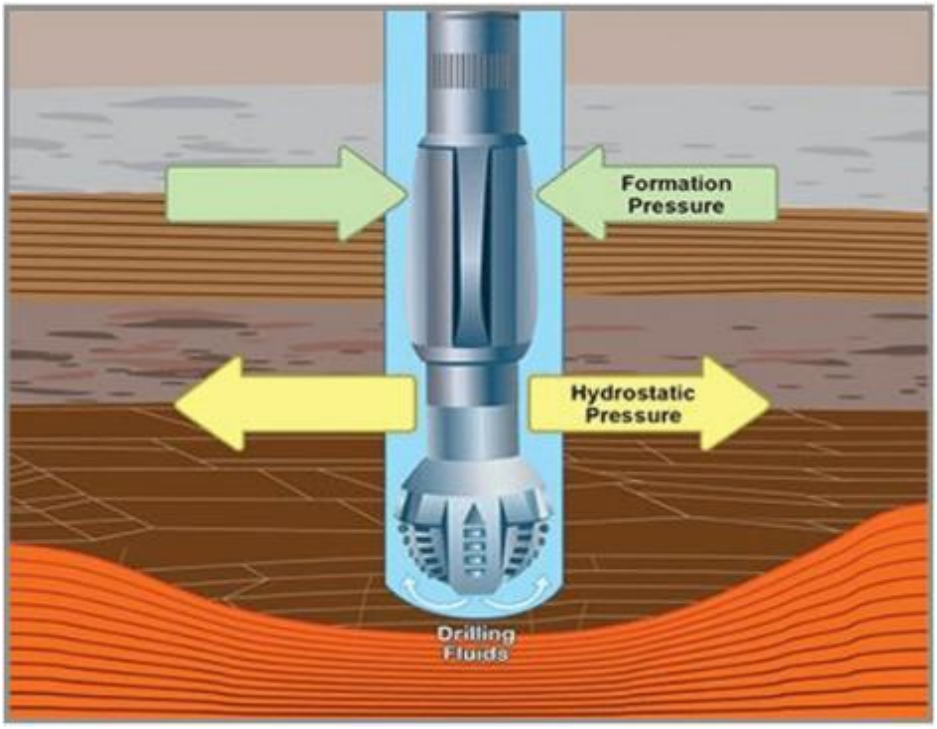
2.2.6.3.2.2 Drilling Mud

The use of drilling mud/slurry throughout the drilling process is necessary for the following reasons:

- It removes rock cuttings from the bottom of the well and transports them to the surface, where they are examined to provide information about the geology of the formation being drilled.
- It protects the borehole walls from collapse (it creates a coating on the walls, preventing the diffusion and loss of drilling fluids during drilling).

- It reduces the temperature and lubricates the cutting edge and the drill string.
- It exerts pressure (equal to or greater than hydrostatic pressure), thus controlling the inflow of fluids from the geological layers into the borehole.

The drilling mud enters the borehole through the drill pipe and then returns to the floor of the drill rig through the annular space formed between the borehole walls and the drill pipes (see **Figure)**. In the drill floor area, the drilling mud undergoes a series of processes so that it can be recirculated into the borehole. Any gases are then safely removed and released into the atmosphere. The rock cuttings are removed in a series of vibrating screens (shale shakers). After the screens, the mud passes through centrifuges where fine debris is removed. The sand that remains in the slurry is removed in settling tanks. If there are gas bubbles, they are removed in a separate tank with a vacuum system. The treated slurry returns by gravity pipes to the storage tanks at the drilling rig and is returned to the drilling rig floor by high-pressure slurry pumps.



2 –50 : Schematic representation of the circulation of drilling mud

2.2.6.3.2.3 Piping

Once a section of a specified diameter has been opened up, a pipe of slightly smaller diameter is inserted into it. This casing reaches the bottom of the opened section to provide stability to the walls of the borehole. Once in place, cement is pumped through a special tool into the borehole and pushed upwards into the annulus where it dries. The cement must completely fill the ring between the pipe and the geological formation. Once stabilized, a smaller diameter borehole is drilled to the bottom of the next section and the above process is repeated. In this way, a telescopic, stable borehole is constructed. The length of each section is defined in the drilling program and is a function of the fluid pressure of the geological formation.

The new wells on the Beta platform do not require **surface casing**, as all four wells will be **sidetracks** and will therefore have the same casing as the existing wells - starting points.

The steps for drilling include installing **a whipstock** to be used as a base for the **sidetrack equipment**, determining the orientation of the sidetrack, and creating an opening using drilling equipment (Error! R eference source not found.).

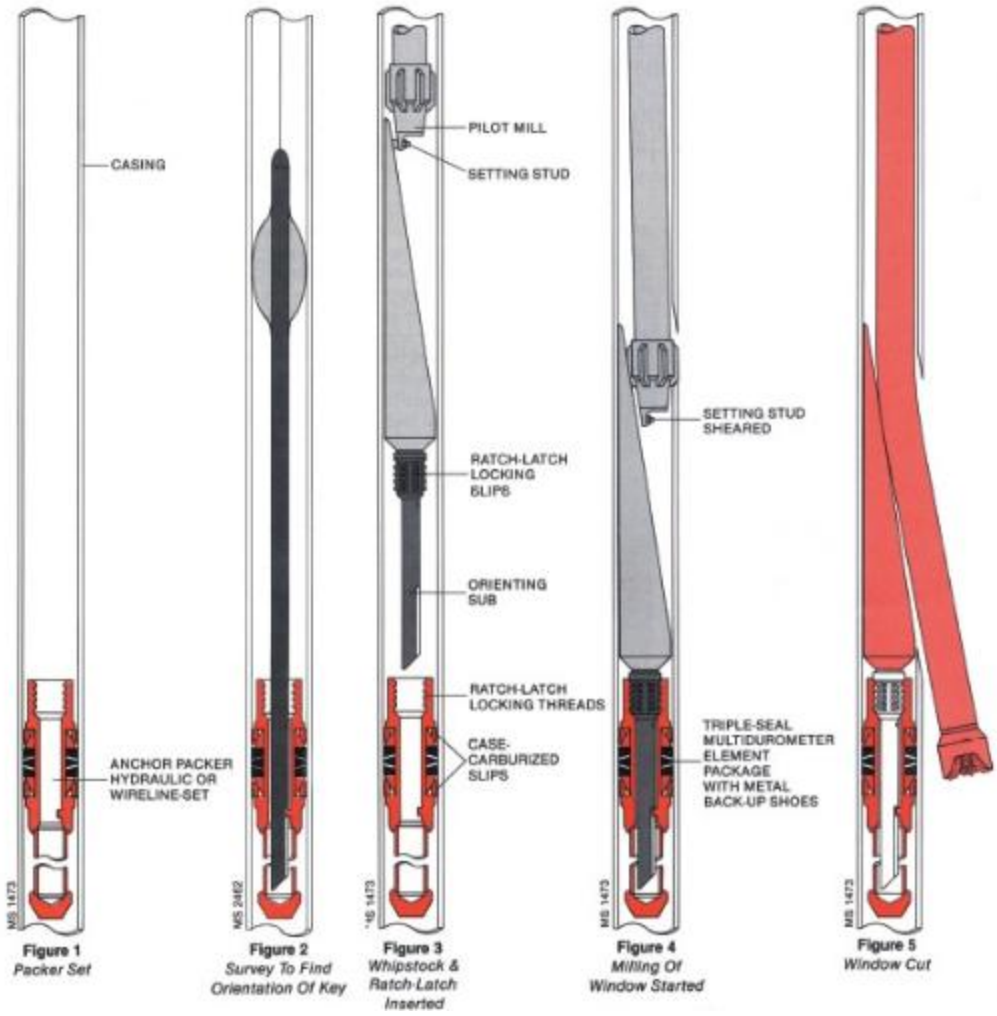


Figure2 –51 : Schematic representation of the side drilling steps

During drilling, no **core** sampling from the reservoir is planned. The drill rig will be equipped with a complete mud data logging unit, with appropriate operators, during the drilling operations.

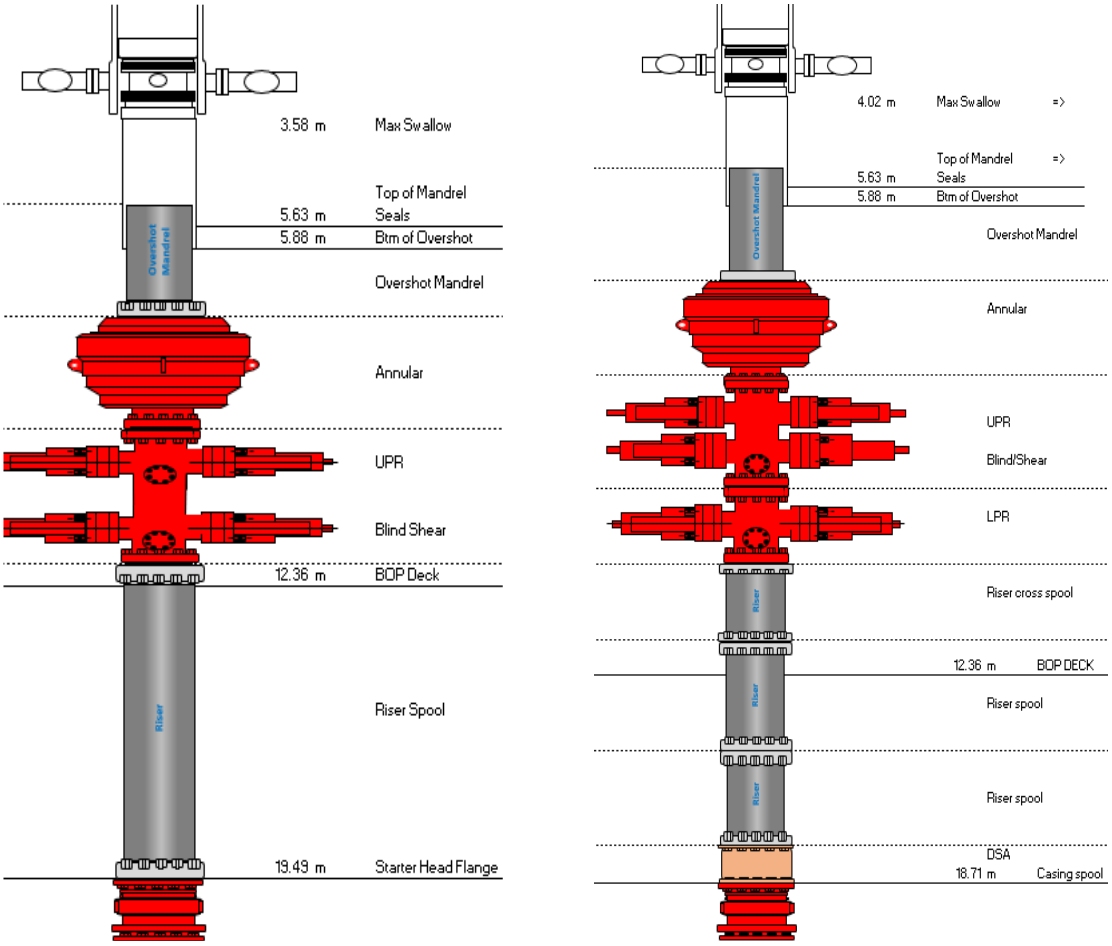
Samples of the geological formation will be taken as described in **the** following **Table**.

Table2 –8 : Formation samples per drilling phase

Cross-section	Sample cutting		Frequency
	No. of samples	Type	
16	1	Liquid	20 m
	1	Washed/Dry	20 m
12 1/4	1	Wet	20 m
	1	Washed/Dry	20 m
8 1/2	1	Wet	20 m
	1	Washed/Dry	20 m

2.2.6.3.2.4 Blowout Preventer (BOP)

Before drilling commences, a blowout preventer (BOP) will be installed (see **Figure** below). The BOP is one of the main barriers ensuring that the inflow of fluid during drilling does not reach the drill bit. In each new well, the BOP is installed when the protective surface casing has been guided to the required depth. In an existing well, it is first suppressed ("killed"), the Christmas Tree is removed, and the blowout prevention mechanism is attached to the wellhead.



2 –52 : BOP assemblies to be used in the wells under study

Any fluids from the geological formation may flow into the wellbore during drilling if the pressure of the formation is greater than the pressure exerted on the formation by the drilling mud. The BOP mechanism consists of a series of valves. When required, these valves can be closed using a container of hydraulic fluid stored on the floor of the drill rig, in cylinders or accumulators. These cylinders are kept fully charged at all times. A loss of pressure automatically triggers the BOP mechanism to close. When the valves close, the well is sealed, preventing fluids from the formation from flowing to the surface. The sudden influx of reservoir fluids into a wellbore is called **a kick.** The fluids can be water or hydrocarbons.

2 –53 : Typical BOP mechanism on a jack-up rig

Before the BOP mechanism is reopened, the fluids in the wellbore are removed and the weight of the mud is increased to prevent further inflow. Increasing the weight of the mud increases the hydrostatic pressure and eventually balances the pressure of the geological formation.

For this process to work properly, special outlet pipes are installed in the BOP mechanism. These pipes are located on the outside of the riser and are connected to a **remote-controlled valve system (choke manifold)**.

2.2.6.3.3 CO_2 Injection Drilling and Water Production Drilling Process

The following describes the program for a CO_2injection well (including the preparation of the existing kick-off well) for each section up to the final depth of approximately **3,700 m**. The following **sections** provide a brief description of the drilling stages.

2.2.6.3.3.1 Preparation of Existing Start Well

For the injection well phase, which is planned to be drilled to a total measured depth of 3,700 m, a **permanent mechanical barrier (bridge plug)** will be installed at a predetermined depth inside the production tubing after the **well has been killed (killing)** of the well. The well is planned to be killed (hydrostatic pressure will be much greater than that of the reservoir) with a special weight drilling mud that will provide a hydrostatic pressure at least 200 psi higher than the reservoir pressure. The production tubing will then be recovered from the mechanical barrier to the surface and a double cement plug will be installed.

Placing the cement plug will achieve complete **isolation between the geological formations (rock-to-rock)**, since at this depth the formation outside the well is impermeable. The next step is to recover the 9 5/8" protective production pipe to approximately 1200 m, in order to create enough space for lateral drilling with a planned hole size of 12 ¼". A mechanical barrier will be placed above the cut 9 5/8" protective casing to serve as a base for the deviation wedge (Error! Reference source not found.).

During the above steps, the "Christmas tree" and the head accessories will be removed from the 9 5/8" protective casing.

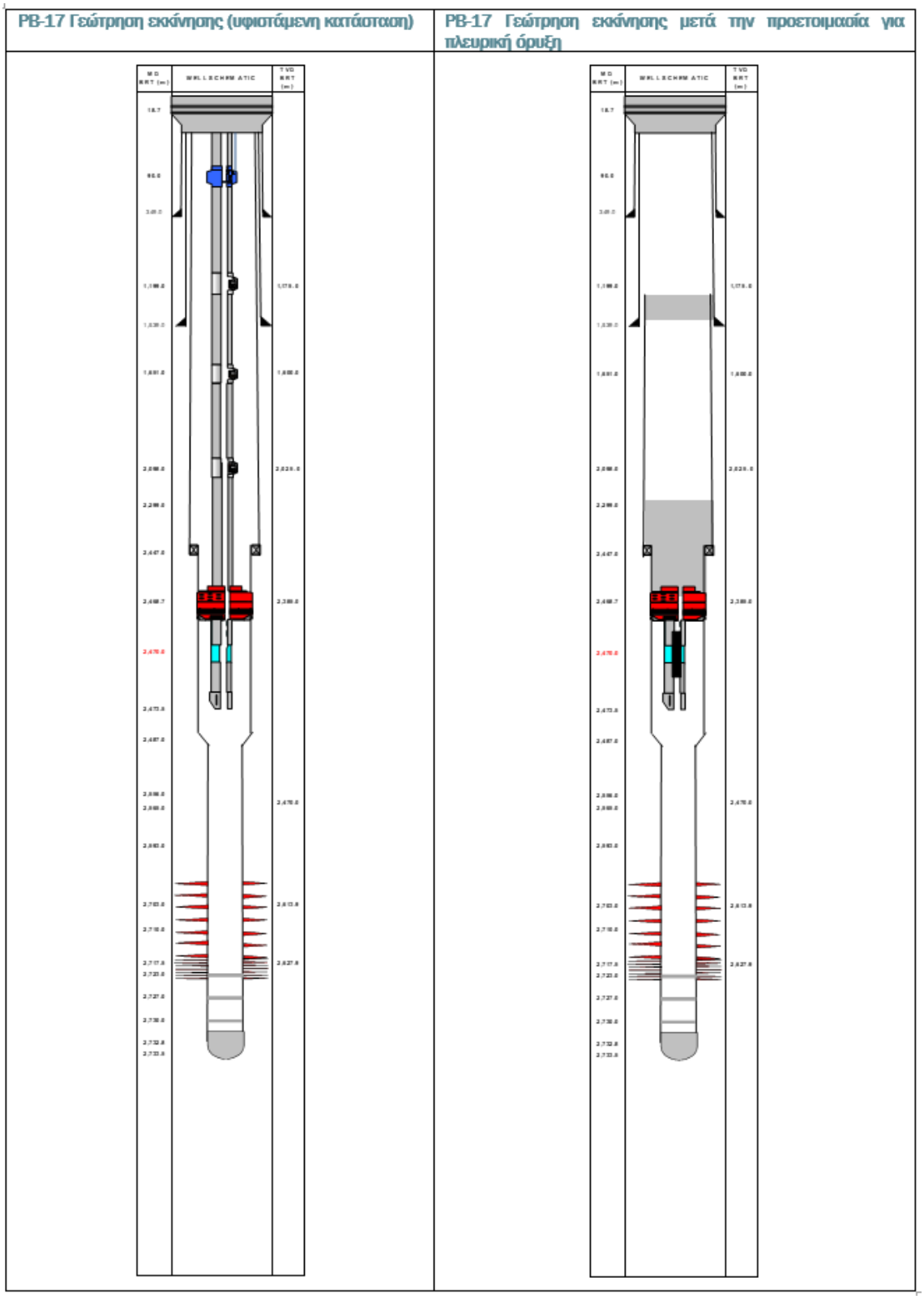


Figure2 –54 : Start drilling and preparation for side drilling of CO_2injection well

2.2.6.3.3.2 16" diameter drilling to a depth of up to ~ 2,200 m

The well will be drilled to a depth of approximately 2,200 m, using a 16" diameter drill bit. High-viscosity mud with a specific gravity of 1.05 to 1.25 SG will be used. Calcium-based mud and water-based mud will be used for this section. The well will be cleaned with fresh high-viscosity mud prior to logging and installation of the 13-3/8" protective casing. The protective casing will be cemented 200 m above the base of the previous casing.

2.2.6.3.3.3 12-1/4" x 13 ½" diameter drilling to a depth of up to +/- 3,150 m

A 12-1/4" x 13 ½" diameter cutting tip will be used to drill to a depth of approximately 3,150 m. For this section, low-toxicity, oil-based mud with a specific gravity of 1.35 to 1.75 SG will be used. The final depth of this phase of drilling will be at the bottom of the evaporite, just above the reservoir section. The protective casing will be cemented with a 200 m cement column above the base of the previous 13-3/8" protective casing and cemented along the entire length of the open geological formation.

2.2.6.3.3.4 8-1/2" diameter drilling to a depth of up to +/-3,700 m

Drilling will proceed to approximately 3,700 m using an 8-1/2" cutting edge. The previous drilling mud will be used. The final target of the CO_2 injection wells is within zones B and C of the reservoir. This will allow CO_2 to be injected into these specific reservoirs without disturbing the productive formations in zone A. In general, the reservoirs in the Prinos field consist of compacted sandstones and sand production is not expected to be a problem. A 7" diameter protective pipe will be cemented along the reservoir section and then **perfo**rated at the preferred depth where CO(2)injection is required.

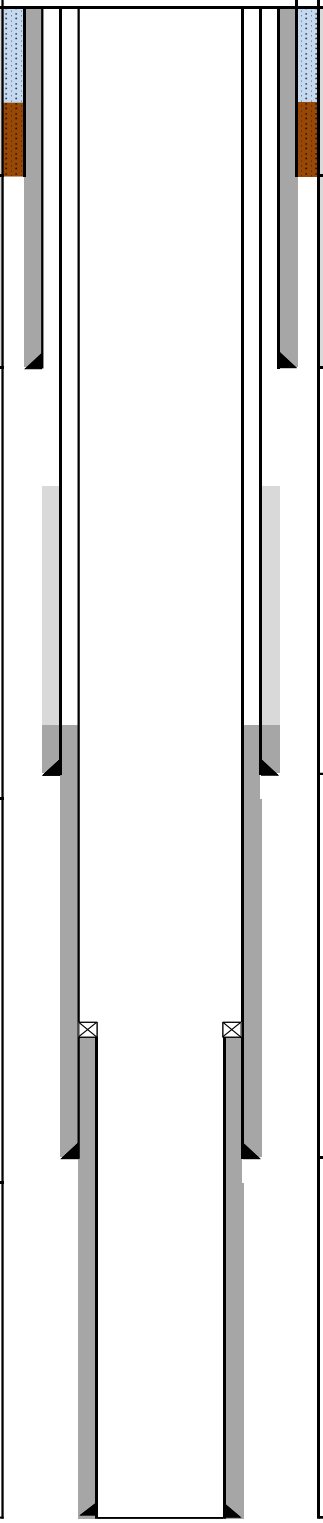
2 –9 : Drilling sections and piping plan for CO_2 injection drilling

Section	Final depth (MD m)	Section length (m)	Section diameter (inches)	Piping diameter (inches)
I	22	185	16	13 5/8
II	3150	900	12 ¼	9 5/8
III	3700	550	8 ½	7

A similar approach will be applied to both water production wells. The following **figure** shows the proposed drilling diagram, where the depth will be finalized during the final stage of well design.

CCS injector Well Status Diagram: Rev A

HOLE SIZE	DEPTH MDBRT	DEPTH TVD RT	INC	Conn OD	Min ID / Drift	CASING DESIGN MDBRT	CASING DESIGN Description
						30.5 m	MSL
Drive						62.0 m	Sea bed
	91	91	0	24.000	22.500	91 m	24" Conductor
22"					17.755" (Casing ID) 17.568" (Drift ID)		
	349	349	3°	18.625	17.568	349 m	18 5/8" Surface Casing
16"					12.415" (Casing ID) 12.259" (Drift ID)		
	2,200	1,850	45°	14.252	12.259	2,209 m	13 3/8" Intermediate Casing
12 1/4" x 13 1/2"					8.535" (9 5/8" ID) 8.500" (9 5/8" Drift ID)		9 5/8" casing from surface to above 13 3/8" shoe, 9 7/8" across open hole
					8.539" (9 7/8" ID) 8.500" (9 7/8" Drift ID)	3,950 m	Top of 7 5/8" Production Liner & 9 5/8" x 9 7/8" XO
	3,150	2,667	68°	10.984	8.500	4,003 m	9 7/8" x 9 5/8" Production Casing
8 1/2" x 9 1/2"					6.375" (Casing ID) 6.25" (Drift ID)		
						0 m	Top of 4 1/2'' slotted liner
Well TD	3,700	2,837	83°	7.811	6.250	4,984 m	7 5/8" Production Liner



2 –55 : Proposed drilling diagram. The depth will be finalized during the final stage of the drilling design.

2.2.6.3.4 Total Drilling Depth Criteria

All wells must be drilled within zones B and C of the Prinos reservoir in order to inject CO_2 and, at the same time, produce water from the aquifers located below zone A of the reservoir. The targets for each well have been determined based on the geomechanical model mapping the reservoir boundaries (seeError! R eference source not found.).

The drilling specifications (see **table** below) are dictated both by the limitations of the facility and by the experience gained from the Epsilon and Prinos wells.

Table2 –10 : Well operating specifications

Maximum CO_2injection rate	102.7 tons/hour
Minimum pump pressure (BHP) for injection wells	3,500 psi
Maximum THP for injection and water production wells	2,830 psi
Maximum water production rate	9,000 bpd
Maximum pump pressure (BHP) for CO_2injection	6,500 psi

The water production wells (see **Figure** below) will be equipped with electric submersible pumps (ESPs) to assist in the production of water from the reservoir aquifer. The estimated maximum water production volume per well will be approximately 9,000 barrels per day. For these needs, two different completion scenarios are being considered for the installation of the ESP pump, in a 7" protective production pipe or in a 9 5/8" protective production pipe. In both cases, the completion tubing was selected to be 4 ½" or 3 1/2" with a 2 7/8" or 3 ½" end, with high-quality connections and construction materials suitable for water production and CO(2)management.

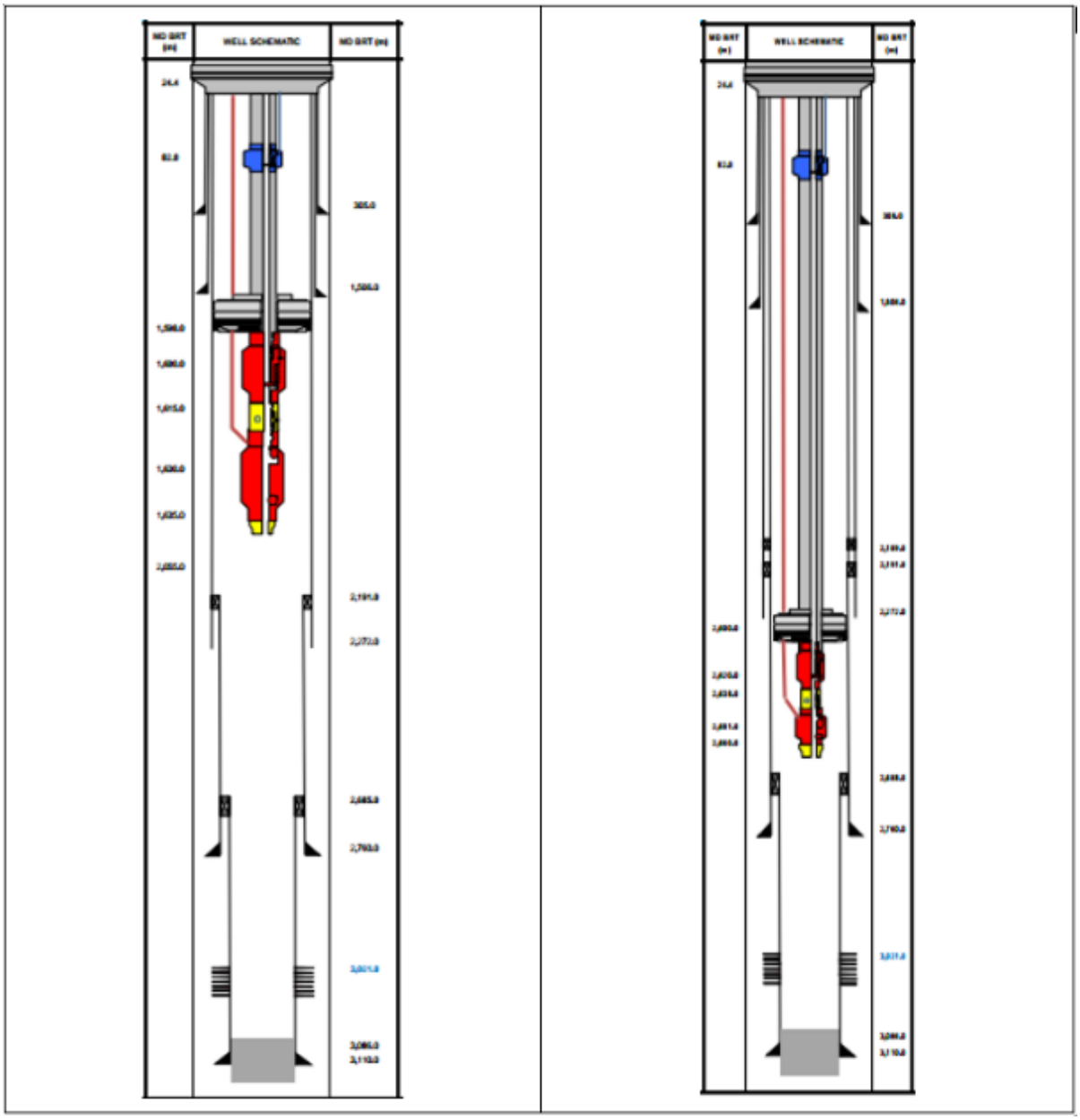


Figure2 –56 : Water wells with pumps at different depths

The choice of materials and quality of protective pipes for the 4 boreholes is presented below (

). The materials for each section will be determined at a later stage and once the design for each borehole has been completed. However, the table below shows a range of materials that have been used in protective pipes for similar projects.

Table2 –11 : Selection of protective piping for CO_2injection and water production wells

Protective piping	Size (in)	Weight (lbs/ft)	Type	Connection	ID (in)	OD (in)	Expansion (psi)	Compression / Collapse (psi)	Tensile strength (Lbs)
Intermediate	13 5/8"	68	L-80	TSH B or similar	12,250	13,886	8,830	4,570	1556k
Production casing	9 ⅝"	53	L80 or 13Cr	TSH B or similar	8.535	9.878	12.390	8,440	1244k
Production pipe (liner)	7'' or 75/8"	32	L80 or 13Cr	TSH B or similar	6,094 / 6,625	7,732/76.25	1246	10780	1025k/895k
Integration piping	3 1/2" and/or 2 7/8"	9.2/6.4	L80 or 13Cr 25Cr	TSH B or similar	2.9/2.4	3.9/3.3	10160 / 10570	10540	207k/145k

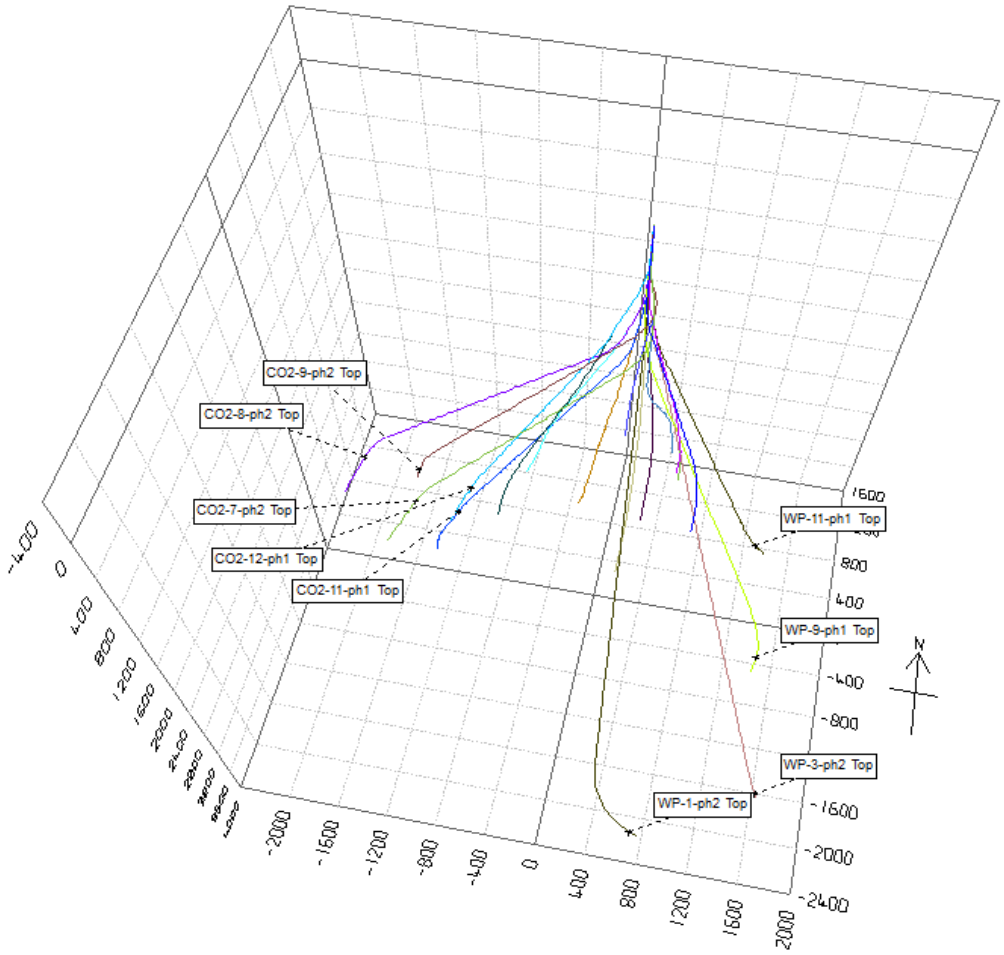
In any case, regardless of the materials, quality, and weight of the protective casing selected, the drilling design criteria shall be met in accordance with the drilling delivery procedure documents. The design of the casing will comply with the following minimum design factors for casing and production tubing:

- Compression/Collapse: 1.0
- Elongation: 1.1
- Tensile strength: 1.4
- Triaxial stress: 1.25

The following available data from relevant neighboring boreholes will be taken into account in the borehole design:

- Protective casing design and placement depth,
- Pore pressure and rock fracture profile,
- Lithological column,
- Drilling constraints,
- Drilling problems,
- Drilling mud and cementing data,
- Sequence of operations and schedule.

The drilling design will aim to minimize risks (see **Figure** below). The identified risks will be listed and mitigation methods will be determined. The final drilling design will reflect the expected operating window of the well during the full life cycle of the well's construction and production.



2 –57 : Target points and drilling trajectories for the Project, including kick-off drilling from the Beta platform

2.2.6.3.5 Typical Drill String Design

The primary section of the well will be 16 inches and will be drilled from approximately 350 m to a depth of 2,200 m. In this section, a seawater-based, biodegradable drilling fluid containing lime will be used, which will have no negative impact on the environment. The geological formation in this section is uniform and consists of sandstone and clay layers, and from all the wells that have been drilled in the area, no traces of hydrocarbons have ever been observed at these depths.

The cuttings from this section will be deposited on the seabed, while below a depth of approximately 2,200 m, the drilling fluids will return to the surface, where the cuttings will be removed and the mud will be processed.

The total volume of drilling mud and additives is shown in **the table** below.

Table2 –12 : Drilling mud program per cross section and additives used

Section	Diameter (inches)	Estimated volume of drilling mud per well (m^3)	Drilling mud system – Main additives
I	16	+/- 700	Gel / Polymer / Lime Additives: Bentonite, Potassium Chloride, Polypac, CMC, Lime, Calcium Carbonate, Sodium Chloride, Flo-Vis.
II	12 1/4	+/- 490	Versavert LTOBM Additives: EDC 95/11, Safe-Scav, Safe Carb, Bentonite, Calcium Chloride, Barite, Versatrol
III	8 1/2	+/- 350	FLO-PRO WBM or Versavert LTOBM Additives: Flo-Trol, Soda Ash, Safe-Scav, Sodium Chloride, Zinc Oxide, Conqor

2.2.6.3.6 Mitigation of Drilling Mud Losses

Circulation losses occur due to drilling mud losses from the wellbore into surrounding geological formations during drilling. In the event of losses, the drilling section does not remain filled with drilling mud when the pumps are turned off, resulting in a reduction in hydrostatic pressure in the well and thus a reduction in the pressure applied to the geological formation of the reservoir. In this case, there is a risk of losing control of the drilling operations. To regain control of the well, and specifically control of the reservoir formation pressure, the losses must be stopped. There are various techniques that can be used in the event of drilling mud loss, depending on the extent of the loss. The additives used seal the perforations and pores of permeable formations to prevent drilling mud losses during drilling and casing. These products react with the drilling mud at the bottom of the well, creating a mass that allows reopening and thus regaining control of the well.

2.2.6.3.7 Well Control

One of the objectives of well design is to maintain the density of the drilling mud so that it exerts hydrostatic pressure on the formations greater than the formation pressure, but not so high as to cause losses. After investigation, suitable depths are selected for the placement of protective casings to restrict loose formations, thus allowing the pressure of the drilling fluids to be increased as required to exceed the pressure of the formations.

In the event of a well blowout, the blowout preventer (BOP) system is activated. In formations above evaporites, it is unlikely that formation pressures will exceed hydrostatic pressure. Since water-based drilling mud has a higher density than water, there is very little chance of a sudden influx of formation fluids into the well under normal conditions. Nevertheless, a Drilling Control Plan will be implemented, which will specify all necessary preventive actions and response measures, in accordance with Best Practices for the drilling program, when the evaporite section is drilled and the pressure is expected to be above normal hydrostatic pressure. Mud weight management is critical in these deeper horizons. In the Prinos wells, the reservoirs below the evaporites have been significantly depleted over the last 35 years and pressures are now lower than hydrostatic. Drilling mud weights are therefore reduced once the reservoir rock cap is penetrated and the evaporite section is isolated with the protective production casing. Low-toxicity oil-based

mud is used when drilling through evaporites to prevent swelling of the interbedded clay formations and thus casing entrapment. The reservoir can also be drilled with low-toxicity oil-based mud, but with a lower fluid system density.

2.2.7 Operational Phase

2.2.7.1 General Information

EnEarth plans to build a full-scale carbon dioxide storage facility in Prinos, capable of storing significant amounts of CO_2. The operation of the facility is planned to be developed in two distinct phases (Phase 1 & Phase 2), for reasons of scalability and adaptation to market conditions, each of which has synergistic prospects that can achieve significant $CO_{(2)}$reductions:

- **Phase 1**: Initial nominal capacity of up to 1 MTPA (starting in late 2025 to early 2026).
- **Phase 2**: Expansion to a final nominal capacity of up to 3 MTPA.

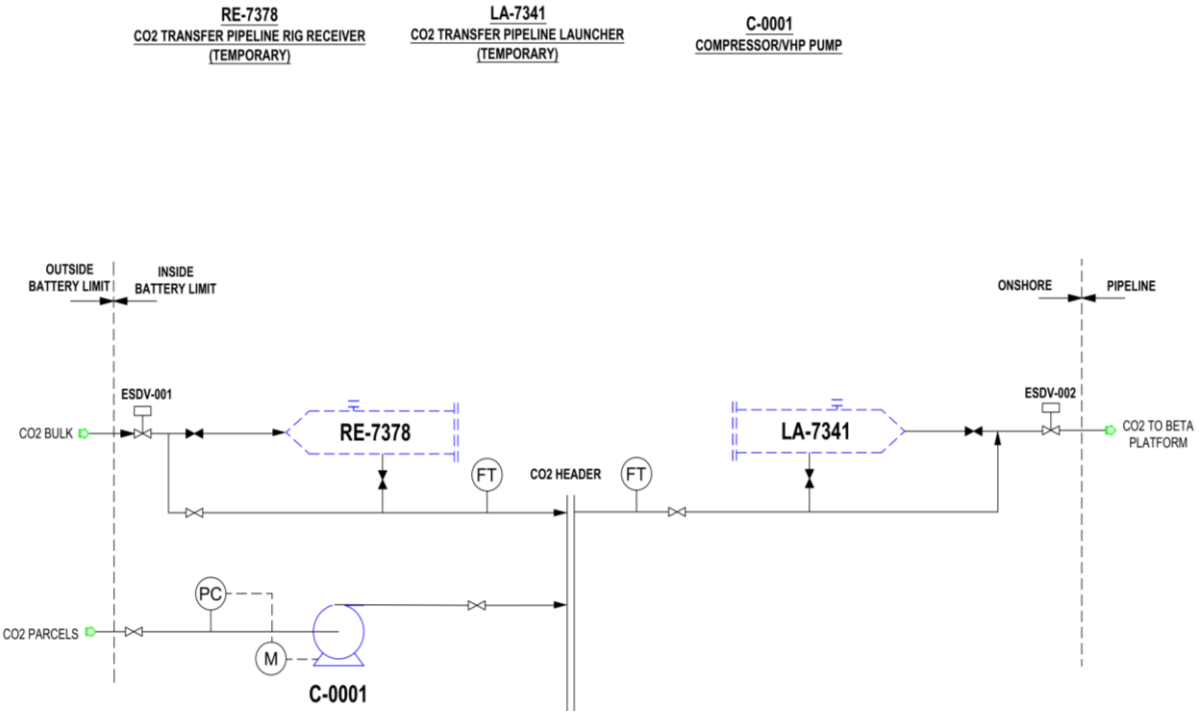
The licensed project concerns **Phase 1 of the facility**, which is described in the following sections. In summary, Phase 1 includes the following CO_2 sources:

- Supply of bulk CO_2 via pipeline to the boundaries of the onshore facility under conditions suitable for injection.
- Receipt of CO_2 loads at the onshore facilities from trucks through CO_2 capture pilot projects.

2.2.7.2 Onshore CO_2 Receiving Facilities and Unloading Operations

The basic reception processes during Phase 1 of the Project's operation will be carried out at the onshore CO_2 reception facilities, which will include (Error! Reference source not found.):

- **Bulk CO_2 supply via pipeline**: An onshore station within the Sigma facility, consisting of the manifold of the onshore CO_2 pipeline, will receive up to 1 MTPA of compressed CO_2 . The $CO_{(2)}$ stream will then be transported via a new dedicated pipeline to an existing offshore platform, where the $CO_{(2)}$ will be injected through special injection wells.
- **CO_2cargo reception**: Cargoes will be delivered by truck to the Sigma onshore facilities and delivered in ISO containers. The containers will be loaded onto supply vessels with cranes, transported and unloaded at the existing Beta platform of the Prinos offshore facilities via a system of flexible pipes (hoses).



2 –58 : Flow chart of CO_2reception onshore facility processes (Phase 1)

There is also provision for the direct injection of CO_2loads from the containers into the receiver manifold at the onshore facilities. This configuration creates the need for a compression station during unloading from trucks next to the receiver area. In this case, trucks will unload ISO containers next to the receiver area. A flexible hose will be used to unload the contents of the ISO containers into the compressor, from where the $CO_{(2)}$ will be directed to the receiving manifold, ensuring that all safety measures for safe operation are observed.

The CO_2reception processes are described in detail below.

2.2.7.2.1 Receipt of Bulk CO_2 via Pipeline

The CO_2 entering the facility via a land pipeline during Phase 1 is expected to be at a pressure and temperature suitable for injection into the storage site (the specifications of the bulk CO2 to be received are presented in **the** following **Table**), without requiring further processing.

2 –13 : Bulk CO_2specifications

Parameter	Value / Description
Source	Underground pipeline
Nominal flow	126 tons/hour
Pressure	102 barg
Temperature	29°C
Composition	SeeError! Reference source not found.

CO_2 is supplied under conditions suitable for injection and is fed to the head, from which it is extracted to the Prinos complex via the CO_2 transfer pipeline (1500#). The intake lift for the $CO_{(2)}$ pipeline will have emergency shut-off valves (ESDV) for isolation. The injection pressure for Phase 1 is 101 barg and the injection temperature is 20°C.

EnEarth, as part of its technical studies, is investigating similar projects in operation in order to understand the challenges associated with CO_2 stream composition and compliance with the requirements of Article 12 of the relevant European Directive (2009/31/EC), which explicitly states that the CO_2will mainly consist of carbon dioxide with possible small amounts of other substances.Error! Reference source not found. presents p ossible specifications for CO(2) expected to be received in bulk through the pipeline and CO_2 . These values are indicative and based on the maturity of the Pilot Programs. The specifications of similar projects in Europe that are at a more mature stage of operation (Northern Lights[3] , Porthos[4]) are also taken into account.

Table2 –14: Possible composition of bulk flow and CO_2loads

Ingredient	Price	Unit
CO_2	>99	mol%
N_2	-	mol%
H_2	50	ppm mol
Ar	-	ppm mol
CO	0.1	mol%
Methane	< 100	ppm mol
Ethane	< 75	ppm mol
Permitted mixture (N_2 +H_2 +Ar+CO+CH_4 +C2)	0.4 (H_2 +N_2 +O_2 +Ar+CH_4 +CO)	mol
Hydrocarbons C3+	0.12 (hydrocarbons C2 - C10)	mol
H_2 O	30	ppm mol
O_2	10	ppm mol
NOx	10	ppm mol

[3] https://norlights.com/news-media-and-technical-reports/
[4] https://www.porthosco2.nl/en/

Ingredient	Price	Unit
SOx	10	ppm mol
H_2S	9	ppm mol
NH_3	10	ppm mol
Aromatic hydrocarbons (C6-C10, incl BTEX)	15	ppm mol
Methanol	40	ppm mol
Solids	1	mg/Nm³
Mercury	3	ppb mol
Cadmium	0.03	ppm mol
Thallium		
VOCs (Formaldehyde, Acetaldehyde, Dimethyl sulfide, Ethanol)	10 (excluding MeOH, EtOH, and aldehydes)	ppm mol
Formaldehyde	20	ppm mol
Acetaldehyde	20	ppm mol
Amines	10	ppm mol
Glycols	Not permitted (MEG, TEG)	ppm mol

2.2.7.2.2 Receipt of CO_2 cargoes in containers (CO_2 parcels)

CO_2 cargoes from pilot projects will be transported to the Sigma plant dock using ISO container trucks. The containers will be picked up with a 50-ton crane, loaded onto the ship's deck (supply ship/transport barge), and transported to the offshore facilities at the Beta platform. The high-pressure containers can store CO_2 at ambient temperatures without energy losses associated with liquefaction and cryogenic storage. The following assumptions are made regarding the quantities of CO_2 expected to be received in shipments and the frequency of deliveries:

- Considering a quantity of 400 tons from Pilot Program 1[5] in the context of the EU's Horizon Europe program, 19 trips will need to be made by a truck with a capacity of 21,375 kg (indicatively, 18 trips with 100% load capacity, 1 trip with 71% load capacity) to deliver the total quantity of CO(2)cargo. A frequency of 1 truck per week is assumed for a period of almost 5 months (19 weeks).
- Considering a quantity of 40 tons from Pilot Program 2[6] in the context of the EU's Horizon Europe program, 2 trips will need to be made by a truck with a capacity of 21,375 kg (indicatively, 1 trip with 100% load capacity, 1 trip with 87% load capacity) to deliver the total quantity of CO(2)cargo. A frequency of 1 truck every 3 months is considered.

The distance that the trucks will travel per trip to deliver the CO_2cargo to Sigma's facilities can be considered 150 km (Pilot Program 1) and 700 km (Pilot Program 2), respectively.

[5] HERCCULES/HORIZON-CL5-2022-D3-01 Call (Project no. 101096691)
[6] COREU/ HORIZON-CL5-2023-D3-01 (Project No. 101136217)

There is also provision for the direct injection of CO_2 loads from the containers into the receiving collector of the pipeline at the onshore facilities. This configuration creates the need for a compression station during unloading from trucks next to the receiver area. In this case, trucks will unload ISO containers next to the receiver area. A flexible hose will be used to unload the contents of the ISO containers into the compressor, from where the $CO_{(2)}$will be directed to the receiving manifold, ensuring that all safety measures for safe operation are observed.

2.2.7.3 Transport of CO_2 to the Offshore Storage Facilities in Prinos

During Phase 1, according to the preliminary design study (pre-FEED), CO_2 will be supplied via pipeline under conditions suitable for injection. It will be connected to the new facilities via a flange connection to the host collector and will be exported to the Prinos offshore facility complex via the new CO_2 pipeline, 18-20 km long, 12-16" in diameter, and 1500# class.

The CO_2 pipeline will initially have a capacity of up to 1 MTPA of compressed CO_2 , but has been designed to be sufficient for the future planned capacity of the Project (3 MTPA CO_2). The jacket's riser connecting to the $CO_{(2)}$pipeline will have emergency shut-off valves (ESDV) for isolation.

With regard to CO_2 cargoes, it is assumed that the supply vessel/tanker transporting the containers will be connected to the pipeline on the platform via a system of flexible hoses. From there, the $CO_{(2)}$ loads will undergo further processing (as described below) to ensure they meet the correct specifications/conditions for injection into the well.

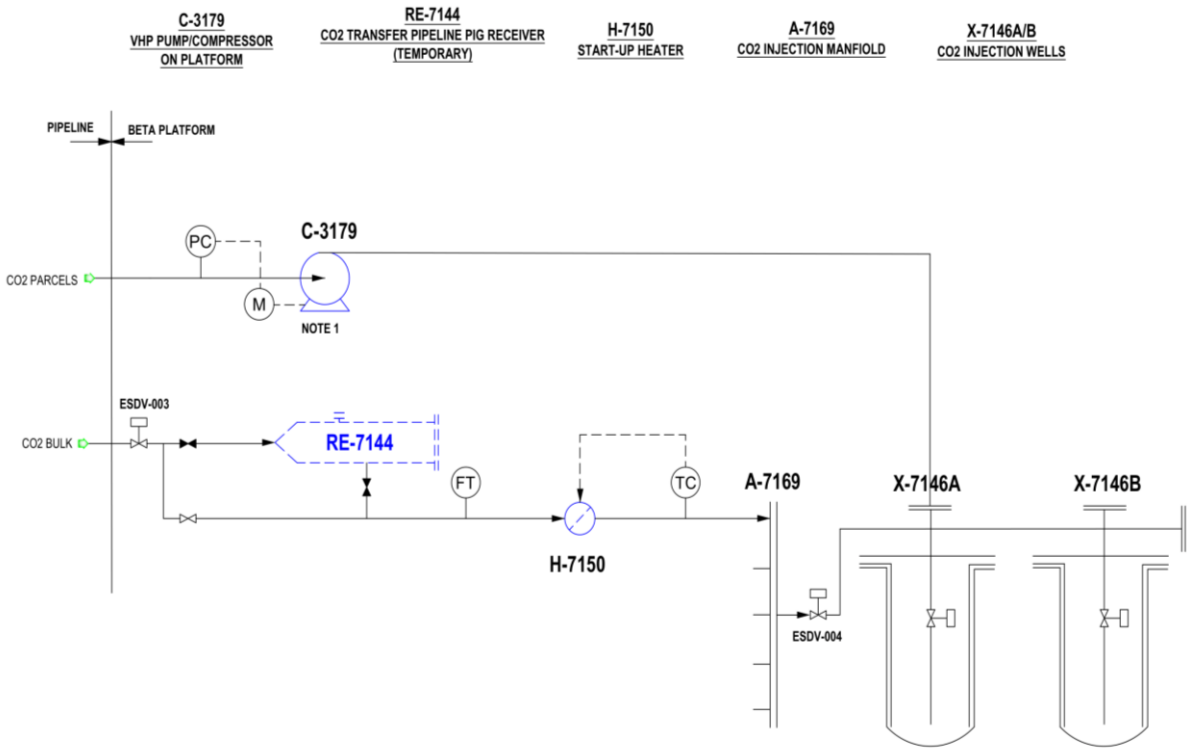
2.2.7.4 CO_2 injection

The main CO_2cargo processing equipment on the Beta platform will include a compression station for the required injection conditions, installed on the open deck of the platform. During start-up, to avoid low temperatures in the piping and the formation of hydrates/salts in the area near the well, an electric start-up heater and a methanol injection system (Error! Reference source not found.) are planned to be installed.

CO_2injection will target zones B and C of the reservoir with two injection wells during the period 2025-2035 and will then be extended to the entire reservoir by the end of the Project.

During the first 3 years of operation of the storage site, the CO_2injection rate will gradually increase from 0.25 to 0.5, then to 0.75 and finally to 1.0 MTPA.

For Phase 1, the required injection conditions in the well are a pressure of 101 barg and a temperature of 20°C.



2 –59 : Flow chart of CO_2injection processes at the Beta platform

2.2.7.5 Water Pumping

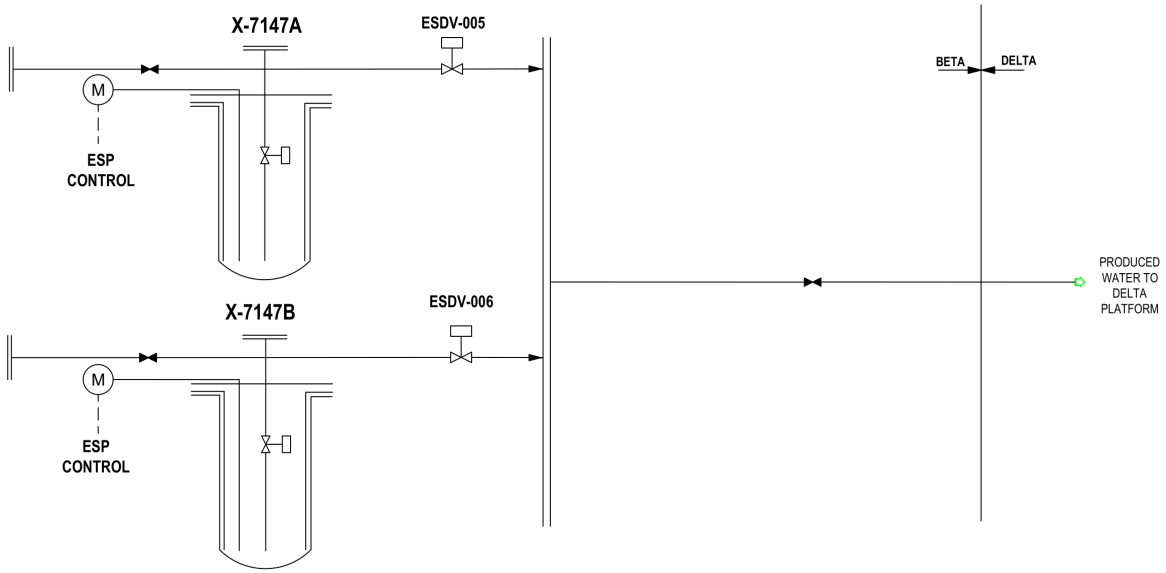
The water wells on the Beta platform will be equipped with **electrical submersible pumps (ESPs)** and will extract water from the reservoir to provide a means of actively managing reservoir pressure.

According to simulation studies, the two water production wells will operate at a production rate of up to 7,500 bwpd each during the period 2025-2030 (6 years). Water production will gradually increase to 9,000 bwpd per well in 2031 and until the end of the Project.

The capacity of 7,500 bwpd/well is achieved by operating the electric submersible pump (ESP) at 83% of its capacity, while the capacity of 9000 bwpd/well is attributed to the operation of the electric subsea pump (ESP) at 100% of its capacity.

The water extracted from the reservoir to provide a method of actively managing reservoir pressure will be treated at the Delta platform and discharged into the sea via a **disposal caisson**. All extracted water is expected to be treated at the existing facilities on the Delta platform, similar to the treatment of produced water at the Prinos facilities currently in operation, without the need to construct new facilities on the platform. It is important to note that the above consideration is subject to further evaluation once samples of the aquifer water have been obtained.

The following **figure** describes the process of producing water from the water wells on the Beta platform.



2 –60 : Flow chart of the water production process at the new water wells on the Beta platform

2.2.8 Shutdown - Restoration

2.2.8.1 Decommissioning Philosophy

The guidelines of the trade association Offshore Energies United Kingdom (OEUK), which represents the offshore oil, natural gas, hydrogen, and wind power generation, have been taken as a reference point for assessing the suitability of wells for the conversion of Prinos into a $CO_{(2)}$storage complex.The OEUK has also developed guidelines for the decommissioning process for CO_2 storage wells (OEUK, November 2022).

According to the OEUK guidelines, each well within the storage site must be assessed individually for its suitability for $CO_{(2)\ storage}$, including existing wells that are still accessible and older wells that have already been abandoned/decommissioned. Also, based on the OEUK guidelines, decommissioned/abandoned wells with flow zones must have two barriers between them and the surface. For zones that could flow if filled with $CO_{(2)}$,they should be isolated from the reservoir with two barriers, recognizing that a) the final CO_2 is likely to be unknown and b) if the zone is shallow, the formation at the depth of the cap should have sufficient strength to resist failure due to pressure.

For the purposes of decommissioning the CO_2storage site, the lithology at Prinos can be simplified into three main sections:

- Section 1 – Post-evaporitic sequence from the Pliocene and Pleistocene epochs: Its extent is from the sea floor to the Brown Marker formation. These formations are mainly sandstones with clay/silt layers in places.
- Section 2 – Evaporitic sequence: This section extends from the Brown Marker formation to the cap rock. It consists of a large sequence of overburdened evaporite salts separated by clastic, clayey, and silty formations. There are also overpressurized clay formations (OPC).
- Section 3 - Prinos Reservoir: Basaltic succession of salt, anhydrite, and clay formations, followed by a pile of sandstone reservoir layers. For decommissioning purposes and in accordance with OEUK guidelines, abandonment caps must be placed in a solid formation with a breaking strength greater than the maximum expected pressure that could be imposed by the reservoir at the depth of the cap base. The minimum depth this can be depends on the strength of the formation. The minimum cap depth is referred to as the minimum safe abandonment depth. Ideally, a double abandonment cap is placed in one of the salt sections within the evaporite sequence to "restore the rock cap" and create two barriers between the reservoir and the surface/shallow permeable zones.

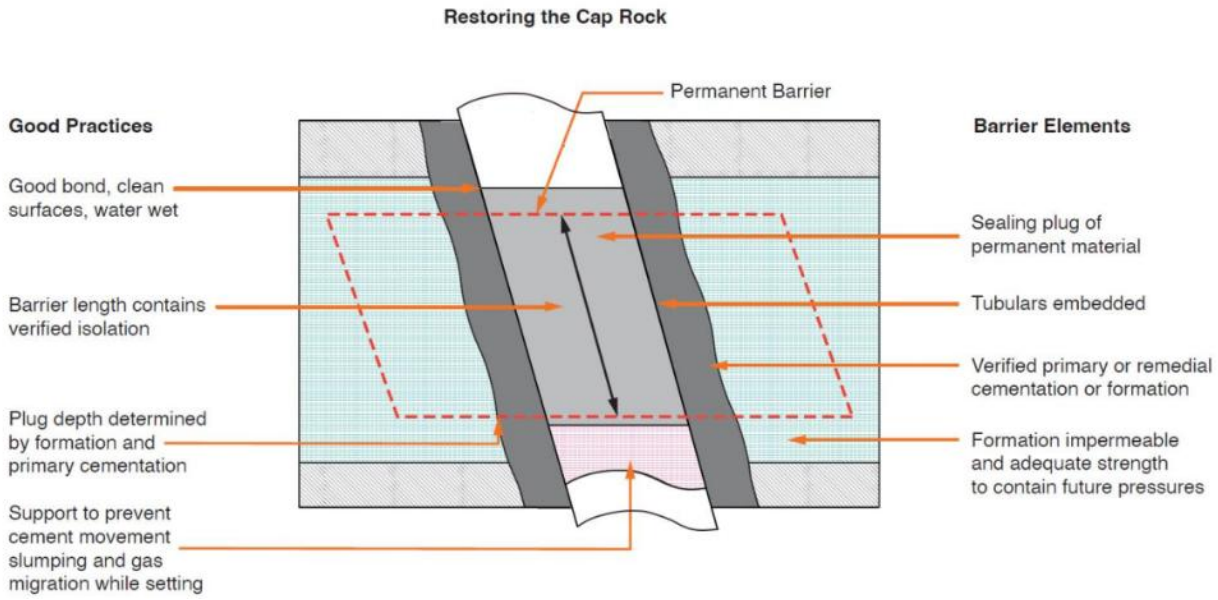
2.2.8.2 Sealing and Decommissioning of Wells

Cement is considered the most suitable material for permanently sealing/abandoning boreholes, but other materials may also be used. To be considered a permanent barrier, the long-term integrity of the material must be ensured and it must not degrade significantly during the design life of the barrier, while continuing to meet the design criteria.

Sealing formations such as evaporites, which are known to close a ring space where cement is absent or incomplete, can be considered barriers, provided that the formation is impermeable and has sufficient

strength. If it can be verified that the length of the resulting seal from the geological formation against the protective casing is sufficient to prevent fluid flow, then such a seal is acceptable as an alternative to the cement ring.

If cement is used as a barrier, then a cement column of at least 30 m is required to form a permanent barrier. Where possible, 152 m cement plugs are installed to provide these 30 m of cement. A combined plug of at least 60 m of cement is required to form a double barrier. Where possible, 244 m of cement is placed to provide these 60 m of cement.



2 –61 : Schematic representation of permanent withdrawal barriers (OEUK, 2022)

2.2.9 Cleaning, Securing, and Uninstalling Pipes

The pipelines within the onshore section of the CO_2pipeline transport system will be depressurised, cleaned and purged with nitrogen to secure them in accordance with international guidelines and best practices[7] . The onshore section will be isolated from the offshore pipeline with a sealed flange, dismantled, and the site will be restored to its original condition.

The offshore pipeline and riser will be depressurized, cleaned with standard jetting operations, and then inerted with nitrogen. The pipeline will then be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with international standards. The pipes from the top of the jack-up to the wellheads will be depressurized and filled with nitrogen to inert the system. The pipes will be disconnected from the wellheads, capped, and left in place.

[7] *UK Offshore Petroleum Regulator for Environment and Decommissioning, 2022. Decommissioning of Offshore Oil and Gas Installation and Pipelines Guidelines, OEUK Decommissioning Pipeline's Guidelines*

2.2.10 Post-project Monitoring of the Reservoir and CO_2Storage Site

Post-project monitoring will focus on identifying potential leaks to minimize environmental impacts and ensure regulatory compliance. Geological surveys of the reservoir layers will be conducted to identify potential leakage pathways or geological hazards and minimize the risk of CO_2 into the marine environment and monitoring parameters such as pressure, temperature, and composition will be monitored to ensure safety against leaks.

Post-closure monitoring shall be based on the information gathered and modeled during the implementation of the monitoring plan and during its updating. In particular, it will serve to provide the information required to ensure the safety requirements of the closed storage site, in accordance with paragraph 1 of Article 19 of Joint Ministerial Decision 48416/2037/E.103/2011.

Specific provisions for post-closure monitoring are included in the specific CO_2 Monitoring Plan of Paragraph 2 of Article 14 of Joint Ministerial Decision 48416/2037/E.103/2011.

3 DESCRIPTION OF PROPOSED AMENDMENT

3.1. GENERAL INFORMATION

The proposed amendment to the licensed project, which is presented in this document, has been designed based on the requirements of the project's AEPO (XXXXXXXXXX), as included in **the** relevant **PO 4.2** , which states the following:

"4.2. Conditions for the design of the facilities

4.2.1. *The final design of the project must consider the complete separation of offshore facilities with CO_2 from the facilities with hydrocarbon extraction wells in Prinos, in order to minimize any potential for unforeseen incidents due to the coexistence of these wells. For this reason, the offshore part of the project needs to be reviewed so that the CO_2 be developed on an independent offshore platform, if possible at a distance of 500 m or more from the existing platforms, and the route of the relevant CO_2 and power supply cables, taking into account the existing routes between the coastline and the existing platform complex, so as to minimize any additional footprint.*

4.2.2. *For the location of the new independent offshore platform, a suitable site should be selected based on geological characteristics for the implementation of the required drilling, soil characteristics of the seabed for the installation of the platform, as well as characteristics of the natural and man-made environment, in order to limit potential adverse effects.*

4.2.3. *In this context, the project operator shall prepare and submit to the licensing authority an appropriate environmental study for the amendment of the AEPO of the project in question, documenting the appropriateness of the amendment to the project design based on the requirements of clause 4.2.1 and the criteria of term 4.2.2.*

4.2.4. *In addition, the above environmental study should include appropriate provisions so that:*

4.2.4.1. *The feasible mechanism for driving the piles between the pulsed (which is preferable) and the percussive methods, based on the soil conditions of the seabed, is selected.*

4.2.4.2. *Minimise work in the area of the offshore platform and the associated environmental impacts by providing for its assembly in as few and as short steps as possible.*

4.2.4.3. *Ensure that the piles can be extracted from the seabed and removed during the decommissioning phase of the platform.*

4.2.4.4. *When designing the connections between the new platform and onshore facilities, appropriate provisions shall be made to ensure that:*

4.2.4.4.1. *Surface equipment and subsea pipelines have a strength suitable for the maximum closed-head pressure of the wells, in order to limit the possibility of corrosion when operating under normal conditions and the consequent possibility of loss of integrity and therefore leakage of $CO_{(2)}$ into the environment.*

4.2.4.4.2. *The new platform shall be connected to the existing Delta platform or to the project's onshore facilities via an underwater power cable in order to avoid the installation of an autonomous oil-fired generator.*

4.2.4.4.3*. The water produced by the extraction will be sent for treatment in appropriate systems, which will have a performance that meets the applicable discharge limits. Water from the surfaces of the platforms (cleaning and rainwater) will be discharged through appropriate treatment systems, in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL).*

Based on the above, in accordance with the guidelines of the PO in question, the project design was modified to include the requirements of the AEPO, and this modification is the subject of this study.

The aim of the proposed amendment is the "*complete separation of offshore facilities with CO_2injection wells from facilities with hydrocarbon extraction wells in Prinos."* To achieve this, it is proposed that the equipment and facilities for the project's offshore activities be located on a new independent offshore platform (hereinafter referred to **as the 'OMEGA' platform)** at a distance of more than 500 m from the existing platforms. In addition, the relocation of the project's equipment and facilities will result in the following secondary modifications to the project design:

- Adaptation of the pipeline and cabling networks of the offshore section of the project, which are being adapted to serve the new independent offshore platform. These modifications concern the $CO_{(2)}$transfer pipelines and the power supply cabling.
- Installation of a pipeline to transport the produced water (the water wells on the new platform will be equipped with electric submersible pumps (Electrical Submersible Pumps ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) from the new platform to the existing Delta platform, so that the produced water can be treated and disposed of in accordance with the project's EIA (PO *"1.4.7.2.4.3. The produced water will be treated at the existing Delta platform")*.
- Minor changes to the technical characteristics of the drilling works, so that they are adapted to the geographical displacement and geological characteristics of the location of the new OMEGA platform.

3.2. SUMMARY DESCRIPTION OF PROPOSED PROJECT MODIFICATION

In summary, the proposed project description includes the interventions described below.

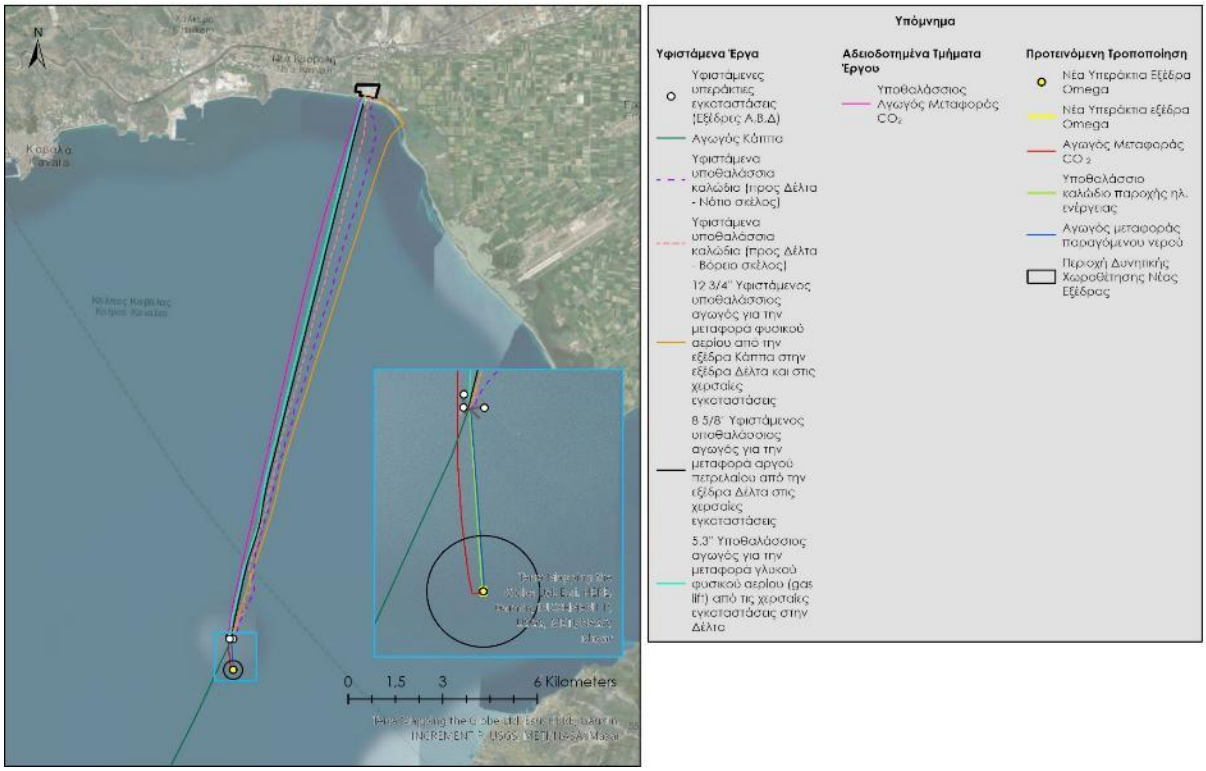
Installation of a new offshore platform (Omega platform)

A new offshore drilling platform will be installed at the new location and will remain as a permanent installation of the project. The platform can be installed either before the start of drilling or after the completion of the four (4) wells. The new platform replaces the Beta platform as the primary CO_2 injection point from the pipeline. The new Omega offshore platform:

- It will consist of a metal jacket,

- Will have 15 wellhead connections,
- Will be founded on 4 piles at a depth of approximately 31 meters,
- Will be installed approximately 1 km south of the existing Delta platform complex.
- The platform will be unmanned and will have the minimum equipment required to receive CO_2 (from the pipeline) and inject it, as well as to transport the produced water to the existing facilities on the Delta platform.

The location of the proposed new Omega platform is shown in **the** following **Figure** and its coordinates are listed in **the** following **Table**.



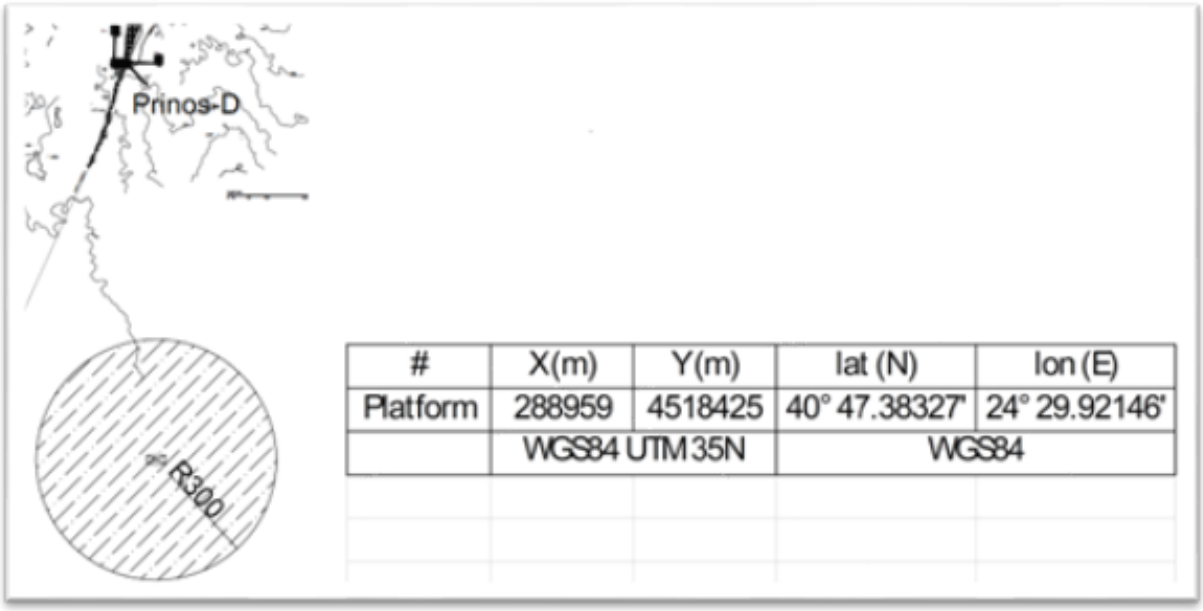
3 –1 : The location of the new Omega platform

3 –1 : Coordinates of the location of the new Omega platform in WGS84 UTM Zone 35N, WGS 84, and EGSA 87

	UTM Zone 35N		WGS 84		EGSA 87	
	X	Y	Lat (φ)	Lon (λ)	X	Y
Omega platform	288958	4518424	40.789717	24.498691	541924	4515247

It should be noted that the specific location of the new Omega platform is indicative of a specific area, which is initially assessed as suitable for the location of the Omega platform (hereinafter referred to as **the Potential Location Area for the Omega Platform**), as it does not present any undulations on the seabed, it is a flat zone without surface or underground obstacles, and the geological conditions are similar to those of the existing offshore installations. This area is shown in **the** following **Figure** and extends to a radius of 300 meters from the coordinates of the designated central point, which is the indicative location of the Omega platform, as described above (latitude (B) 40° 47.38327' and longitude (A) 24° 29.92146'). The final location of the Omega platform will be determined after investigating and evaluating the exact technical and soil characteristics to find the most appropriate technical solution, which is carried out as the first step in the construction methodology for each new platform.

It should be noted that the entire area in question is included in **the study/influence area of the project** under consideration in the present study, and any potential impacts from the location of the Omega platform (and the implementation of the corresponding drilling operations) have been assessed in **the** relevant **sections** of the present study. Consequently, the final definitive location of the new Omega platform will be specified in the context of the submission of the Final Design Compliance File to the competent environmental authority, as specified in paragraph 7 of Article 11 of Law 4014/2011. A prerequisite for this is the location of the Omega platform (and the implementation of the corresponding drilling operations) within a radius of 300 meters from the coordinates of the specified central point, which is the indicative location of the Omega platform, as described above, for which area the relevant potential P&K impacts have been assessed and evaluated in the context of this document.



#	X(m)	Y(m)	lat (N)	lon (E)
Platform	288959	4518425	40° 47.38327'	24° 29.92146'
	WGS84 UTM 35N		WGS84	

3 –2 : The indicative location of the new Omega platform and the area within which the final location of the platform will be determined – Potential Location Area of the Omega Platform (shaded circle)

Drilling

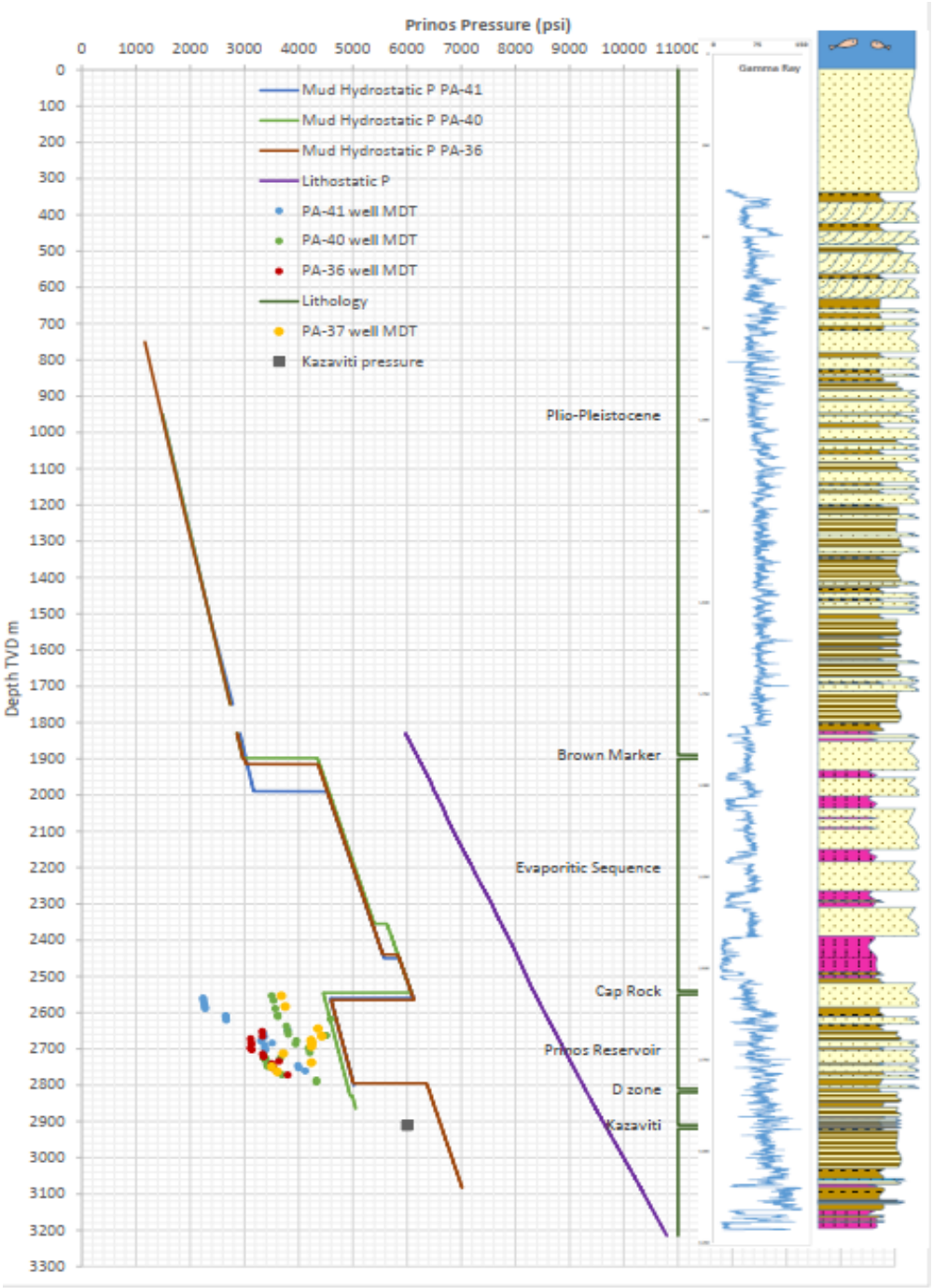
The implementation of two CO_2injection wells and two water production wells for the project's operational needs is provided for in the approved EIA for the project. This document includes changes to the drilling method and technical characteristics of the drilling work, so that they can be adapted to the geographical shift and geological characteristics of the location of the new Omega platform.

Consequently, all wells will be drilled from the seabed from a new location without using other wells as starting points (Donors) from the existing platforms, as provided for in the initial project design that was environmentally licensed with the approved EIA for the project. The wells that will be required as part of this project, as amended by this document, are summarized in **the** following **table**.

Table3 –2 : The boreholes that will be required within the framework of the project

Type of drilling	Name	Donor drilling	Starting depth (m)
CO_2injection	POC-1	N/A – New well	0 – Seabed
CO_2injection	POC-2	N/A – New drilling	0 – Seabed
Water production	POW-1	N/A – New drilling	0 – Seabed
Water production	POW-2	N/A – New drilling	0 – seabed

The wells initially target the "B & C" formations of the reservoir and below for water production and $CO_{(2)}$injection,as the Prinos reservoir has been drilled numerous times and the pressures and geological formation are well known. The recorded pressure in the pores of the Prinos reservoir from basic drilling is shown in **the** following **figure.**



3 –3 : Recorded pressure in the pores of the Prinos reservoir from basic boreholes

It should be noted that the Prinos reservoir is a Miocene-aged sandstone reservoir. It consists of three stacked zones, A, B, and C, separated by thin clay layers. The expected formation tops of the boreholes are included in **the** following **Table.**

Table3 –3 : Formation tops of new boreholes

Formation	Borehole *			
	POC-1	POC-2	POW-1	POW-2
Brown Marker geological formation	3150	3200	3050	3250
Top of Formation A	3700	3750	3600	3800
Top of Formation B	4000	4050	3900	4100
Top of Formation C	4200	4250	4100	4300

* All depths in TVDSS, RT=0

The targets for each drilling, which have been decided upon following the completion of an appropriate geomechanical model mapping the boundaries of the reservoir, are presented in **the** following **table**.

3 –4 : Final depth criteria for new boreholes, target coordinates, and surface locations

Type of borehole	Name	Target			Surface location		
		UTM Zone 35N	WGS 84	EGSA 87	UTM Zone 35N	WGS 84	EGSA 87
CO_2injection	POC-1	X: 287531 y: 4519696 Z: -2780	Lon: 24.48134903 Lat: 40.8007919	X: 540455 y: 4516469	X:288959 y:4518425	Lon: 24.49869105 Lat: 40.78972111	X: 541924.5 y: 4515248
CO_2injection	POC-2	X: 288070 y: 4520006 Z: -2620	Lon: 24.48762732 Lat: 40.80372111	X: 540982 y: 4516797	X:288959 y:4518425	Lon: 24.49869105 Lat: 40.78972111	X: 541924.5 y: 4515248
Water production	POW-1	X: 289901 y: 4517635 Z: -2772	Lon: 24.51011152 Lat: 40.78285248	X: 542892.5 y: 4514491	X:288959 y:4518425	Lon: 24.49869105 Lat: 40.78972111	X: 541924.5 y: 4515248
Water production	POW-2	X: 290290 y: 4517087 Z -2967	Lon: 24.51490137 Lat: 40.77801978	X: 543300 y: 4513957	X:288959 y:4518425	Lon: 24.49869105 Lat: 40.78972111	X: 541924.5 y: 4515248

Rerouting of pipeline CO_2

The CO_2transmission pipeline will be installed using a pipeline laying barge, in accordance with the methodology approved in the project's approved EIA. A large-diameter 12-16" pipeline will be installed for the maximum capacity of Phase 1, which will also be sufficient for Phase 2 (1500#, material: CS, WT: 0.5", 3mm LPP coating, design pressure: 240 barg, design temperature: -46 °C).

The main difference in the present case is the extension of the pipeline by approximately **1.3–1.6 km from the centroid** (indicative location of the new platform, as described in **the** previous **section**) **or the less favorable location of the new platform**, respectively (at the farthest point of the Omega Platform Potential Location Area), so that it can be connected to the new Omega platform. The total length of the final CO(2)transfer pipeline is **19-19.3 km.** In addition, with the proposed amendment, the route of the pipeline in question is maintained, with a minor modification so that instead of ending at the Beta platform, it bypasses it.

The indicative route of the CO_2transmission pipeline is shown in **the** following **Figure** and its relevant coordinates (start, middle, end) are listed in **the** following **Table**.

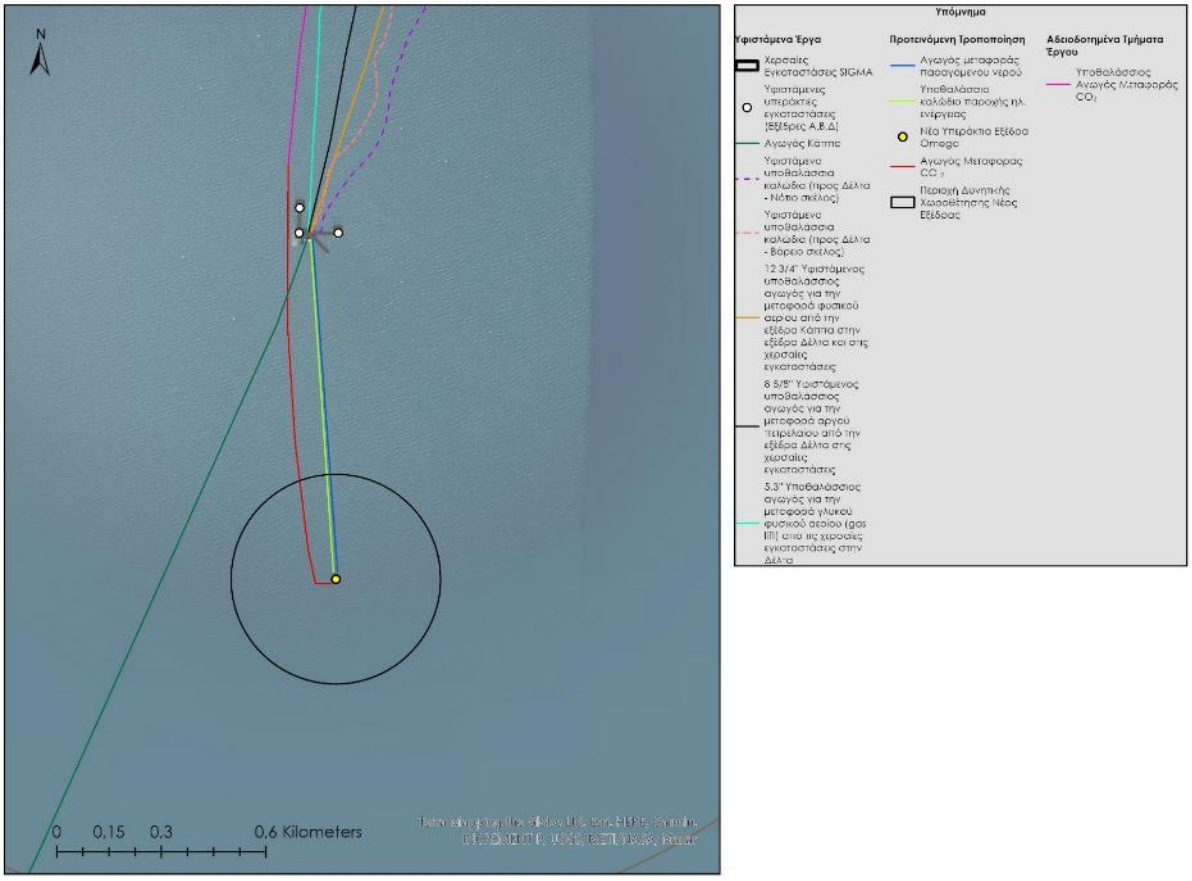


Figure3 –4 : The indicative route of the CO_2transmission pipeline

Table3 –5 : Coordinates of the new CO_2submarine transmission pipeline in WGS84 UTM Zone 35N, WGS 84, and EGSA 87

	UTM Zone 35N		WGS 84		EGSA 87	
	X	Y	Lat (φ)	Lon (λ)	X	Y
Start *	288823	4519612	40.80036545	24.49667549	541897	4516715
Average	288840	4519010	40.79495621	24.49708748	541935	4516115
End **	288946	4518419	40.78966522	24.49853706	542061	4515528

*The starting point is taken as the entry point of the pipeline into the proposed onshore CO_2storage facilities.

** The connection point of the pipeline to the proposed new Omega platform is taken as the end point.

Pipeline for transporting the produced water

The water produced from the two water production wells (the water wells on the new platform will be equipped with electrical submersible pumps (ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) from the new platform to the existing Delta platform, so that the produced water can be treated and disposed of in accordance with the project's EIA (PO *"1.4.7.2.4.3. The treatment of the produced water will take place at the existing Delta platform"*). The total length of the subsea pipeline for transporting the produced water for the indicative centric location of the new platform is approximately 1 **km (0.96 km),** while for the most unfavorable case of platform location at the furthest point of the Omega Platform Potential Location Area, the length will be 1**.3 km.**

The indicative route of the produced water transfer pipeline is shown in **the** following **Figure** and its relevant coordinates (start, middle, end) are listed in **the** following **Table**.

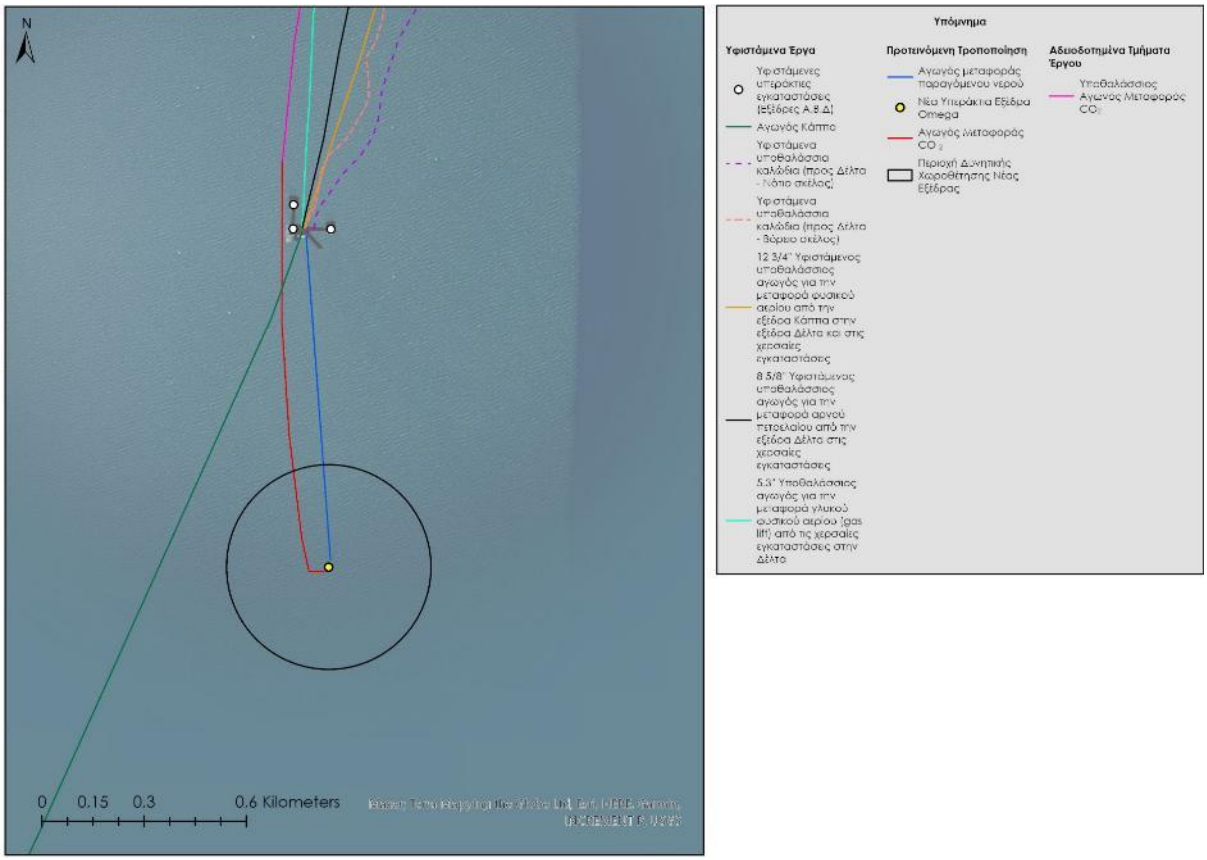


Figure3 –5 : The indicative route of the pipeline for transporting the produced water

Table3 –6 : Coordinates of the submarine pipeline for transporting the produced water in WGS84 UTM Zone 35N, WGS 84, and EGSA 87

	UTM Zone 35N		WGS 84		EGSA 87	
	X	Y	Lat (φ)	Lon (λ)	X	Y
Start *	288964	4518450	40.78990936	24.49874115	542,077.875	4515555.5
Average	28892	45189	40,794	24.4981575	542,025.9375	4516031
End **	288892	451940	40.79848862	24.49757385	541974	4516507

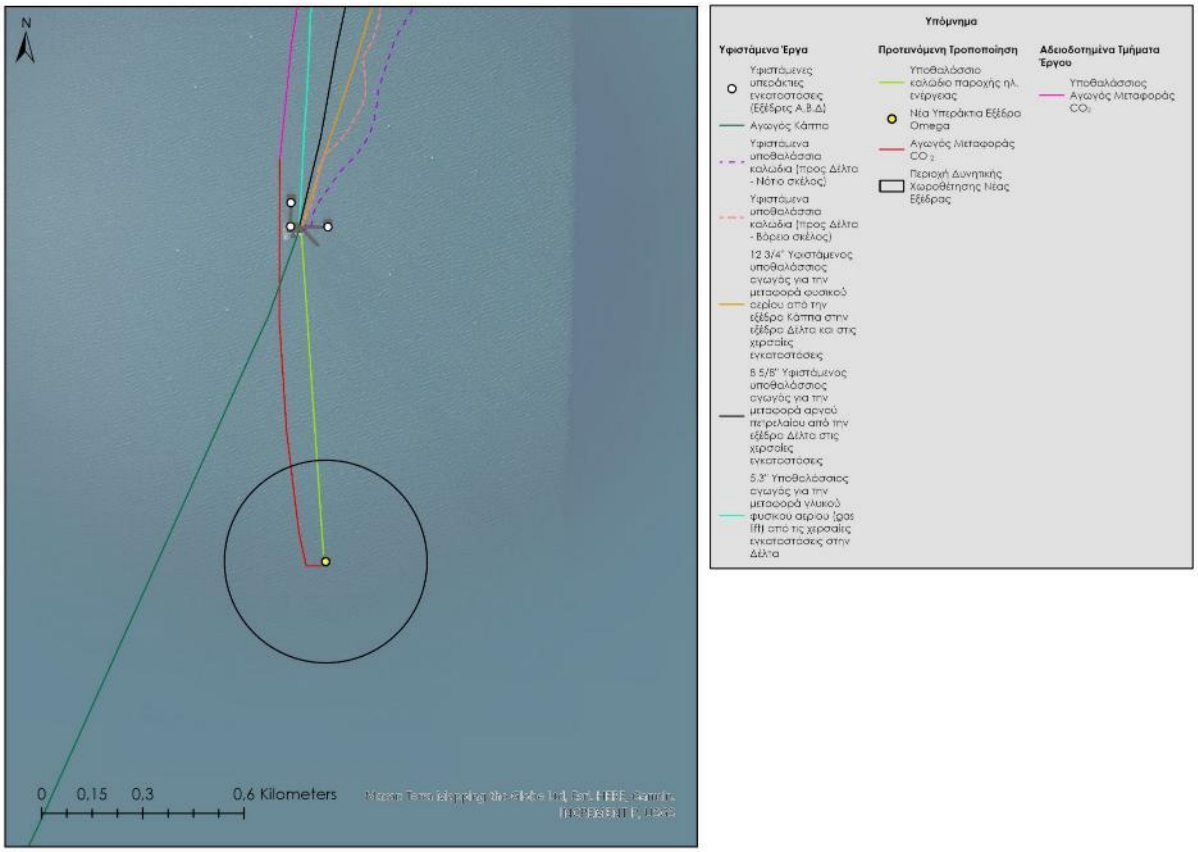
*The starting point is taken to be the entry point of the pipeline into the proposed new Omega platform.

** The end point is taken as the connection point of the pipeline to the existing Delta platform.

Power supply cabling

The operation of the Omega platform (and the related project equipment) requires a power supply, which will be provided by the existing submarine network that supplies the existing platforms of the Prinos complex. Therefore, an underwater power cable needs to be installed to connect the new Omega platform to the existing Delta platform. The total length of the power cable from the indicative centric location of the new platform is approximately 1 **km** ( ), while the worst-case scenario for the location of the platform at the furthest point of the Potential Platform Location Area is approximately 0.96 **km. (0.96 km),** while in the worst-case scenario of the platform being located at the furthest point of the Omega Platform Potential Location Area, the length will be 1.3 **km.**

The indicative route of the pipeline for transporting the produced water is shown in **the** following **Figure** and its relevant coordinates (start, middle, end) are listed in **the** following **Table**.



3 –6 : Indicative route of the submarine power cable transmission pipeline

Table3 –7 : Coordinates of the submarine power cable in WGS84 UTM Zone 35N, WGS 84, and EGSA 87

	UTM Zone 35N		WGS 84		EGSA 87	
	X	Y	Lat (φ)	Lon (λ)	X	Y
Start *	288952	4518450	40.78990555	24.49860191	542,066.1875	451555
Average	288919	451892	40.7942009	24.49805069	542017	4516031.5
End **	288886	4519400	40.79849625	24.49750137	541967.8125	4516508

*The starting point is taken to be the cable entry point on the proposed new Omega platform.

** The end point is taken as the point where the cable connects to the existing Delta platform.

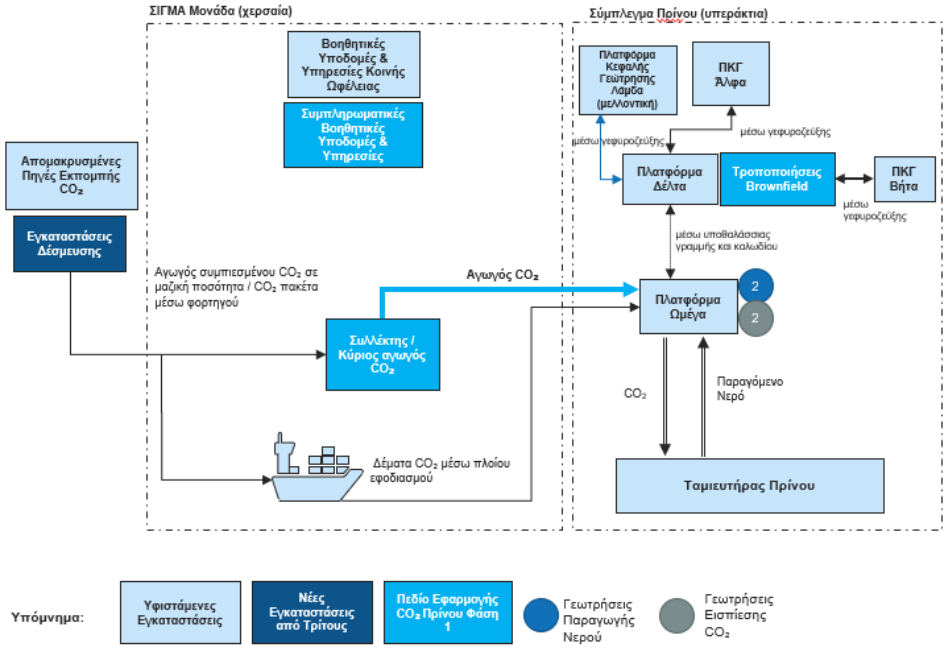
3.3. SUMMARY DESCRIPTION OF THE PROJECT AFTER THE ADDITION OF THE PROPOSED AMENDMENT

The licensed project after the addition of the proposed amendment (hereinafter referred **to as the project**) is a full-scale CO_2storage facility in Prinos. The operation of the facility is planned to be developed in two distinct phases (Phase 1 and Phase 2) for reasons of scalability and adaptation to market conditions.

- ***Phase 1*** envisages an initial nominal capacity of up to 1 MTPA for 20 years (starting at the end of 2025 and beginning in early 2026). $CO_{(2)}$ will be supplied mainly in bulk, via a pipeline reaching the boundaries of the onshore facility under suitable conditions for injection. Small quantities of $CO_{(2)}$ will also be delivered to the Sigma onshore facilities by truck through $CO_{(2)}$ capture pilot projects.
- During ***Phase 2***, an expansion to the final nominal capacity of up to 3 MTPA is planned. The facility will be modified to accept liquefied $_{CO_2}$, which will be delivered by sea transport to a newly built pier.

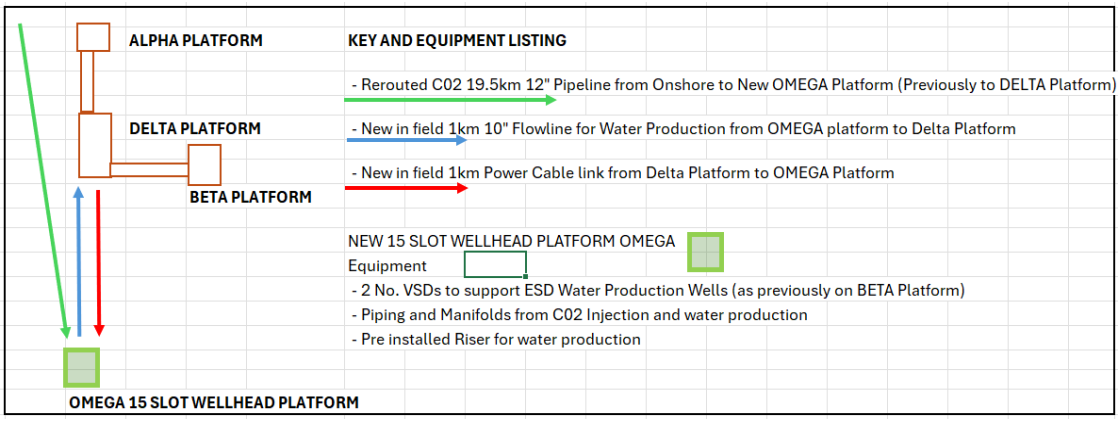
The licensed project and the proposed modification relate to **Phase 1 of the Project**. The CO_2 sources and main host processes during Phase 1 of operation will be as follows:

- **Bulk CO_2 supply via pipeline**: An onshore station within the Sigma facilities, consisting of the manifold of the onshore CO_2 pipeline, will receive up to 1 MTPA of compressed CO_2 . The $CO_{(2)}$ stream will then be transported via a new dedicated pipeline to the new OMEGA platform of the offshore facilities, where the $CO_{(2)}$ will be injected through special injection wells.
  The CO_2stream will come from remote producers and is expected to be supplied at pressure and temperature conditions suitable for injection into the wells. The $CO_{(2)}$ receiving collector will route the $CO_{(2)}$ stream to the Prinos offshore facility complex via a 20 km long 12-16" pipeline. The $CO_{(2)}$pipeline will initially have a capacity of up to 1 MTPA of compressed $CO_{(2)}$,but it has been designed to be sufficient for the future planned capacity of the Project (3 MTPA $CO_{(2)}$). The vertical riser connecting the platforms for the $CO_{(2)}$pipeline will have emergency shut-off valves (ESDV) for isolation. In addition, to prevent low temperatures in the pipeline and the formation of hydrates/salts in the area near the well, an electric start-up heater will be installed.
- **CO_2cargo reception**: Cargoes will be delivered by truck to the Sigma onshore facilities and delivered in ISO containers. The containers will be loaded onto supply vessels or barges using cranes, transported and unloaded at the new OMEGA platform via a system of flexible pipes (hoses). This unloading process involves connecting the ship and supplying $CO_{(2)}$ to the platform's pipes, where, with the appropriate treatment, the $CO_{(2)}$ stream will be brought to the appropriate conditions for injection into the well. The platform will achieve the appropriate conditions for injection (minimum pressure 113 barg, temperature 30°C) according to the most recent design study (post pre-FEED engineering design). The basic processing equipment, including a pump station/compressors, will be located on the open deck of the OMEGA platform. In addition, the ship may have integrated pumps/compressors to increase the pressure of the $CO_{(2)}$stream,facilitating flow through the flexible hose from the ship to the platform. It should be noted that there will also be provision for direct injection of $CO_{(2)}$ loads into the onshore manifold via a compression station during unloading from trucks.



3 –7 : Schematic diagram for Phase 1 of the CO_2 storage project in Prinos

The following **figure** shows the revised field development plan, with emphasis on the new facilities and the drilling location.



3 –8 : Revised field development plan, with emphasis on new facilities and drilling location

The licensed project, following the addition of the proposed amendment, includes the following:

- **Onshore facilities**: Intervention in a specific area within the existing Sigma plant site for the construction of the receiving manifold and an unloading and compression area. As has been repeatedly noted, the proposed amendment does not include any intervention in the onshore facilities of the licensed project, which remain unchanged, as described in the approved EIA of the project and licensed by the relevant AEPO.
- **Offshore platform**: Installation of a new offshore platform (**Omega** platform) to receive CO_2 from the new subsea pipeline and CO_2 cargoes in containers, and injection into the new wells. The new

platform replaces the planned (according to the approved EIA for the project) installation of the project's offshore facilities on the existing Beta platform of the Prinos offshore complex.

- **Wells**: Construction of two CO_2injection wells and two water production wells on the new Omega offshore platform. The construction of these wells is provided for in the approved EIA for the project. This includes minor changes to the drilling method and technical characteristics of the drilling work, so that they can be adapted to the geographical shift and geological characteristics of the location of the new Omega platform.
- **Offshore CO_2transport pipeline**: The licensed project includes an underwater pipeline connecting the Sigma plant area to the offshore Beta platform, approximately 20 km long. Following the proposed amendment, the route of this pipeline is maintained (with a minor modification so that instead of ending at the Beta platform, it bypasses it) and is extended by approximately 1**.3 km** to connect to the new Omega platform. The total length of the final CO(2)transfer pipeline is **19 km.**
- **Produced water transfer pipeline**: The water produced from the two water production wells (the water wells on the new platform will be equipped with electrical submersible pumps (ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) will be transported from the new Omega platform to the existing Delta platform, so that the produced water can be treated and disposed of in accordance with the project's EIA (PO *"1.4.7.2.4.3. The treatment of the produced water will take place at the existing Delta platform"*). The total length of the produced water transfer pipeline is approximately **1 km**.
- **Power supply cables**: The operation of the Omega platform (and related project equipment) requires a power supply, which will be provided by the existing submarine network that supplies the existing platforms of the Prinos complex. Therefore, an underwater power cable approximately 1 **km** long will need to be installed to connect the new Omega platform to the existing Delta platform.

Therefore, based on the above proposed modifications, the overall project will be as follows:

Project description

General information

The project involves the installation of a carbon dioxide (CO_2) storage facility in Prinos, with a nominal capacity of one million tons (1 MTPA) of CO_2per year. The CO(2) storage formation is located within the Prinos Concession area, in the Prinos basin of the Gulf of Kavala, in the North Aegean Sea.

The facility will be developed in the following two distinct phases based on capacity (Phase 1 and Phase 2), in order to adapt to demand conditions. The project of the approved EIA and this MT AEPO concerns only Phase 1:

- **Phase 1** (subject of the approved EIA and this MT AEPO): The initial nominal capacity of the project will be up to one (1) MTPA for 20 years. The CO(2)will mainly arrive via third-party pipelines, while some quantities will also be delivered by truck to the Sigma land facilities via pilot projects.
- **Phase 2** (not covered by the approved EIA and this MT AEPO and mentioned only for the sake of completeness): The project is expected to be gradually expanded to a final nominal capacity of

approximately three (3) MTPA. A new EIA must be submitted for the environmental licensing of Phase 2.

The new facilities and boreholes planned for the implementation of the Phase 1 CO_2storage project include:

- **Onshore facilities**: Modification of a specific area within the existing Sigma plant site for the construction of the CO_2 receiver and unloading and compression area.
- **Offshore CO_2 transfer pipeline**: Subsea pipeline connecting the Sigma plant area to the Beta offshore platform, approximately 19 km long.
- **Offshore produced water pipeline**: Subsea pipeline connecting the new Omega platform to the existing Delta offshore platform of the Prinos offshore complex, approximately 1 km long.
- **Offshore power cable**: Subsea power cable from the Delta platform to the new Omega platform.
- **Offshore platforms**: Installation of a new offshore platform (**Omega** platform) for receiving $CO_2$from the new subsea pipeline and CO_2 cargoes in containers, and injection into the new wells. The new Omega platform will be located within a radius of 300 meters from the indicative location proposed in the MT AEPO (latitude (B) 40° 47.38327' and longitude (A) 24° 29.92146') (**Potential Omega Platform Location Area**). The final location of the Omega platform will be determined after investigating and evaluating the exact technical and soil characteristics to find the most appropriate technical solution, which is carried out as the first step in the construction methodology for each new platform. The final definitive location of the new Omega platform will be specified in the Final Design Compliance File submitted to the competent environmental authority, as specified in paragraph 7 of Article 11 of Law 4014/2011. A prerequisite for this is the location of the Omega platform (and the implementation of the corresponding drilling operations) within a radius of 300 meters from the coordinates of the specified central point, which is the indicative location of the Omega platform, as described above, for which area the relevant potential P&K impacts have been assessed and evaluated within the framework of the MT AEPO.
- **Wells**: Two (2) CO2 injection wells and two (2) water production wells on the existing Beta platform of the Prinos offshore complex.

The CO_2sources and the main host processes during the operation of the CO_2storage project will be as follows:

- Supply of $CO2$under suitable conditions for injection via third-party pipelines to a land-based receiving station within the Sigma facility site (third-party pipelines are not covered by the approved EIA and MT AEPO).
- Reception of CO_2 loads from trucks with ISO containers at the Sigma land facilities. The containers will be loaded onto supply vessels/crane trucks, transported and unloaded at the new Omega platform. At the same time, direct injection of $CO_{(2)}$ loads into the onshore manifold is also planned, via a compression station during unloading from trucks.

Projects related to the CO_2storage project

Offshore facilities (existing and expansion) for hydrocarbon extraction (environmentally licensed under No. 8413/24.04.2018 ΑΕΡΟ (ΑΔΑ: ΨΓΛ14653Π8-Ζ79), in the sea area of the Gulf of Kavala by Energean Oil and Gas A.E., which include:

- The existing offshore project consisting of a cluster of production platforms (Alpha, Beta, Kappa) and processing platforms (Delta), subsea pipelines for the transport of sour natural gas and crude oil from the platforms to the onshore unit, sweet natural gas from the onshore unit to the platforms, as well as submarine power cables,
- The offshore immediate extension project, which consists of sidetracking nine existing wells located on the Alpha platform in Prinos, installing a new satellite platform (Lambda), drilling 5 to 9 new production wells from this facility, and installing 3 subsea connection pipelines from Lambda. (Lambda), the drilling of 5 to 9 new production wells from this facility, 3 subsea pipelines connecting Lambda to Delta for the transport of produced fluids and 2 subsea pipelines for the transport of injection water, and
- The offshore future extension project, consisting of the installation of a second new platform (Omicron) between the North Prinos and Prinos fields.

Onshore facilities (Sigma industrial unit) environmentally licensed under No. 213450/05.12.2013 AEPO (ΑΔΑ: ΒΛΓΨ0-ΒΦ7), in the coastal area of the Gulf of Kavala, owned by Energean Oil and Gas A.E., which includes facilities for the reception, desalination, dehydration, stabilization , and desulfurization of the crude oil produced, the conversion of the produced sour gas into sweet gas, the production of liquid and solid sulfur, as well as the necessary facilities for the safe storage and handling of the produced crude oil, natural gas, and sulfur. The unit is classified as a higher-tier facility in accordance with Joint Ministerial Decision 172058/2016 complying with Directive 2012/18/EU (Seveso III), as it includes onshore storage facilities for stabilized crude oil and liquid fuel gas.

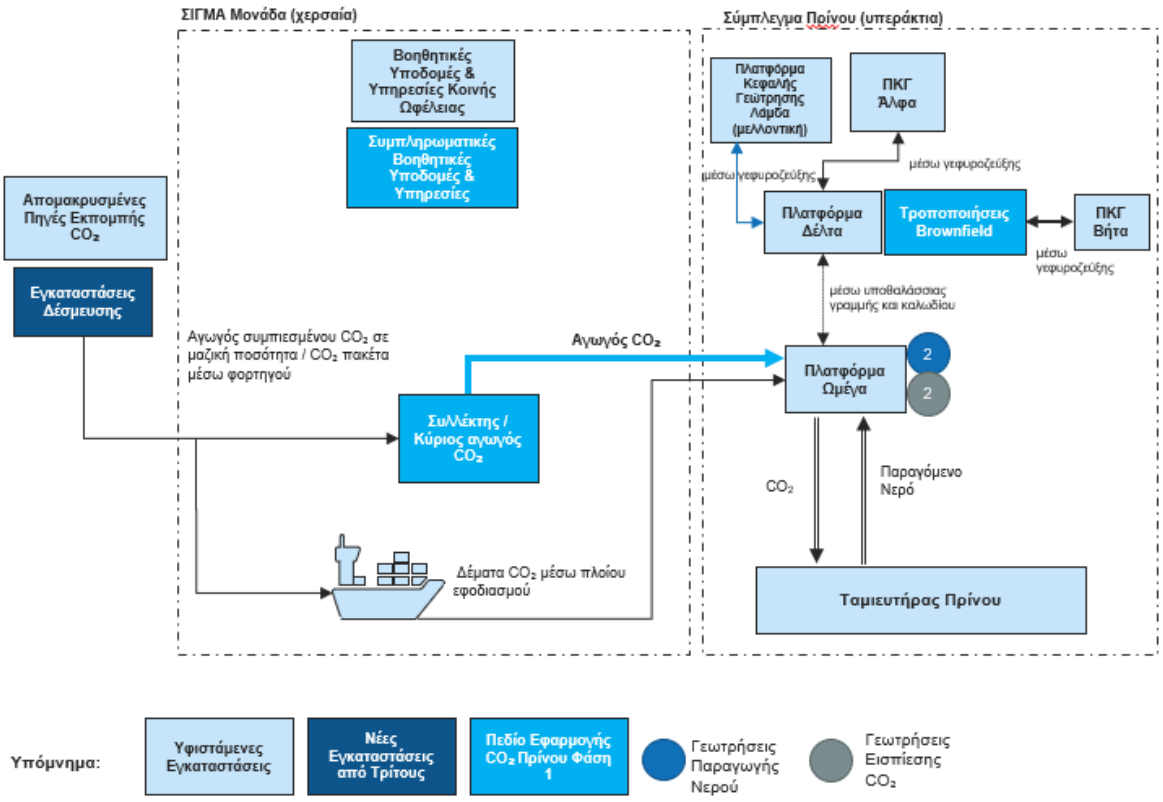
CO_2sources and key host processes during Phase 1 of operation

CO_2 supply via pipeline: An onshore station within the Sigma facilities, consisting of the manifold of the onshore CO_2 pipeline, will receive up to 1 MTPA of compressed CO_2 . The $CO_{(2)}$ stream will then be transported via a new dedicated pipeline to the new Omega platform, where the $CO_{(2)}$ will be injected through special injection wells. The $CO_{(2)}$ stream will come from remote producers and is expected to be supplied at pressure and temperature conditions suitable for injection into the wells.

The CO_2collector will route the CO_2stream to the Omega platform via a 12-16" pipeline approximately **19 km** long. The $CO_{(2)}$pipeline will initially have a capacity of up to 1 MTPA of compressed $CO_{(2)}$,but has been designed to accommodate future capacity expansion. The vertical riser for the $CO_{(2)}$pipeline will be equipped with emergency shut-off valves (ESDV) for isolation. In addition, to prevent low temperatures in the pipeline and the formation of hydrates/salts in the area near the well, an electric start-up heater and a methanol injection system will be installed.

CO_2cargo reception: Cargoes will be delivered by truck to the Sigma onshore facilities and delivered in ISO containers. The containers will be loaded onto supply vessels or barges using cranes, transported and unloaded at the new Omega platform via a system of flexible hoses (manifolds). This unloading process involves connecting the ship and supplying $CO_{(2)}$ to the platform's pipes, where, with the appropriate treatment, the $CO_{(2)}$ stream will reach the appropriate conditions for injection into the well. The platform will achieve the appropriate conditions for injection (minimum pressure 113 barg, temperature 30°C).

The basic processing equipment, including a pump station/compressors, will be located on the open deck of the Omega platform. In addition, the ship may have integrated pumps/compressors to increase the pressure of the $CO_{(2)}$stream,facilitating flow through the flexible hose from the ship to the platform. It should be noted that there will also be provision for the direct injection of $CO_{(2)}$ loads into the onshore manifold via a compression station during unloading from trucks.



3 –9 : Schematic diagram for Phase 1 of the CO_2 storage project in Prinos

New facilities

CO_2storage complex and site in Prinos

The storage site, which includes the Prinos field structure and the underlying aquifer, refers to a specific volume within a geological formation that is selected and configured for the purpose of CO_2storage. The Prinos storage site covers an area of approximately 20.16 km^2 ,with a perimeter of 26.77 km.

The storage complex includes the storage site and the surrounding geological formations, the nature of which is decisive for the effectiveness and safety of CO_2 storage. These formations contribute to the overall storage capacity and integrity of the CO_2 storage project.The Prinos storage complex covers an area of approximately 256.86 km^2,with a perimeter of approximately 72.99 km.

Onshore facilities – configurations

The basic infrastructure for receiving CO at the Sigma plant site during Phase 1 of the project will include: a receiving station, consisting of the receiving manifold of the CO_2 and a compression/pumping station for CO_2 loads.

The area where the land-based equipment bases will be located is estimated at approximately 50 m^2. The estimated excavation area for the land-based section of the pipeline is 200 m^2.

Road access for the needs of the new Project, and mainly for the delivery of CO_2 loads by trucks, will be provided from the Central Gate of the Sigma plant.

Land infrastructure area for CO_2 reception and transport

The facilities for receiving, processing, and pumping CO_2 to the storage site are located within the Sigma facility. The type and nature of these facilities will be based on standard industry practices for transporting gas from onshore to offshore facilities.

The basic equipment includes a collection pipeline with suitable flange outlets, a portable pig launcher/receiver for the subsea pipeline, a 12-16" onshore pipeline with a welded connection to the subsea pipeline and monitoring equipment, safety valves and control room.

CO_2transport pipeline to storage

A large-diameter pipeline 12-16" will be installed for the maximum capacity of Phase 1, with sufficient capacity for Phase 2. The pipeline, approximately 21 km long, will run from the Sigma plant landfall to the new Beta offshore platform, within the existing Prinos pipeline corridor. It will be buried along its entire length to protect it from fishing activities. In the first 500 m from the coast, the burial depth from the top of the pipeline will be 2 m, and in the offshore section, the depth will be 1 to 1.5 m.

Installation of a new offshore platform (Omega platform)

A new offshore drilling platform will be installed either before drilling commences or after the four (4) wells have been completed. The new Omega offshore platform will consist of a metal jacket, will have 15 wellhead connections, will be founded on 4 piles at a depth of approximately 31 meters, will be installed approximately 1 km south of the existing Delta platform complex, will be unmanned and will have the minimum equipment required for the reception of CO_2 and injection, as well as for transporting the produced water to the existing facilities on the Delta platform.

The final location of the Omega platform will be within a specific area, which is initially assessed as suitable for this purpose. This area extends within a radius of 300 meters from the coordinates of the designated central point, which is the indicative location of the Omega platform, (latitude (B) 40° 47.38327' and longitude (E) 24° 29.92146'). The final location of the Omega platform will be determined after investigating and evaluating the exact technical and soil characteristics to find the most appropriate technical solution, which is carried out as the first step in the construction methodology for each new platform. The final location of the new Omega platform will be specified in the Final Design Compliance File submitted to the competent

environmental authority, as specified in paragraph 7 of Article 11 of Law 4014/2011. A prerequisite for this is the location of the Omega platform (and the implementation of the corresponding drilling) within a radius of 300 meters from the coordinates of the specified central point, which is the indicative location of the Omega platform.

Drilling

The project includes the drilling of a total of four (4) wells, two (2) of which will be used as CO_2injection wells and two (2) as water production wells for the relevant pressure equalization of the reservoir. All wells will be drilled from the seabed from the new Omega platform without using other wells as starting points (Donors) from existing platforms. The wells will initially target zones B and C of the reservoir for water production and $CO_{(2)}$injection.The drilling stages for each section up to the final measured depth of 4,200 m include, in summary:

1. Drilling section with a diameter of 30" at a measured depth of up to ~ 125 m (vertical depth 1,850 m).
2. Drilling section with a diameter of 26" at a measured depth of up to ~ 450 m (vertical depth 450 m).
3. 16” diameter drilling section to a measured depth of up to ~ 2,600 m (vertical depth 1,950 m).
4. 12-1/4” diameter drilling to a measured depth of up to ~ 3,500 m (vertical depth 2,800 m).
5. Drilling of an 8-1/2” diameter well to a measured depth of up to ~ 4,200 m (vertical depth 3,350 m).

Water transfer pipeline

The water produced from the two water production wells (the water wells on the new Omega platform will be equipped with electrical submersible pumps (Electrical Submersible Pumps ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) will be transported from the new Omega platform to the existing Delta platform, so that it can be treated by the existing water treatment facilities and disposed of in accordance with the project's environmental permit. The total length of the produced water transfer pipeline is approximately 1 **km.**

Power supply cables

For the operation of the Omega platform, the injection of CO_2 injection and water pumping, a power supply is required, which will be provided by the existing submarine network that supplies the existing platforms of the Prinos complex. Therefore, an underwater power cable approximately 1 km long will need to be installed to connect the new Omega platform to the existing Delta platform.

3.4. DETAILED DESCRIPTION OF PROPOSED PROJECT MODIFICATION

3.4.1. Detailed Description of Proposed Interventions

3.4.1.1. CO_2 Storage Site

The licensed CO_2storage site is located within the Prinos basin, in the Gulf of Kavala, in the northern Aegean Sea. The deposits in this area have been explored since the 1970s, followed by the development of oil production from three deposits within the Prinos Concession, as well as natural gas production from the South Kavala Concession (**Figure 2-15)** since the 1980s.

The area of interest for CO_2storage exploration is located within the Prinos Concession, where Energean has held 100% of the interests and management of oil and natural gas exploration and development activities since 2007.

As the studies carried out for the Project matured, it was found that it is more effective to limit$_{CO_2}$ storage to the Prinos structure. In order to classify this area as suitable for $_{CO_2}$ storage (on a reservoir scale), the wider surrounding area is assessed as a storage complex (on a basin scale), covering a wider area of the required minimum radius of 1 km around the storage site, as shown in **Figure 2-18.**

The present proposed amendment does not include any change to the licensed CO_2 , which remains unchanged, as described in the approved EIA for the project (and has been environmentally licensed with the relevant AEPO) and presented in **Section 2.2.2.1** herein.

3.4.1.2. CO_2 Management Facilities (Reception - Transport - Injection)

The onshore CO_2management facilities (receipt, processing, and pumping to the storage site) are located within the Sigma facility. The Sigma onshore industrial unit includes facilities for the desalination and stabilization of crude oil produced (at the offshore facilities), the separation of sweet gas from the sour gas produced (at the offshore facilities), the production of liquid sulfur, as well as the necessary facilities for the safe storage and handling of the crude oil, natural gas, and sulfur produced. The Sigma unit also has the necessary auxiliary facilities (e.g., steam production and distribution, air compression and dehumidification, nitrogen storage, deionized water production, flare) as well as facilities for the collection, temporary storage, and treatment of waste produced at each stage of the production process and of the staff's domestic wastewater

The type and nature of the onshore CO_2management facilities will be based on standard industry practices for gas transport from onshore to offshore facilities.

This proposed amendment does not include any changes to the licensed onshore CO_2 , which remain unchanged, as described in the approved EIA for the project (and have been environmentally licensed with the relevant AEPO) and are presented in **Sections 2.2.1.1, 2.2.4.1**, and **2.2.4.2** herein.

3.4.1.3. Installation of a New Offshore Platform (Omega Platform)

This proposal involves the installation of a new offshore platform (**Omega** Platform) to receive $CO_2$from the new subsea pipeline and CO_2 cargoes in containers, and to inject it into the new wells. The new platform replaces the planned (according to the approved EIA for the project) installation of the offshore facilities of the project on the existing Beta platform of the Prinos offshore complex.

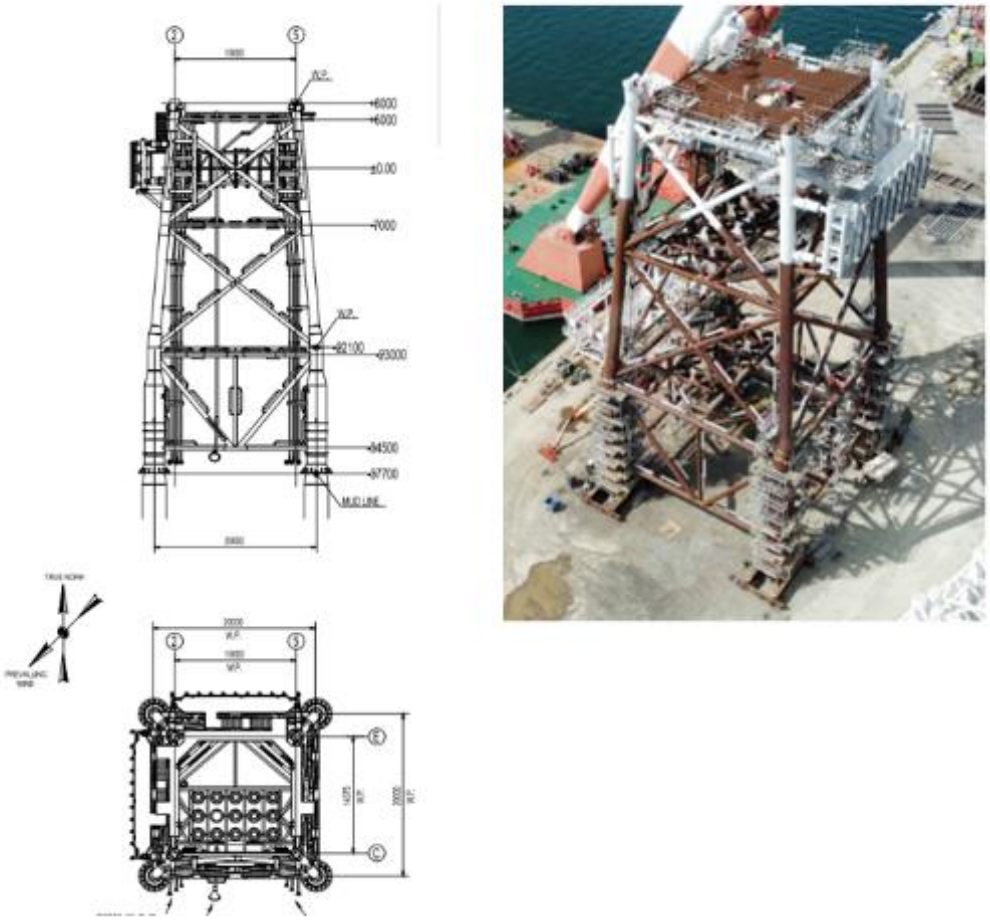
The new **Omega** platform will be a minimalist, unmanned facility, similar to the Beta platform. It will consist of a jacket-type steel structure on piles, weighing approximately 900 tons, and a simple superstructure weighing approximately 500 tons to support equipment related to drilling and platform operation. Its design complies with international standards and regulations, covering requirements for extreme environmental conditions, seismic loads, ship impact, and operational loads.

The new **Omega** platform is essentially a replica of the Lambda platform used in the Prinos Offshore Development project and has been licensed under ΑΕΡΟ ΔΙΠΑ/8413/24.04.2018 (ΑΔΑ: ΨΓΛ14653Π8-Ζ79). The platform will be installed using a floating crane with a lifting capacity of 2000 tons, as described in detail in **a** separate **section** of this document.

The three basic structural elements of the platform are described as follows:

- Four tubular steel foundation piles, 40 meters long and weighing 130 tons each, will be placed in a 20 m x 20 m square arrangement, centered on the final coordinates of the platform. The geometric arrangement of the piles on the seabed will be aligned with the legs of the superstructure.
- The steel subsea jacket structure will weigh approximately 780 tons, with a base footprint of 20 m x 20 m and a total height of 45 meters. It will be capable of supporting drilling operations from a jack-up drilling rig for up to 15 wells. Drilling can be carried out either before or after the installation of the topside.
- The topside will be a facility that will house the wellheads and XMAS trees for the four wells. Basic equipment, piping, and an emergency control system will be installed to support the operation of the two CO_2 injection wells and the two water production wells, as provided for in the licensed project.

The general layout of the platform is shown in **the** following **figure**.

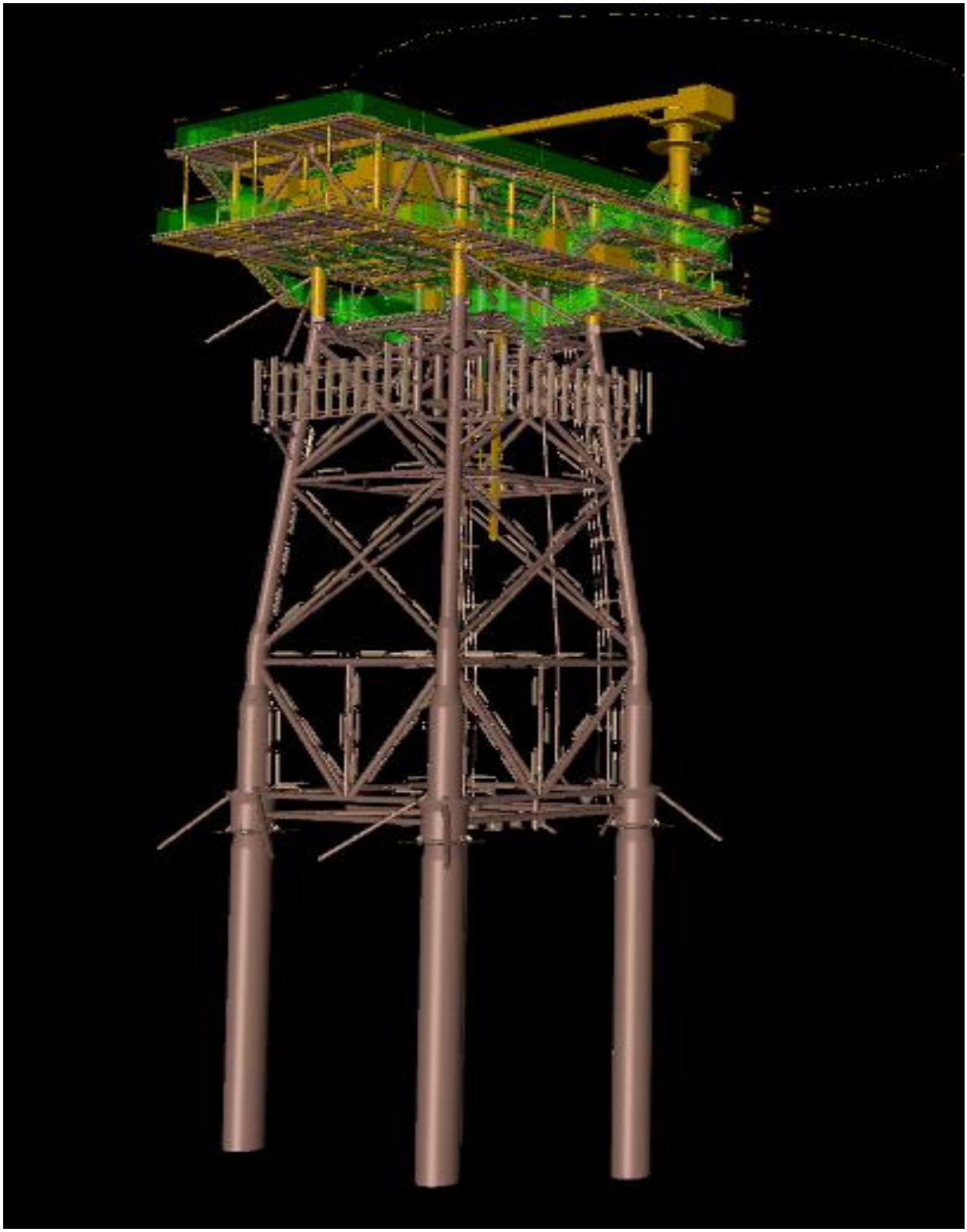


3 –10 : General layout of the Omega platform

The Omega platform includes the following equipment/materials required to support CO_2injection operations and related support activities:

- 50 tons of pipes, valves, and flanges for connection to the valve systems (XMAS trees) of the wells (no changes from what's in the approved EIA for the licensed project).
- 1 km of electrical wiring, electrical panels, emergency systems (no changes from what's in the approved EIA for the licensed project).
- 50 tons of hydraulic power unit and control panel for the heads (no changes compared to the provisions of the approved EIA for the licensed project).
- 15 tons of electric crane for operational use (no changes from what's in the approved EIA for the licensed project).

The three-dimensional schematic representation of the new Omega platform, whose maximum height above sea level will be 35 meters, is shown in **the** following **Figure.**



3 –11 : Three-dimensional schematic representation of the new Omega platform

The technical drawings of the Omega platform and its related equipment are included in **Appendix 12.3** of this document.

3.4.1.4. CO_2Injection and Water Production Wells

3.4.1.4.1. General Information

Two CO_2injection wells and two water production wells are planned to be drilled in the Prinos reservoir. All wells will be drilled within zones B and C of the Prinos reservoir in order to inject $CO_{(2)}$ and simultaneously produce water from the aquifers located below zone A of the reservoir.

Consequently, all wells will be drilled from the seabed at a new location without using other wells as starting points (Donors) from the existing platforms, as provided for in the initial project design that was environmentally licensed with the approved EIA for the project. The wells required for this project, as amended by this document, are summarized in **Table 3-3**.

The targets of each well, which have been decided upon with the completion of an appropriate geomechanical model mapping the boundaries of the reservoir. The final depth criteria for the new boreholes, the target coordinates, and the surface locations are presented in **Table 3-4.**

All four new boreholes will be constructed using the "traditional" method, i.e. using the telescopic method with protective pipes of decreasing size at depth, which will be cemented, with the cement located in the ring between the pipe and the wall/rock. Two of the wells will be completed as $CO_{(2)}$injection wells and two as water producers, but all will be drilled using the Top Drive drilling unit and guided by a combination of mud motors (PDM) motors and rotary steering systems (RSS) depending on the angle and inclination required to reach the drilling targets. The cuttings will be removed from the well using drilling mud, which will be injected through the drill string, passing through the nozzles at the cutting edge and then rising through the well ring. This mud will be both water-based and low-toxicity oil-based mud. The water-based mud will be used up to the "Brown marker" geological formation, which consists of clay. The low-toxicity oil-based mud will be used to drill the evaporite section and the reservoir. The specific gravity of the mud varies based on the pressure of the geological layers to be drilled. Additives such as barite are used to increase the specific gravity of the drilling mud, and more details will be discussed in **the** relevant **sections** below**.**

3.4.1.4.2. CO_2 Injection Drilling

The wells will be drilled using a jack-up type drilling rig with a horsepower of approximately 2,500 hp, with a TDS (Top Drive System) drilling unit and three high-pressure drilling mud pumps (an indicative 6,500 psi drilling head system is shown in **the** following **figure)**. The drilling rig includes the required equipment for the temporary storage of produced waste and fuel ( ). The RSS (Rotary Steerable System) drilling method was selected for drilling the wells. The decision to use the RSS technique for drilling the 26", 16", 12 ¼" and 8½" cross-sections was based on the following reasons:

- Increased drilling efficiency is achieved due to higher penetration rate (ROP) when correcting verticality, if necessary.
- It is the best way to confirm the position of the casing shoe with the possibility of using near-bit gamma ray instruments.
- It ensures better control of the drilling direction.

- Smoother correction of the verticality of the drilling is achieved, which facilitates the installation of pipes and the recording of data with wired instruments to the total depth.
- Reduced total well skew is observed.
- The risk of differential sticking is reduced since drilling is performed by rotating the entire drill string.

The stages of each drilling for each section up to the final measured depth of 4,200 m include, in summary:

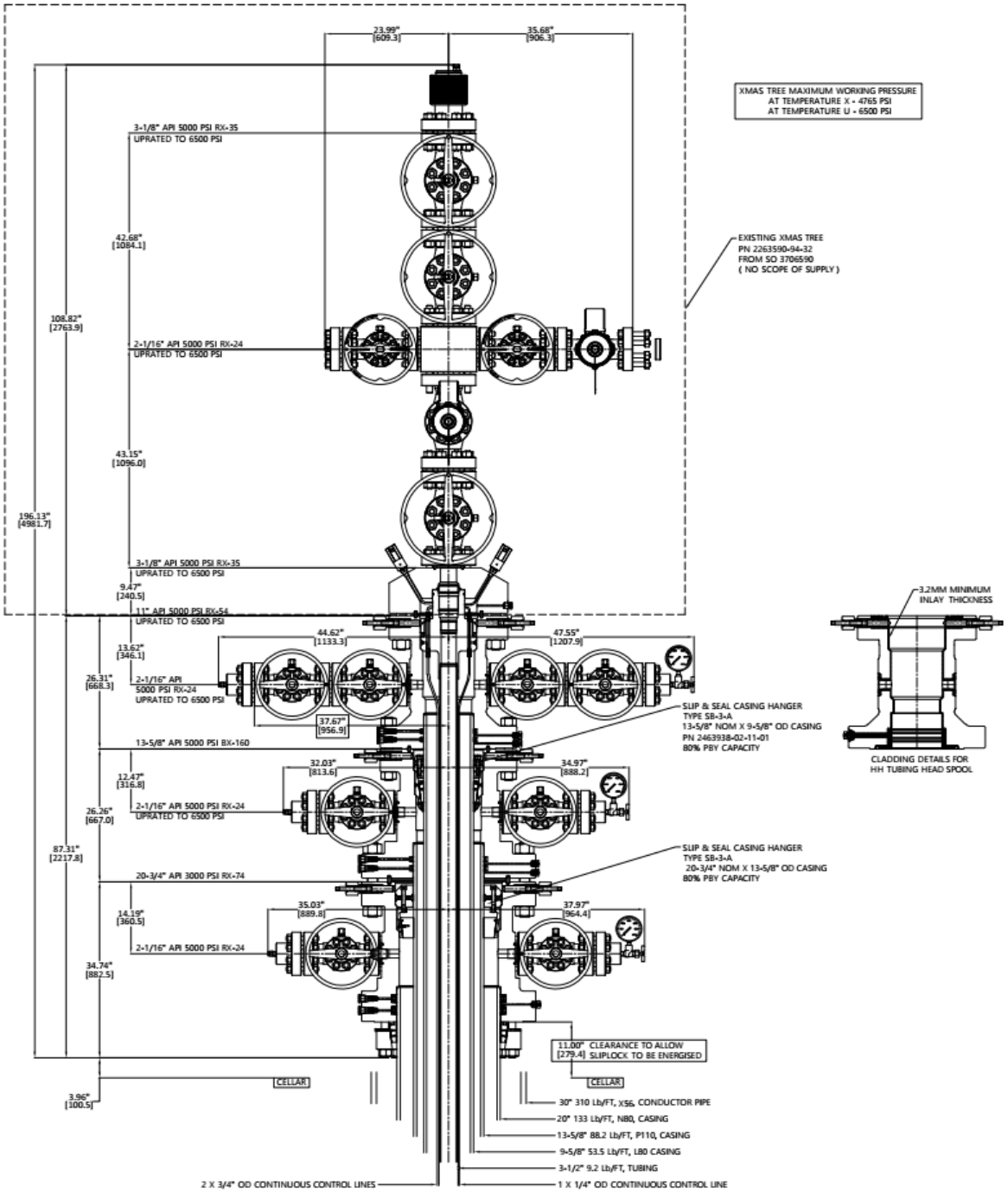
1 **Section with a diameter of 30"** at a measured depth of up to ~125 m (vertical depth 1,850 m).

2 **26" diameter section** at a measured depth of up to ~ 450 m (vertical depth 450 m).

3 **16" diameter drilling** to a measured depth of up to ~ 2,600 m (vertical depth 1,950 m).

4 **12-1/4" diameter drilling** to a measured depth of up to ~ 3,500 m (vertical depth 2,800 m).

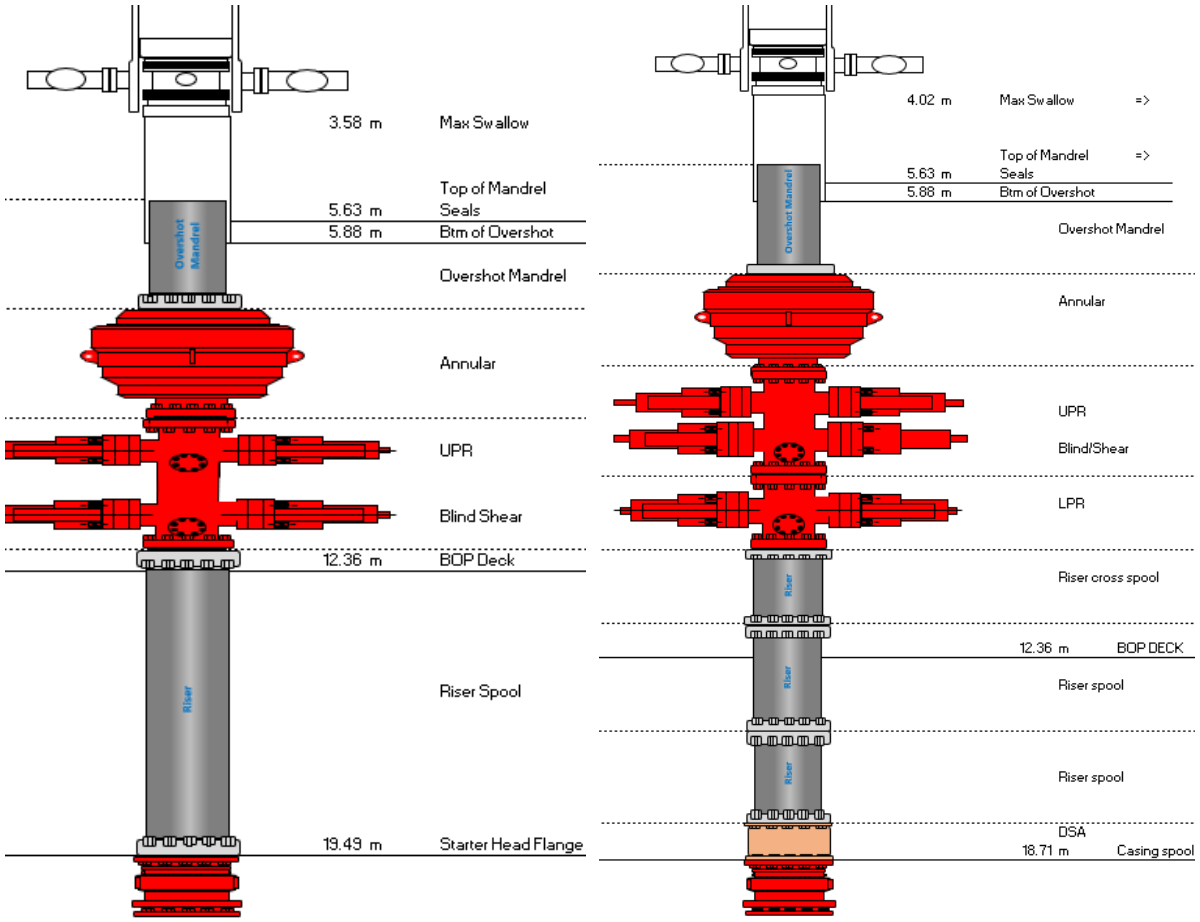
5 **8-1/2" diameter drilling** to a measured depth of up to ~ 4,200 m (vertical depth 3,350 m).



3 –12 : 6,500 psi drilling head system

Before starting the 16" section, a blowout preventer (BOP) will be installed (see **Figure** below). The blowout preventer (BOP) is one of the **main barriers** that ensures that fluid flowing into the well during drilling cannot reach the surface at the drill level. A **diverter ( )** will be installed for the 26" section, which, in the event of unwanted inflow of surface gases, will divert the gases away from the drill.

The BOP valves will be checked and tested every 14 days. Permission to extend the testing of the BOP valves beyond 14 days will be granted by the company's drilling supervisor.



3 –13 : BOR assemblies to be used in the wells under study

During the first 3 years of operation of the storage site, the CO_2injection rate will gradually increase from 0.25 to 0.5, then to 0.75 and finally to 1.0 MTPA.

CO_2injection will target zones B and C of the reservoir with two injection wells during the period 2025-2035 and will then be extended to the entire reservoir by the end of the Project.

3.4.1.4.3. Water Production Wells

The stages of each water production well will follow the methodology described above for CO_2injection wells.

The water wells will be equipped with electrical submersible pumps (ESPs) and will extract water from the reservoir to provide a means of actively managing reservoir pressure. The produced water will be piped to the water treatment facilities on the existing Delta platform, from where the treated water will ultimately be discharged to the sea.

The evolution of water well operations is expected to be as follows, according to simulation studies:

- The two water production wells will operate at a production rate of up to 7,500 bwpd each during the period 2025-2030 (6 years).

- Water production will increase to 9,000 bwpd per well in 2031 and until the end of the Project.
- The capacity of 7,500 bwpd/well is achieved by operating the electric submersible pump (ESP) at 83% of its capacity, while the capacity of 9000 bwpd/well is attributed to the operation of the electric submersible pump (ESP) at 100% of its capacity.

3.4.1.4.4. Well Tubing

As part of the proposed project, the following piping work will be carried out in order to complete the drilling with 3 ½'' or 4 ½'' production piping:

- **30" protective piping**

  30", 310 lb/ft, Grade X-56 with LEOPARD SD2 connection.
- **Surface casing 20"**

  20", 133 lb/ft, Grade X-56 with LEOPARD SD2 connection.
- **Intermediate tubing 13 5/8"**

  13 5/8", 68 lb/ft, Class L80 with VAM 21 connection.
- **Production piping 9 ⅝"**

  9 5/8", lb/ft, or 53.5 9 7/8", 69.9 lb/ft, Class L80 with VAM 21 connection.
- **Production pipe / pipe sleeve 7"**

  7", 32.0 lb/ft, Class L80/25Cr with VAM 21 connection.

The approximate lengths of the drilling sections and the final measured depth are shown in **the** following **table**.

Table3 –8 : Characteristics of drilling sections and piping

Section	Measured Depth (m)	Vertical depth (m)	Section Length	Well Diameter (In)	Pipe Diameter (In)
I	12	125	125	30	30
II	450	450	450	26	20
III	2,600	1,950	2,150	16	13 3/8
IV	3,500	2,810	900	12 1/4	9 5/8
V	4,200	3,350	700	8 1/2	7

The drill rig will be equipped with a complete mud data logging unit, manned by qualified operators, during the well recovery and drilling operations.

Formation samples will be taken as described in the following **Table**

3 –9 : Formation samples per drilling phase

Cross-section	Sample cutting	Frequency

	No. of samples	Type	
26	2	Liquid	20
	2	Washed/Dry	20
16	2	Wet	20
	2	Washed/Dry	20
12 1/4	2	Wet	20
	2	Washed/Dry	20m
8 1/2	2	Wet	20
	2	Washed/Dry	20m

3.4.1.5. Rerouting of Pipeline CO_2

The main change in this proposal is to extend the pipeline by approximately **1.3–1.6 km** so that it connects to the new Omega platform. The total length of the final CO_2 pipeline will be **19–19.3 km**. In addition, with the proposed modification, the route of the pipeline will remain unchanged, with a minor modification so that instead of ending at the Beta platform, it will bypass it.

The CO_2 pipeline will be installed using a pipe-laying barge, in accordance with the methodology approved in the project's approved EIA. A large-diameter pipeline (12-16") will be installed for the maximum capacity of Phase 1, which will also be sufficient for Phase 2.

The main characteristics of the pipeline, according to the preliminary design study (pre-FEED) completed in 2022, are as follows:

- **Length**: 19 km, within the existing Prinos pipeline corridor.
- **Size**: 12-16" OD, 3 mm anti-corrosion coating, 30 to 50 mm thick concrete overlay.
- **Material**: CS, WT: 0.5", 3 mm LPP coating,
- **Design pressure**: 230 barg,
- **Design temperature**: -46 °C).
- **Corrosion protection**: Anodes at appropriate intervals to provide a 30-year service life.
- **Installation**: The pipeline will be buried along its entire length to protect it from trawling activities in the area. In the first 500 m of the coastal section, the burial depth from the top of the pipeline will be 2 m, and in the offshore section, the burial depth will be 1 to 1.5 m.
- **Maximum water depth**: 32 m at the platform location.

3.4.1.6. Produced Water Transfer Pipeline

The produced water will be transported from the 2 water production wells (the water wells on the new platform will be equipped with Electrical Submersible Pumps (ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) from the new platform to the existing Delta platform, so that the produced water can be treated and disposed of in accordance with the project's EIA (PO *"1.4.7.2.4.3. The treatment of the produced water will take place at the existing Delta platform"*), to the existing Delta platform produced water treatment system, as described in **Section 2.2.1.2**.

The total length of the subsea CO_2transfer pipeline is approximately **1 km**. The pipeline will be made of carbon steel, with a diameter of 10 inches and a wall thickness of 15 millimeters, and will be laid 1 m below the seabed.

The methodology for installing the submarine pipeline for transporting the produced water is the same as that described for the installation of the CO_2transport pipeline.

3.4.1.7. Power Supply Cables

The operation of the Omega platform (and the related project equipment) requires a power supply, which will be covered by the existing submarine network that supplies the existing platforms of the Prinos complex. Therefore, an underwater power supply cable approximately 1 **km** long will need to be installed to connect the new Omega platform to the existing Delta platform. The cable will be laid on the seabed by a vessel with a reeling capability and then buried 1 m below the seabed . The cable is sized to provide 6.3 MW of power. Both platforms (Delta and Omega) will have connection points for the new cable as cable terminals. The new cable will be a 3-core, 400 mm^2 Cu, XLPE-insulated armored submarine cable.

3.4.1.8. Auxiliary Facilities

The present proposed amendment does not include any substantial change to the auxiliary facilities, which remain as described in the approved EIA for the project (and have been environmentally licensed with the relevant AEPO) and are presented in **Section 2.2.5** of this document.

3.4.2. Construction Phase

3.4.2.1. Construction Process

3.4.2.1.1. Installation of New Offshore Platform (Omega Platform)

3.4.2.1.1.1. General Information

The final design of the Omega platform includes its transport and installation in the following 3 parts:

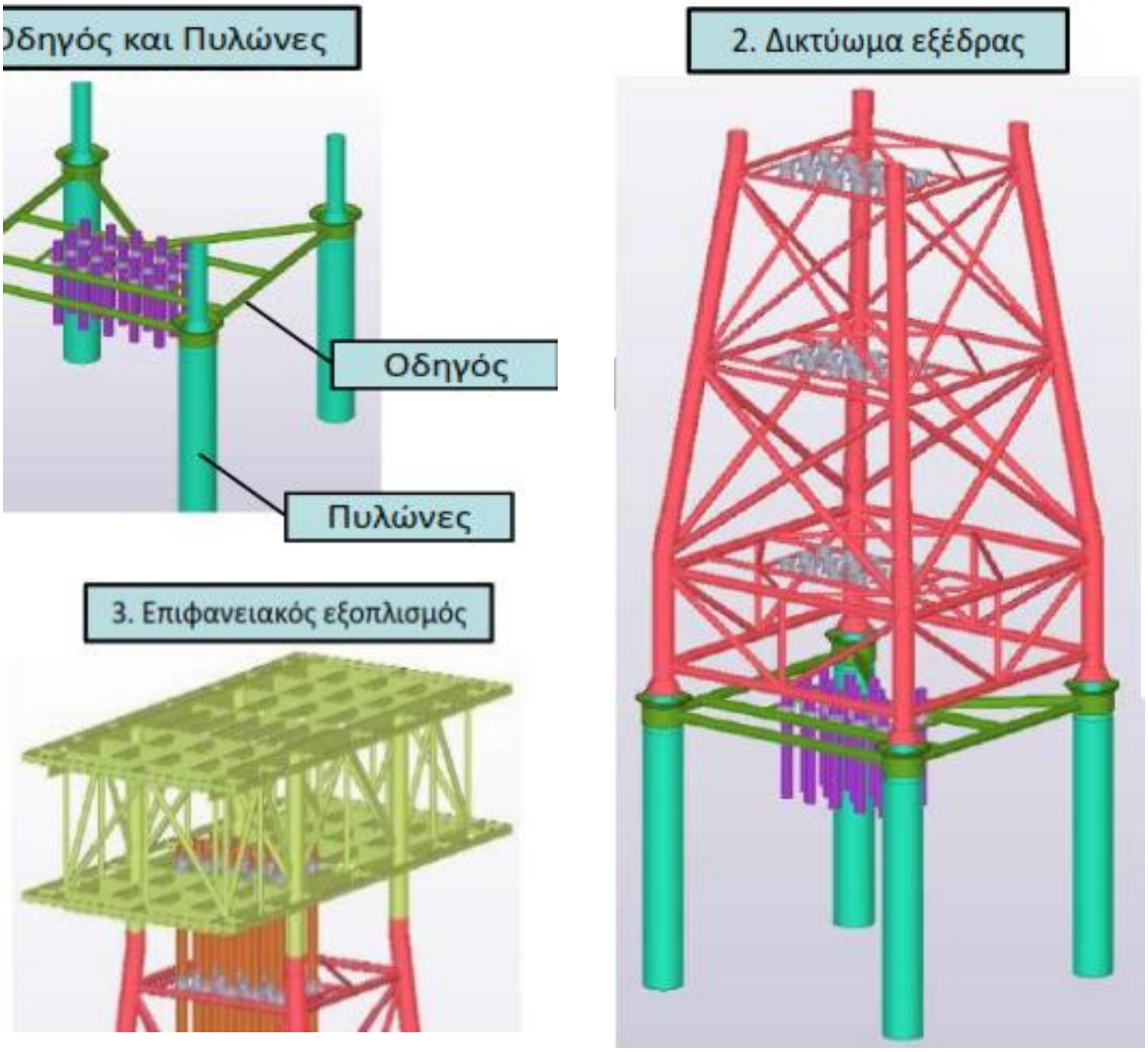
1 Guide and pillars.

2 Platform grid.

3 Surface equipment.

The Omega platform will be of conventional type (see **Figure** below) and will consist of the following parts:

- The pillars and protective conduits of the wells, together with their installation frame/guide.
- The support grid for the platform decks.
- The decks with the platform's surface equipment.



3 –14 : Conventional platform components.

The preliminary design of the Omega platform includes the following:

- The conventional Omega platform will be supported by four (4) pillars.
- Each pillar will have two levels: below the seabed, it will have a diameter of 3–3.5 m, while above the seabed, it will have a diameter of 1.5–1.75 m.
- Each pile will penetrate the seabed to a depth of 30 m. Driving will be carried out using a percussion or pulsed mechanism (the final choice of driving mechanism will be determined during the detailed design phase, following detailed analyses of the specific soil and geological characteristics of the exact location of the new platform) and will take approximately 2-3 hours for each pile.
- The upper part of the pillars will protrude 8-10 m from the seabed.

3.4.2.1.1.2. Installation of the new platform

The installation of the platforms includes the following stages:

1 Inspection of the installation area.

2 Execution of the first preparatory boreholes, which are sealed and temporarily abandoned for completion in production after the completion of the platform installation.

i. A self-installing jack-up drill rig will be used for the drilling.

ii. Before drilling begins, the drill will install a frame/guide for the precise insertion of the protective drill pipes. This frame will form part of the frame shown in the following figure.

3 –15 : Frame/guide for the pillars and protective pipes for the boreholes

3 Placement of the transport vessel (see following Figure), carrying the frame/guide and the pillars, in the installation area.

Figure3 –16 : Indicative transport vessel for the frame/guide and pillars

4 Placement of the frame/guide (**Figure 3-15**) on the seabed from the transport vessel and orientation using a special system on the frame.

5 Lifting the 30–32 m long pillars with the transport vessel's crane and driving them into the seabed through the frame/guide (see **figure** below) using an impact mechanism.

3 –17 : Driving the piles through the frame/guide

6 Once the pillars have been driven to the appropriate depth, the installation distances (axial distance and height difference between the ends) are checked.

7 The above measurements are used to properly adjust the grid connections (to the pylons) so that the upper part remains horizontal for the installation of surface equipment.

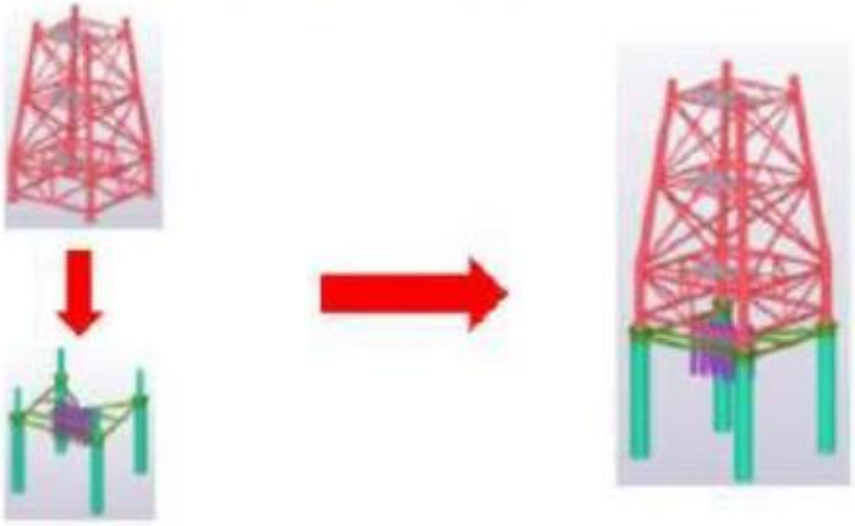
Note: the vertical connection pipes of the submarine pipelines (risers) and the boat landings will be pre-installed on the grid.

8 Installation of a floating crane with an articulated triangular boom (see **figure** below) to continue the installation of the network and surface equipment.

3 –18 : Floating crane with articulated triangular boom

9 The platform grid is transported by barge to the platform installation site.

10 The floating crane lifts the framework and places it on the ends of the pillars that protrude 8–10 m from the seabed (see **figure** below).



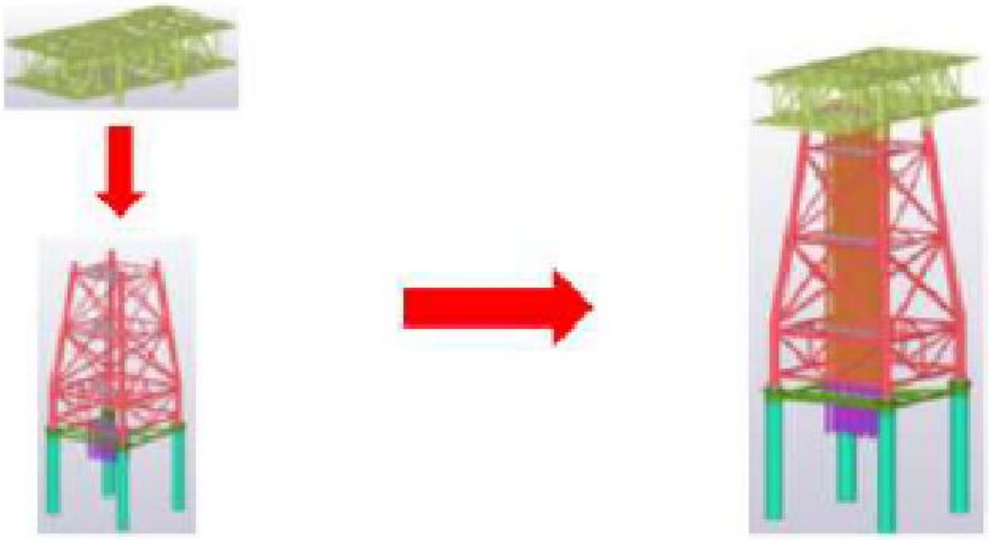
3 –19 : Installation of the platform grid on the support pillars

11 The mesh is welded to the pillars once it has been verified that it has been placed correctly, and cement is injected into the space between the mesh legs and the pillars.

12 While the cement is hardening, the final alignment of the upper ends of the legs is carried out. At the same time, the surface equipment on the floating barge is prepared for lifting and secured by the crane that has released the latticework.

13 During the same period, the lifting aids are removed from the mesh and the surface equipment is prepared for welding.

14 Once the Inspector has given approval to continue the work, the surface equipment is lifted and placed on the platform's network (see **Figure** below).



3 –20 : Placing the surface equipment on the platform's framework

15 After placement, the crane is released and the support legs of the surface equipment are welded.

16 The four legs are welded simultaneously.

17 After the first non-destructive tests of the welds, they are cleaned in anticipation of subsequent tests.

18 Upon successful completion of the second non-destructive tests, the necessary navigation aids are installed on the platform and all floating installation equipment is removed.

Installation of the CO_2transfer pipeline, the interconnection pipeline between the new Omega platform and Delta, and the submarine cable for the electrification of the new Omega platform facilities will be carried out in parallel with the installation of the new platform so that they can be connected to the new platform once its construction is complete (tie-in). The details of the construction methods for these elements are described in the following relevant **Sections**.

3.4.2.1.1.3. Pile Driving Mechanism

The impact driving mechanism (see **Figure** below) for the piles will be **of the hydraulic type (Hydraulic Impact Hammer)**. The main means of moving the piston is hydraulic oil. When the piston is lifted by increasing the oil pressure, the oil is quickly drained or diverted to another chamber and the piston falls with force, driving the pile into the ground.

The main parts of the driving mechanism are as follows:

- **Piston**: Consists of one or more sections and its physical and chemical properties are checked before use.
- **Piston shaft**: Adjusts the release height of the piston.
- **High pressure unit**: Creates the appropriate pressure to move the piston.
- **Hydraulic hose**: Receives the hydraulic oil and moves the piston.
- **Pressure tank**: Operates at high and low pressure. Absorbs shock and controls the piston to move at 130% of free fall speed.
- **Piston release height indicator**: The operator can see the piston release height and adjust it as needed by remote control.
- **Protective cover**: Protects the piston and reduces noise.
- **Hydraulic hose support frame**: Secures the hydraulic hoses from the high-pressure unit to the hydraulic hose of the mechanism.

Its main features are as follows:

- It produces a relatively high acoustic pulse load at low frequency.
- High operating efficiency with minimized energy loss through appropriate design.
- Equipped with a pressure damping tank that accelerates the drop and compensates for energy loss during the piston drop.
- Precision remote control for complete control of piston movement and prevention of mechanism damage due to sudden and unstable piston movement.
- In case of soft ground, a low piston drop height is set to prevent sudden penetration of the pile into the ground and problems with the suspension mechanism.
- Easy maintenance and identification of operating problems due to its simple design. Additionally, easy operation with remote control.
- Designed and manufactured for long-term use and minimization of downtime due to problems.

The technical characteristics of the mechanism (shown in **the** following **figure**) that may be used are presented in **the table** below.

3 –10 : Technical characteristics of the impact mechanism for driving piles

Energy	
Maximum energy/impact (kN.m)	150
Minimum energy/impact (kN.m)	6
Impact rate (maximum energy) (impacts/min)	45
Weights	
Piston (ton)	7.5
Hammer (including piston and guide) (ton)	19.6
Hydraulic data	
Operating pressure (bar)	26
Maximum pressure (bar)	35
Noise levels	
Typical noise levels (db@3-10m)	18

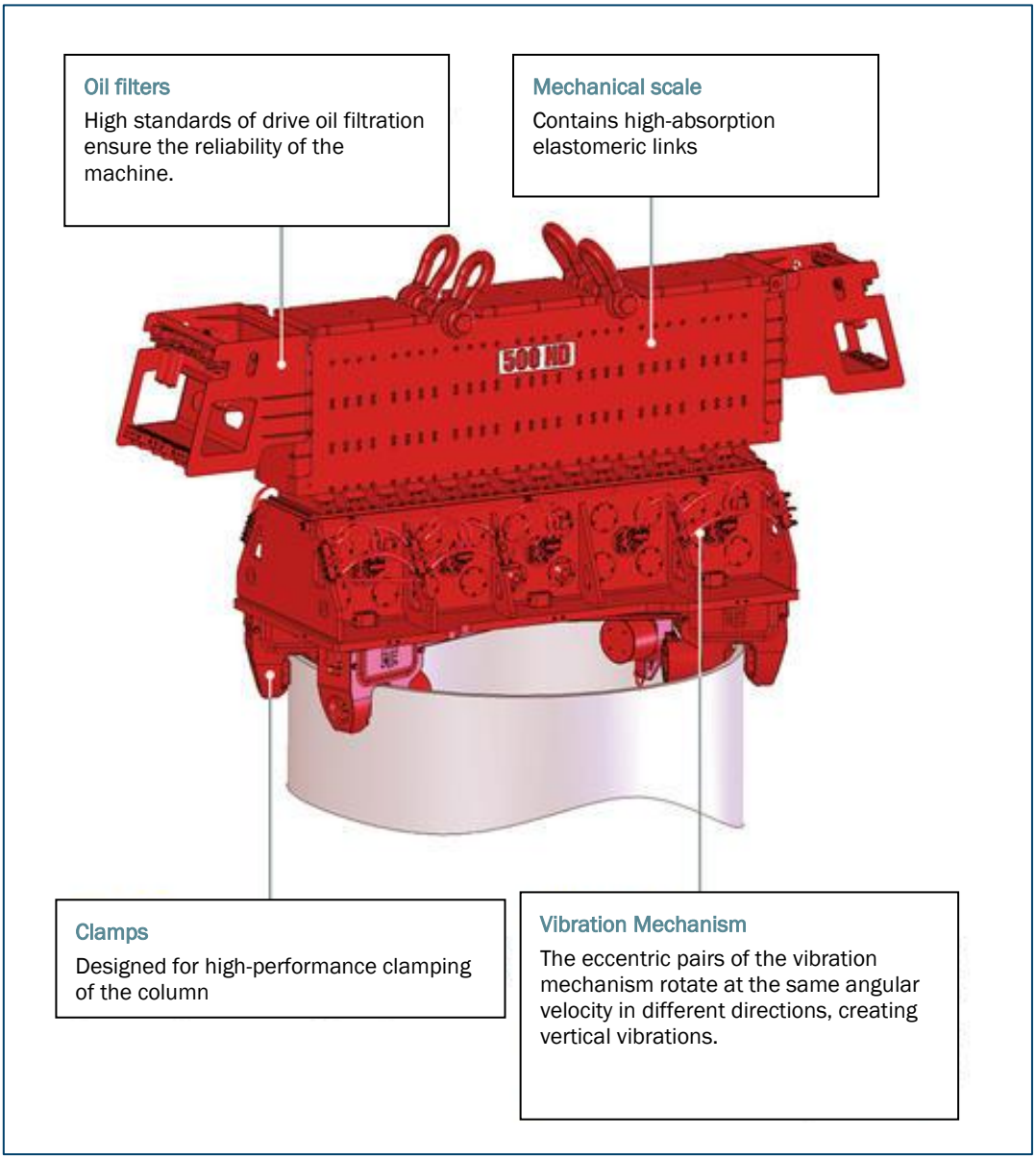
3 –21 : Impact drive mechanism during operation

3.4.2.1.1.4. Pulsed column driving mechanism

The **pulsed driving mechanism of the piles (vibro hammer or vibro driver)** (next **Figure)**, whose use will be examined based on soil analyses, operates in conjunction with a high-pressure unit and a mechanism for tightening/holding the driven piles.

The principle of operation is based on the creation of vibrations from the piles in the ground in order to reduce its natural resistance and friction between it and the pile.

The vibrations are generated by the generator/driver with hydraulic oil injected by the high-pressure unit and transmitted to the pile through its clamping/restraining mechanism.



3 –22 : Main parts of the pulsed column drive mechanism

Its main features are as follows:

- It produces a relatively low steady load of acoustic pulses at a high frequency.
- Due to the low impact energy of the pulsed mechanism, the risk of malfunction due to problems is reduced.
- It lifts the pile, places it at the installation point, and then starts driving it.
- It is equipped with an electronic instrument for monitoring depth, inclination, applied pressure, amplitude, and vibration frequency.

The technical characteristics of the mechanism (shown in **the** following **figure**), which may be used, are presented in **the table** below.

3 –11 : Technical characteristics of the pulsed pile driving mechanism

Eccentric momentum (kgm)	500
Hydraulic power (kW/HP)	709 / 964
Maximum hydraulic oil flow (lt/min)	2600
Maximum frequency (Hz/rpm)	23 / 1380
Maximum centrifugal force (kN)	10748
Maximum pulling force (kN)	3380
Maximum vibration range (mm)	15.8
Size with clamps (mm)	6800x 5500x 1500
Total weight without clamps and pipes (kg)	84300

3 –23 : Pulsating drive mechanism during operation.

3.4.2.1.2. Injection Wells and Water Producing Wells

3.4.2.1.2.1. General Information

Two CO_2injection wells and two water producing wells are planned to be drilled in the Prinos reservoir. All wells will initially be drilled within zones B and C of the Prinos reservoir in order to inject $CO_{(2)}$ and simultaneously produce water from the aquifers located below zone A of the reservoir.

All wells will be drilled from the seabed from a new location without using other wells as starting points (Donors) from the existing platforms, as provided for in the initial project design that was environmentally licensed with the approved EIA for the project. The wells required for this project, as amended by this document, are summarized in **Table 3-3**.

The targets of each well, which have been decided upon with the completion of an appropriate geomechanical model mapping the boundaries of the reservoir. The final depth criteria for the new boreholes, the target coordinates, and surface locations are presented in **Table 3-4.**

All four new wells will be constructed in the "traditional" manner, i.e. using the telescopic method with protective casing of decreasing size at depth, which will be cemented, with the cement located in the annulus between the casing and the wall/rock. Two of the wells will be completed as $CO_{(2)}$injection wells and two as water producers, but all will be drilled using the Top Drive drilling unit and guided by a combination of mud motors (PDM) motors and rotary steering systems (RSS) depending on the angle and inclination required to reach the drilling targets. The cuttings will be removed from the well using drilling mud, which will be injected through the drill string, passing through the nozzles at the cutting edge and then rising through the well ring. This mud will be both water-based and low-toxicity oil-based mud. The water-based mud will be used up to the "Brown marker" geological formation, which consists of clay. The low-toxicity oil-based mud will be used to drill the evaporite section and the reservoir. The specific gravity of the mud varies based on the pressure of the geological layers to be drilled.

The following **sections** describe the activities related to the drilling of the four new wells.

3.4.2.1.2.2. Drill rig

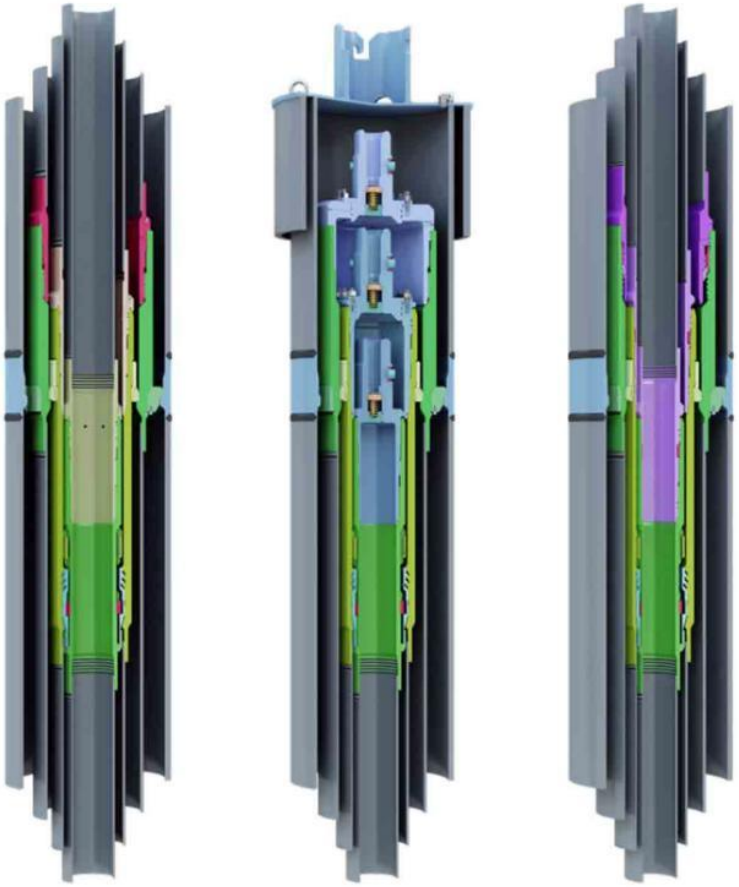
The proposed amendment provides for the implementation of four new boreholes, which will be drilled using the drill described in the approved EIA for the project (and licensed environmentally by the relevant AEPO) and presented in **Section 2.2.6.3.1** of this document.

In summary, it is noted that in order to minimize the environmental footprint of the drilling, a drilling rig with a horsepower of approximately 2,500 hp will be used, with a drilling unit of the type TDS (Top Drive System) and 3 high-pressure drilling mud pumps. The drilling rig includes the necessary equipment for the temporary storage of produced waste and fuel. The drilling rig, of the CROSCO Labin type or similar characteristics, will be designed and constructed in accordance with API 4F and the latest European regulations, including low emission specifications, and shall be fully ATEX certified. The drilling rig shall be transported to the drilling site by suitable tugboats. The drilling rig is expected to be located in the Adriatic Sea.

Also, in the event that the platform needs to be installed at a later date and after drilling has commenced, equipment will be used that will allow the temporary abandonment of the wells at the bottom after their

completion (MLS - Mud Line Suspension) (see **Figure** below**)**. After the new platform is installed, the wells will be connected to the platform level that will house the trees. After this phase, the wells will be completed with the trees (Xmas trees) in place.

The MLS system will have the same nominal pressure as the rest of the equipment to match the maximum expected drilling pressure and will comply with the relevant API standards (API 17D, API 5CT).



3 –24 : MLS (Mud Line Suspension) equipment

3.4.2.1.2.3. Drilling Methodology

3.4.2.1.2.3.1. Standard Drilling Methodology

The proposed amendment provides for the implementation of four new wells, which will be drilled using the same **standard drilling methodology** described in the approved EIA for the project (and has been environmentally licensed with the relevant AEPO) and are presented in **Section 2.2.6.3.2.1** herein.

3.4.2.1.2.3.2. Drilling Mud

The use of drilling mud/slurry throughout the drilling process is necessary, as in the case of the licensed project. Therefore, the proposed amendment provides for the implementation of four new boreholes, which will be drilled using drilling mud/slurryslurry, as described in the approved EIA for the project (and environmentally licensed by the relevant AEPO) and presented in **Section 2.2.6.3.2.2** herein.

3.4.2.1.2.3.3. Installation of Protective Piping

Once a section of borehole of a specified diameter has been drilled, a protective pipe of slightly smaller diameter is run through it. This pipe is placed at the bottom of the drilled section to provide stability. Once the pipe is in place, cement is injected through the cement head into the borehole and pushed upward into the annulus where it solidifies. The cement must completely fill the annulus between the protective pipe and the formation. Once the cement has compacted, the next smaller diameter drill section is started from the bottom of the last section and the above process is repeated. In this way, a telescopically mechanically stable borehole is constructed. The length of each section is defined in the drilling program and is a function of the escalating pressure of the geological formation's pores.

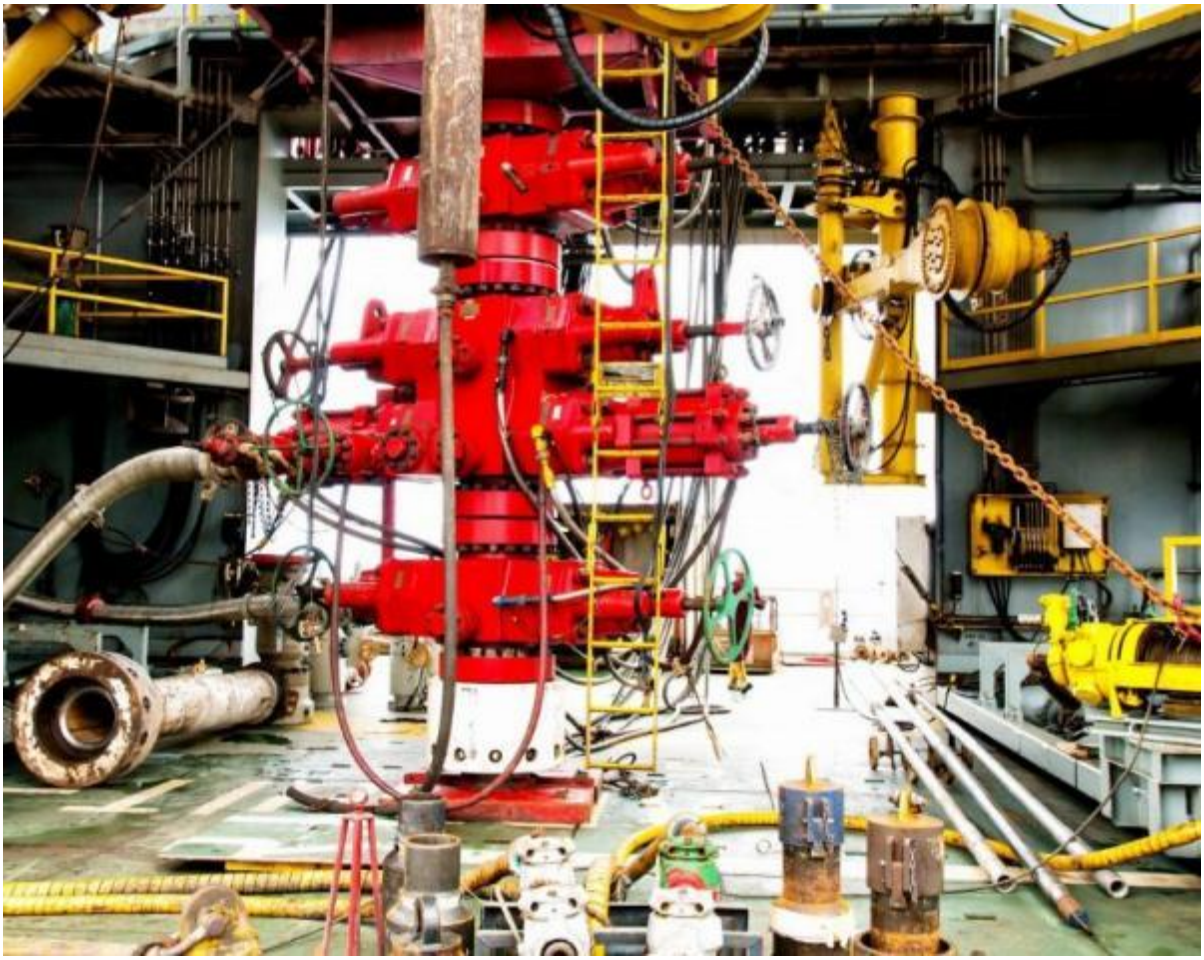
In a new CCS well, as will be constructed from the new platform, it will be necessary to install surface protective piping, also known as a "conductor," and all four wells will be drilled from the seabed.

Before drilling begins on the 16" sections, a **Blow Out Preventor (BOP)** will be installed. The BOP consists of a series of valves and is one of the main barriers ensuring that fluids entering the well cannot reach the surface.

Fluids in the formation pores can enter a well during drilling if the formation fluid pressure is greater than the hydrostatic pressure exerted by the drilling mud used. When required, BOP valves can be closed hydraulically using a multiple cylinder hydraulic fluid reservoir placed around the perimeter of the drill.

These cylinders are kept fully charged during operations. Loss of pressure in the cylinder tanks automatically causes the BOP to close. When the valves close, the well is sealed, preventing formation fluids from flowing to the surface. The sudden influx of reservoir fluids into a well is called a "kick." The fluids may be water or hydrocarbons.

A typical BOP (dry) system on a jack-up drilling rig is shown in **the** following **figures**.



3 –25 : Typical BOP (dry) system on a jack-up rig

3 –26 : Typical BOP system on a jack-up drilling rig

Before reopening the blowout preventer (BOP), the fluids that have entered the well are removed by circulating the mud, whose specific gravity is increased to prevent further inflow. Increasing the weight of the mud increases the hydrostatic pressure applied and ultimately balances the formation pressure.

For the proper and easy execution of the process of removing geological fluids that have entered the well unintentionally, a **choke manifold consisting of special outlet pipes and valves** is installed in series with the blowout preventer (BOP). The choke manifold is connected to a remote control system that allows it to be operated from a distance.

3.4.2.1.3. CO_2Injection Drilling and Water Production Drilling Process

The following describes the program for a CO_2injection well for each section up to the final depth of approximately **4,200 m**. The following paragraphs provide a brief description of the drilling stages.

3.4.2.1.3.1. CO_2injection drilling

The stages of each CO_2injection well for each section up to the final measured depth of 4,300 m include, in summary:

- **30" diameter drilling section with a measured depth of up to ~ 120 m:**

This protective casing will be fixed at approximately 120 m; it will not be necessary to open a drilling section using a cutting edge. With the approach of the fixing, the 30" pipe will reach the final depth without the need for cementing.

- **Drilling section with a diameter of 26" and a measured depth of up to ~ 450 m:**

  The drilling will be carried out to a depth of approximately 450 m, using a 26" diameter cutting edge. Water-based mud with a specific gravity of approximately 1.03 SG will be used (no specific gravity increasing agents such as barite are expected to be used). The surface casing to be used in this section is 20" and will be cemented to a depth of 20 m below the seabed.

- **16" diameter drilling section with a measured depth of up to ~ 2,600 m:**

  The drilling will be carried out to a depth of approximately 2,600 m, using a 16" diameter cutting edge. High-viscosity mud with a specific gravity of 1.05 to 1.25 SG will be used. For this section, the mud will be calcareous mud and water-based mud. The well will be cleaned with fresh high-viscosity mud prior to logging and installation of the 13-3/8" casing. The casing will be cemented 200 m above the base of the previous casing.

- **12-1/4" x 13 ½" borehole section with a measured depth of up to +/- 3,500 m**

  A 12-1/4" x 13 ½" diameter cutting edge will be used to drill to approximately 3,500 m. Low toxicity oil-based mud with a weight of 1.35 to 1.75 SG will be used for this section. The final depth of this phase of drilling will be at the bottom of the evaporite, just above the reservoir section. The protective casing will be cemented with a 200 m cement column above the base of the previous 13-3/8" protective casing and cemented along the entire length of the open geological formation. If the formation does not allow cementing along the entire length of the open geological formation, then the top of the cement will reach 200 m below the base of the previous protective casing.

- **Drilling section with a diameter of 8-1/2" and a measured depth of up to +/-4,200 m**

  Drilling will be carried out to approximately 4,200 m with an 8-1/2" cutting edge. The previous drilling mud will be used. The final target of the CO_2 injection wells is the aquifers below reservoirs B and C. This will allow CO_2 to be injected into the aquifer without disturbing the productive formations in zone A. In general, the reservoirs in the Prinos deposit consist of compacted sandstones, and sand production is not expected to cause any problems. A 7" diameter protective pipe will be cemented along the length of the reservoir section and then perforated at the preferred depth where CO_2 injection is required.

The piping plan for each CO_2 injection well section is summarized in **the** following **table**.

Table3 –12 : Drilling sections and piping plan for CO_2 injection drilling

Section	Final depth (MD m)	Section length (m)	Section diameter (inches)	Pipe diameter (inches)
I	12	12	30	30
II	450	330	26	16
III	2600	2150	16	13 3/8
IV	3500	900	12 ¼	9 5/8 x 9 7/8
V	4200	700	8 ½	7 or 7 5/8

The stages of each water production well will follow the methodology described above for CO_2injection wells.

3.4.2.1.3.2. Total Drilling Depth Criteria

All wells must be drilled within zones B and C of the Prinos reservoir in order to inject CO_2 and simultaneously produce water from the aquifers located below zone A of the reservoir. The targets for each well have been determined based on the geomechanical model mapping the reservoir boundaries (see **Table 3-4)**.

The drilling operation constraints (as summarized in **the** following **Table**) on which the integration approach is based are dictated by the installation constraints, the flow assurance study, and the experience gained from the Epsilon and Prinos wells.

3 –13 : Well operation constraints

Maximum CO_2injection rate	0.7MTPA
Maximum water production rate	10Kbpd
FWHP of CO_2injection wells	225-340barg
FWHP of water production wells	6-150barg
FWHT of CO_2injection wells	5-90degC
FWHT water production wells	100-130degC

The water production wells will house electric submersible pumps (ESPs) to assist in producing water from the reservoir aquifer. The estimated water production volume per well will be approximately 9,000 barrels per day. For these requirements, two different completion scenarios are being considered for the development of the ESP pump in 9 5/8" production casing or 10 3/4" production casing. In both cases, the completion tubing was selected to be 4 ½" or 3 1/2", with high-quality connections and metallurgy suitable for water and $CO_{(2)}$production.

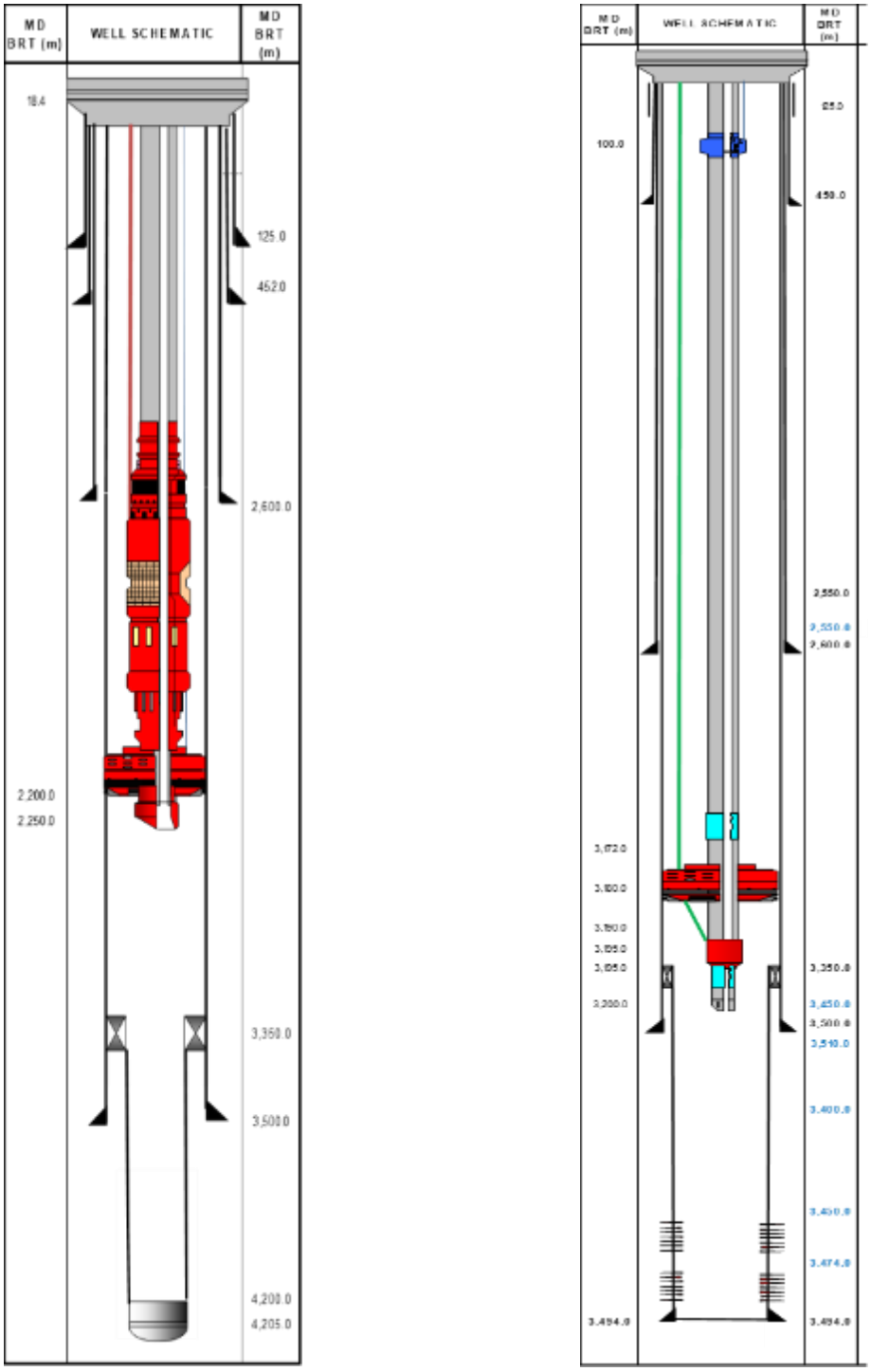


Figure3 –27 : Water wells with pumps at different depths

The choice of materials and quality of protective pipes for the 4 boreholes is presented below (see **Table**). The materials for each section will be determined at a later stage, once the design for each borehole has been completed. However, the following **table** presents a range of materials that have been used in protective pipes for similar projects.

Table3 –14 : Selection of protective piping for CO_2injection and water production wells

Protective piping	Size (in)	Weight (lbs/ft)	Type	Connection	ID (in)	OD (in)	Expansion (psi)	Compression / Collapse (psi)	Tensile strength (Lbs)
Conductor	30	310	X-56	LEOPARD SD2 or similar	28	32	3302	1688	5160k
Surface	20	133	X-56	LEOPARD SD2 or similar	19	21.5	3571	1506	2480k
Intermediate	13 5/8	68	L-80	VAM 21 or similar	12,250	13,886	8,830	4,570	1556k
Production Casing	9 ⅝”	53.5	L80	VAM 21 or similar	8,535	9.878	12,390	8,440	1244k
Production liner	7’’ or 75/8''	32	L80 and 25Cr (below packer)	VAM 21 or similar	6,094 / 6,625	7,732/76.25	1246	10,780 / 8,820	1025k/895k
Completion tubing	3 1/2''	9.2/6.4	25Cr	VAM 21 or similar	2.9/2.4	3.9/3.3	10160 / 10570	10540	207k/145k

In any case, regardless of the metallurgy, quality, and weight of the protective casing selected, Energean's design criteria adopted by EnEarth for drilling will be met as described in the drilling delivery management process documents. The design of the casing will use the minimum design factors for casing and production pipes, as shown in **the** following **Table.**

Table 3 –15 : Protective casing design safety factors

Compression/Collapse	1.0
Expansion	1.
Tension	1.4
Triaxial compression	1.25

For the design of the new boreholes, data from relevant neighbouring boreholes has been collected and examined. The following relevant data will be taken into account in the design analysis:

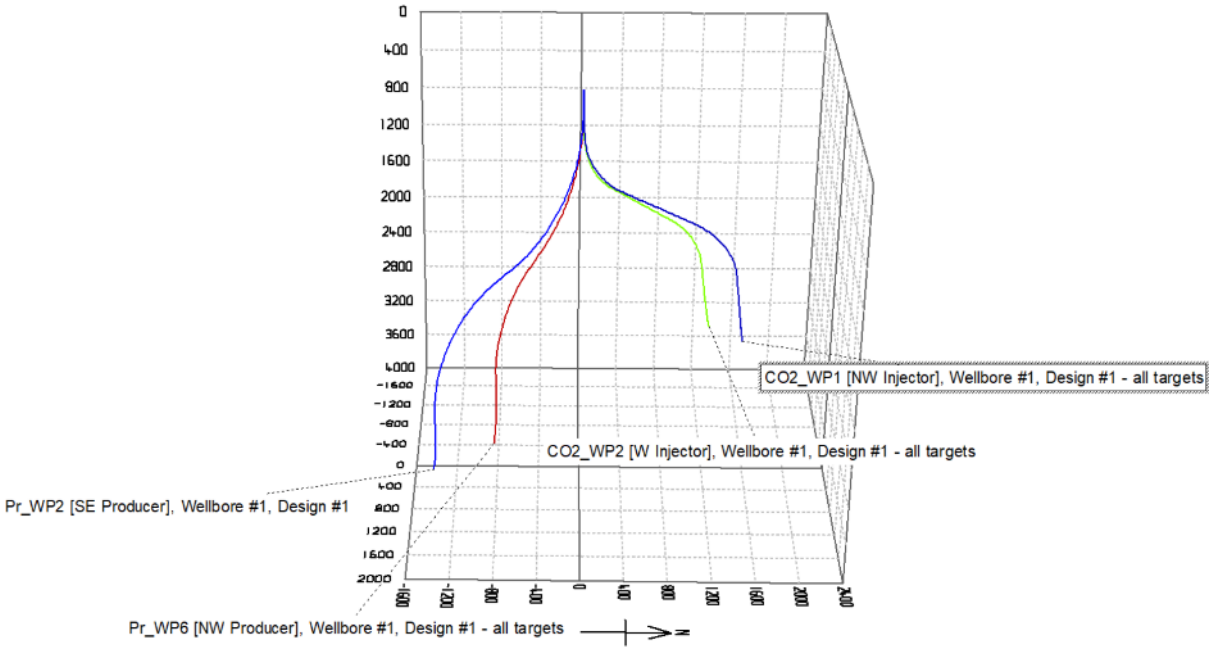
- Protective casing design and installation depths.
- Pore pressure and rock fracture profiles.
- Lithological column.

- Drilling constraints.
- Drilling problems.
- Summary of drilling muds and cementing.
- Execution sequence and schedule.

The detailed final design of the new wells will ensure that the identified risks are minimized as much as possible.

The identified risks will be recorded in a risk register and mitigation methods will be defined. The final well design will reflect the expected operating window of the well during the full construction and production life cycle of the well.

The targets and trajectories of the new wells for the project under consideration, including the start-up wells from the Omega platform, are shown in **the** following **figure**.



3 –28 : Drilling targets and trajectories for wells from the new location – CCS 1MPA.

3.4.2.1.3.3. Typical Drilling Mud Design

During the drilling of the 26-inch and 16-inch diameter section to a depth of 2600 meters, a seawater-based or seawater and lime-based drilling fluid will be used, which is biodegradable with no negative impact on the environment. The cuttings from this section will be deposited on the seabed. The water-based mud used has been selected to be biodegradable without negative impacts on the local environment. Below this depth, the drilling fluids return to the surface where the cuttings are removed and the mud is maintained as described above.

The total volume of drilling mud and the added components (by concentration) are shown in **the table** below.

Table3 –16 : Drilling mud program per cross-section and additives used

Section	Diameter (inches)	Estimated volume of drilling mud per well (m^3)	Drilling mud system – Main additives
I	30	N/A	**N/A** The protective casing will be installed without the use of drilling mud.
I & II	26 & 16	+/- 1400	**Gel / Polymer / Lime** Additives: Bentonite, Potassium Chloride, Polypac, CMC, Lime, Calcium Carbonate, Sodium Chloride, Flo-Vis.
III	12 1/4	+/- 490	**Versavert LTOBM** Main products: EDC 95/11, Safe-Scav, Safe Carb, Bentonite, Calcium Chloride, Barite, Versatrol
II	8 1/2	+/- 350	**FLO-PRO WBM** or **Versavert LTOBM** (as above) Main products: Flo-Trol, Soda Ash, Safe-Scav, Sodium Chloride, Zinc Oxide, Conqor

Below are some of the main products used in the preparation of drilling mud. More specifically:

- BENTONITE: This is a clay mineral used to increase the specific weight of the drilling mud and to compensate for hydrostatic pressure. It is used with pre-hydration at initial concentrations of 40-70 kg/m(^{3}).Bentonite is a mineral at the recommended concentrations and is not considered hazardous to the environment.
- POLYPAC: Polypac consists of polyionic cellulose and is a high-quality water-soluble polymer designed to control mud loss. It is an ultra-low additive, therefore causing zero to minimal reduction in fluidity . The usual concentration is 5 - 15 kg/m(^{3}).POLYPAC at the recommended concentration is not considered hazardous to the environment.
- LIME: Lime is used as a source of calcium and alkalinity in water-based drilling muds. Lime, a widely available commercial chemical, is a basic source of calcium ($Ca_{(2)}^{(+)}$)and hydroxyl ions ($OH^{(-)}$). Lime at the recommended concentration is not considered hazardous to the environment.
- CMC HV: CMC HV is a high viscosity sodium carboxymethylcellulose designed to control drilling fluid losses in wellbore walls and control the fluidity of water-based drilling fluids. It is resistant to bacteria and has high tolerance to chemical reactions in the mud. CMC HV is biodegradable.
- POLYDRILL: Polydrill is a polymer for water-based mud that controls fluid loss and mud rheology and is particularly effective at high temperatures and in fluids with high electrolyte content. Polydrill reduces mud loss by reducing or blocking the pore diameter. This polymer has a significant water-binding capacity, minimizing fluid loss.
- KLA-CURE: KLA-CURE is a hydration suppressant consisting of a water-soluble, environmentally acceptable organic blend designed to reduce the swelling and dispersion of reactive clay formations. KLA-CURE can be used in fresh or salt water systems with low or high solids content. The concentration is usually 11.4–22.8 kg/m(^{3})depending on the diameter of the hole and the length of the drilling section.
- BARITE: Barite is used to increase the specific gravity of the drilling mud and counteracts hydrostatic pressure. Barite is a mineral and is not considered hazardous to the environment.

- FLO-VIS: FLO-VIS is a high-quality biopolymer (clarified xanthan gum biopolymer) that can improve the rheological characteristics of the drilling mud. It is not considered hazardous to the environment.
- FLO-TROL: FLO-TROL is a highly modified starch derivative used to control mud loss and viscosity. It is not considered hazardous to the environment.
- SAFE SCAN HS: SAFE-SCAN HS reacts with hydrogen sulfide and remains soluble even after chemical reaction with it. It is based on an organic chemical instead of the commonly used zinc or iron compounds.
- SAFE CARB: SAFE-CARB is a powdered marble bridging agent, a high-purity, acid-soluble calcium carbonate used as a bridging and weighting agent in drilling, treatment, and completion fluids. Compared to limestone, the agent has higher hardness and purity, providing better solubility in acids.
- SIZED CARBONATE: Sized calcium carbonate is produced in different grain sizes that can be used as a weighting agent to increase the specific weight of the drilling mud and to reduce the influx of formation fluids into the drilling mud. It is a mineral and is not considered hazardous to the environment.
- VERSATROL: VESATROL resin is a natural asphalt used for high pressure and high temperature (HPHT) filtration control in all VERSA oil-based systems. It is often used to seal depleted formations and low-pressure formations. High-temperature conditions and special applications require higher concentrations, up to 29 kg/m(3).
- EDC 95-11: EDC is the main component of LTOBM and is also referred to as base oil. It has a high level of purity and very low aromatic content.
- CONQOR: CONQOR is a phosphate-based corrosion inhibitor used in water-based drilling muds, brine, air, and foam fluid systems. It is suitable for applications where calcium salt deposition is a problem and is particularly effective in highly aerated fluids, such as underbalanced drilling. If the corrosion rate is unacceptably high, the concentration should be increased to at least 1.7 L/m(3).
- SODA-ASH: The alkalinity agent soda ash is a granular form of sodium carbonate powder used primarily to increase the pH of the drilling mud. It can also maximize the performance of bentonite and other polymer products. The usual concentration is 1.2–2.4 kg/m(3).

The concentrations of components for the preparation of drilling mud per drilling section are summarized in the following table.

Table3 –17 : Concentration of components for the preparation of drilling mud per drilling section

Substances / Additives		Quantity per section (cross-section)			
		I	I&II	III	IV
Bentonite	kg/m³	N/A	86	N/A	N/A
Potassium chloride	kg/m³	N/A	10	N/A	100
Polypac	kg/m³	N/A	6	N/A	6
CMC	kg/m³	N/A	6	N/A	N/A
Lime	kg/m³	N/A	11	7	N/A

Substances / Additives		Quantity per section (cross-section)			
		I	I&II	III	IV
Calcium carbonate	kg/m³	N/A	100	N/A	N/A
Sodium chloride	kg/m³	N/A	40	N/A	314
Flo-Vis	kg/m³	N/A	4	N/A	4
EDC 95-11	kg/m³	N/A	N/A	428	N/A
Safe Scav	kg/m³	N/A	1	N/A	1
Safe Carb	kg/m³	N/A	100	42	100
Spercene CF	kg/m³	N/A	9	N/A	N/A
Calcium chloride	kg/m³	N/A	N/A	60	N/A
Barite	kg/m³	N/A	30	565	N/A
Versatrol	kg/m³	N/A	N/A	14	N/A
Flo-trol	kg/m³	N/A	9	N/A	9
Sodium carbonate	kg/m³	N/A	1	N/A	1
Safe Scav	kg/m³	N/A	1	N/A	1
Zinc oxide	kg/m³	N/A	1	N/A	1
Conqor	kg/m³	N/A	1	N/A	1

3.4.2.1.3.4. Mitigation of Drilling Mud Losses

The proposed amendment provides for the implementation of four new wells, which will be drilled using the same standard drilling methodology described in the approved EIA for the project, including methods **for mitigating drilling mud losses** (and has been environmentally licensed by the relevant AEPO) and are presented in **Section 2.2.6.3.6** herein.

3.4.2.1.3.5. Drilling Control

The proposed amendment provides for the implementation of four new wells, which will be drilled using the same standard well drilling methodology described in the approved EIA for the project, including the **drilling control** methods (and has been environmentally licensed by the relevant AEPO) and are presented in **Section 2.2.6.3.7** herein.

3.4.2.1.4. CO_2 Transfer Pipelines To Storage

The procedure for installing the CO_2transfer pipeline remains unchanged under the present agreement and follows the same methodology that has been licensed under the approved EIA for the project. In other words, the subsea pipeline will be buried along its entire length to protect it from fishing activities (trawlers) in the area. On land, the burial depth will be 2 m from the top of the pipeline (Top Of Pipe - TOP) for the first 500 m, and 1 to 1.5 m (TOP) for the offshore section.

The pipeline construction work will be carried out in five phases:

- **Phase 1:** Geophysical and geotechnical surveys along the pipeline route (1 month).
- **Phase 2:** Works to bring the pipeline to shore, with dredging of a 500 m section from the coastline, in the area of the pipeline head at the Sigma plant. The trench will be approximately 3 m deep along its entire length and will end at sea floor level at the end of the 500 m zone (6 months).
- **Phase 3**: Installation of submarine pipeline and hydraulic testing using a specialized pipe-laying vessel (2–3 weeks).
- **Phase 4:** Installation of a riser pipe on **the new Omega platform** (the approved EIA provided for the corresponding installation on the existing Beta platform) and work by divers to connect the riser to the end of the subsea pipeline (1 week).
- **Phase 5:** Final testing and commissioning (1 month).

Therefore, the CO_2transfer pipeline installation process remains unchanged as described in **Section 2.2.6.2** herein. It should be noted that, in relation to the provisions of the approved EIA for the project, the installation point of the lifting pipe has been changed and the route of the pipe has been extended by a limited length. However, these limited changes to the project design do not affect the methodology for installing the $CO_{(2)}$transfer pipeline and do not alter the corresponding schedule for the implementation of the relevant works.

3.4.2.1.5. Produced Water Transfer Pipeline

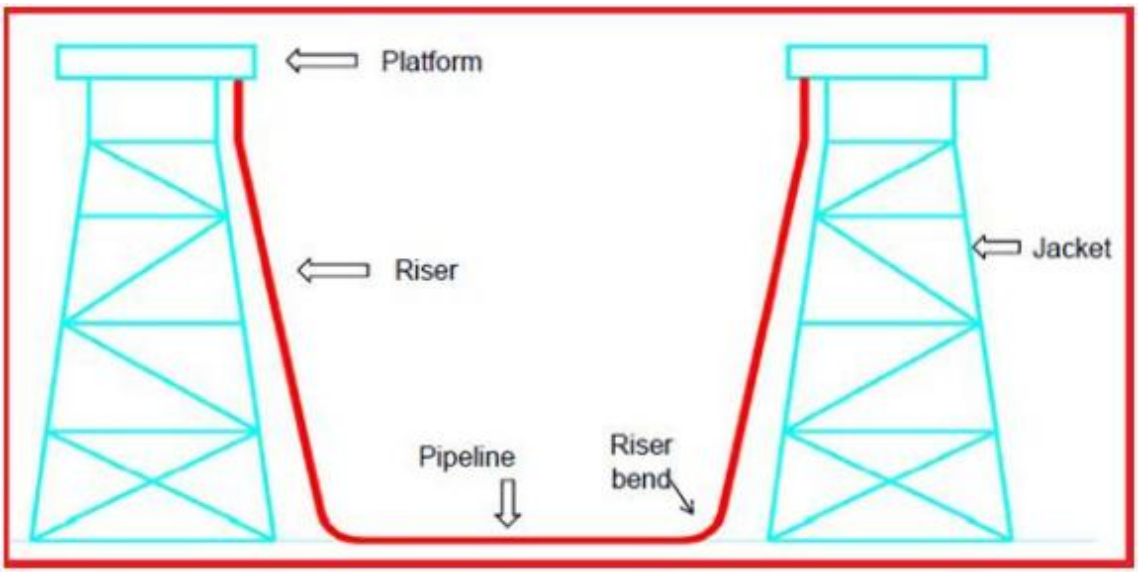
The water produced from the two water production wells (the water wells on the new platform will be equipped with electric submersible pumps (Electrical Submersible Pumps ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) from the new platform to the existing Delta platform, so that the produced water can be treated and disposed of in accordance with the project's EIA, in the existing produced water treatment system of the Delta platform, as described in **Section 2.2.1.2**.

The total length of the subsea water transfer pipeline is approximately **1 km**. The pipeline will be made of carbon steel, with a diameter of 10 inches and a wall thickness of 15 mm, and will be laid 1 m below the seabed.

Once the produced water reaches the Delta platform facilities via the pipeline, it will be connected to the existing water treatment facilities and treated in accordance with the approved EIA. In summary, the following applies to the water transfer pipeline:

- **Pipe data**: Diameter 10", wall thickness 15 mm, 3LPE coating.
- **Total weight**: 1000 m × 98 kg/m = 98 metric tons (mT).
- **Pipe installation method**: Pipelay vessel or towing.
- **Depth of installation**: 1 meter below the seabed.
- **Tie-in methods**: Connection with riser (stalk on riser) to the Delta platform and subsea connection with spools to the new Omega platform.

The water transfer pipeline will ensure a very short connection between the two platforms, as shown in **the** following **figure**.



3 –29 : Platform and jacket connection

The installation methodology for the subsea pipeline for transporting the produced water is the same as that described for the installation of the CO_2pipeline.

3.4.2.1.6. Power Supply Cables

An underwater power supply cable with a diameter of approximately 80 mm will be laid over a length of approximately **1 km** at a voltage **of 20kV** to connect the new Omega platform to the existing Delta platform. The cable will be installed from the reels located on the ship with the possibility of winding and then buried 1 m below the seabed. The cable will be laid parallel to the water pipeline described in **the** above **section.** The typical total weight per meter of the submarine power cable (including armor and sheath) is shown in **the** following **Table.**

3 –18 : Typical total weight per meter of submarine power cable (including armor and sheath)

Item	Weight (kg/m)
Copper conductor (400 mm²)	~31.2 kg/m (Copper density 8.96 g/cm³)
XLPE insulation + protective layer	~10–15 kg/m
Steel armour (steel wires)	~25–30 kg/m
Outer sheath (PE/LSZH)	~5–7 kg/m
Total cable weight	~70–85 kg/m, total maximum weight approx. 85 tons

The cable will be installed using **a cable lay reel,** and both ends of the submarine cable will be lifted via **J tubes tubes** at both the Delta platform and the new Omega platform in order to connect to the termination units. A new 10MVA transformer at 20/6.3kV will be installed on the Omega platform to distribute the appropriate voltage to the variable speed drive (VSD) systems, as well as a second 1.25MVA transformer at 6.3/0.4kV voltage for distributing the appropriate voltage to the lighting and drilling drive units.

As the cable will be installed next to the produced water pipeline, it will be buried after installation at a depth and width of approximately 1.5 meters on the seabed in order to protect it from fishing activities in the area. The total volume of soil material to be removed by the excavation equipment is estimated at 1500 m³, of which approximately half is expected to naturally cover the installation again over time. In the area around the platform, where post-trenching is not possible, the cable and pipeline will be covered with **concrete mattresses.** Approximately 10 mattresses will be required for each platform (Omega and Delta).

The standard dimensions of each concrete mattress are 6 m x 4 m x 0.3 m, with a concrete density of 2.4 tons/m³ , and a weight of approximately 11 tons each, i.e. a total weight of approximately 110 tons for the 10 concrete layers.

3.4.2.2. Schedule of Individual Works and Construction Stages

The changes to the work schedule relating to the proposed modification of the licensed project in relation to the approved EIA are summarised below:

- **CO_2 transfer pipeline:** Additional duration of 1 day for the laying of the additional approximately 1 km of pipeline.
- **Pipeline connection to the new Omega platform**: Reduction of 5 days for the installation of tie-in spools.
- **Installation of the Omega platform**: Additional duration of 20 days for the offshore installation and foundation of the platform.
- **Pipeline for transporting produced water from the Omega platform to the existing Delta platform**: Additional duration of 2 days for laying the pipeline and 7 days for installing the connections on each platform.
- **Laying of power cable from the Delta platform to the new Omega platform**: Additional duration of 5 days for laying the cable and completing the electrical connections on each platform.

In accordance with the above, the updated schedule for the implementation of the construction works for the entire CO_2 storage project (including the proposed amendment) is presented in **the** following **table**.

Table3 –19 : Updated schedule for the implementation of construction works for the entire CO_2storage project (including the proposed amendment)

Works	Time
Onshore facilities: modification of a certain area within the existing site at the Sigma plant for the construction of the collector and an unloading and compression area. These works are not affected in any way by the interventions of the proposed modification.	3 months
Offshore pipelines and cable: Subsea pipeline connecting the Sigma plant area to the Omega offshore platform, subsea pipeline connecting the Omega offshore platform to the existing Delta platform, and subsea cable connecting the Omega offshore platform to the existing Delta platform. The pipeline works will be carried out in several phases:	8 1/2 months
Phase 1 Geophysical and geotechnical surveys along the route of the pipelines and cable These works are essentially unaffected by the proposed modification in terms of time.	1 month
Phase 2 Works to bring the pipeline ashore, with dredging of a 500 m section of the coastline in the area of the pipeline head at the Sigma plant. The trench will be approximately 3 m deep along its entire length and will end at sea floor level at the end of the 500 m zone. These works are not affected in any way by the interventions of the proposed modification.	6 months
Phase 3 Installation of subsea pipelines and hydrostatic testing using a specialized vessel for pipeline laying. Installation of a subsea cable connecting the Omega offshore platform to the existing Delta platform These works are essentially extended by approximately one week compared to the time required for the implementation of the approved project.	3–4 weeks
Phase 4 Installation of a lifting pipe on the Omega platform and diving operations to connect the lifting pipe to the end of the subsea pipeline. Installation of water transfer pipe connections on each platform and electrical connections on each platform. Additional duration of 7 days for the installation of water transfer pipeline connections on each platform and 5 days for the completion of electrical connections on each platform.	2-3 weeks
Phase 5 Final commissioning and testing. These works are essentially unaffected by the proposed modification in terms of time.	1 month
Offshore platform: Installation of Omega platform and related equipment These works are essentially extended by approximately one month compared to the time required for the modification of the existing platforms for the needs of the CO_2storage project.	5

Works	Time
Drilling: 2 CO_2injection wells and 2 water production wells on the existing Beta platform of the Prinos offshore complex. These works are essentially unaffected by the proposed modification in terms of time.	8 months

It is important to note that due to the overlap of the work stages described in **the** above **table**, the total implementation period for the entire project (including the proposed amendment) is estimated at **14** months .

3.4.2.3. Personnel Requirements

3.4.2.3.1. Onshore Project Facilities, Drilling, Pipeline Installation, and Cable Laying

With regard to the implementation of the project's land facilities, drilling, pipeline installation, and cable laying, the project's personnel requirements do not differ from the provisions of the approved EIA, as described in **the** relevant **Section 6.4.3** of the approved EIA.

More specifically, the typical crew of a **jack-up drilling rig** is approximately **90 people**, divided into two 12-hour shifts. The personnel are housed on the offshore facility, in a structure that usually accommodates 110 people, and are transported to and from the platform by ship from Kavala. The number of additional personnel from the contractor depends on the activities undertaken. Typical contractor personnel include drill operators, drilling fluid management engineers, geologists, cementing engineers, solids management crew, etc. The rig is supported by a vessel and a support ship owned by third parties and Energean, respectively.

The crew that will work during the drilling is described below:

- **Drill crew**: 15-20 people
- **Maintenance crew**: 15-18 people
- **Boat crew**: 10-15 people
- **Catering crew**: 10-15 people
- **Platform deck crew**: 10-15 people
- **Drilling supervision**: 3-5 persons
- **General crew**: 10-20 people

Energean already employs a number of technical and administrative staff to carry out day-to-day operations. Construction work (drilling, jack-up unit) will also be supported by contractor personnel.

During the **construction** phase **of the CO_2transfer pipeline,the produced water transfer pipeline, and the power cable,** it is estimated that an average of **200 workers** will be staying on the ship for construction each day.

During the construction phase of the project, it is estimated that **10 workers** will be working on **the land-based construction site** on peak days.

3.4.2.3.2. Installation of the New Omega Platform

The installation of the new Omega platform will require the employment of additional personnel, as described below:

- **Sea Crew (heavy crane operations):** Includes supervisors, deck personnel, sailors, welders, and lifting workers – estimated number: 30 people.
- **Support Vessel Crews**: Tugs and auxiliary vessels – estimated number: 20 people.
- **Land-based personnel: Supply chain support, coordination, and operational teams** – estimated number: 10 people.

3.4.2.4. Equipment Requirements

3.4.2.4.1. Land Facility Construction Equipment

The equipment for the construction of land facilities does not differ in the context of this proposed amendment from that provided for in **Section 6.4.4.1** of the approved EIA for the project.

3.4.2.4.2. Equipment for the Installation of the CO_2Subsea Transmission Pipeline

The equipment used for the construction of the CO_2subsea pipeline does not differ from that specified in **Section 6.4.4.2** of the approved EIA for the project. In summary, during the construction of the CO_2pipeline, **a specialized vessel (pipelay and trenching vessel)** will be used for the seabed excavation and pipeline laying works (see **Figure** below). The basic characteristics of a typical vessel of this type are as follows:

- Total length: 164.62 m
- Length between perpendiculars (bow to stern): 112.82 m
- Overall width: 36.57 m
- Unloaded draft (average): 2.84 m
- Unloaded displacement: 10,875 t
- Maximum deck area: 1,000 m^2
- Maximum deck load: 3.6 t/m^2

The equipment for the construction of the pipeline includes:

- Fully enclosed production line for maximum pipeline diameter of 60".
- Two-track tensioners @ 90 t.
- Winch ≥ 200 t @ 30 m/min.
- Fully automated welding system.
- Alignment system: 2 multi-directional rollers.
- Edge cutting equipment: 2 stations @ 44 kW.
- 2 X-ray welding test stations.
- Pipe joint stations with marine mastic or foam injection.

Two support supply vessels/tugs will also be used for the construction of the pipeline.

3 –30 : Typical pipeline construction vessel (pipelay and trenching vessel)

3.4.2.4.3. Underwater Water Pipeline Installation Equipment

The equipment used to lay the submarine water pipeline is the same as that which will be used to lay the submarine $CO_{(2)}$pipeline as described in **Section 6.4.4.2** of the approved EIA for the project and summarised in **Section 3.4.2.6.2** herein.

3.4.2.4.4. Submarine Cable Installation Equipment

The submarine cable will be installed using **a cable lay reel,** and both ends of the submarine cable will be lifted via **J tubes** to connect to the termination units.

The submarine cable will be laid parallel to the water pipeline using the relevant pipeline laying equipment, as described in **the** previous **sections**.

3.4.2.4.5. Drilling Equipment

Specialized equipment will be used to construct the four new wells (injection wells, water production wells, and associated works) based on the best practices provided for in the approved EIA for the project. In order to minimize the environmental footprint of the well drilling, a 2,500 hp drill rig with a TDS (Top Drive System) drilling unit and 3 high-pressure drilling mud pumps. The drill rig includes the necessary equipment for the temporary storage of waste and fuel. The CROSCO Labin type drilling rig, or one with similar characteristics, will be designed and constructed in accordance with API 4F and the latest European regulations, including low emission specifications, and shall be fully ATEX certified. A more detailed description of the drilling rig is provided in **Section 3.4.2.1.2.2** herein.

The drilling rig will be transported to the drilling site by tugboats.

3.4.2.4.6. New Platform Installation Equipment

The following additional marine equipment will be required for the installation of the new Omega platform:

- **A heavy-duty floating crane vessel** with a lifting capacity of 2,000 tons. The relevant equipment is shown in **the** following **figure**, and its technical characteristics are summarized in **the table** below, according to the technical brochure of the heavy-duty crane.

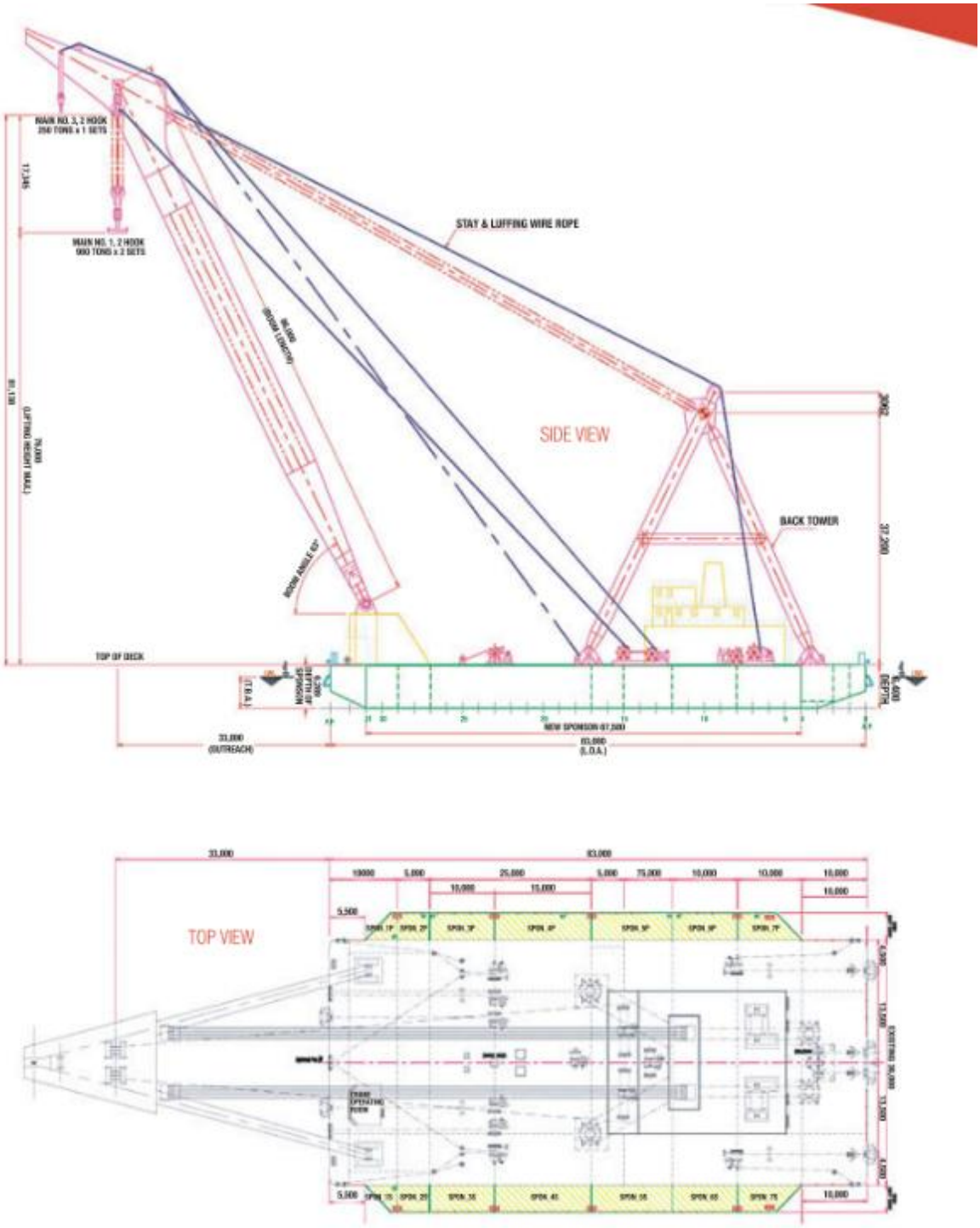


Figure3 –31 : Heavy-duty floating crane vessel

Table3 –20 : Technical characteristics of the heavy-duty floating crane vessel, according to its technical brochure

PONTOON CRANE BARGE
(Floating Crane, 1,800 tons)

Classification:	Bureau Veritas I ✠HULL Pontoon Crane Unrestricted Navigation ✠ALM
L.O.A:	83 m
LBP:	79,680 m
Breadth:	44 m
Depth:	6.29 m
Gross Tonnage:	7,502 tons
Ballast Tank:	6,527.60 m^3

DECK MACHINERY:
CRANE / MOORING & ANCHOR SYSTEM
Pipe Jib Luffing Type Boom
(2,500 f x 5,000 f x 86,000 m): 1 set
Gate Post Type Back Tower: 1 set

LUFFING WINCH: 2 sets

Capacity:	62 t x 16 m / min
Wire Spec.:	63 ø x 2,300 m

MAIN HOISTING WINCH
(Main Hook 900 t): 2 sets

Capacity:	30 t / 15 t x 26 m / 52 m / min.
Wire Spec.:	46 Ø x 3,600 m

AUX. HOISTING WINCH
(Aux. Hook 250 t): 1 set

Capacity:	18.4 t / 6.4 t x 24 m / 48 m / min.
Wire Spec.:	42 Ø x 1,800 m

GENERAL SERVICE WINCH: 1 set

Capacity:	13 t x 15 m / min.
Wire Spec.:	30 Ø x 400 m

MOORING WINCH (outside): 2 sets

Capacity:	25t / 9.3 t x 20 m / 40 m / min.
Wire Spec.:	42 Ø x 500 m

MOORING WINCH (inside): 2 sets

Capacity:	25 t / 9.3 t x 20 m / 40 m / min.
Wire Spec.:	42 Ø x 500 m

ANCHOR WINDLASS: 1 set

Capacity:	18 t x 10 m / min.
Anchor:	4,930 t – 2 sets
Anchor Chain:	62 mm (grade 2) x 550 m

FWD ANCHOR WINCH: 2 sets

Capacity:	15 t / 7,5 t x 20 m / 40 m / min.
Anchors:	3,540 t
Anchor Chain:	46 mm (grade 2), 30 m with wire rope 42 mm x 500 m, 2 sets

AFD ANCHOR WINCH: 2 sets

Capacity:	32 t / 16 t x 20 m / 40 m / min.
Anchors:	6.450 t
Anchor Chain:	58 mm (grade 2) 30 m with wire rope 46 mm x 500 m, 2 sets

MACHINERY AND PROPULSION

Main Engines (Hydraulic Machinery System):	Diesel Engine for Hydraulic Power Unit Driven – Detroit Diesel, Model 9162 – 7301 (16 V – 149T1), capacity – 1,280 HP x 1,800 rpm, 3 sets

- **A support vessel and tow tug** will be required to assist the heavy-lift crane on the floating structure. These vessels will actively participate in towing, stabilisation and general support operations during the lifting and installation of the new platform. The following **table** summarises the technical characteristics of these vessels, according to their technical specifications.

Table3 -21 : Technical characteristics of the support vessel and tow tug, according to their technical brochure

TECHNICAL DATA

MAIN PARTICULARS

L.O.A.:	70 m
LPP:	66.80 m
Breadth Moulded:	16.8 m
Draft:	6.8 m max.
DWT:	2,000
GRT:	2,690
Net Tonnage:	807

CARGO CAPACITIES

Deck Area:	500 m^2
Deck Cargo:	800 t
Deck Load:	7.5 t / m^2
Fuel:	1,126 cubm
Potable Water:	361.9 cubm
Drill Water:	308.51 cubm
Liquid Mud:	490.32 cubm
Dry Bulk:	226 cubm

DISCHARGE CAPACITIES

Fuel:	1 x fo cargo pump 200 cubm / h @ 0 bar
Potable Water:	1 fw cargo pump 120 cubm / h @ 9 bar
Drill Water:	1 x drill / ballast pump 150 / 100 cubm / h @ 9 / 2 bar
Liquid Mud:	2 x liquid mud pump 75 cubm / h @ 24 bar
Dry Bulk Compressors:	2 x 20 cubm / min @ 5.5 bar

DECK MACHINERY / MOORING

Tugger Winches:	2 x 10 t
Capstans:	2 x 10 t
Deck Cranes:	1 x 2.2 t @ 12.2 m
Windlass:	1 x Brattvaag 17 t duty of drum
Anchors:	2 x 2,090 kg, AC 14
Chain:	918 m x 46 mm, U2 chain

TOWING / ANCHOR HANDLING EQUIPMENT

Winch Type:	Brattvaag, triple drum, waterfall type
AHT Winch Pull:	300 t
AHT Winch Break:	450 t
Tow Drum Capacity:	1,700 m x 76 mm, SWR
Tow Line:	1,300 m x 76 mm
Working Drums Capacities:	1,500 m x 76 mm
Storage Drums Capacities:	1,500 m x 76 mm
Spare Tow Line:	1,300 m x 76 mm
AH Triplex Shark Jaws:	1 x 500 t SWL
Towing Pins Triplex:	1 x 160 t SWL
Stern Roller:	5,000 mm length, 2,500 mm diameter, 450 t SWL

MACHINERY & PROPULSION

Main Engines:	2 x 4,000 kW @ 750 rpm, Wartsila 8L32
Aux. Engines:	2 x 410 kW @ 1,800 rpm, Caterpillar 3408 DITA
Emergency Generator:	1 x 60 kW @ 1,800 rpm, Perkins / 1004 TG2
Shaft Generators:	2 x 2,875 kVA @ 1,750 rpm, ABB
Main Propellers:	2 x Wartsila propulsion, CPP, 4 blades / 4,000 mm diameter
Bow Thruster:	2 x Kawasaki KT -8883, 10 t thrust
Stern Thruster:	1 x Kawasaki KT -8883, 10,5 t thrust
Rudders:	2 x Spade

NAVIGATION & COMMUNICATION EQUIPMENT

Radars:	1 x Furuno X-band, 1 x Furuno S-band
Main Radio:	GMDSS Furuno
Inmarsat C:	Felcom 15
GPS:	2 x Furuno
Autopilot:	Anschutz
Gyro:	C-Plath

PERFORMANCE

Bollard Pull:	135.69 tons
Max. Speed:	14 knots
Consumption per Day:	32 t @ fullspeed, 35 t @ towing, 25 t @ sailing

ACCOMMODATION

Total Capacity:	40 persons
Cabins:	10 cabins x 1 person 15 cabins x 2 persons
Hospital:	Fully equipped
Lounges:	1

CONTINGENCY EQUIPMENT

Fast Resque Craft:	1 x Narwhal SV -480 type, outboard motor, 40 BHP
Fire Fighting:	FI-FI 1, totally 2,400 cubm / h
Rescue Zones:	2, port and starboard

OTHER INFORMATION

DP2 System:	Kongsberg

- **A floating cargo barge** will be used to transport the metal infrastructure (jacket) and superstructure (deck) to the new location of the platform. The following **table** summarizes the technical characteristics of the floating cargo barge, according to its technical brochure.

Table3 –22 : Technical characteristics of the floating cargo barge, according to its technical brochure

CLASSIFICATION

Class Notation: ✠ 100A1 submersible pontoon, max. operating depth 12.26 m to bottom of keel, deck strengthened for 9,275 tons / sqm.

Lloyd's Register

MAIN DIMENSIONS

L.O.A.	122,450 m
Breadth	30,500 m
Depth	7,600 m
Draft Tropical	6,138 m
Draft Summer	6,014 m
Draft Light Ship	1,500 m
Deck Area	110 m x 30.5 m
Void Tank (aft)	992.7 m3
Fresh Water Tank	53.1 m3
Fuel Oil Day Tank (fwd)	53.1 m3
Dead Weight	14,859 mt
Light Ship Weight	3,636 mt

EQUIPMENT

Ballast pump: Two (2) - 3,000 m / h, 250 kW, 950 rpm, electrical driven
Generator: Two (2) - 400 V, 383 kW, 1,500 rpm, Caterpillar, Type C18

OPTIONAL:

Tender assist
ROV
SAT Diving

DESCRIPTION

- Heavy lift and submersible ocean going deck cargo barge
- All bollards recessed
- The pontoon is divided into 15 water ballast tanks, each with two manholes, and pneumatic-electrical sounding system and remote controlled sea inlet valve
- The watertight engine and pump room is placed forward on main deck

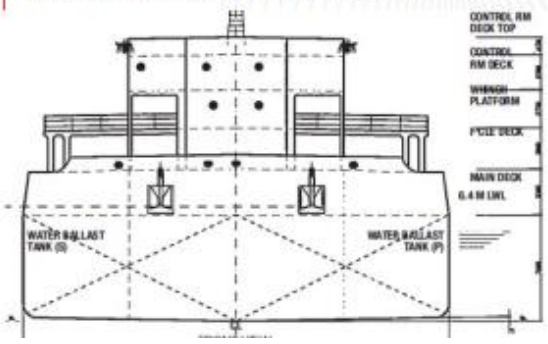
NOMINAL DECK STRENGTH

In case of concentrated load applied at:

- The center of deck plate around 10 square inches, 15.0 tons.
- Deck trans, 70.0 tons
- Longitudinal Bhd., 50.0 tons

SUBMERSION & BALLASTING

Max. Submergence Depth: Above main deck Cabt. 5.5 m fwd. and abt. 10 m. aft
Pumping Capacity abt.: 6,000 t / h
Deck Outfit / Windlass /- FWD: 2 gypsies. 2 anchors @ 3,240 kgs.
Remote Controlled Ballast & De-ballasting System
2 - Hydraulic Anchor Winches with Wildcat / Drums psi.



3.4.2.5. Required Construction Materials

3.4.2.5.1. Land Facilities

The implementation of the land facilities is not affected in any way by the proposed amendment, and therefore the raw material requirements for their implementation do not differ from those provided for in **Section 6.4.5.1.1** of the approved EIA for the project, as summarized below.

The following will be required for the land facilities during the construction phase:

- Carbon steel pipes and steel protective casings: 50 tn.
- Concrete for pipe coatings, foundations, pipe supports, temporary access: 350 tn
- Copper cables for electrical installations and instruments, various sizes: 2 tons.

3.4.2.5.2. Omega Platform Installation

The following structural elements are required for the construction of the new **Omega** platform:

- Four tubular steel foundation piles, each 40 meters long and weighing 130 tons.
- The steel subsea jacket structure will weigh approximately 780 tons, with a base footprint of 20 m x 20 m and a total height of 45 meters.
- The topside will be a facility that will house the wellheads and XMAS trees for the four wells. Basic equipment, piping, and an emergency control system will be installed to support the operation of the two CO_2 injection wells and the two water production wells.

The Omega platform includes the following equipment/materials required to support CO_2injection operations and related support activities:

- 50 tons of piping, valves, and flanges for connection to the wellhead systems (XMAS trees).
- 1 km of electrical cabling, electrical panels, emergency systems.
- 50 tons of hydraulic power unit and control panel for the heads.
- 15 tons of electric crane for operational use.

3.4.2.5.3. Drilling

Based on the estimates of the project's technical studies, the following will be required to drill the four wells on the Omega platform:

- Concrete: +/-800 m^3
- 30" diameter pipes: 500 m
- 20" diameter pipes: 1800 m
- 13 5/8" diameter pipes: 10,400 m
- 9 5/8" diameter pipes: 14,000 m
- 7" diameter pipes: 3,100 m

Description of the quantities of chemicals required for the drilling mud needed to drill the four wells on the Omega platform (i.e. the volumes of drilling mud, the chemical additives and their concentrations), based on the estimates of the project's technical studies, are presented in **Section 3.4.2.1.3.3** herein.

3.4.2.5.4. Construction of CO_2Transfer Pipeline

Estimated quantities of materials for the subsea CO_2transport pipeline:

- Carbon steel pipes for the offshore pipeline: 2605 Mte
- Concrete for pipeline coating: 3990 Mte
- Anti-corrosion coating with epoxy polyethylene/polypropylene (3LPE/PP): 107 Mt
- Anodes for cathodic protection of pipelines (magnesium, zinc, aluminum): 75 te

After completion of the construction work, monoethylene glycol (MEG) will be used to remove any remaining moisture, so that the pipeline is completely dry and ready to start operating. MEG is a recyclable substance included in the PLONOR list and will be recovered for disposal by a certified company. A special study will be carried out prior to the construction phase to confirm the exact quantities of MEG to be used.

3.4.2.5.5. Construction of the Produced Water Transfer Pipeline

Estimation of material quantities for the subsea produced water transfer pipeline:

- Carbon steel pipes for the offshore pipeline: 124 Mte
- Concrete for pipe coating: 190 Mte
- Anti-corrosion coating with epoxy polyethylene/polypropylene (3LPE/PP): 5 Mt

3.4.2.5.6. Installation of submarine cable

The project will require the installation of an underwater power cable with a diameter of approximately 80 mm and a length of approximately **1 km (**and a total weight of approximately **85 tons)** will be required for the project to connect the new Omega platform to the existing Delta platform.

The typical total weight per meter of the submarine power cable, including armor and sheath, is described in **Section 3.4.2.5.5**.

In the area around the platforms, where post-trenching is not possible, the cable and conduit will be covered with **concrete mattresses**. Approximately 10 mattresses will be required for each platform (Omega and Delta). The typical dimensions of each concrete mattress are 6 m x 4 m x 0.3 m, with a concrete density of 2.4 tons/m^3 , and a weight of approximately 11 tons each, i.e. a total weight of approximately 110 tons for the 10 concrete layers. Consequently, a total of 220 tons of concrete (i.e. approximately 91.5 $m^{(3)}$)is required to cover the cable and pipeline.

3.4.2.6. Water and Energy Requirements

3.4.2.6.1. Water Requirements

3.4.2.6.1.1. Land Facilities

The implementation of the land facilities is not affected in any way by the proposed amendment, and therefore the water requirements for their implementation do not differ from those provided for in **Section 6.4.5.2.1** of the approved EIA for the project, as summarized below.

Accommodation of workers

During the construction phase of the project, it is estimated that 10 workers will be working on the site on peak days. The daily consumption for each worker is estimated at 20 liters and concerns the consumption of drinking water (5 liters) and the use of water for personal hygiene (15 liters). Therefore, during the construction of the project, approximately 200 liters of drinking water per peak day will be required for the living conditions of the workers and a total of **12 m(3)** during the construction phase (3 months, 60 working days). These needs will be covered by the Sigma facilities' water supply network and the supply of bottled water.

Wetting of materials

During the construction phase, quantities of water will be required to wet the materials in the project area and in the temporary storage area in order to control dust released from earth surfaces and materials. In addition, a quantity of water will be required for wetting concrete surfaces. The water requirements for wetting concrete and washing tools are limited to approximately **100 m(3)**, which will be covered by the Sigma facilities' water supply network. The water required for wetting materials and earth surfaces, approximately **200 m(3)**, can be covered by seawater using a mobile pump or tankers under the responsibility of the project operator.

Concrete production

The drinking water requirements for concrete works are estimated to be low given the nature of the works and will be covered by the Sigma facilities' water supply network.

3.4.2.6.1.2. Omega Platform Installation

During the installation phase of the Omega platform, it is estimated that the crews of the relevant construction vessels will average 50 workers per day. The daily consumption for each worker is estimated at 150 liters and relates to the consumption of drinking water and the use of water for personal hygiene. Therefore, during the installation of the Omega platform, approximately 15 m^3 /day for the workers' living conditions and a total of **1,500 m^3** during the construction phase (based on approximately 100 working days during which 50 workers will be working on the vessels daily).

Drinking water and water for domestic use will be supplied by a seawater treatment system (Vacuum Vapour Compression) on the vessels and by bottled water.

In addition, during the installation phase of the Omega platform, 10 land-based personnel (supply chain support, coordination, and operational teams) will also be employed. The daily consumption for each employee is estimated at 20 liters and concerns drinking water consumption (5 liters) and water use for personal hygiene (15 liters). Therefore, during the construction of the project, approximately 200 liters of drinking water per day will be required for the workers' living needs and a total of **20 m³**during the construction phase (based on approximately 100 working days during which 10 workers will work daily). These needs will be covered by the Sigma facilities' water supply network and the supply of bottled water .

3.4.2.6.1.3. Drilling

Significant water demand is expected to arise at the offshore facilities during the construction period of the new boreholes. Water consumption for one borehole is estimated at approximately 4,500 m³ as shown in the following calculations (see **Table** below).

Table3 –23 : Estimated water requirements per well and per section

Drilling section (diameter - in)	MD (m)	Fluid type	SG	Water use per well (m³)	Water consumption for the 4 boreholes (m³)
30	125	N/A	N/A	N/A	N/A
26	450	WBM/Lime	1.05-1.15	2,000	8,000
16	26	WBM/Lime	1.05-1.15	1,700	6,800
12.25	3	OBM	1.45-1.70	600	2,400
8.5	42	OBM/WBM	1.10-1.30	200	800
Total				4,500	18

The water requirements of the personnel during the construction phase are estimated **at ~ 4,000 m³** (of which approximately 200 m³ will be drinking water). Commercially bottled water will be used as drinking water for the workers.

3.4.2.6.1.4. Construction and Cable Installation

During the construction phase of the pipelines and the submarine cable, it is estimated that an average of 200 workers will stay on the ship for construction each day. The daily consumption for each worker is estimated at 150 liters and refers to the consumption of drinking water and the use of water for personal hygiene. Therefore, during the construction of the pipelines and the submarine cable, approximately 30 m³ /day for the workers' living quarters and a total of **1,350 m³** during the construction phase (based on approximately 45 working days during which 200 workers will stay on the ship daily).

Drinking water and water for domestic use will be supplied by a seawater treatment system (Vacuum Vapour Compression) with an estimated capacity of 50 m^3/day, which will be available on the ship, and by the supply of bottled water.

3.4.2.6.2. Energy Requirements

3.4.2.6.2.1. Energy Consumption

The following **table** shows the average consumption for a drilling unit similar to the Labin Jack up drilling rig.

3 –24 : Installed power of drilling rig

Equipment	Installed power (kW)	Comments
Slurry pumps (MP)	1760	2 x 3200 lpm @ 300 bar
Drilling unit (TDS)	770	34K Nm @ 200 rpm
Drilling column lifting unit (DW)	740	1 x Motor
Motor Control Center (MCC)	60	440 V / 220 V, 60 Hz

The average power during drilling operations varies as follows:

- Maximum average power 3,870 kW.
- Minimum average power 1,500 kW.

The total energy consumption for the drilling operations is estimated at **1,006,200 kWh**.

These needs will be covered by the drill generator, which will run on diesel.

3.4.2.6.2.2. Fuel consumption

The implementation of the land facilities is not affected in any way by the proposed amendment, and therefore fuel consumption from their implementation does not differ from that provided for in **Section 6.4.5.3.2** of the approved EIA for the project. Consequently, during the construction of the land facilities, liquid fuel consumption relates to the movement of heavy vehicles and the operation of construction site machinery. More specifically, during the construction phase, it is estimated that approximately **16 t of diesel** and approximately 0**.5 t of gasoline** will be required.

For the construction of the $CO_{(2)}$transfer pipeline,the produced water transfer pipeline, and the submarine cable, marine fuel (Marine Gasoil DMA ISO 8217:2012 / Max. Sulphur Cont. 0.1 % (M/M)), in quantities:

- Moored, stationary: 3.5 Mt/day,
- Mooring, during loading: 4.5 – 5.6 Mt/day,
- During movement: 3.5 – 4.5 Mt/day
- During pipeline construction and cable laying: 11 - 12 Mt/day.

Liquid fuel (diesel) consumption during drilling relates to the drill rig and support vessel, as shown in **the table** below (per well).

3 –25 : Total fuel consumption per indicative drilling phase

Drilling phase	Total fuel consumption (t)
Placement of drill in final position	13.5
30" pipe packing	30
Drilling of 26" section	60
Installation and cementing of 20" pipe	40
~~18 5/8" Window opening~~	~~10~~
Drilling of 16" cross-section	72
Installation and cementing of 13 3/8" pipe	15
Drilling of 12-1/4" section	45
Installation and cementing of 9 5/8" pipe	15
Drilling of section with cross-section 8 1/2"	22.5
Installation and cementing of 7" pipe	15
Formation deletions	0.00
Completion works	82
Transportation of drill to next location	9.5
Total	419

The above **table** shows that the total fuel consumption during the drilling phase for all four wells is **1,678 t**, while the average fuel consumption is estimated at **5.5 t/day** .

For the installation of the new Omega platform, marine fuel (Marine Gas oil DMA ISO 8217:2012 / Max. Sulphur Cont. 0.1% (M/M)), in the quantities shown in **the** following **Table.**

3 –26 : Total fuel consumption for the installation of the new Omega platform

Source	Fuel Consumption	Average Daily Fuel Consumption	Total fuel consumption
Heavy-lift crane barge	~20–30 t/day	25 t/day	500 t
Tugs (3 units)	~15–30 t/day (i.e. ~5–10 t/day each)	22.5 t/day	450 t
Support vessels (supply, guard, crew vessels)	~3–6 t/day	4.5 t/day	90 t
Generators (pre-commissioning)	~1–2 t/day	1.5 t/day	30 t
Total		53.5 t/day	1070 t

Finally, consumption for the supply vessel is estimated to **be 1,300** t for the total duration of the project.

3.4.2.7. Waste Output

3.4.2.7.1. Urban Waste

3.4.2.7.1.1. Urban Waste

It is estimated that during the implementation of the project (after the addition of the proposed amendment), non-hazardous and hazardous municipal waste (MW) will be produced, as well as certain other waste streams that fall under alternative management (management through EPR).

The categories of waste that are estimated to be produced during the implementation of the project (after the addition of the proposed amendment) based on the European Waste Catalogue (EWC) (Decision 2001/118/EC, as amended and in force), are presented in **the** following **Table.** It should be noted that codes with an asterisk (*) in addition to the number represent waste that is considered hazardous.

Table3 –27 : Classification of municipal waste according to the EWC

EWC code	EWC description
15	**WASTE FROM PACKAGING; ABSORBENT MATERIALS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED**
15 01	packaging (including separately collected municipal packaging waste)
15 01	paper and cardboard packaging
15 01	plastic packaging
15 01 04	metal packaging
15 01 05	synthetic packaging[8]
15 01 06	mixed packaging
15 01 07	glass packaging
15 01 10	packaging containing residues of or contaminated by dangerous substances
19	**WASTE FROM WASTE MANAGEMENT FACILITIES, WASTEWATER TREATMENT PLANTS OUTSIDE THE POINT OF GENERATION AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTIONWATER FOR INDUSTRIAL USE**
19 08	Waste from liquid waste treatment plants not otherwise specified
19 08 05	sludge from the treatment of urban waste water
20	**MUNICIPAL WASTE (HOUSEHOLD WASTE AND SIMILAR WASTE FROM COMMERCIAL ACTIVITIES, INDUSTRIES AND INSTITUTIONS), INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 01	separately collected fractions (except those mentioned in 15 01)
20 01	paper and cardboard
20 01 02	glass
20 01 13	solvents
20 01 14	acids

[8] Beverage packaging (Tetra Pak type), Snack packaging (e.g., potato chips/crisps, pretzels), Tablet packaging

EWC code	EWC description
20 01 15*	alkaline waste
20 01 19	pesticides
20 01 21	fluorescent tubes and other mercury-containing waste
20 01 23	discarded equipment containing chlorofluorocarbons
20 01 25	edible oils and fats
20 01 27	paints, inks, adhesives and resins containing dangerous substances
20 01 29	detergents containing dangerous substances
20 01 33	batteries and accumulators mentioned in 16 06 01, 16 06 02 or 16 06 03 and mixed batteries and accumulators containing such batteries
20 01 34	batteries and accumulators other than those mentioned in 20 0 133
20 01	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components
20 01	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23, and 20 01 35
20 01 37	wood containing dangerous substances
20	plastics
20 01	metals
20 03	other municipal waste
20 03 01	mixed municipal waste
20 03	septic tank sludge

It should be noted that the classification of waste, i.e. the determination of hazardous properties through the assessment of the hazardousness of waste and, ultimately, its classification as hazardous or non-hazardous, will be carried out in accordance with the provisions of the "*Commission Communication on technical guidance for the classification of waste*" (2018/C 124/01), based on the Waste Framework Directive 2008/98/EC (Water Framework Directive - WFD), which has been incorporated into Greek law by Law 4819/2021 (Government Gazette 129/A/23.07.2021) and CLP Regulation[9] *"Regulation (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC and amending Regulation (EC) No. 1907/2006*."

The estimates made for the project's municipal waste production (after adding the proposed amendment) are based on a number of assumptions:

- Duration of construction works
  - Onshore facilities: 3 months
  - Offshore pipelines and cable: Subsea pipeline connecting the Sigma plant area to the Omega offshore platform, subsea pipeline connecting the Omega offshore platform to the existing

[9] Current consolidated version: 01/12/2023: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008R1272-20231201

Delta platform and subsea cable connecting the Omega offshore platform to the existing Delta platform: 8 1/2 months
  - Offshore platform: Installation of the Omega platform and related equipment: 5 months
  - Drilling: 8 months
  - Total construction duration: 14 months (worst-case scenario for AA assessment)
- Average number of workers per day:
  - Onshore facilities: 10
  - Offshore pipelines and cable: 200
  - Offshore platform: 60
  - Well drilling: 90
- Daily AA production rate: 0.4 kg/person
- Qualitative composition of MSW based on ESD estimates[10]
- Separate collection of recyclable materials (paper and cardboard, metals, plastics, glass)
- Specific weight per type of MSW:
  - paper/cardboard: 0.20 tn/m^3
  - plastics: 0.22 tn/m^3
  - metals: 0.23 tn/m^3
  - glass: 0.33 tn/m^3
  - ^{other} – mixed: 0.26 tn/m^3
- Percentage of waste that can be recycled per waste stream AA:
  - paper/cardboard: 85%
  - plastics: 50%
  - metals: 70%
  - glass: 60%

Based on the above, the following **table** shows the estimated total amount of AA during the construction of the project (after adding the proposed amendment) as well as the average daily amounts of AA produced. In addition, the maximum expected production of AA corresponding to a parallel daily presence of 290 workers is presented.

Table3 –28 : Estimated quantities of AA produced

AA production		Mixed	Recyclables	Total	Unit
Total Production (14 months)	AA Production (tn)	14.83	7.17	**22**	**tn**
	AA production (m^3)	57.06	33.69	**90.75**	**m^3**

[10] ESDA YA Act 39 of 31.8.2020 (Government Gazette 185/A/29.9.2020), as amended by PYS 5 of 18.4.2023/2023 (Government Gazette 94/A 18.4.2023).

AA production		Mixed	Recyclables	Total	Unit
Average Daily Production	Average Daily Production AA (tn/d)	0.05	0.03	**0.08**	**tn/d**
	Average Daily AA Production (m3/d)	0.2	0.12	**0.32**	**m³ /d**
Maximum Daily Production	Maximum Daily Production AA (tn/d)	0.08	0.04	**0.1**	**tn/d**
	Maximum Daily AA Production (m3/d)	0.3	0.18	**0.48**	**m³ /d**

With regard to other urban-type streams (waste streams falling under Alternative Management, Small Quantities of Hazardous Waste (SQHA), etc.), whose permanent production is not expected during the operation of the project (after the addition of the proposed amendment) based on the data of the current phase, it is not possible to estimate the quantities produced.

The following **table** shows how municipal waste streams are managed based on the requirements of current legislation. Note that the overall **Waste Management Plan** for the Project is presented in **Appendix 12.6.**

Table3 –29 : Recording of integrated waste management system - Municipal Waste

EKA code	EKA description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[11]
20 03 01	Mixed municipal waste	Mixed municipal waste	Temporary storage within the Project	Mixed Waste Bin (plastic bin EN 840-2/5/6, capacity 80 to 1100lt)	Competent local authority or collection and transport agency – *if is not feasible, provision should be made for the Project agency to deposit the waste in the existing collection system of the local authority* / Kavala landfill site
19 08 05	Sludge from urban wastewater treatment	Sigma WWTP sludge from the treatment of the Project's urban wastewater	-	-	Licensed collection, transport, and management operator
15 01 01	Paper and cardboard packaging	Mixed recyclable materials from paper/cardboard,	Separate collection of recyclable materials /	Recyclable Materials Bin (plastic bin EN	Competent local authority or collection and

[11] "Treatment": Recovery or disposal operations, including preparation prior to recovery or disposal (Law 4819/2021)

EKA code	EKA description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[11]
15 01 02	plastic packaging	plastic, metal, and glass [12]	Temporary storage within the Project	840-2/5/6, capacity 80 to 1100 liters)	transport agency – *if this is not feasible, provision should be made for the Project agency to deposit the waste in the local authority's existing collection* system /Xanthi Recyclable Materials Sorting Center (KDAU)
15 01 04	Metal packaging				
15 01 05	synthetic packaging[13]				
15 01 06	mixed packaging[14]				
15 01 07	glass packaging				
20 01 01	paper and cardboard				
20 01 02	glass				
20 01 39	plastics				
20 01 40	metals				
20 01 25	edible oils and fats	Edible oils and fats. *No permanent production is planned during the implementation of the Project. In any case, and if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area ( ).*	Separate collection of edible oils and fats / Temporary storage within the Project *if necessary	Container for collecting edible oils and fats (Intermediate Bulk Container (IBC) or UN HDPE barrel, capacity from 30 to 220 liters) *if necessary	Licensed collection, transport, and management operator *if necessary
20 01 23	Discarded equipment containing chlorofluorocarbons	Waste Electrical and Electronic Equipment (WEEE). *No permanent production of WEEE is anticipated during the implementation of the Project. In any case, and if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area*	Separate collection of WEEE / Temporary storage within the Project *if necessary	WEEE bin (plastic bin EN 840-2/5/6, capacity 80 to 1100 liters, or WEEE bin from a contracted waste management company) *if necessary	Collection and transport agency / WEEE WEEE - *if this is not feasible, provision should be made for the disposal of waste by the Project operator at appropriate WEEE recycling points of the WEEE agencies.* *if necessary
20 01 35	discarded electrical and electronic equipment, except those mentioned in 20 01 21 and 20 01 23 containing hazardous components				
20 01 36	discarded electrical and				

[12] https://www.eoan.gr/%ce%b5%ce%bd%ce%b7%ce%bc%ce%ad%cf%81%cf%89%cf%83%ce%b7/%cf%84%ce%b9-%cf%85%ce%bb%ce%b9%ce%ba%ce%ac-%ce%b1%ce%bd%ce%b1%ce%ba%cf%85%ce%ba%ce%bb%cf%8e%ce%bd%ce%bf%cf%85%ce%bc%ce%b5/

[13] Beverage packaging (Tetra Pak type), snack packaging (e.g., potato chips/crisps, pretzels), tablet packaging.

[14] Composite packaging: packaging consisting of two or more layers of different materials that cannot be separated by hand and form a single integrated unit consisting of an inner receptacle and an outer casing, which is filled, stored, transported, and emptied as a single unit. DIRECTIVE (EU) 2018/852.

EKA code	EKA description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[11]
	electronic equipment, except those mentioned in 20 01 21, 20 01 23, and 20 01 35				
20 01	batteries and accumulators mentioned in 16 06 01, 16 06 02 or 16 06 03 and mixed batteries and accumulators containing these batteries	Waste Electrical Batteries (batteries) & Accumulators (WBA)	Separate collection of WEEE / Temporary storage within the Project	WBA bin (WBA bin from contracted WBA)	Collection and transport agency / WEEE collection agency
20 01 34	Batteries and accumulators other than those mentioned in 200133				
20 01 21	Fluorescent tubes and other waste containing mercury	Waste from lighting, lamps, and small appliances AHHE. *No permanent production of WEEE is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area.*	Separate collection of lighting equipment, lamps, and small appliances / Temporary storage within the Project *if necessary	Lighting Fixtures-Lamps Bin (WEEE Bin from a contracted WEEE collection point) *if necessary	Collection and transport agency / WEEE WEEE - *if this is not feasible, provision should be made for the Project operator to deposit the waste at suitable WEEE recycling points of the WEEE WEEE.* *if necessary
20 01 13*	solvents	MPA (Small Quantities of Hazardous Waste in AA). *No permanent production is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be stored temporarily and separately for each type in the Project's temporary waste storage area.*	Separate collection / Temporary storage within the Project *if necessary	Suitable separate bin for each type (plastic bin EN 840-2/5/6, capacity 80 to 1100lt or UN HDPE barrel, UN metal barrel, etc.) *if necessary	Licensed hazardous waste collection, transport, and management operator *if necessary
20 01 14	Acids				
20 01 15*	alkaline waste				
20 01 19*	pesticides				
20 01 27	paints, inks, adhesives, and resins containing dangerous substances				
20 01 29	detergents containing dangerous substances				
20 01 37	wood containing dangerous substances				

EKA code	EKA description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[11]
15 01 10	packaging containing residues of or contaminated by dangerous substances	Empty containers of paint, solvent, etc. *No permanent production is planned during the implementation of the Project. In any case, and if necessary, the quantities produced should be stored temporarily and separately for each type, in the Project's temporary waste storage area and managed as hazardous waste.*	Separate collection / Temporary storage within the Project *if necessary	UN HDPE barrel, UN metal barrel *if necessary	Licensed hazardous waste collection, transport, and management operator *if necessary
20 03 04	septic tank sludge	Wastewater from chemical toilets at construction sites	-	-	Collection and transport operator

It should be noted that the electronic services of the Electronic Waste Register (HMA)[15] allow users to search for the corresponding licensed waste collection and transport operators per regional unit based on the EKA code or codes.

3.4.2.7.1.2. Sewage and Other Liquid Waste During Construction

During the construction phase at **the land works site**, urban wastewater will be produced from the living quarters of the workers. It is estimated that the supply of urban wastewater will be equal to the workers' drinking water consumption, as calculated in **Section 3.4.2.6.1.1,** i.e. 0.2 m^3 /peak day. The infrastructure of the existing Sigma facilities will be used to serve the staff, while alternatively, chemical toilets may be used within the construction site, which will be emptied and maintained regularly by a licensed company under the responsibility of the contractor. In total, the liquid waste generated by workers during the construction phase (3 months, 60 working days) amounts to approximately **12 m^3**.

During the **construction** phase **of the pipelines (for transporting CO_2 and produced water)** , domestic wastewater will be produced on the vessels from the workers' living quarters. It is estimated that the supply of domestic wastewater will be equal to the water consumption for the living conditions of the workers, as calculated in **Section 3.4.2.6.1.4,** i.e. approximately 30 m^3/day. The wastewater will be treated in a biological treatment system on board the ship.

[15] https://wrm.ypeka.gr/eka-search-form

Other liquid waste expected to be produced on the ship during the construction of the CO_2 pipeline is bilge water and ballast water.

- Water from the ship's engine room may contain grease and/or oil (bilge water). Bilge water shall be managed in accordance with Annex I of MARPOL 73/78 (Regulations for the Prevention of Pollution by Oil) and its relevant amendments. The treatment equipment (bilge water separator) shall comply with the specifications of the IMO Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships (, IMO Resolution MEP. 107(49)).
- The discharge of ballast water used to stabilize ships at sea is subject to the requirements of Annex I of MARPOL 73/78 and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management – BWM). The ballast water treatment system on board the ship will comply with standard D-2, which concerns the treatment of ballast water.

During the **drilling** phase, domestic wastewater will be produced from the living quarters of the workers. It is estimated that the supply of domestic wastewater will be equal to the water consumption for the living quarters of the workers, as calculated in **Section 3.4.2.6.1.3**. Domestic wastewater from the platform complex is transported and stored in special tanks located on each platform. The tanks are periodically emptied into the barge or the support vessel's tank. The contents of the tank are transported via the barge to the onshore facilities for biological treatment.

During the **installation** phase **of the Omega platform**, domestic wastewater will be produced from the living quarters of the workers. It is estimated that the supply of domestic wastewater will be equal to the water consumption for the workers' living conditions, as calculated in **Section 3.4.2.6.1.2.** The wastewater will be treated in a biological treatment system on board the vessel.

Other liquid waste expected to be produced during the installation phase of the Omega platform is bilge water and ballast water.

- Water from the ship's engine room may contain grease and/or oil (bilge water). Bilge water will be managed in accordance with Annex I of MARPOL 73/78 (Regulations for the Prevention of Pollution by Oil) and its relevant amendments. The treatment equipment (bilge water separator) shall comply with the specifications of the IMO Guidelines (Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships, IMO Resolution MEP. 107(49)).
- The discharge of ballast water used to stabilize ships at sea is subject to the requirements of Annex I of MARPOL 73/78 and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management – BWM). The ballast water treatment system on board the ship shall comply with standard D-2, which concerns the treatment of ballast water.

In addition, during the installation phase of the Omega platform, 10 land-based personnel (supply chain support, coordination, and operational teams) will be employed. It is estimated that the supply of urban wastewater will be equal to the drinking water consumption of the workers, as calculated in **Section 3.4.2.6.1.4,** i.e. 0.2 $m^{(3)}$ /peak day. The infrastructure of the existing Sigma facilities will be used to serve

the staff, while alternatively, chemical toilets may be used within the construction site, which will be emptied and maintained regularly by a licensed company under the responsibility of the contractor. In total, the liquid waste generated by these workers during the construction phase amounts to approximately **20 m(3)**.

3.4.2.7.1.3. Construction Waste

The integrated management of construction and demolition waste (CDW) relating to the construction works and excavation works in the Project will be carried out in accordance with Joint Ministerial Decision 36259/1757/E103/2010 (Government Gazette 1312/B/24.08.2010) *"Measures, conditions, and program for the alternative management of waste from excavations, construction, and demolition (CCW)"* and the relevant provisions of Law 4819/2021, as amended and in force.

It is estimated that the Project will produce CDW that falls under alternative management (AM) and other waste, hazardous and non-hazardous, such as construction debris (e.g., concrete, metals, packaging materials, etc.) and surplus materials from site preparation and construction activities.

The waste resulting from construction works and estimated to be produced during the construction of the Project is presented in **the** following **Table**, based on the European Waste Catalogue (Decision 2001/118/EC, as amended and in force). It should be noted that codes marked with an asterisk (*) represent waste that is considered hazardous.

Table3 –30 : Classification of construction waste according to EWC

WEEE code	Description
08	**WASTE FROM THE PRODUCTION, FORMATION, SUPPLY, AND USE (PFSU) OF COATINGS (PAINTS, VARNISHES, AND GLASS ENAMELS), ADHESIVES, SEALANTS AND PRINTING INKS**
08 01	Waste from PDPCH as well as the removal of paints and varnishes
08 01 11	Waste from paints and varnishes containing organic solvents or other dangerous substances
08	Waste from the manufacture, formulation, supply, and use of adhesives and sealants (including waterproofing products) waterproofing products)
08 04	Waste adhesives and sealants containing organic solvents or other dangerous substances
10	**WASTE FROM THERMAL PROCESSING**
10	Waste from the manufacture of cement, quicklime and mortar lime, and articles and products made from these materials
10	concrete and concrete slurry waste
12	**WASTE FROM THE SHAPING AND PHYSICAL AND MECHANICAL SURFACE TREATMENT OF METALS AND PLASTICS**
12	Waste from the shaping and physical and mechanical surface treatment of metals and plastics
12 01	welding waste
13	**OIL AND LIQUID FUEL WASTES (except edible oils and those included in chapters 05, 12, and 19)**
13	Waste hydraulic oils
13 01 11	synthetic hydraulic oils
13	waste gearbox and lubricating oils
13 02 06*	synthetic engine, gearbox and lubricating oils

WEEE code	Description
13 05	oil/water separator contents
13 05 07*	oily water from oil/water separators
15	**WASTE FROM PACKAGING; ABSORBENT MATERIALS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED**
15	absorbents, filter materials, wiping cloths and protective clothing
15 02	Absorbent materials, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated with dangerous substances
17	**WASTE FROM CONSTRUCTION AND DEMOLITION (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**
17	concrete, bricks, tiles, and ceramics
17	concrete
17 02	wood, glass, and plastic
17 02	wood
17 02 04	glass, plastic and wood containing or contaminated with dangerous substances
17 04	metals (including their alloys)
17 04	iron and steel
17 04	metal wastes contaminated with dangerous substances
17 05	soil (including excavated soil from contaminated sites), stones and rubble
17 05	soil and stones other than those mentioned in 17 05 03
17 05	excavation debris other than those mentioned in 17 05 05

It should be noted that the classification of waste, i.e. the determination of hazardous properties through the assessment of the hazardousness of waste and ultimately its classification as hazardous or non-hazardous, shall be carried out in accordance with the provisions of the "Commission Communication on technical guidance for the classification of waste" (2018/C 124/01) based on the Waste Framework Directive 2008/98/EC (Water Framework Directive - WFD), which has been incorporated into Greek law by Law 4819/2021 (Government Gazette 129/A/23.07.2021) and CLP Regulation[16] "Regulation (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC and amending Regulation (EC) No. 1907/2006."

According to initial estimates, the surplus excavation material from the project site formation works amounts to approximately **200 m³**. Excavations will be limited to what is absolutely necessary and will be reused as a priority for backfilling needs in the context of the project's construction.

Apart from the excess excavation, it is difficult to estimate the other C&D waste generated by the construction works at this stage as there is no corresponding calculation model.

[16] Current consolidated version: 01/12/2023: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008R1272-20231201

The presentation of the waste stream management method based on the requirements of the current legislation is given in **the** following **Table**. It should be noted that the overall **Waste Management Plan** for the Project is presented in **Annex 12.6**.

Table3 –31 : Record of integrated waste management system from construction works

EKA Code	EKA Description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[17]
17 01 01	Concrete	Concrete from demolition. *No production is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area.*	Separate collection of demolition concrete / Temporary storage within the Project *if necessary	Concrete skip (Skip Lift Container) *if necessary	Reuse - recycling within or collection and transport operator / SSED *if necessary
17 02 01	Wood	Wood. *No production is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area.*	Separate collection of wood / Temporary storage within the Project *if necessary	Wood skip (Skip Lift Container) *if necessary	Reuse within or collection and transport operator / SSED *if necessary
17 02 04	Glass, plastic, and wood containing or contaminated with dangerous substances	Wood containing dangerous substances or contaminated by them. *No production is expected during the implementation of the Project. In any case, if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area and managed as hazardous waste.*	Separate collection of hazardous wood / Temporary storage within the Project *if necessary	Hazardous wood skip (Skip Lift Container) *if necessary	Licensed hazardous waste collection, transport, and management operator *if necessary
17 04 05	iron and steel	Iron and steel (metal waste)	Separate collection of iron/steel / Temporary storage within the Project	Iron/steel bin (Skip Lift Container or EN 840-2/5/6 metal bin)	Reuse within or collection and transport operator / SSED

[17] "Treatment": Recovery or disposal operations, including preparation prior to recovery or disposal (Law 4819/2021)

EKA Code	EKA Description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[17]
17 04 09*	Metal waste contaminated with dangerous substances	Metals contaminated with dangerous substances. *No production is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area and managed as hazardous waste.*	Separate collection of hazardous metals / Temporary storage within the Project *if necessary	Hazardous metal container (Skip Lift Container or EN 840-2/5/6 metal container) *if necessary	Licensed hazardous waste collection, transport, and management operator *if necessary
17 05 04	soil and stones other than those mentioned in point 17 05 03	Earth excavation waste	Separate collection of excavated material / Temporary storage within the Project site	Bulk - Temporary storage area near the Project site	Reuse within or collection and transport operator / Disposal in approved suitable areas (e.g. quarries, landfills) in accordance with the Project's EIA or SSED
08 01 11*	Waste from paints and varnishes containing organic solvents or other dangerous substances	*No permanent production is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be stored temporarily and separately for each type in the Project's temporary waste storage area.*	Separate collection/temporary storage within the Project	Suitable separate bin for each type (plastic bin EN 840-2/5/6, capacity 80 to 1100 liters, or UN HDPE barrel, or UN metal barrel, etc.) *if necessary	Licensed hazardous waste collection, transport, and management operator *if necessary
08 04 09	Waste adhesives and sealants containing organic solvents or other hazardous substances				
10 13	concrete and concrete slurry waste	Concrete production waste *No production is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area and managed as hazardous waste.*	Separate waste collection / no temporary storage *if necessary	-	Collection and management by the contractor supplier or Collection and transport agency / SSED
13 01 11*	synthetic hydraulic oils	Waste lubricating oils (WLO)	Separate collection of		

EKA Code	EKA Description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[17]
13 02 06*	synthetic engine, gearbox and lubricating oils		lubricating oils / Temporary storage within the project	Lubricating Oil Container (UN metal barrel)	Collection and transport agency / SED ALE
13 05 07*	oily water from oil/water separators				
15 02 02*	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	Oily rags, oil filters. *No permanent production is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be stored temporarily and separately for each type in the Project's temporary waste storage area and managed as hazardous waste.*	Separate collection / Temporary storage within the Project *if necessary	UN HDPE barrel, UN metal barrel, portable pollution control unit containing large waste bags *if necessary	Licensed hazardous waste collection, transport, and management operator *if necessary
12 01 13	Welding waste	Residues and residues resulting from metal welding operations	Separate collection / Temporary storage within the project	UN HDPE barrel, UN metal barrel, IBC (Intermediate Bulk Containers), etc.	Licensed operators at approved treatment, recycling, or disposal facilities
-	-	Other construction waste not included in this plan and which may contain small quantities of hazardous or toxic materials (solvent-based concrete additives, adhesives, tar-based emulsions, paints and coatings, packaging, etc.). *If the above are produced during the implementation of the Project, they should be categorized according to EKA, temporarily stored in the Project's temporary waste storage area, and managed as hazardous waste.*	Separate collection of each type / Temporary storage within the Project *if necessary	Suitable equipment for temporary storage of hazardous waste (Intermediate Bulk Container (IBC) or UN HDPE barrel, etc.) *if necessary	Licensed hazardous waste collection, transport, and management operator *if necessary

Please note that the Electronic Waste Registry (HMA)[18] offers the possibility to search for the corresponding licensed waste collection and transport operators per regional unit based on the EKA code or codes.

The management of AECC in the Region of Eastern Macedonia - Thrace is carried out in accordance with the provisions of Joint Ministerial Decision 36259/1757/E103/2010 through the following Alternative Management Systems (based on data from the Hellenic Recycling Agency (EOAN)[19]):

- SSED "Recycling of Inert Waste of Northern Greece S.A.", with the distinctive title "AN.A.B.E. S.A.".
- SSED "Recycling of Construction and Demolition Waste of Central Macedonia S.A.", with the distinctive title "ANAKEM".
- SSED "Central Greece Recycling System Ltd," with the distinctive title "S.A.N.K.E. Ltd."
- SSED "PEDMEDE ECO Limited Liability Company," with the distinctive title "PEDMEDE ECO MEPE."

3.4.2.7.1.4. Drilling Waste

Drilling operations produce extractive waste, both hazardous and non-hazardous, consisting mainly of drilling cuttings and drilling mud.

Drilling muds are classified according to their main component, which may be petroleum derivatives, water, or synthetic substances. A combination of materials and chemicals is used to produce drilling muds in order to achieve the desired properties (specific gravity, viscosity, etc.). Water-based/lime-based, oil-based, and oil-based/water-based muds will be used to implement the Project. Cuttings consist of pieces of geological formations penetrated by the drill string, separated during the removal of solids from the recirculation of the drilling mud flow in a series of natural processes and temporarily stored in special closed bins. The drilling mud is then temporarily stored in special mud tanks and reused in the further drilling process until it is no longer needed or has been exhausted.

It should be noted that in the 26-inch (125-450 MD (m)) and 16 inches (450-2600 MD (m)), a drilling fluid based on seawater and lime will be used, which will be biodegradable and have no negative impact on the environment. The geological formation in this section is uniform and consists of sandstone and clay layers, and from all the wells that have been drilled in the area, no traces of hydrocarbons have ever been observed at these depths. All solids that are not impregnated with environmentally unfriendly substances are disposed of at sea. Thus, cuttings from the Pre-Vaporite Sequence (Pliocene and Pleistocene) up to the "brown marker" sections, which will be drilled using a water-based drilling mud system, will be disposed of at sea.

As for cuttings containing hydrocarbons, either from the geological formation or due to the oil-based mud, these will be separated at the drilling unit and transferred to a management system located at the drilling unit. This cuttings will be properly treated, and it will be ensured that there will be no discharge into the sea. Specifically, the cuttings are centrifuged to remove most of the mud and then dried. The dry cuttings are placed in bins and transported ashore for further management by a certified waste management contractor. Drilling mud is temporarily stored in special mud tanks and reused in the further drilling process until it is no

[18] https://wrm.ypeka.gr/eka-search-form

[19] https://www.eoan.gr

longer needed or has been "exhausted." The depleted mud is transported to onshore facilities and finally managed by a licensed waste collection, transport, and management operator.

During the concreting process for the drilling of wells, given that drilling mud and cement emulsion are displaced in sequence, for effective displacement and to avoid contamination between the two fluids (drilling fluid and emulsion), an intermediate separating fluid ($CaCl_{(2)}$brine)known as a spacer is inserted. The intermediate fluid displaces the drilling fluid and then, with the injection of cement, it is also displaced, leaving no passage between them.

The categories of extractive waste that are estimated to be produced during the construction of the Project based on the European Waste Catalogue (EWC) are presented in **the** following **Table**. It should be noted that codes marked with an asterisk (*) represent waste that is considered hazardous.

Table3 –32 : Classification of drilling waste according to the EWC

EKA code	WEEE description
01	**WASTE FROM EXPLORATION, MINING, QUARRYING AND PHYSICAL AND CHEMICAL PROCESSING OF MINERALS**
01	Drilling mud and other drilling wastes
01 05	*fresh water drilling muds and wastes applies to water-based mud/fluids)*
01 05 05	*oil-containing drilling muds and wastes*
01 05 06	*drilling muds and other drilling wastes containing hazardous substances*
01 05	*barite-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06*
01 05 08	*drilling muds and wastes containing chlorides other than those mentioned in 01 05 05 and 01 05 06*
17	**WASTE FROM CONSTRUCTION AND DEMOLITION (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**
17	concrete, bricks, tiles and ceramics
17	concrete

It should be noted that the classification of waste, i.e. the determination of hazardous properties through the assessment of the hazardousness of waste and ultimately its classification as hazardous or non-hazardous, will be carried out in accordance with the provisions of the "Commission Communication on technical guidance on the classification of waste" (2018/C 124/01), based on the Waste Framework Directive 2008/98/EC (Water Framework Directive - WFD), which has been incorporated into Greek law by Law 4819/2021 (Government Gazette 129/A/23.07.2021) and the CLP Regulation[20] "Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labeling

[20] Current consolidated version: 01/12/2023: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008R1272-20231201

and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No. 1907/2006."

It is estimated that the drilling muds produced during the construction of the Project will amount to 2,240 m^3per well.

A typical borehole for the CO_2 storage project produces approximately 920 m^3 of cuttings, so the four (4) borehole program will produce approximately 3,690 m^3 of solid waste . Drilling operations in the Project produce small volumes of residues, as all planned wells are small in diameter.

It is estimated that the low-toxicity oil-based drilling muds that will be produced during the implementation of the project will amount to +/- 3,200 m^3. Similarly, the amount of cuttings that will result from sections that will be drilled with low-toxicity oil-based mud will amount to +/- 1,300 $m^{(3)}$.

Table3 –33 : Estimated quantities of spoil per drilling section

Cross-section section (in)	MD (m)	Pulp type	Specific gravity (SG)	Mud volume per drilling (m^3)	Volume of cuttings per borehole (m^3)	Total cuttings volume (4 boreholes) (m^3)
30	125	N/A	N/A	N/A	N/A	N/A
26	450	Water-based / Lime	1.05-1.15	+/- 1400	250	10
1	1850	Water-based / Lime	1.05-1.15		360	1440
12.25	950	Oil base	1.45-1.70	+/- 490	210	844
8.5	1033	Oil-based / Water-based	1.10-1.30	+/- 350	10	406
Total				2,240	920	3,690

The spacer fluid (the hypersaline water of the $CaCl_{(2)\ aquifer}$) that can be used during the concreting phase is estimated at approximately 20-30m^3 per borehole, while the excess cement is estimated at approximately 20m^3 per borehole.

The following **table** shows how waste streams that may be produced are managed in accordance with current legislation. It should be noted that the overall **Waste Management Plan** for the Project is presented in **Annex 12.6.**

Table3 –34 : Record of integrated waste management system from drilling operations

EKA Code	EKA description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[21]
01 05 04	Sludge and waste from water drilling	Sludge (water-based drilling mud)	Separate sludge collection / Temporary storage within the Project	Mud tanks	Licensed collection, transport, and management operator
		Drilling cuttings from water-based drilling muds	Separate sludge collection / Temporary storage within the Project	-	Disposal at the bottom of the sea
		Separating fluid - spacer	Separate collection of liquid / Temporary storage within the Project *if necessary	Metal storage tanks 5-25m³	Licensed collection, transport, and management operator
01 05 05	sludge and drilling waste containing oil	Sludge (oil-based drilling mud)	Separate sludge collection / Temporary storage within the Project	Mud tanks	Licensed collection, transport, and management operator
		Drilling cuttings from oil-based drilling muds	Separate collection of cuttings / Temporary storage within the Project	Cutting tanks	Licensed collection, transport, and management operator
		Spacer fluid	Separate collection of liquid / Temporary storage within the Project *if necessary	Metal storage tanks 5-25m³	Licensed collection, transport, and management operator
01 05 06	Drilling mud and other drilling waste containing dangerous substances	Sludge (drilling mud containing hazardous substances)	Separate sludge collection / Temporary storage within the Project	Mud tanks	Licensed collection, transport, and management operator
		Drilling cuttings containing hazardous substances	Separate collection of cuttings / Temporary storage within the Project	Cutting tanks	Licensed collection, transport, and management operator
		Spacer fluid	Separate collection of liquid / Temporary storage within the Project *if necessary	Metal storage tanks 5-25m³	Licensed collection, transport, and management operator

[21] "Processing": Recovery or disposal operations, including preparation prior to recovery or disposal (Law 4819/2021)

EKA Code	EKA description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[21]
01 05 07	Drilling muds and wastes containing barite other than those mentioned in 01 05 05 and 01 05 06	Sludge containing barite (water-based drilling muds)	Separate collection of sludge / Temporary storage within the Project	Mud tanks	Licensed collection, transport, and management operator
		Drilling cuttings containing barite from water-based drilling muds	Separate collection of cuttings / Temporary storage within the Project	Cutting tanks	Collection and transport operator or disposal at approved suitable recipients in accordance with the Project's EIA
01 05 08	Drilling muds and wastes containing chlorides other than those mentioned in 01 05 05 and 01 05 06	Sludge containing chlorides (water-based drilling muds)	Separate collection of sludge / Temporary storage within the Project	Mud tanks	Licensed collection, transport, and management operator
		Drilling cuttings containing chlorides from water-based drilling muds	Separate collection of cuttings / Temporary storage within the Project	Cutting tanks	Collection and transport operator or disposal at approved suitable recipients in accordance with the Project's EIA
		Spacer fluid	Separate collection of liquid / Temporary storage within the Project *if necessary	Metal storage tanks 5-25m^3	Licensed collection, transport, and management operator
17 01 01	Concrete	Excess cement slurry	Separate collection of solidified cement / Temporary storage within the project *if necessary	Metal storage container	Reuse within or collection and transport operator / SED

It should be noted that the electronic services of the Electronic Waste Register (HMA)[22] allow users to search for the corresponding licensed waste collection and transport operators per regional unit based on the EKA code or codes.

Finally, it should be noted that small quantities of water may be produced during drilling and testing operations prior to the completion of the Omega platform and its infrastructure. In this case, the produced water will be temporarily transported by a suitably equipped and licensed marine vessel either to the Delta

[22] https://wrm.ypeka.gr/eka-search-form

platform or to a suitably licensed facility for treatment and disposal in accordance with the applicable terms and restrictions. Transportation to the vessel will be via a closed connection (e.g., flexible hose) to prevent leaks and related environmental risks.

3.4.2.8. Emissions of Air Pollutants and Greenhouse Gases

3.4.2.8.1. General Information

Atmospheric emissions from the construction works of the proposed Project arise as follows:

- Atmospheric pollutants from the construction of land facilities
  - Exhaust fumes from the transportation of workers to and from the project site.
  - Exhaust fumes from trucks traveling to the project site and construction machinery within the project site.
  - Dust emissions from the movement of trucks to the project site and construction machinery within the project site.
- Air pollutants from the installation of the offshore platform.
- Air pollutants from the operation of the drill during drilling operations.
- Air pollutants from the construction of the CO_2pipeline.

The calculations of air pollutants per source are presented in more detail in **the** following **sections**.

3.4.2.8.2. Atmospheric Emissions from the Construction of Onshore Facilities

The implementation of the onshore facilities is not affected in any way by the proposed modification, and therefore the corresponding atmospheric emissions from their implementation do not differ from those predicted in **Section 6.4.7.3** of the approved EIA for the project, as summarized below.

The main sources of air pollutant emissions during the construction phase of the land facilities within Sigma's site include:

- Air pollutant emissions from truck traffic to and from the project site and from construction machinery.
- Air pollutant emissions from passenger car transportation of employees.

The following paragraphs calculate the emissions of main air pollutants (CO, HC, NOx, SO_2 , TSP) from the above activities during the construction phase of the land facilities.

Air pollutant emissions from the movement of trucks to and from the projects and construction machinery

Emissions of main air pollutants (CO, HC, NOX, SO_2 , TSP) from the construction of land facilities are examined. Emissions are calculated using the Gaussian Model and concern exhaust emissions from trucks and construction machinery, taking into account traffic assumptions and an indicative construction site

composition, as presented in **the** following **Table.** This composition is indicative and is derived from the individual technical parameters of the proposed projects.

Table3 –35 : Construction site composition of the project

Worksite equipment	Number
Mechanical excavator	1
Loader	1
Dump truck	2
Concrete mixer	1
Propeller	1
Road roller	1
Generator	1

The above indicative composition is a maximalist approach, which aims to investigate the most environmentally unfavorable scenario in order to ensure maximum protection of the environment.

The estimated fuel consumption of construction site machinery during the construction phase of the projects (see **Table** below) and the emission factors per type of fuel consumed (**Table 3 37**) are presented below. It should be noted that the daily fuel consumption of the construction site machinery will be significantly lower, as the machinery will not be in continuous operation (the daily operating hours of the machinery range from 4 to 6 hours). However, for safety reasons and based on the precautionary principle, the calculations are made for 8 hours of daily operation of the machinery.

Table3 –36 : Estimated fuel consumption of construction site machinery and heavy vehicles during the construction phase of the projects

Type of machine	Fuel Type	Fuel Consumption		
		lt/day	tn/day	Total project (tn)
Mechanical excavator	Diesel	80	0.06	2
Loader	Diesel	40	0.03	1
Tipper truck	Diesel	160	0.11	4
Concrete mixer	Diesel	170	0.12	1.4
Propeller	Diesel	160	0.11	4
Asphalt paver	Diesel	160	0.11	2.7
Generator	Diesel	40	0.03	0.7
Total		810	0.6	15.9

3 –37 : Air pollutant emission factors

	CO	HC	NO_X	SO_2	TSP
Machinery, kg/tn diesel	0.049	0.017	0.025	0.006	0.014

Diesel trucks, gr/km	19.2	5.2	9.5	2.7	2.3

The following **table** shows the total estimated emissions of CO, HC, NOX, $SO_{(2)}$,TSP from the operation of construction machinery within the worksite and from the movement of heavy vehicles to and from the Sigma facilities during the construction phase as a whole and on the peak day, according to the assumptions set out above.

Table3 –38 : Total emissions of air pollutants (CO, HC, NOX, SO_2 , TSP) from construction machinery and heavy vehicles during the construction phase of the project

	CO	HC	NOx	SO_2	TSP	Unit
Machinery	745.0	258.5	380.1	91.2	212.9	kg
Heavy vehicles	9.98	2.70	4.94	1.40	1.20	kg
Total	755.0	261.2	385.0	92.6	214.1	kg
Daily emissions	12.6	4.4	6.4	1.5	3.6	kg/d

Air pollutant emissions from employee commuting

The traffic load from employee commuting to and from the construction site is estimated at approximately 5 passenger vehicles/day. The following **table** shows the estimated emissions of main air pollutants from staff passenger cars for the entire construction phase of the land facilities (60 working days) based on the applicable EU passenger vehicle emission factors, assuming an average road distance of 15 km from the city of Kavala and two trips per day.

Table3 –39 : Emissions of main air pollutants from employee travel to and from the project

Type of passenger vehicle	Technology	CO (g/km)	NMVOC (g/km)	NOx (g/km)	N_2O	NH_3	Pb
Petrol Medium	Euro 5-EC 715/2007	0.62	0.065	0.061	0.0013	0.0123	0.0000182
Total emissions (kg)		5.58	0.585	0.549	0.0117	0.1107	0.0001638

3.4.2.8.3. Atmospheric Emissions from Offshore Platform Installation

The total emissions of key air pollutants (COPC) during the installation of the offshore platform, based on the estimated fuel consumption during the works according to the indicative construction schedule (**Section 3.4.2.6.2.2**), are calculated in **the** following **Table**. The standard emission factors for Marine Gas oil fuel from the European Environment Agency's air pollutant emission inventory guidebook (*EMEP/EEA 2023, EMEP/EEA air pollutant emission inventory guidebook, Technical guidance to prepare national emission inventories, https://www.eea.europa.eu/publications/emep-eea-guidebook-2023)*.

Table3 –40 : Estimated air pollutant emissions during the installation of the offshore platform

	CO	HC	NOX	SO	TSP	Unit
Emission factors	72.2	3.84	1.75	1.82	1.07	kg/t of fuel
Total per day during offshore platform installation	3,862.7	204.44	93.66	97.37	57.25	kg/d
Total for the offshore platform construction phase (tn)	77.25	4.11	1.87	1.95	1.15	t

(Source: Tier 1 Emission Factors for Ships using Marine Diesel/Marine Gas Oil (EMEP/EEA, 2023)

3.4.2.8.4. Atmospheric Emissions from Drilling Operations

Emissions to the atmosphere will be generated by the jack-up drilling rig and support vessels during drilling operations. Given the limited emissions and the distance from receptors, these emissions are not considered to contribute significantly to the degradation of air quality in the area of the proposed Project.

The assessment of pollutant emissions from drilling operations is based on the expected fuel consumption as calculated in **Section 3.4.2.6.2.2**. Pollutant emissions (CO and NOx) from individual components of the drilling equipment are presented in **the** following **table,** according to data provided by the drilling equipment supplier:

3 –41 : Emissions during drilling operations

Equipment	Total daily emissions	
	CO (mg/m³)	NOx (mg/m³)
Main engine #1, Caterpillar 3516, Ser. No. 73Z00834	3058.8	8678.7
Main engine #2, Caterpillar 3516, Ser. No. 73Z00835	2594.76	9100.80
Main engine #3, Caterpillar 3516, Ser. No. 73Z00836	2523.96	9534.72
Main engine #4, Caterpillar 3516, Ser. No. 73Z00837	2360.04	8031.12
Deck crane #1, Caterpillar 3406, Ser. No. 90U17565	3623.60	1826.8
Deck crane #2, Caterpillar 3406, Ser. No. 90U17584	1311.60	2760
Deck crane #3, Caterpillar 3408, Ser. No. 67U3279	1080.80	2231
Cement unit engine #1, Detroit Diesel 12VA, Ser. No. 48993-7123-7000	636	2661
Cement unit engine #2, Detroit Diesel 12VA, Ser. No. 28335-7123-7000	545	2811
Auxiliary engine, Caterpillar 3508, Ser. No. 70Z01072	32	118.34

3.4.2.8.5. Atmospheric Emissions from the Construction of the CO_2Pipeline,the Produced Water Transfer Pipeline, and the Submarine Cable

The main sources of air pollutant emissions during the construction of the CO_2pipeline, the produced water transfer pipeline, and the submarine cable will be the diesel engines and generators of the vessels. Emissions include greenhouse gases (GHGs): carbon dioxide ($_{CO_2}$), methane ($_{CH_4}$),and nitrogen oxide (N_2 O), as

well as Contaminants of Primary Concern (COPC): carbon monoxide (CO), nitrogen oxides (NOX), sulfur oxides (SOx) and particulate matter (PM).

The vessels to be used will fully comply with the international standards of MARPOL 73/78, Annex VI "Regulations for the Prevention of Air Pollution from Ships." Annex VI regulates emissions of ozone-depleting substances, nitrogen oxides (NOx), sulfur oxides (SOx) and volatile organic compounds (VOCs).

For the construction of the CO_2pipeline, the produced water transfer pipeline, and the submarine cable, marine fuel (Marine Gasoil DMA ISO 8217:2012) with a maximum sulfur content of 0.1% (M/M), in quantities:

- Moored, stationary: 3.5 Mt/day,
- Moored, during loading: 4.5 – 5.6 Mt/day,
- During transport: 3.5 – 4.5 Mt/day
- During pipeline construction: 11 - 12 Mt/day.

Total emissions of key air pollutants (COPC) based on estimated fuel consumption during operations according to the indicative construction schedule (**Section 3.4.2.2)** are calculated in the following **Tables.** standard emission factors for Marine Gas oil fuel from the European Environment Agency's air pollutant emission inventory guidebook (*EMEP/EEA 2023, EMEP/EEA air pollutant emission inventory guidebook, Technical guidance to prepare national emission inventories, https://www.eea.europa.eu/publications/emep-eea-guidebook-2023)*.

Table3 –42 : Fuel consumption during the construction of the CO_2pipeline, the produced water transfer pipeline, and the submarine cable

Subsea pipeline construction phase	Duration	Pipelay vessel		Tugboats		Total fuel consumption (t)
		Mt/day	Days	Mt/day	Days	
Phase 2: Works for approaching the coast, dredging 500 m from the coastline	6 months	4.5	10	4.5	120	1530
Phase 3: Installation of submarine pipelines and hydraulic testing. Installation of submarine cable.	3–4 weeks	12	25	4.5	25	600
Phase 4: Installation of lifting pipe on Omega platform	2-3 weeks	4.5	10	4.5	10	90
Total						2220

Table3 –43 : Estimated emissions of air pollutants during the construction of the CO_2pipeline, the produced water transfer pipeline, and the submarine cable

	CO	HC	NOX	SO	TSP	Unit
Emission factors	72.2	3.84	1.75	1.82	1.07	kg/t of fuel
Total per day, installation and hydrostatic testing phase	1,191.3	63.4	28.9	30	17.7	kg/d

	CO	HC	NOX	SO	TSP	Unit
Total for the construction phase of the submarine pipeline (tn)	159.17	8.47	3.85	3.96	2.31	t

(Source: Tier 1 Emission Factors for Ships using Marine Diesel/Marine Gas Oil (EMEP/EEA, 2023)

3.4.2.8.6. Greenhouse Gas Emissions

Greenhouse gas emissions during the construction phase of the onshore facilities mainly concern direct emissions from the **transportation of workers, construction machinery and heavy vehicles** to and from the project, as well as indirect emissions from the production of construction materials and E/M equipment for the projects. Emissions from the transportation of workers and heavy vehicles to and from the project site and from the operation of construction machinery for the construction of land facilities amount to approximately **61 t CO_2** , as calculated in **Section 6.4.7.4** of the approved EIA for the project and summarized in **the** following **Tables**. Emissions from the production of construction materials cannot be estimated at this stage.

Table3 –44 : Estimated $_{CO_2}$ emissions from employee transportation during project construction

Employee travel	
Total vehicle kilometers (km) / day	150
Total duration of construction phase (days)	60
Estimated number of staff vehicles	5
CO_2emissions factor $_{for}$passenger cars (EU Regulation (EU) 2019/631) (kgCO_2/km)	0.09
Total CO_2emissions (t)	0.85

Table3 –45 : Estimated CO_2emissions from heavy vehicle transport and the operation of construction machinery during project construction

Machinery/vehicle	CO_2emissions (t)
Mechanical excavator	7.60
Loader	3.8
Tipper	15
Concrete mixer	5.3
Propeller	15
Road roller	10.14
Generator	2.53
Total CO_2emissions (t)	59.8

Greenhouse gas emissions from the **Omega platform installation** with the construction vessel and support vessels, where marine fuel (Marine Gasoil DMA ISO 8217:2012 / Max. Sulphur Cont. 0.1% (M/M)), are

calculated based on the equipment specifications. For fuel consumption, as calculated in **Section 3.4.2.6.2.2,** total CO(2)emissions for the entire pipeline construction period are estimated at **2,520 tn**.

3 –46 : Estimated CO_2emissions from vessel operations during the installation of the Omega platform

Source	Average daily fuel consumption	Average daily CO_2 emissions	Total fuel consumption	Total CO_2 emissions
Heavy-lift crane barge	25 t/day	65 t	500 t	1300 t
Tugs (3 units)	22.5 t/day	48 t	450 t	960 t
Support vessels (supply, guard, crew vessels)	4.5 t/day	10 t	90 t	200 t
Generators (pre-commissioning)	1.5 t/day	3 t	30 t	60 t
Total	53.5 t/day	126 t	1070 t	2520 t

Greenhouse gas emissions from the **operation of drilling equipment** are calculated based on equipment specifications, as described in **the** following **table**.

3 –47 : Estimated GHG emissions from the operation of drilling equipment

Equipment	Average fuel consumption (l/h)	Operating hours/day	Daily emissions (kg/GJ)*			Daily emissions (kg/day)		
			CO_2	CH_4	N_2O	CO_2	CH_4	N_2O
Main engine #1, Caterpillar 3516, Ser. No. 73Z00834	82.00	12	2820	0.0072	0.0156	107,110.4	0.27	0.59
Main engine #2, Caterpillar 3516, Ser. No. 73Z00835	82.0	12	2820	0.0072	0.0156	107,110.4	0.27	0.59
Main engine #3, Caterpillar 3516, Ser. No. 73Z00836	82.0	12	2820	0.0072	0.0156	107,110.4	0.27	0.59
Main engine #4, Caterpillar 3516, Ser. No. 73Z00837	82.0	12	2820	0.0072	0.0156	107,110.4	0.27	0.59
Deck crane #1, Caterpillar 3406, Ser. No. 90U17565	33	4	376	0.0012	0.00	1,915.8	0	0.01
Deck crane #2, Caterpillar 3406, Ser. No. 90U17584	33	4	376	0.0012	0.0024	1,915.8	0.01	0.01
Deck crane #3, Caterpillar 3408, Ser. No. 67U3279	34	4	388	0.0012	0	2,036.8	0	0.01
Cement unit engine #1, Detroit Diesel 12VA, Ser. No. 48993-7123-7000	31	2	178	0.00	0	426	0	0
Cement unit engine #2, Detroit Diesel	31	2	178	0	0	426	0	0

Equipment	Average fuel consumption (l/h)	Operating hours/day	Daily emissions (kg/GJ)*			Daily emissions (kg/day)		
			CO_2	CH_4	N_2O	CO_2	CH_4	N_2O
12VA, Ser. No. 28335-7123-7000								
Auxiliary engine, Caterpillar 3508, Ser. No. 70Z01072	35	0	10	0	0.00	1.4	0	0
Total						435,163.2	1.11	2.41

**Emission factor: 74.1 kg CO_2 /GJ fuel, 0.0002 kg CH4/GJ fuel, 0.0004 kg N_2O/GJ fuel*

Greenhouse gas emissions from the **construction of the CO_2, pipeline and the installation of the submarine cable** by the construction vessel and auxiliary vessels, where marine fuel (Marine Gasoil DMA ISO 8217:2012 / Max. Sulphur Cont. 0.1 % (M/M)), are calculated using the UNFCCC Greenhouse Gas (GHG) Emissions Calculator, Document version: 01.3, Publication date: May 2021 (https://unfccc.int/documents/271269). For fuel consumption, as calculated in **Section 3.4.2.6.2.2,** the total $CO_{(2)}$emissions for the entire period of pipeline and cable construction are calculated at **7,114.06 tn.** Based on the above analysis, the following **Table** summarizes the calculation of $CO_{(2)}$emissions from the Project construction works.

Table3 –48 : Calculation of CO_2emissions from the Project's construction works

Construction activities	CO_2emissions (tn)
Transportation of workers and heavy vehicles to and from the project site, operation of construction machinery	61
Installation of new Omega Platform	2,520
Operation of drilling equipment[23]	69,626.1
Construction of pipelines and cable with construction vessel and support vessels	7,114.06
Total CO_2emissions during construction	79,321.16

3.4.2.9. Noise and vibration emissions

3.4.2.9.1. Noise emissions from the construction of land facilities

The implementation of the land facilities is not affected in any way by the proposed amendment, and therefore the corresponding noise emissions from their implementation do not differ from those provided for in **Section 6.4.8.3** of the approved EIA for the project, as summarized below.

- Noise from mobile and stationary construction machinery: According to calculations, the combined level of the LAeq (12 hours) for this specific construction site scenario and for 100% of the operating

[23] Drilling equipment is considered to be in operation for 20 days per month over a period of 8.5 months, in accordance with the Project construction schedule.

time is estimated to be **67 dB(A)** at an average distance of 50 m from the construction works and **60 dB(A)** at an average distance of 100 m.

- Noise from heavy vehicle traffic: According to calculations, the combined level of the LAeq (12-hour) indicator for this specific scenario for 100% of the operating time is estimated to be equal to **58 dB(A)** at an average distance of 50 m from the vehicle.

During the construction phase, **vibrations** are likely to be generated during excavation work and the movement of heavy vehicles. In the case of the Project's land facilities, due to the absence of extensive (in depth and area) earthworks, vibration levels and their duration are not expected to be significant.

3.4.2.9.2. Noise Emissions from the Installation of the Omega Platform

The activities involved in the installation of the Omega platform that will cause noise emissions are as follows:

- Installation of the pillars for the platform foundation.
- Operation of support and equipment transport vessels.

Installation of the pillars for the platform foundation. The potentially most significant noise emissions during the construction phase are those related to the installation of the pillars and the platform foundation.

Specifically, the noise levels of the pile drivers that will be used to install the piles can reach up to 180 dB at the source. For comparison, natural noise levels in the ocean, resulting from wind and wave action, can range from 90 dBA re 1μPa under mild wind conditions to 110 dB re 1μPa under severe weather conditions.

For the installation of the Omega platform, the pile driving mechanism will be percussive or pulsed, as described in detail in **Sections 3.4.2.1.1.3** and **3.4.2.1.1.4**, respectively.

In this specific case, the corresponding values resulting from the measurements and estimates of the Dieseko Group for **a pulsed mechanism** are SELss 112-135 dB re 1 μPa^2·s and SPL peak-to-peak 132-161 dB re 1 μPa at a distance of 750 m from the source, while the SPL in the case of **the impact mechanism** is 180 dB re 1 μPa at a distance of 3-10 m from the source.

Operation of support vessels and support works. The vessels will generate underwater noise during the works. The main sources of underwater noise are categorized as follows:

- Propellers and thrusters: Noise from propellers and thrusters is mainly caused by cavitation around the propellers when the vessel is moving or when the thrusters are operating to maintain/stabilize the position of the support vessel (OSPAR 2009, Richardson et al., 1995). The underwater noise generated by propellers and thrusters includes:
  - Relatively broadband acoustic signals with free-field source levels of approximately 160-175 dB (re 1 μPa), produced by small boats and ships (up to 50 m in length), although these emissions depend largely on the speed of the vessel and other operational characteristics.
  - Typical broadband source levels ranging from 165-180 dB (re 1 μPa) from more complex propulsion systems typically involving submersible thrusters on tugboats, crew boats, supply vessels, and many research vessels (50 to 100 m in length).

- Relatively strong and mainly low-frequency noise (the strongest energy is usually concentrated at frequencies lower than several hundred Hz), with broadband source levels of approximately 180-190 dB (re 1 μPa) from large vessels (length > 100 m).

- Engines and E/M equipment: Noise from engines often dominates when vessels are stationary or moving at low speeds. The main sources of mechanical noise include large mechanical equipment such as large power generation units (diesel engines or gas turbines), compressors, and pumps. Mechanical noise is usually low frequency and tonal in nature.

3.4.2.9.3. Noise Emissions from Drilling Operations

Natural noise levels at sea resulting from wind and waves can range from 90 dBA at 1 mPa in very calm conditions with low winds to 110 dB at 1 mPa in windy conditions. Certain phases of drilling operations could generate noise exceeding the above-mentioned natural conditions. Shell Australia conducted a detailed study in 1998, comparing noise levels for a platform under static conditions with a platform under drilling conditions. Noise levels from a supply vessel servicing the drill ship were also measured and compared with noise from the drill ship (*R. McCauley, 1998, Underwater noise emitted by the Ocean General drill ship, tugs, fishing vessels, and natural sources in the Timor Sea, Australia)*. Noise levels during drilling and non-drilling periods (generator operation, human activity) were similar. A noise level of 117 dB was recorded at 125 m from the drilling rig. During unloading activities from support vessels, noise levels reached 134 dB.

Therefore, although the jack-up drilling rig will introduce an increased noise level above the natural background, this level is not expected to be higher than the noise levels produced by other marine vessels in the area, including those serving existing platforms.

3.4.2.9.4. Noise Emissions from the Construction of Subsea Pipelines and Cable

The subsea pipeline and cable construction vessel, as well as the escort/support vessels, will generate underwater noise during the works. The main sources of underwater noise are categorized as follows:

- Propellers and thrusters: Noise from propellers and thrusters is mainly caused by cavitation around the propellers when the vessel is moving or when the thrusters are operating to maintain/stabilize the position of the support vessel during vessel refueling (OSPAR 2009, Richardson et al., 1995). The underwater noise generated by propellers and thrusters includes:
  - Relatively broadband acoustic signals with free-field source levels of approximately 160-175 dB (re 1 μPa), produced by small boats and ships (up to 50 m in length), although these emissions depend largely on the speed of the vessel and other operational characteristics.
  - Typical broadband source levels ranging from 165-180 dB (re 1 μPa) from more complex propulsion systems typically involving submersible thrusters on tugboats crew boats, supply vessels, and many research vessels (50 to 100 m in length).
  - Relatively strong and mainly low-frequency noise (the strongest energy is usually concentrated at frequencies lower than several hundred Hz), with broadband source levels of approximately 180-190 dB (re 1 μPa) from large vessels (length > 100 m).

- Engines and E/M equipment: Noise from engines often dominates when vessels are stationary or moving at low speeds. The main sources of mechanical noise include large mechanical equipment such as large power generation units (diesel engines or gas turbines), compressors, and pumps. Mechanical noise is usually low frequency and tonal in nature.

3.4.2.10. Electromagnetic Radiation and Radioactivity Emissions

No electromagnetic radiation emissions are expected during the construction of the projects, as no fixed installations or machinery that continuously emit radiation will be used.

With regard to Naturally Occurring Radioactive Material (NORM) associated with the Prinos formations, most of the drill cuttings historically produced from the Prinos wells have radioactivity levels comparable to background levels.

3.4.3. Operational Phase

3.4.3.1. Overall Process Description

EnEarth plans to construct a full-scale carbon dioxide storage facility at Prinos, capable of storing significant amounts of CO_2. The operation of the facility is planned to be developed in two distinct phases (Phase 1 & Phase 2) for reasons of scalability and adaptation to market conditions, each of which has synergistic prospects that can achieve significant $CO_{(2)}$reductions:

- **Phase 1**: Initial nominal capacity of up to 1 MTPA (starting at the end of 2025 and beginning of 2026).
- **Phase 2**: Expansion to final nominal capacity of up to 3 MTPA.

The licensed project concerns **Phase 1 of the facility**, which is described in the following sections. In summary, Phase 1 includes the following CO_2sources:

- Supply of bulk CO_2 via pipeline to the boundaries of the onshore facility under conditions suitable for injection.
- Receipt of CO_2 loads at the onshore facilities from trucks through pilot CO_2 capture projects.

The present proposed amendment does not include any change in the mode of operation of the overall project, which remains unchanged (the technical adjustments from the proposed amendments do not alter the operational processes of the project), as described in the approved EIA for the project (and environmentally licensed with the relevant AEPO).

Therefore, with regard to the project's operating processes, the provisions of the licensed project apply (onshore CO_2reception facilities and unloading, CO_2 to offshore storage facilities, CO_2 injection and water pumping) and are presented in **Section 2.2.7** of this document.

An exception is the management of the water produced, which will be implemented as described in the following paragraphs.

The produced water arriving at the new Omega platform will be channelled to the subsea transfer line. The pipeline has been designed so that the pressure drop is less than 1 bar, ensuring sufficient pressure at the Delta platform facilities without the need for modifications. The arrival temperature will remain constant, as the pipeline will be located 1 meter below the seabed. These conditions are within the operating limits of the Delta platform.

The treatment of the produced water transported from the Omega platform to Delta will be carried out by the existing treatment unit, as described in **Section 6.2.2** of the approved EIA for the project and the corresponding **Section 2.2.1.2** of this document. **The treated water will be discharged in accordance with the environmental and operating permits of the existing offshore project in Prinos and, in any case, the relevant emission limits of Decision 6924/1987 will be complied with.**

3.4.3.2. Personnel Requirements

EnEarth will employ specialized technical and administrative personnel during both the construction and operation phases of the Project.

In addition, Energean will provide technical support to EnEarth through its human resources, which will continue to be employed at the existing facilities.

In summary, the following operational team is envisaged for the operational phase of the project (following the addition of the proposed amendment):

- Security, offices, warehouse, logistics, marine control: 20 people.
- Monitoring, Environment, Health and Safety (HSE) team: 20 people.
- Maintenance team: 6 people.

3.4.3.3. Equipment List

For the operation of the project, in terms of equipment requirements, no changes are anticipated to those specified in **Section 6.5.3** of the approved EIA for the project. , the following **tables** include the equipment lists, according to the preliminary design study, that will be used in the onshore part of the Project (bulk CO_2 by pipeline and CO_2 cargo by truck) and in the offshore section (CO_2 injection and water production).

Table3 –49 : Indicative list of equipment for bulk CO_2 reception via pipeline (according to the preliminary design study)

Equipment		Number	Size / Capacity	Design pressure (barg)	Operating pressure (barg)	Design temperature (°C)
RE-7378	CO_2 Transfer Pipeline Pig Receiver	1	8	90	240	-46
LA-7341	CO_2 Transfer Pipeline Pig Launcher	1	12-16	90-220	24	-
RE-7144	CO_2 Transfer Pipeline Pig Receiver	1	12-16	101-194	24	-
H-7150A	Start-up heater	1	1.5 MW			Input T ~ 10

3 –50 : Indicative list of CO_2load reception equipment (according to the preliminary design study)

Equipment		Number	Size / Capacity	Design pressure (barg)	Operating pressure (barg)	Design temperature (°C)
C-001	Compressor	1	~ 5-10 kW	60	84	52
P-3179	Compressor on Platform	1	~ 5-10 kW	60-80	84	5

3 –51 : Indicative list of equipment for CO_2injection and water production processes (according to the preliminary design study)

Equipment		Number	Size / Capacity	Design pressure (barg)	Operating pressure (barg)	Design temperature (°C)
ESP-001	Electric Submersible Pump	1	9 5/8''	25-165	200	150
ESP-002	Electric Submersible Pump	1	9 5/8	25-165	200	150
XMT –001	Xmas tree water producers and CO_2injectors	2	13 5/8	240-345	450	-29
XMT –002	Xmas tree water producers and CO_2injectors	2	13 5/8	240-345	450	-29
X-7146A	CO_2 injection well	1	8	101-194	240	-46
X-7146B	CO_2injection well	1	8	101-194	240	-46
X-7147A	Water production well	1	8	101-194	240	-46
X-7147B	Water production well	1	8	101-194	240	-46
A-7169	1-5 flowline CO_2injection manifold	1	16" (1 off) x 8" (5 off)	101-194	240	-

3.4.3.4. Material, Energy, and Water Inputs

3.4.3.4.1. Material Requirements

For the operational phase of the CO_2storage facilities (after the addition of the proposed amendment), the necessary materials and consumables will be used as needed, mainly for the regular maintenance of the facilities.

3.4.3.4.2. Water Requirements

For the operational phase of the CO_2storage facilities (after the addition of the proposed amendment), no fresh water requirements are expected, except for the accommodation of personnel, in line with the current operation of the facilities.

Daily consumption per employee is estimated at 20 liters and includes drinking water (5 liters) and water for personal hygiene (15 liters). Therefore, during the operation of the Project, a quantity of drinking water of approximately 800 liters/day at peak times is required for the living conditions of the employees.

3.4.3.4.3. Energy Requirements

3.4.3.4.4. Energy Consumption

During the operational phase, the new offshore facilities will require power to process CO_2 at the Omega platform in order to achieve the appropriate injection conditions (P, T). Based on the initial estimate of the projected energy consumption for compressing CO_2 loads and heating bulk CO_2during start-up, the power demand is expected to be in the order of 1.6 MW. Approximately 99% of this power demand is due to the

operation of the electric heater required during start-up as a means of preventing low temperatures in the piping and the formation of hydrates/salts in the area near the well. The daily energy required for 16 hours of operation (2 shifts) amounts to 1.6 MW x 16h/d = 25.6 MWh, while the annual energy requirement is 9,344 MWh/year.

Two Electric Submersible Pumps (ESP) with a power of approximately **0.5 to 1 MW** each are planned to pump the water produced from the water wells on the Omega platform. Power will be supplied to the pumps via power cables fed by variable speed drives (VSDs) inside the platform's electrical room. Assuming 24-hour operation of the pumps, taking into account an average power rating of 0.75 MW, the annual energy requirement for each pump is equal to 0.75 MW x 24hr/d x 365 d = 6,570 MWh. Therefore, a total energy of **13,140 MWh/year** is required to operate the two pumps**.** The next phases of development will require the installation of additional water wells and corresponding submersible pumps and transmission systems, with a corresponding increase in the required power.

The required control systems, power supply, and hydraulic system from the hydraulic power unit and the head control panel will be installed on the "Christmas tree" surface valves on the Omega platform.

Electricity will be supplied from the Delta platform to the Omega platform via an approximately 1 km long submarine cable, which will provide up to ~ 4 MW of power. Electricity consumption during project operation (after the proposed modification) is summarized in **the** following **table.**

Table3 –52 : Electricity consumption during operation of the project

Installed capacity	8,000 kW
Maximum power demand	4,000 kW
Average energy consumption	96,000 kWh/day 2,900 MWh/month
Grid voltage (low/medium)	0.4 / 6.3 and 20 kV

With regard to the needs of the onshore facilities, it should be noted that no processing is planned for CO_2loads and for the quantity delivered by pipelines. Nevertheless, as the majority of the $CO_{(2)}$ quantity will be transported to the reservoir in the future via a pipeline system, originating from industries in the wider region of Northern Greece (from Volos, Larissa to Alexandroupolis), the corresponding energy requirements are estimated, but these are **outside the physical boundaries of the Project under study.** The energy requirements for receiving bulk CO_2 via pipeline (outside the Project) during the operation of the Project will consist of consumption for compression (of the order of 100 kWh/t CO_2), cooling (of the order of 144 Mcal/t-CO_2) and transport of CO_2 from producers to the storage site. Based on the above, the total energy consumption in the pipeline is expected to be approximately 267.4 kWh/t CO_2 , i.e. **267,360.0 MWh/year** for the 1 MTPA capacity.

3.4.3.4.5. Fuel Consumption

Fuel consumption during operation will relate to the movement of trucks and boats for the collection of CO_2 , as well as the usual transportation of personnel and supplies, which will be similar to those for the existing

activity at the Sigma onshore facilities and the Prinos offshore facilities. More specifically, the following are envisaged for the operation of the project (after the addition of the proposed amendment):

- The delivery of CO_2 cargoes is estimated to be carried out via 21 truck routes with a capacity of 21,375 kg (indicative calculation in **Section 6.5.1.1.2** of the approved EIA). The distance that the trucks will travel per route to deliver the $CO_{(2)}$ loads to the Sigma facilities can be considered 150 km (Pilot Program 1) and 700 km (Pilot Program 2), respectively. Based on the above, fuel consumption is expected to be in the range of **2.5–3 t.**
- The frequency of mobilization of the supply vessel/barge for the transport of CO_2 loads will be similar to that of the trucks delivering the loads (indicative calculation in **Section 6.5.1.1.2** of the approved EIA). Consumption for the supply vessel is estimated to be **1,300 t** for the total duration of the Project.

3.4.3.5. Waste Outputs

3.4.3.5.1. Urban Waste

3.4.3.5.1.1. Urban Waste

It is estimated that the Project (after the addition of the proposed amendment) will produce non-hazardous and hazardous Urban Waste (UW) as well as certain other waste streams that fall under alternative management (AM).

The categories of waste that are estimated to be produced during the operation of the Project (after the addition of the proposed amendment) based on the European Waste Catalogue (EWC) (Decision 2001/118/EC, as amended and in force), are presented in **the** following **Table.** It should be noted that codes with an asterisk (*) in addition to the number represent waste that is considered hazardous.

Table3 –53 : Classification of municipal waste according to the EWC

EWC code	EWC description
15	WASTE FROM PACKAGING; ABSORBENT MATERIALS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED
15 01	packaging (including separately collected municipal packaging waste)
15 01	paper and cardboard packaging
15 01	plastic packaging
15 01 04	metal packaging
15 01 05	synthetic packaging[24]
15 01 06	mixed packaging
15 01 07	glass packaging

[24] Beverage packaging (Tetra Pak type), snack packaging (e.g., potato chips/crisps, pretzels), tablet packaging

EWC code	EWC description
15 01 10*	packaging containing residues of dangerous substances or contaminated by them
19	**19 WASTE FROM WASTE MANAGEMENT FACILITIES, WASTEWATER TREATMENT PLANTS OUTSIDE THE POINT OF GENERATION AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTIONWATER FOR INDUSTRIAL USE**
19 08	**Waste from liquid waste treatment plants not otherwise specified**
19 08 05	sludge from the treatment of urban waste water
20	**MUNICIPAL WASTE (HOUSEHOLD WASTE AND SIMILAR WASTE FROM COMMERCIAL ACTIVITIES, INDUSTRIES AND INSTITUTIONS), INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 01	**separately collected fractions (except those mentioned in 15 01)**
20 01	paper and cardboard
20 01	glass
20 01 13	solvents
20 01 14	acids
20 01 15*	alkaline waste
20 01 19	pesticides
20 01 21	fluorescent tubes and other mercury-containing waste
20 01 23	discarded equipment containing chlorofluorocarbons
20 01 25	edible oils and fats
20 01 27	paints, inks, adhesives and resins containing dangerous substances
20 01 29	detergents containing dangerous substances
20 01 33	batteries and accumulators mentioned in 16 06 01, 16 06 02 or 16 06 03 and mixed batteries and accumulators containing such batteries
20 01 34	batteries and accumulators other than those mentioned in 20 0 133
20 01	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components
20 01	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23, and 20 01 35
20 01 37	wood containing dangerous substances
20	plastics
20 01	metals
20 03	**other municipal waste**
20 03 01	mixed municipal waste

The estimates made for the Project's municipal waste production (after adding the proposed amendment) are based on a series of assumptions:

- Average number of employees per day: 46
- Daily AA production rate: 0.4 kg/person

- Qualitative composition of MSW based on ESD estimates[25]
- Separate collection of recyclable materials (paper and cardboard, metals, plastics, glass)
- Specific weight per type of MSW:
  - paper/cardboard: 0.20 tn/m^3
  - plastics: 0.22 tn/m^3
  - metals: 0.23 tn/m^3
  - glass: 0.33 tn/m^3
  - ^{other} – mixed: 0.26 tn/m^3
- Percentage of waste that can be recycled per waste stream AA:
  - paper/cardboard: 85%
  - plastics: 50%
  - metals: 70%
  - glass: 60%

Based on the above, the following **table** shows the estimated annual amount of waste during the project's operation (after adding the proposed amendment) as well as the average daily amounts of waste produced.

3 –54 : Estimated quantities of AA produced – Operational Phase

AA production		Mixed	Recyclables	Total	Unit
Annual Production	AA Production (tn)	2.98	1.44	**4.42**	**tn**
	AA production (m^3)	11.45	6.76	**18.22**	**m^3**
Average Daily Production	Average Daily Production AA (tn/d)	0.012	0.006	**0.02**	**tn/d**
	Average Daily AA Production (m^3/d)	0.048	0.028	**0**	**m^3 /d**

With regard to other urban-type streams (waste streams falling under Alternative Management, Small Quantities of Hazardous Waste (SQHW), etc.), whose permanent production is not expected during the operation of the Project (after the addition of the proposed amendment) based on the data of the current phase, it is not possible to estimate the quantities produced.

The following **table** shows how municipal waste streams are managed based on the requirements of current legislation. Note that the overall **Waste Management Plan** for the Project is presented in **Appendix 12.6.**

[25] ESDA YA Act 39 of 31.8.2020 (Government Gazette 185/A/29.9.2020), as amended by PYS 5 of 18.4.2023/2023 (Government Gazette 94/A 18.4.2023).

Table3 –55 : Recording of an integrated waste management system - Municipal Waste

EKA Code	EKA Description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[26]
20 03 01	Mixed municipal waste	Mixed municipal waste	Separate collection of mixed municipal waste / Temporary storage within the Project	Mixed Waste Bin (plastic bin EN 840-2/5/6, capacity 80 to 1100lt)	Competent local authority or collection and transport agency – *if this is not feasible, provision should be made for the Project agency to deposit the waste in the existing collection system of the local authority* / Kavala landfill site
19 08 05	Sludge from urban wastewater treatment	Sigma WWTP sludge from the treatment of the Project's urban wastewater	-	-	Licensed collection, transport, and management operator
15 01 01	Paper and cardboard packaging	Mixed recyclable materials from paper/cardboard, plastic, metal, and glass [27]	Separate collection of recyclable materials / Temporary storage within the Project	Recyclable Materials Bin (plastic bin EN 840-2/5/6, capacity 80 to 1100 liters)	Competent local authority or collection and transport agency – *if this is not feasible, provision should be made for the Project agency to deposit the waste in the existing local authority collection system* / Xanthi Recyclable Materials Sorting Center (KDAU)
15 01 02	plastic packaging				
15 01 04	Metal packaging				
15 01 05	synthetic packaging[28]				
15 01 06	mixed packaging[29]				
15 01 07	glass packaging				
20 01 01	paper and cardboard				
20 01 02	glass				
20 01 39	plastics				
20 01 40	metals				
20 01 25	edible oils and fats	Edible oils and fats. *No permanent production is planned during the implementation of the*	Separate collection of edible oils and fats / Temporary	Edible oil and fat collection container (Intermediate Bulk Container	Licensed collection, transport, and management operator

[26] "Treatment": Recovery or disposal operations, including preparation prior to recovery or disposal (Law 4819/2021)

[27] https://www.eoan.gr/%ce%b5%ce%bd%ce%b7%ce%bc%ce%ad%cf%81%cf%89%cf%83%ce%b7/%cf%84%ce%b9-%cf%85%ce%bb%ce%b9%ce%ba%ce%ac-%ce%b1%ce%bd%ce%b1%ce%ba%cf%85%ce%ba%ce%bb%cf%8e%ce%bd%ce%bf%cf%85%ce%bc%ce%b5/

[28] Beverage packaging (Tetra Pak type), snack packaging (e.g., potato chips/crisps, pretzels), tablet packaging.

[29] Composite packaging: packaging consisting of two or more layers of different materials that cannot be separated by hand and form a single integrated unit consisting of an inner receptacle and an outer casing, which is filled, stored, transported, and emptied as a single unit. DIRECTIVE (EU) 2018/852.

EKA Code	EKA Description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[26]
		Project. In any case, and if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area.	storage within the Project *if necessary	(IBC) or UN HDPE barrel, capacity from 30 to 220 liters) *if necessary	*if necessary
20 01 23	Discarded equipment containing chlorofluorocarbons	Waste Electrical and Electronic Equipment (WEEE). *No permanent production of WEEE is anticipated during the implementation of the Project. In any case, and if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area*	Separate collection of WEEE / Temporary storage within the Project *if necessary	WEEE bin (plastic bin EN 840-2/5/6, capacity 80 to 1100 liters, or WEEE bin from a contracted waste management company) *if necessary	Collection and transport agency / WEEE WEEE - *if this is not feasible, provision should be made for the disposal of waste by the Project operator at appropriate WEEE recycling points of the WEEE agencies.* *if necessary
20 01 35	discarded electrical and electronic equipment, except those mentioned in 20 01 21 and 20 01 23 containing hazardous components				
20 01 36	discarded electrical and electronic equipment, except those mentioned in 20 01 21, 20 01 23, and 20 01 35				
20 01	batteries and accumulators referred to in 16 06 01, 16 06 02 or 16 06 03 and mixed batteries and accumulators containing such batteries	Waste Electrical Batteries (batteries) & Accumulators (WBA)	Separate collection of WEEE / Temporary storage within the Project	AESS bin (AESS bin from contracted SED)	Collection and transport agency / WEEE collection agency
20 01 34	Batteries and accumulators other than those mentioned in 200133				
20 01 21	Fluorescent tubes and other waste containing mercury	Waste from lighting, lamps, and small appliances AHHE. *No permanent production of WEEE is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be temporarily stored in the Project's temporary waste storage area.*	Separate collection of lighting, lamps, and small appliances / Temporary storage within the Project *if necessary	Lighting Fixtures-Lamps Bin (WEEE Bin from a contracted WEEE collection point) *if necessary	Collection and transport agency / WEEE WEEE - *if this is not feasible, provision should be made for the Project operator to deposit the waste at suitable WEEE recycling points of the WEEE WEEE.* *if necessary
20 01 13*	solvents	MPA (Small Quantities of Hazardous Waste in AA).	Separate collection / Temporary	Suitable separate bin for each type (plastic bin EN 840-2/5/6,	Licensed hazardous waste collection, transport, and
20 01 14*	Acids				
20 01 15*	alkaline waste				

EKA Code	EKA Description	Description of waste type	Waste Stream Management		
			Collection/Temporary Storage within the Project	Temporary Storage Equipment within the Project	Removal (Transport) / Treatment[26]
20 01 19*	pesticides	*No permanent production is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be stored temporarily and separately for each type in the Project's temporary waste storage area.*	storage within the Project *if necessary	capacity 80 to 1100lt or UN HDPE barrel, UN metal barrel, etc.) *if necessary	management operator *if necessary
20 01 27	paints, inks, adhesives, and resins containing dangerous substances				
20 01 29	detergents containing dangerous substances				
20 01 37*	wood containing dangerous substances				
15 01 10	packaging containing residues of or contaminated by dangerous substances	Empty containers of paint, solvents, etc. *No permanent production is expected during the implementation of the Project. In any case, and if necessary, the quantities produced should be stored temporarily and separately for each type, in the Project's temporary waste storage area and managed as hazardous waste.*	Separate collection / Temporary storage within the Project *if necessary	UN HDPE barrel, UN metal barrel *if necessary	Licensed hazardous waste collection, transport, and management operator *if necessary

Please note that the Electronic Waste Registry (HMA)[30] allows you to search for the corresponding licensed waste collection and transport operators per regional unit based on the EKA code or codes.

3.4.3.5.1.2. Wastewater and Other Liquid Waste

The water produced from the planned boreholes will be transported to the Delta platform in Prinos, where it will be separated and treated in the existing systems and then discharged into the sea, as described in detail in **the** relevant **sections** of this document.

Rainwater on the platforms, which may potentially contain hydrocarbons, enters the closed drainage system through the enclosed areas. To minimize these quantities, the size of the enclosed areas has been minimized and protected from rain where possible.

[30] https://wrm.ypeka.gr/eka-search-form

3.4.3.5.1.3. Operational/Maintenance Waste

It is estimated that during the operation and maintenance of the underground CO_2storage facility, non-hazardous and hazardous waste will be generated.

Given the early stage of the Project study, it is not possible to accurately estimate the types and quantities of hazardous and non-hazardous waste that may be generated. However, it can be noted that hazardous waste from existing facilities is generated at the Delta platform. This waste is generated during general maintenance of the facilities, which lasts 15 days every 30 months. The hazardous waste produced from the cleaning of tanks V-101 A/B, V-107, and V-102 containers from water treatment on the Delta platform consists of petroleum sludge (mixtures of heavy hydrocarbons containing mainly asphaltenes), rags, absorbent materials, etc. Hazardous and non-hazardous waste may be generated from $CO_{(2)}$treatment.

Indicatively, the categories of waste that are estimated to be produced from the operation and maintenance of the underground storage facility based on the European Waste Catalogue (EWC) are presented in **the** following **Table**. It should be noted that codes marked with an asterisk (*) represent waste that is considered hazardous.

Table3 –56 : Indicative types of waste from the operation and maintenance of the underground facility according to the EWC

EKA code	Description
13	**OIL WASTE AND LIQUID FUEL WASTE (except edible oils and those included in chapters 05, 12, and 19)**
13	Waste gearbox and lubricating oils
13 02	non-chlorinated mineral-based engine, gearbox and lubricating oils
14	**WASTE FROM ORGANIC SUBSTANCES USED AS SOLVENTS, COOLANTS AND PROPELLANTS (except 07 and 08)**
14	Waste from organic substances used as solvents, coolants and foaming/aerosol propellants
14 06 01	chlorofluorocarbons, HCFCs, HFCs
14 06 03	other solvents and solvent mixtures
15	**WASTE FROM PACKAGING; ABSORBENT MATERIALS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED**
15 02	Absorbents, filter materials, wiping cloths and protective clothing
15 02	Absorbent materials, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated with dangerous substances
16	**WASTE NOT OTHERWISE SPECIFIED IN THE LIST**
16	gases in pressure containers and discarded chemicals
16	laboratory chemicals consisting of or containing dangerous substances, including mixtures of laboratory chemicals
16	Aqueous liquid waste intended for off-site treatment
16 10	aqueous liquid waste containing dangerous substances
16 10	aqueous liquid waste other than those mentioned in 16 10 01
17	**WASTE FROM CONSTRUCTION AND DEMOLITION**
17	metals (including their alloys)
17 04	iron and steel
17 04 09	metal waste contaminated with dangerous substances

The management of the above hazardous and non-hazardous waste and any other waste generated during the operation and maintenance of the facility will be carried out in accordance with the provisions of the applicable legislation . The waste produced will be collected separately by type in containers suitable for its safe temporary storage at the Project in accordance with safety and environmental protection regulations, and its management will be carried out by licensed waste collection, transport, and waste management.

Hazardous waste such as rags, absorbent materials, etc. related to this project and originating from the shared use of the Delta platform's water separation system, e.g. V-102 water separator, are already included in the existing operation of the Delta platform.

3.4.3.6. Atmospheric Emissions

Emissions to the atmosphere during the operation of the Project (after the incorporation of the proposed modification) will mainly come from the operation of trucks transporting CO_2 , the operation of cranes, the operation of supply vessels, and the processing of CO_2 cargoes and bulk flow (heating and pumping).

3.4.3.6.1. Atmospheric Emissions During CO_2 Receipt

The receipt of CO_2 cargoes is estimated to be carried out via 21 truck routes with a capacity of 21,375 kg (indicative calculation of **Section 6.5.1.1.2** of the approved EIA for the project). The distance that the trucks will travel per route to deliver the $CO_{(2)}$ loads to the Sigma facilities can be considered 150 km (Pilot Program 1) and 700 km (Pilot Program 2), respectively.

Typical air pollutant emissions from transport trucks include pollutants such as carbon dioxide (CO_2), nitrogen oxides (NOx), particulate matter (PM), volatile organic compounds (VOCs), sulfur dioxide (SO_2), and carbon monoxide (CO). These emissions result from the use of fuel in truck engines.

Air pollutant emissions from crane operation result from the use of fuel in their engines, similar to trucks.

The estimated fuel consumption during CO_2 (Error! Reference source not found.) and the emission factors p er type of fuel consumed (Error! Reference source not found.) are listed below. It should be noted that daily fuel consumption will be significantly lower, as the operation of cranes and vehicles will not be continuous, but will last only as long as the reception process. However, for safety reasons and based on the precautionary principle, calculations are made for 8 hours of daily operation of the machinery.

Table3 –57 : Estimated fuel consumption of machinery and heavy vehicles upon delivery CO_2

Machine type	Fuel Type	Fuel Consumption		
		lt/day	tn/day	Total project (tn)
Crane	Diesel	40	0.03	3
Truck	Diesel	80	0.06	2
Total		12	0.08	5

3 –58 : Air pollutant emission factors

	CO	HC	NO_X	SO_2	TSP
Machinery, kg/tn diesel	0.049	0.017	0.025	0.006	0.014
Diesel trucks, gr/km	19.2	5.2	9.5	2.7	2.3

The following **table** presents the total estimated emissions of CO, HC, NOX, SO_2 , TSP from the operation of cranes and trucks and from the movement of heavy vehicles to and from the Sigma facilities, according to the assumptions presented above.

Table3 –59 : Total emissions of air pollutants (CO, HC, NOX, SO_2 , TSP) upon receipt CO_2

	CO	HC	NO_x	SO_2	TSP	Unit
Machinery	247.0	85.7	126.0	30.2	70.6	kg
Heavy vehicles	116.0	31.4	57.4	16	13	kg
Total	362.9	117.1	183.4	46.5	84.5	kg
Daily emissions	1.0	0.3	0.5	0.1	0	kg/d

3.4.3.6.2. Atmospheric Emissions During Transportation – Processing for CO_2 Injection

Emissions from the operation of CO_2cargo and personnel transport vessels include exhaust gases from the movement of the ship and the operation of its engines, as well as emissions from internal combustion engines of other equipment.

Total emissions of key air pollutants (COPC) based on estimated fuel consumption are calculated in **the** following **tables**. The standard emission factors for marine gas oil fuel from the European Environment Agency's air pollutant emission inventory guidebook (*EMEP/EEA 2023, EMEP/EEA air pollutant emission inventory guidebook, Technical guidance to prepare national emission inventories, https://www.eea.europa.eu/publications/emep-eea-guidebook-2023)*.

Table3 –60 : Fuel consumption by CO_2cargo transport vessels and refueling vessels

Use of vessels during project operation	Tugboats		Total fuel consumption (t)
	Mt/day	Days	
Transportation of CO_2 loads to the Beta platform	4.5	20	90
Refueling / Personnel transport	4.5	30	1,350
Total			1,440

3 –61 : Estimated emissions of air pollutants from cargo ships CO_2 and refueling

	NO_x	CO	NMVOC	SO	PM10	Unit
Emission factors	72.2	3.84	1.75	1.82	1.07	kg/t of fuel
Total per day	324.9	17.3	7.9	8.2	4.8	kg/d
Total Phase A	104.0	5.5	2.5	2.6	1.5	t

(Source: Tier 1 Emission Factors for Ships using Marine Diesel/Marine Gas Oil (EMEP/EEA, 2023)

There will be no direct atmospheric emissions during the preparation for CO_2injection and water production at the Omega platform, as the equipment (heater, compressors/pumps) will be electric and no fuel will be used.

3.4.3.6.3. Greenhouse Gas Emissions

Greenhouse gas emissions during the project's operational phase (after incorporation of the proposed amendment) relate to the transport of CO_2 from pilot projects during the first year of operation of the Project, the transport of CO_2 cargoes to the Beta platform and the movement of workers by ship, as well as the operation of the Project's equipment.

Emissions from CO_2 tanker trucks from pilot projects are expected during the first year of operation of the Project (see relevant analysis in **Section 6.5.1.1.2** of the approved EIA for the project). For a distance of 4,250.0 km, emissions from diesel use are estimated at **3,678.0 tn CO(2)**[31] .

The majority of the carbon dioxide will be transported to the reservoir in the future via a pipeline system, originating from industries in the wider region of Northern Greece (from Volos and Larissa to Alexandroupolis). The corresponding energy requirements for receiving bulk CO_2 via pipeline (outside the Project) during the operation of the Project will consist of consumption for compression (of the order of 100 kWh/t CO_2), cooling (of the order of 144 Mcal/t-CO_2) and transport of CO_2 from producers to the storage site. Based on the above, the total energy consumption in the pipeline is expected to be approximately 267.4 kWh/t CO_2 , i.e. **267,360.0 MWh/year** for the capacity of 1 MTPA.

Consumption for the supply vessel is estimated at **1,4500 t** for the entire duration of the Project. Emissions from marine fuel consumption (Marine Gasoil DMA ISO 8217:2012 / Max. Sulphur Cont. 0.1% (M/M)) are calculated using the UNFCCC Greenhouse Gas (GHG) Emissions Calculator, Document version: 01.3, Publication date: May 2021 (https://unfccc.int/documents/271269). For the above fuel consumption, total CO(2)emissions for the entire duration of the Project are calculated at 4**,504.7 tn**.

A power of 1.6 MW is required for CO_2 processing in order to achieve the appropriate injection conditions (P, T). This power demand includes the requirements for compressing/pumping loads of CO(2) , as well as heating bulk CO(2)during start-up. This power demand is mainly due to the operation of the electric heater required during start-up as a means of preventing low temperatures in the piping and the formation of hydrates/salts in the area near the well. The daily energy required for 16 hours of operation (2 shifts) amounts to 1.6 MW x 16h/d = 25.6 MWh, while the annual energy requirement is 9**,344 MWh/year**.

In addition, two Electric Submersible Pumps (ESP) with a capacity of approximately 0.5 to 1 MW each are planned for pumping the produced water from the water wells on the Omega platform ( ). Power will be supplied to the pumps via power cables fed by variable speed drives (VSDs) within the platform's electrical

[31] Calculations are made using the UNFCCC Greenhouse Gas (GHG) Emissions Calculator, Document version: 01.3, Publication date: May 2021 (https://unfccc.int/documents/271269)

substation. Assuming 24-hour operation of the pumps, taking into account an average power rating of 0.75 MW, the annual energy requirement for each pump is equal to 0.75 MW x 24hr/d x 365 d = 6,570 MWh. Therefore, a total energy of **13,140 MWh/year** is required to operate the two pumps.

According to the emission factor of the residual energy mix, as published by the Hellenic Energy Agency, the **indirect annual emissions due to electricity consumption** are:

CO_2emissions = energy production x emission factor = (9,344 + 13,140 + 267,360) MWh x 436.889 kg/MWh = **126,629.6 tn CO_2/year.**

Based on the above analysis, the following **table** summarizes the calculation of CO_2emissions for an average year of operation of the Project.

Table3 –62 : Calculation of CO_2 emissions for an average year of Project operation

Emissions	Value	Units
A. Direct CO_2emissions		
CO_2transport trucks from Pilot Projects[32]	3,678.0	tCO_2 /year
Supply vessel	4,504.7	tCO_2 /year
B. Indirect CO_2emissions		
Compression/pumping and heating (within the Project)	9,344.0	MWh/year
Pumping of produced water	13,140.0	MWh/year
Energy consumption in pipeline (outside the Project)	267,360	MWh/year
Total indirect emissions	126,629.6	tCO_2 /year
C. CO_2emissions (A + B)	**134,812.3**	**tCO_2 /year**

3.4.3.7. Noise and Vibration Emissions

During the operational phase, vibrations or noise may occur. Vibrations may result from the operation of rotating machinery such as pumps. Although operational vibrations are generally less intense than those caused by construction activities, they may pose risks to surrounding infrastructure or sensitive equipment. Operational noise emissions mainly result from the continuous operation of machinery and equipment on the platforms (pumps, electric heaters).

Although noise emissions from the operation of the project will be continuous, they can be prevented and mitigated through modifications to the design of the equipment, the installation of soundproofing in noisy areas of the facilities, and regular equipment maintenance practices.

[32] Land transport of $CO_{(2)}$ by truck within the framework of Pilot Projects will only take place during the first year of operation of the Project, therefore it is not taken into account for the calculation of $CO_{(2)}$ emissions for an average year of operation of the Project.

Limited noise emissions will also occur during the receipt of cargo and its loading onto vessels for transport to offshore facilities due to the movement of heavy vehicles and transport trucks.

3.4.3.8. Electromagnetic Radiation and Radioactivity Emissions

No electromagnetic radiation or radioactivity emissions are expected during the project's operational phase.

3.4.3.9. Supporting Functions

3.4.3.9.1. Technical Works / Maintenance

Regular inspections of the facilities will be carried out in accordance with Energean's existing facility maintenance procedures.

The most important inspection planned is the inspection of the offshore pipeline. Typically every 5 years or in other cases of system shutdown, the offshore $CO_{(2)}$pipeline will be inspected by a smart pigging tool, which measures the thickness of the pipeline wall to ensure that the integrity of the pipeline is maintained. The tool will be able to detect any defects, loss of wall thickness due to corrosion or other impacts, so that corrective measures can be taken if repairs are necessary. The tool is inserted into the pipeline from the land end with a launcher and operates by applying water pressure until it reaches the end of the pipeline at the Omega platform.

The figure below shows a typical example of a pipeline inspection tool.

3 Figure –32 : Pipeline inspection equipment (intelligent pig)

3.4.3.9.2. Waste management

Waste generated during the operation of the new CO_2storage facilities will be managed in accordance with the Project **Waste Management Plan**, as presented in **Appendix 12.6**.

3.4.3.9.3. Monitoring and Control

The operation of the new CO_2 facilities will be monitored in accordance with the Project's Environmental Terms, in conjunction with the applicable Monitoring Plans implemented by Energean at the Sigma onshore facilities and the Prinos offshore facilities.

The proposed Monitoring Plan for the CO_2storage Project facilities is presented in **Chapter 7.** The specific $CO_{(2)}$Monitoring Plan of Paragraph 2 of Article 14 of Joint Ministerial Decision 48416/2037/E.103/2011 is set out in **Annex 12.5.**

3.4.4. Decommissioning and Dismantling Phase

3.4.4.1. Decommissioning philosophy

The overall project (as amended on the basis of the proposed interventions included herein) will adopt the same **Decommissioning Philosophy** as described in the approved EIA for the project (and has been environmentally licensed with the relevant AEPO) and presented in **Section 2.2.8.1** of this document.

3.4.4.2. Sealing and Decommissioning of Boreholes

The sealing and decommissioning of the project's boreholes (as modified on the basis of the proposed interventions included herein) will be implemented using the same methodology described in the approved EIA for the project (and environmentally licensed by the relevant AEPO) and presented in **Section 2.2.8.2** of this document.

3.4.4.3. Dismantling of the Offshore Platform

Prior to the decommissioning of the Omega platform, the wells must be abandoned, as described in **the** relevant **Section** of this document, and the process systems must be shut down and cleaned.

In general, the decommissioning of the platform can be divided into the following stages:

- **Disconnection**: Prior to removal of the facilities, a disconnection team will disconnect all necessary connections to the jacket surface equipment and install the necessary lifting points on the surface equipment. These operations can be performed by local resources.
- **Dispersion of drilling debris**: On the platform piles, accumulated drilling debris must be removed. The debris will be removed from the jacket platform to prevent obstruction of the platform removal operations. Removal activities will be carried out by divers employed by the platform, who will disperse the piles using water jet nozzles. After being transported to disperse the drilling debris, the divers will also disconnect the pipes from the base of the vertical connection pipes.
- **Removal**: The lifting vessel will then be moved to the area to remove the platform. The surface equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the jack-up vessel can lift and load the jackets onto barges.
- **Disposal**: After removal of the platform, the preferred disposal methods are considered to be either onshore decommissioning and recycling of the material or deep-water disposal (note: this disposal alternative is discussed as described below).

The new Omega platform uses a design that can be removed and reused in an alternative location, using the reverse of the installation process. This process significantly reduces the cost of abandoning operations and allows for complete recycling if reuse can be achieved.

More specifically:

- The basic decommissioning operation for the Omega platform is to remove the platform and load it onto barges for towing to shore, unloading, and dismantling. A prerequisite is that all disconnection activities have been completed prior to the crane vessel's arrival at the site and that all drilling holes have been dispersed around the base of the jacket drilling platform.
- Typically, removal operations involve positioning a crane vessel adjacent to the platform and removing the bridges, surface equipment, and jacket in a predetermined sequence and placing them on pre-arranged transport barges to the appropriate final destination. The dimensions of the platform are necessary when calculating the size and number of barges.
- Activities will be scheduled to minimize the time of the crane vessel at the site. Therefore, it is recommended that the bridges and surface equipment be removed first to allow the DSV/workboat to lower explosive charges onto the piles and perform pile cutting activities simultaneously with other surface equipment removal operations. Explosive cutting tools are envisaged for pile cutting, but other options, such as diamond wire sawing and jetting techniques, could also be used.

An alternative solution for decommissioning the platform is deep-water disposal. The exact deep-water disposal technique to be used is the result of extensive environmental, legal, social, and technical studies.

This deep-water disposal solution was previously considered (in 1998) for the existing offshore facilities of the Prinos offshore complex. A crane vessel, a special barge, and explosive cutting tools will be used.

Proposed disposal sites are:

- 100 m depth at a distance of 10 km N/NW of the Kappa platform
- 200 m depth at a distance of 15 km N/NW of the Kappa platform
- 500 m depth at a distance of 30 km N/NW of the Kappa platform

All disconnection activities must be completed before the crane vessels are transported to the site. The procedures for drilling and boreholes are the same as those described in the basic decommissioning.

In other shallow water areas, jacket platforms are used to create artificial reefs to help the local fishing industry. Once removed, the jackets are placed horizontally on the seabed in an agreed position. They are covered with wire or mesh to provide a structure for encouraging marine growth. Surface equipment should not be abandoned in this way due to the possibility of contamination.

3.4.4.4. Cleaning, Securing, and Removing Pipes and Cable

The cleaning, securing, and removal of the project's pipelines (as modified based on the proposed interventions included herein) will be carried out using the same methodology described in the approved EIA for the project (and environmentally licensed by the relevant AEPO) and presented in **Section 2.2.9** of this document.

The same procedure described for the submarine pipelines will be used for the removal of the cable.

3.4.4.5. Subsequent Monitoring of the Reservoir and CO_2Storage Site

Post-monitoring of the reservoir and CO_2storage site will be carried out using the same methodology described in the approved EIA for the project (and licensed environmentally by the relevant AEPO) and presented in **Section 2.2.10** of this document.

3.4.4.6. Waste Outputs

Waste management during the decommissioning and dismantling phase will be carried out in accordance with current legislation. The waste produced will be collected separately by type in containers suitable for its safe temporary storage at the Project in accordance with safety and environmental protection regulations, and its management will be carried out by licensed waste collection, transport, and management.

The most significant source of waste during the decommissioning and dismantling phase is the equipment that is removed. The priority in waste management will be reuse, followed by recycling and finally the safe disposal of non-reusable and non-recyclable materials. Specifically, the amount of metal waste (expected to be the largest in volume) that will need to be managed will depend largely on the decommissioning method chosen (i.e., deep-sea disposal or towing ashore for dismantling).

A special type of waste stream during decommissioning comes from the growth of marine organic matter on the support pipes. It is preferable to remove the organic matter with a water jet in the marine area rather than on land during the dismantling stage. Its disposal in the marine environment (either on the seabed or on the surface) will cause a short-term increase in suspended solids in the water column, which is expected to disperse rapidly under the prevailing hydrodynamic conditions. This organic matter will then biodegrade naturally, without adverse environmental effects.

In addition to the above, the usual special categories of waste are also expected, such as: metal waste, batteries, electrical and electronic equipment (WEEE), however, these cannot be determined at this stage in terms of quantities.

3.4.4.7. Atmospheric Emissions

Atmospheric emissions during the decommissioning phase will mainly come from the operation of supply/transport vessels transporting equipment and waste, and will include exhaust gases from the movement of the ship and the operation of its engines, as well as emissions from internal combustion engines of other equipment.

3.4.4.8. Noise and Vibration Emissions

During the decommissioning phase, noise levels will depend largely on the size of the fleet used for dismantling and removing structures. The abandonment of new installations will have a much smaller impact, as they will be lifted and moved to a new location or dismantled on land. Noise levels are not expected to exceed those of maritime activities in the area, but temporary noise episodes may occur that could disturb marine fauna in the area.

3.4.4.9. Electromagnetic Radiation and Radioactivity Emissions

No electromagnetic radiation or radioactivity emissions are expected during the cessation of the Project's operation.

3.5. CARBON FOOTPRINT OF THE PROJECT UNDER REVIEW

3.5.1. General Information

This **section** calculates the carbon footprint of the project under consideration with the aim of assessing climate change mitigation, i.e. the reduction of greenhouse gas emissions and the contribution of the project under consideration to achieving climate neutrality, in accordance with the provisions of Article 18 of Law 4936/2022 (Government Gazette 105/A/27.05.2022) and the guidelines set out in the European Commission document entitled "Technical guidelines on strengthening the resilience of infrastructure to climate change for the period 2021-2027" (2021/C 373/01), hereinafter referred to as the "Technical Guideline".

However, it is important to note that for the purposes of calculating the carbon footprint of the proposed modification, the project will be considered as a whole, as the proposed modification concerns the modification of essential characteristics of the project which, together with the elements of the licensed project that are retained, constitute a single functional whole. Therefore, the proposed modification of the project cannot be considered in isolation.

For the calculation of GHG emissions, the guidelines are based on the use of the "2006 IPCC Guidelines for National Greenhouse Gas Inventories" (which has also been used in the approved EIA for the project), as amended, and includes direct greenhouse gas emissions and indirect greenhouse gas emissions from energy consumption, as defined in the "GHG Protocol WORLD RESOURCES INSTITUTE" standard or, alternatively, in accordance with the "ISO 14064 1:2018" standard, categories 1 and 2 (Article 20, paragraph 3 of Law 4936/2022).

In order to quantify GHG emissions, it is necessary to understand the type of emissions from the activity and to categorize them into three categories [Scope (Scope) 1, 2, and 3], which are explained below and illustrated in the diagram below (GHG, Protocol, WRI). It should be noted that the term **"scope"** refers to the GHG Protocol and the term **"category"** refers to ISO 14064 and has a corresponding definition, although ISO 14064 provides a more detailed classification of Scope 3 emissions into individual categories:

According to the pre-check list of Technical Guideline[33] , for projects of any category or scale of infrastructure project, for which absolute and/or relative emissions could exceed 20,000 tons of CO_{2e} /year (positive or negative) during the operational phase, a **carbon footprint** assessment is generally required. In this case, according to the technical design of the Project, the storage of CO_2 equal to 1,000,000 tn on an annual basis. Therefore, based on the above, it is necessary to calculate the carbon footprint (phase 1: preliminary check, phase 2: detailed analysis).

Consequently, within the framework of this study, a detailed analysis of the carbon footprint of the project under consideration will be carried out and the following will be calculated:

[33] Commission Communication "Technical Guidelines on Enhancing the Resilience of Infrastructure to Climate Change for the Period 2021-2027" (2021/C 373/01) (hereinafter referred to as the Technical Guidelines). This is the main guidance document setting out the guidelines for assessing climate resilience.

- **Scope (category) 1 - direct emissions:** Direct greenhouse gas emissions arise from sources used within the operational boundaries of the project and are directly controlled by the Organisation[34] that controls the project itself. For example, emissions generated by the combustion of fossil fuels (e.g., space heating or hot water and steam production), industrial processes (e.g., carbonate decomposition), and fugitive emissions (e.g., refrigerant leaks from air conditioning units or methane leakage). Direct emissions from the project do not include emissions from biomass combustion.
- **Scope (category) 2:** Indirect greenhouse gas emissions are emissions resulting from the production of energy (electricity and heat) that is imported from external suppliers and consumed within the operational boundaries of the project. These emissions are included because the project operator directly controls energy consumption within its operational boundaries, for example by reducing it through energy efficiency measures or switching to electricity from renewable sources.
- **Scope 3:** Other indirect greenhouse gas emissions are greenhouse gas emissions related to the operation of the project but produced from sources not under the control of the organization controlling the project. Examples of Scope 3 emissions are emissions from energy consumption by transport vehicles using a transport infrastructure. For example, emissions from vehicles using a highway are considered scope 3 emissions for the Organization controlling the highway. Similarly, emissions from ships using a port facility, emissions from trains using a railway infrastructure, etc. Scope 3 emissions may be related to activities upstream of the project (e.g., emissions from the extraction of a material used as a raw material in the project) or downstream of the project (e.g., use of a product produced in the project).

3.5.2. Calculation of GHG Emissions

3.5.2.1. General Information

With regard to the limits of the calculations of emission types, this **Section** will include calculations of direct (Scope (category) 1) and indirect (Scope (category) 2) emissions for a typical year of operation in order to determine the absolute emissions, baseline emissions, and relative emissions associated with the project. To calculate **relative carbon dioxide emissions, baseline emissions** must be subtracted from **absolute emissions,** as shown in the following equation:

Relative Emissions = Absolute Emissions – Baseline Emissions (1)

The **relative emissions of the Project** are calculated as the difference between the emissions in the baseline scenario (scenario without the Project, baseline emissions) and the absolute emissions of the Project.

[34] Organization: The natural or legal person that owns or controls the operation of a project that is being audited for its emissions.

Absolute greenhouse gas **emissions** are the annual emissions calculated for an average year of Project operation. They include direct and indirect emissions. **Direct** emissions result from on-site fuel consumption during Project operation, while **indirect** emissions are related to energy consumption during Project operation or can be considered a consequence of Project activities but are not produced on-site at the Project.

3.5.2.2. Calculation of Absolute Emissions

Absolute emissions, which include all significant direct and indirect emissions from fields (1 & 2) implemented within the project boundaries, are calculated in the following paragraphs.

Scope (category) 1: Direct greenhouse gas emissions from the project

Direct greenhouse gas emissions are emissions resulting from sources used within the operational boundaries of the project and directly controlled by the organisation controlling the project itself.

In this case, **direct** emissions during the operation of the Project relate to fuel consumption as follows:

- Emissions from CO_2transport tankers from pilot projects during the first year of operation of the Project (see **Section 3.4.3.6.1 'Atmospheric Emissions During CO_2Receipt'** for a relevant analysis). For a distance of 4,250.0 km, emissions from diesel use are estimated at 3**,678.0 tn $CO_{(2)}$**[35] .
- Emissions from the supply vessel. Consumption for the supply vessel is estimated at 1,450 t for the total duration of the Project (see relevant analysis in **Section 3.4.3.6.2 'Atmospheric Emissions During Handling – Processing for CO_2 '**). Total $CO_{(2)}$emissions for the entire duration of the Project from marine fuel consumption (Marine Gasoil DMA ISO 8217:2012 / Max. Sulphur Cont. 0.1% (M/M)) are estimated at **4,504.7 tn $CO_{(2)}$**[36] .

Therefore, total **direct** emissions during the operation of the Project amount to 8,182.7 tn CO_2,or **8,182.7 tn CO_2eq.**

Scope (category) 2: Indirect greenhouse gas emissions of the project

Indirect greenhouse gas emissions are emissions resulting from the production of energy (electricity and heat), which is imported from external suppliers and consumed within the operational boundaries of the project. These emissions are included because the project organization directly controls energy consumption within its operational boundaries.

Indirect emissions during the operation of the Project relate to energy consumption for the following activities:

[35] Calculations are made using the UNFCCC Greenhouse Gas (GHG) Emissions Calculator, Document version: 01.3, Publication date: May 2021 (https://unfccc.int/documents/271269)

[36] Calculations are made using the UNFCCC Greenhouse Gas (GHG) Emissions Calculator, Document version: 01.3, Publication date: May 2021 (https://unfccc.int/documents/271269)

- Compression/pumping of CO_2loads and heating of bulk CO_2(within the Project). During the operational phase of the Project, a power of 1.6 MW is required to process CO_2 processing in order to achieve the appropriate injection conditions (P, T). This power demand includes the requirements for CO_2 load compression/pumping, as well as bulk CO_2 heating during start-up. This power demand is mainly due to the operation of the electric heater required during start-up as a means of preventing low temperatures in the piping and the formation of hydrates/salts in the area near the well. Assuming 16.0 h/day operation (2 shifts), the total electricity consumption is estimated at 9,**344.0 MWh/year** (see **Section 3.4.3.6.3 'Greenhouse Gas Emissions'** for a relevant analysis).
- Pumping of produced water. Two Electric Submersible Pumps (ESP) with a capacity of approximately 0.5 to 1 MW each are planned for pumping the produced water from the water wells on the Omega platform. Assuming 24-hour operation of the pumps, taking into account an average power value of 0.75 MW, the required energy is equal to **13,140 MWh/year** (relevant analysis in **Section 3.4.3.6.3 'Greenhouse Gas Emissions')**.
- Compression, cooling, and bulk transport of CO_2 via pipeline (outside the Project). The main part of the carbon dioxide will in future be transported to the reservoir via a pipeline system, originating from industries in the wider region of Northern Greece (from Volos and Larissa to Alexandroupolis). The corresponding energy requirements during the operation of the Project will therefore consist of consumption for compression (of the order of 100 kWh/t CO_2), cooling (of the order of 144 Mcal/t-CO_2, coefficient 1.16 kWh/Mcal) and the transport of CO_2 from producers to the storage site. According to the above, the total energy consumption in the pipeline is expected to be approximately 267.4 kWh/t $CO_{(2)}$,i.e. **267,360.0 MWh/year** for the capacity of 1 MTPA (relevant analysis in **Section 3.4.3.6.3 'Greenhouse Gas Emissions')**.

However, as these energy requirements of the project are considered indirect GHG emissions of the project, their calculation will be carried out using the emissions calculation tool and the relevant user guide, which are available on the website of the Ministry of Environment and Energy https://ypen.gov.gr/perivallon/klimatiki-allagi/ethnikos-klimatikos-nomos/efarmogi-ethnikou klimatikou-nomou/ and have been developed based on the provisions of ISO 14064 1:2018. The basic equation for calculating indirect emissions is as follows:

(Emissions) = (energy supply) x (emission factor) (2)

At this point, it is important to note that the greenhouse gas emission factors from electricity consumption in Greece were taken from the document *"Conversion factors for energy consumption into equivalent tons of CO_2 for the year 2023"*, which is posted on the website of the Ministry of Environment and Energy[37] . In this document, the emission factor for carbon dioxide $CO_{(2)}$ is taken from the relevant publication by the

[37] https://ypen.gov.gr/perivallon/klimatiki-allagi/ethnikos-klimatikos-nomos/efarmogiethnikou-klimatikou-nomou/

Hellenic Statistical Authority (ELSTAT) entitled "Energy Mix 2023" and concerns the CO_2 for the country's residual energy mix for 2023[38] (as included in *'Table 5: Results of the Residual Energy Mix of Suppliers and the relevant environmental impacts for the year 2023'* of the relevant report). This coefficient [**Emissions ($gCO_{(2)}$/kWh) = 363.19]** can be used regardless of the region where the electricity is consumed.

According to the same document, the emission factors for CH_4 and $N_{(2)\ 0}$(see **table** below) are obtained by processing the data from the latest available National Inventory Report (NIR) on greenhouse gases and relate to emissions from electricity generation in Greece in 2022. The two factors can also be used to calculate emissions for the 2025 operating year, assuming that the uncertainty of total emissions is negligible.

[38] https://www.dapeep.gr/wp-content/uploads/2024/07/%CE%95%CE%9D%CE%95%CE%A1%CE%93%CE%95%CE%99%CE%91%CE%9A%CE%9F-%CE%9C%CE%95%CE%99%CE%93%CE%9C%CE%91-2023.pdf

Table3 –63 : Emission factors for CH_4 and N_2O

Gas	EF (gGHG/kWh)
CH_4	0.0063220
N_2O	0.0026031

(Source: Conversion factors for energy consumption into equivalent tons of CO_2 for the year 2023, YPEN[39])

From the above, as well as the calculations in **Section 3.4.3.6.3 'Greenhouse Gas Emissions',** the total annual electricity consumption is 289,844.0 MWh.

In accordance with the above analysis, the following **table** presents the CO_2eq emissions from electricity consumption, which constitute the **Annual Indirect GHG Emissions of the project .**

Table3 –64 : Annual Indirect GHG Emissions of the project

	CO_2emissions (tn CO_2)	CH_4emissions (tn CO_2 eq)	N_2O emissions (tn CO_2 eq)	Total emissions (tn CO_2 eq)
Electricity consumption	105,268	0.0018	0.0008	**430.85**

Therefore, total **indirect** emissions during the operation of the Project amount to **105.271 tn CO_2 eq.**

Emissions from the construction phase of the project

According to the calculations **in Section 3.4.2.8.6 'Greenhouse Gas Emissions'**, the following **table** summarises the calculation of CO_2emissions from the construction works of the Project.

Table3 –65 : Calculation of $_{CO_2}$ emissions from the construction works of the Project

Construction activities	CO_2emissions (tn)
Transportation of workers and heavy vehicles to and from the project site, operation of construction machinery	61
Installation of new Omega Platform	2,520
Operation of drilling equipment[40]	69,626.1
Construction of pipelines and cable with construction vessel and support vessels	7,114.0
Total CO_2emissions during construction	79,321.1

[39] https://ypen.gov.gr/perivallon/klimatiki-allagi/ethnikos-klimatikos-nomos/efarmogi ethnikou-klimatikou-nomou/

[40] Drilling equipment is expected to operate 20 days per month over a period of 8.5 months, in accordance with the Project construction schedule.

As shown in the **table** above, total emissions during the construction phase of the project amount to **79,321.16 tn CO_2 eq.**

3.5.2.3. Calculation of Baseline Emissions

Baseline greenhouse gas **emissions** are the emissions that would be produced on an annual basis according to the zero solution scenario, i.e. if the Project were not implemented.

In this case, **1,000,000 tn CO_2 eq/year** would remain unbound in the atmosphere.

3.5.2.4. Calculation of Relative Emissions

To calculate relative carbon dioxide emissions, baseline emissions must be subtracted from absolute emissions. In the case of the project under consideration, based on the above **sections,** the following results have been obtained:

- **Baseline emissions** (i.e., CO_2emissions in the absence of the interventions of the project under consideration (licensed and proposed modification)) amount to **1,000,000 tn CO_2eq per year.**
- **Absolute emissions** (i.e., total emissions from the project) amount to (direct emissions 8,182.7 tn CO_2 eq. + indirect emissions 105,271 tn CO_2 eq) approximately **113,454 tn CO_2 per year.**

Therefore, according to equation (1), the **relative CO_2 emissions** are calculated as follows:

(Relative CO_2 emissions) = (Absolute CO_2 emissions) - (Base emissions (Amount of CO_2 to be stored))

(Relevant CO_2emissions) = (113,454) - (1,000,000) = -886,546.0 tn CO_2

The **table** below summarizes the calculation of relative CO_2emissions for an average year of project operation.

Table3 –66 : Calculation of relevant CO2 emissions for an average year of Project operation

Emissions	Values	Units
A. Direct CO_2emissions		
CO_2transport trucks from Pilot Projects[41]	3,678.0	tnCO_2 /year
Supply vessel	4,504.7	tnCO_2 /year
B. Indirect CO_2emissions		
Compression/pumping and heating (within the Project)	9,344.0	MWh/year
Pumping of produced water	13,140.0	MWh/year
Energy consumption in pipeline (outside the Project)	289,844	MWh/year
Total indirect emissions	105,271	tnCO_2 /year
C. Absolute CO_2emissions (A + B)	**113,454**	**tnCO_2 /year**
D. Negative emissions from CO_2storage	**-1,000,000.0**	**tnCO_2 /year**
E. Related CO_2emissions (C + D)	**- 886,546.0**	**tnCO_2 /year**

Therefore, the **Relative Emissions** (i.e. the difference between absolute and baseline emissions) amount to **- 886,546.0 tnCO_2 e/year.**

Finally, considering that the indicative average lifetime of a CO_2 storage project is approximately twenty-five years, it follows that the total reduction in GHG emissions for the project under consideration will be equal to:

Total GHG Emission Reduction = (Annual GHG Emissions * 25 years of operation) - GHG Emissions from construction and decommissioning

Therefore Total GHG Emission Reduction =(886,546.0 tnCO_2 e/year * 25 years of operation) - 79,321.16 CO_2 e(t) (CO_2 emissions during the construction phase of the project) - 79,321.16 CO_2 e(t) (CO_2 emissions during the decommissioning phase of the project)

Therefore, it is estimated that the total reduction in GHG emissions from the implementation of the project under consideration amounts to 22,005,007.68 CO_2 e(t).

[41] Land transport of $CO_{(2)}$ by truck as part of Pilot Projects will only take place during the first year of Project operation, so it is not taken into account when calculating the relevant $CO_{(2)}$ emissions for an average year of Project operation.

3.5.3. Economic Assessment of Emissions

The **shadow cost of carbon** referred to in **Technical Guideline** (Table 6 of the Technical Guideline) is used in the economic assessment of projects, where amounts that are not spent to achieve the Paris Agreement target are recorded and result in **significant savings in financial resources.**

In the case of the proposed Project, construction is scheduled to be completed in 2026 with operation commencing in early 2027. In addition, the relevant emissions are **negative** and are considered **stable** and equal to **886,546 tn $CO_{(2)\,(eq)}$ per year,** as calculated above. Therefore, these are "negative" emissions and the corresponding calculated cost is actually a gain for the country's energy system.

Thus, based on the proposed shadow carbon cost referred to in Table A6 of the EIB Group's Climate Roadmap 2021-2025[42] , the benefit from emissions avoided over the lifetime of the Project is calculated.

For the relevant calculations, the Technical Guidance uses the shadow cost of carbon published by the EIB as the best available data[43] on the cost of achieving the Paris Agreement temperature target (i.e. the 1.5 °C target). The shadow cost of carbon is measured in real terms (and refers to 2016 prices) and is presented in **the** following **table.**

Table3 –67 : Calculation of shadow carbon costs for emissions and GHG reductions from the operation of the Project

Year	€/tn CO_2	million Euro/year)
2026	182	161.35
2030	25	221.63
2035	390	345.75
2040	525	465.43
2045	660	585.12
2050	800	709.23

As noted in Technical Guidance[33] , these values are used only to estimate the value of net carbon or emissions savings in cost-benefit analyses from a societal perspective, without taking into account demand forecasts and other relevant aspects of economic analysis or the economic viability of projects.

3.6. CONTINGENCIES AND ENVIRONMENTAL RISKS

Due to its nature, the proposed modification of the project is associated with potential risks and emergency conditions throughout its life cycle, which require careful identification and risk assessment.

[42] European Investment Bank, *EIB Group climate bank roadmap 2021-2025,* European Investment Bank, 2020, https://data.europa.eu/doi/10.2867/503343

[43] https://www.eib.org/en/publications/the-eib-group-climate-bank-roadmap.htm

During construction, potential risks include structural failures, equipment malfunctions, and accidents during pipeline installation and facility construction, while during operation, risks arise from CO_2 , pipeline ruptures, and equipment failures, leading to environmental damage and risk to personnel. Unpredictable events such as natural disasters and extreme weather conditions exacerbate these risks.

Even during the decommissioning phase, careful planning is necessary to mitigate residual risks, including the possibility of CO_2 migration after closure. Throughout the project lifecycle, diligent monitoring and mitigation strategies are imperative to prevent adverse impacts. Comprehensive risk assessment methodologies are necessary to ensure the safety and sustainability of the Project, while complying with regulatory requirements and environmental standards.

The critical risks associated with the development of the Project are described in detail in **Chapter 9.6 'ASSESSMENT OF POTENTIAL SIGNIFICANT IMPACTS RESULTING FROM THE PROJECT'S VULNERABILITY TO ACCIDENT OR DISASTER RISKS RELATED TO THE PROJECTPROJECT (EMERGENCY CONDITIONS / UNPLANNED EVENTS)** of this MT AEPO.

4 ALTERNATIVES

4.1 GENERAL INFORMATION

EnEarth is implementing a structured process to promote the Prinos CO2 storage project, which started with the feasibility stage, including the exploration of possible approaches and alternatives. The exploration of alternative solutions focuses on the development options of the Project under study, which were explored during the design stages, based on international best practices.

This **Chapter** analyses the alternative solutions for the implementation of the proposed modification of the CO2 storage project in the Prinos reserve. The "zero solution" alternative is examined in a separate paragraph.

Each alternative is benchmarked based on economic criteria such as cost of investment (CAPEX), operating cost (OPEX), as well as qualitative criteria such as operational flexibility, riskiness and environmental impact. The ultimate goal of the evaluation process is to identify the option that best aligns with key priorities such as minimising environmental impacts, ensuring (technically and reasonably) low risk levels (ALARP), maximising the use of available facilities, resources and personnel, and minimising investment and operating costs.

4.2 ZERO SOLUTION

The **Zero Solution E0** concerns the existing situation, i.e. without introducing the new proposed modification of the CO2 storage project in the study area. Given that the implementation of the proposed modification is a requirement of the AEPO of the licensed CO2 storage project of Prinos (if it is to be implemented and operational), its non-realization also implies the non-realization of the entire licensed project. the non-implementation of the proposed amendment will also cause non-implementation of the overall project and therefore the zero solution E0 concerns the suspension of the overall project.

According to this solution, no actions are planned to be implemented for the storage of CO2 in the Prinos reserve, resulting in the four (4) new boreholes and other facilities of the CO2 storage project not being carried out. Therefore, the objective and feasibility described in **Chapter 4** of the approved EIA and in the corresponding **Chapter 5** of this study are not achieved.

This option would have the following consequences:

- Environmental:
  - The absence of CO2 storage infrastructure means that large amounts of CO2 produced by industrial facilities will continue to be released into the atmosphere, which could hinder steps towards carbon emission reduction targets, thereby amplifying the long-term effects of climate change.
  - CO2 storage is increasingly recognised as a key means of reducing carbon emissions from sectors of the economy referred to as 'energy intensive', such as electricity generation. The absence of CO2 storage facilities would hamper efforts to reduce greenhouse gas emissions, but would also hamper the development of the CO2 storage infrastructure sector.

- The absence of CO2 storage infrastructure has a negative effect on the achievement of the country's European and International Obligations, which have been included in the National Strategy for Adaptation to Climate Change (NSCCA) (Article 45 of Law 4414/2016 (A' 149)). The ESPCA sets the general objectives, guiding principles and means for the implementation of a modern, effective and developmental strategy for adaptation to climate change within the framework defined by the United Nations Convention on Climate Change, European policies and international experience.
- The absence of CO2 storage infrastructure has a negative effect on achieving the goals of overall reduction of GHG emissions and achieving climate neutrality in 2050, as well as on offsetting any emissions that exist after 2050, in accordance with the revised NECP and the Long-Term Strategy for the year 2050 of the Ministry of Environment and Energy. The permanent storage of greenhouse gases, in underground formations or materials, is considered to ensure climate neutrality, while the storage of carbon dioxide sequestered by air or biomass is considered to be a negative emission.
- In addition, from an environmental point of view, the non-implementation of CO2 storage facilities would be detrimental to the sustainability objectives of the Energean Group, in particular with regard to efforts to reduce carbon emissions. At a time when the transition to renewable energy and adherence to the Paris Agreement are key, opportunities for sustainable development and carbon reduction should not be missed. The choice of the zero solution will not bring about the specific environmental benefits resulting from (a) the Company's corporate social responsibility policy, (b) the social investment programs and (c) the investment programs for the protection of biodiversity.

- Socio-economic:
  - The formations of the Prinos area encompass a significant CO2 storage potential, so failure to exploit these resources would mean the loss of opportunities for economic development (recruitment of personnel, investment in new know-how). From an economic point of view, it would mean the (direct/indirect) loss of revenue linked to employment in the local market and cooperation with industries related to CO2 storage (producers).
  - The local market would lose the possibility of obtaining direct and indirect revenues related to the CO2 storage activity under study.
  - There would be no recruitment of staff and no investment in new know-how.
  - There would be socio-economic consequences due to the loss of job opportunities for a significant number of people employed mainly by the local market,
  - The Project will offer technological, research and educational opportunities at both local and national level. The Zero Solution option would eliminate these opportunities.
  - The Prinos CO2 Storage Project is expected to contribute positively to the reshaping of the country's development orientation, adding an important alternative pole of environmental development. The implementation of environmentally friendly programs (within the framework of which the proposed Project is included) is an interesting and realistic choice that will contribute positively to the "green" development reconstruction of the country. Choosing Zero Solution will eliminate this possibility.

- Additionally, avoiding further investment in the Prinos region may have broader implications for global energy markets and the transition towards sustainable energy. As the world progressively shifts towards renewable energy and low-carbon technologies, decisions taken in projects such as the planned CO2 Storage Project send signals to investors, policymakers and other stakeholders about the feasibility and trajectory of upcoming energy investments. In a rapidly evolving energy landscape, failing to seize opportunities for innovation and sustainable growth will reduce the prospects for improving competitiveness and securing leadership in developing markets.

In conclusion, the Zero Solution scenario regarding the CO2 storage project in Prinos has substantial consequences in economic, environmental and geopolitical sectors.

Based on the above, the option of **Zero Solution** was not considered as an option for a sustainable future development, as the approach to the implementation of the Project is significantly positive from an environmental point of view, favorable from a socio-economic point of view, while at the same time it does not entail undesirable or additional environmental threats or health risks.

4.3 SUSTAINABLE ALTERNATIVES

4.3.1 Alternative Solutions for the Location and Implementation of Drilling

4.3.2 Alternatives to the Location of Drilling

The location of the new Omega Platform is directly related to the location of the boreholes, as the location of the required boreholes will be the one that determines the optimal conditions for the installation of the new Omega Platform. Therefore, in the context of this **Section,** alternative solutions for the implementation of the drilling are examined, the selection of the optimal one of which will determine the location of the new Omega Platform.

In addition, it should be noted that the solutions examined in the context of the present concern the entire project for the CO2 storage program. As the boreholes included in the framework of this is Phase A of the program (CO2 storage up to 1MTPA) and will be part of an integrated project system that includes all offshore installations and special studies of the reservoir, It would not be possible to study it independently, except within the framework of the overall CO2 storage program. Therefore, the following paragraphs present the alternatives that concern all the interventions of the CO2 storage program and the choice of the appropriate one is the one that will determine the preferred choice in terms of location selection and drilling technology.

The targets for CO2 injection and water production wells are determined by the data collected during neighboring drillings in the Prinos deposit and by all kinds of geological, geochemical, geophysical (mainly seismic) data. The processed seismic data is interpreted and converted into geological information, so that the necessary subsoil maps are then designed, through which the candidate targets that could serve the needs of the project are identified.

After the candidate drilling target has been selected, the location of the borehole must then be determined, i.e. based on the potential drilling trajectory. That is, it is a "bottom-up" approach to determine the initial position of the borehole. In the case of Prinos, two alternative scenarios are being investigated: a) Starting location as close as possible to the goals of the water production wells, since the water production wells are the most boreholes during the full development of the project and b) the number of sections of the boreholes to meet the basic conditions of water production and CO2 imposition.

The drilling alternatives considered for the project include starting drilling from a new drilling starting site, rather than starting from existing production rigs. The rationale behind this approach is to separate CO_2 injection wells from the oil production infrastructure. This separation is intended to reduce the risk of possible unforeseen events that could arise from the simultaneous operation of CO_2 injection wells andhydrocarbon extraction. As a result, a comprehensive review of the offshore part of the project has been carried out to support this design change. The revised concept includes the development of the drilling equipment CO_2 storage on an independent offshore platform. This design variation requires the installation of a new rig as well as the redrawing of the CO_2 transport pipelines and power cables.

The first alternative scenario (**Alternative ΘΓ1**) concerns the location of the boreholes in a Potential Location Area (circular area with a radius of 300 meters) with a central point at a distance of 1 km south of the existing

complex of platforms of Prinos. This Alternative has been the subject of a detailed analysis in **Chapter 3** of this document.

The second alternative scenario (**Alternative Solution TG2**) concerns the location of the boreholes in a Potential Location Area (circular area with a radius of 300 meters) with a central point at a distance of 1 km south of the existing complex of platforms of Prinos. This location was initially chosen to place the starting point of the drilling closer to the water production targets, of which a total of nine are planned in the full development phase of the project, while on the contrary the CO_2 injection wells in full development are estimated to be 6. However, it is estimated that the distance to the CO_2 targets from this location is greater than 4 km (average drilling length) which may not be within the operational range of the drilling units operating in the Mediterranean and Adriatic Seas.

In general, the criteria for selecting the location of the boreholes in the context of this are the following:

- The most basic criterion is that the drilling rig can reach the subsurface target of the survey either vertically or sideways (if the former is not possible).
- The separation of CO_2 injection wells from existing PS pumping facilities.
- The equal drilling distances between the producers of water and CO_2 imprinting.
- An equally important criterion is the geotechnical and technical adequacy and safety of the chosen location for carrying out the drilling operations (stable soils of the seabed, avoidance of footprints of drilling rigs that worked in the area, avoidance of installations on the seabed, e.g. piping and electrical wiring, etc.).
- The azimuth of the drilling trajectory of the donor drilling should be in the desired direction.

In the case of the proposed modification of the project, the design phase of the boreholes was a complex and analytical process, during which all the above criteria (identification of potential targets, their prioritization, technical data, environmental conditions, sustainability parameters, etc.) were co-evaluated and the depths of the "B" and "C" layers of the reservoir were selected as primary targets.

4.3.3 Alternative Solutions for the Implementation of Drilling

The alternative solutions for the implementation of the boreholes concern the number of sections of the boreholes to meet the basic conditions of water production and CO2 imposition.

The well architecture options in this scenario that were evaluated were the configuration of the sections of a borehole with five sections (**Alternative MG1**) versus a configuration with six sections (**Alternative MG2**).

Initially, the choice of six sections was considered to divide the large intermediate section of 16 inches, about 2 km long, into two smaller sections. This configuration would allow for the ability to seal off any problematic formations that could lead to fluid losses or drilling instability.

However, after a detailed review of the data of the boreholes drilled in Prinos, it was found that the Pliocene section in this area is relatively homogeneous and does not present significant geotechnical risks. Given the absence of high-risk zones, the operational justification for the additional segment was reduced.

In addition, adopting the six-row design would require reducing the size of the reservoir section from 7 inches to 5 inches. This reduction would limit the placement of integration equipment and ancillary means such as monitoring equipment and penetration control sensors with a 3.5-inch protective tubing (nominal diameter). As a result, consideration was given to the option of maintaining the design of the five sections, which is a proven and reliable approach to previous drilling that has been successfully drilled in the Prinos deposit.

In general, the criteria for selecting the sections of the borehole are the following:

- The 6-section design was thought to isolate potential problem zones in the 2 km. long section of 16 inches, but data from the history of Prinos confirm that the formation of the Pliocene is geologically stable and low-risk.
- Reducing the reservoir section from 7" to 5" (required by the 6-row design) would limit the use of necessary integration and monitoring equipment.
- The 5-section design has already been successfully used in previous drilling of Prinos, making it a reliable and operationally efficient choice.

4.4 Route Alternatives of Submarine Pipelines and Cable

Within the framework of this amendment, the extension of the CO2 transmission pipeline, the installation of a produced water pipeline and the installation of an electricity supply cable are foreseen. For the installation of the above, it was preferred to choose the shortest routes that will connect the licensed (or existing elements of the project) with the new proposed platform (and the corresponding boreholes), the location of which will largely determine the final routes of the linear infrastructure.

Choosing the shortest routes is the environmentally optimal solution. In addition, it must be taken into account that the choice of the design of the project was the following: The linear infrastructure should avoid intersections with existing pipelines and be located as much as possible within the existing corridors of the Prinos pipelines, so as to avoid the occupation of new areas.

Therefore, in the context of this proposed amendment, the default best environmental solution has been chosen and therefore no further technical options have been considered.

4.5 BENCHMARKING & DOCUMENTATION OF OPTIONS

4.5.1 General Information

For the evaluation of the alternative scenarios for the implementation of the proposed modification of the CO2 storage project in the Prinos reserve, environmental criteria are defined in the framework of this EIA, in order to assess the impact of each scenario and to select the optimal solution in terms of development. The technical feasibility and functionality of the alternatives are also examined, as well as the factor of economic viability (investment cost - CAPEX), operating costs - OPEX).

The above criteria are described in the **Table** below:

Table 4-1: Environmental Criteria for the Assessment of Alternative Scenarios

Criterion		Criterion description
1	Biodiversity – Flora – Fauna	• Avoidance of alteration of protected natural areas • Avoiding disturbances to the flora and fauna of the area
2	Atmosphere and Climatic factors	• Minimization of pollutant emissions into the atmosphere • Avoiding Greenhouse Gas Emissions
3	Energy – Natural resources	• Energy saving
4	Acoustic environment – Noise	• Limiting auditory nuisances
5	Waters	• Rational use of water • Water protection – avoiding uncontrolled waste dumping

In this paragraph, the comparison of the above alternative scenarios will be presented. The comparison will be made using an **Evaluation Table** and a corresponding score of their performance.

The qualitative comparison of the Scenarios achieves an objective approach to the effects of the examined Scenarios, based on commonly accepted scientific principles. The assessment of the environmental performance of the examined scenarios is indicative and is presented to give an overall indicative picture for the evaluation of the Scenarios based on specific environmental objectives and criteria.

In order to better understand the overall comparison of the Scenarios examined, an indicative scoring of the Scenarios will then be provided, so that the detailed comparison can be presented in a quantified manner. For this reason, the colour-coding key corresponds to the degrees of intensity of the environmental impact, as shown below. The most favorable Scenario is the one that will collect the highest sum of the scores.

Explanation of the color coding of the Evaluation Table

This solution is considered to be highly appropriate under the proposed design and is not expected to cause negative effects.	This solution is assessed as appropriate (with limited improvements to the proposed design) and minimizes the negative impacts.	This solution is estimated to cause neutral or uncertain effects.	This solution is estimated that with limited improvements to the proposed design, it would cause small negative effects.	This solution is estimated to cause significant negative effects.

5	4	3	2	1

4.5.2 Alternative Solutions for the Location and Implementation of Drilling

The following **Table** presents a comparative analysis of the alternatives considered in terms of the choice of borehole sites for the modification of the CO2 Storage Project, based on environmental impact, technical feasibility and economic considerations. **Alternative TG1**

Table 4–2: Main solution and alternative scenarios for drilling the wells

Criteria	Main Solution C1Drilling of boreholes from a starting point in the middle of the final drilling targets (Alternative MG1) and 5 drilling sections (Alternative MG1)	Alternative Solution C2Drilling of wells from a starting point closer to the water production targets (Alternative MG2) and 6 drilling sections (Alternative MG2)
Biodiversity – Flora – Fauna	The start of the drilling from the middle of the final drilling targets and a distance of approximately 1km South of the current facilities, as well as the approach with 5 sections is a safe and conventional solution with less environmental risk and a small environmental footprint compared to drilling from a start of 1.5km South of the current platforms and 6 sections, due to the fact that: • The drilling and completion time of the drilling will be shorter. • There will be no need to use additional specialized equipment to build another drilling section (5" iner). • A high-performance drilling rig (>2,500 hp) will not be needed.	Technical risks due to the construction of extensive CO_2 wells with a length of more than 5km, such as: • High Torque Applied to the Drilling Column: Large horizontal sections increase mechanical friction, making it difficult for the column to rotate, with a higher risk of pipe sticking. • Difficulties in Cleaning Drill Sections: Effective removal of chips becomes more challenging in extensive drilling, especially in low-slope sections, increasing the risk of compressions or drilling instability. • Well Stability and Pressure Management: Managing the equivalent circulating density (ECD) and maintaining the stability of the well over long distances is complex, with a greater risk of losses or formation cracks. • These drilling hazards increase the potential impact on the environment and worker safety.
Atmosphere and climatic factors	The drilling time and completion of the drilling will be shorter and less energy (fuel) consumption will be needed, so there will be fewer emissions of air pollutants (CO, NOx, TSP) and greenhouse gases.	The drilling time and completion of the drilling will be long and higher energy consumption will be required, so increased emissions of air pollutants (CO, NOx, TSP) and greenhouse gases are expected.
Energy – Natural resources	The drilling and completion time of the boreholes will be shorter, so less energy consumption will be needed. A high-performance drilling rig (>2,500 hp) will not be needed.	The drilling time and completion of the boreholes will be long, so higher energy consumption will be required, while a high-performance drilling rig (>2,500 hp) will also be needed.
Acoustic environment – Noise	The drilling time and completion of the drilling will be shorter, so less nuisance will be caused. A high-performance drilling rig (>2,500 hp) will not be needed.	The drilling time and completion of the drilling will be long, so significant nuisance will be caused, while a high-performance drilling rig (>2,500 hp) will also be needed.

Criteria	Main Solution C1Drilling of boreholes from a starting point in the middle of the final drilling targets (Alternative MG1) and 5 drilling sections (Alternative MG1)	Alternative Solution C2Drilling of wells from a starting point closer to the water production targets (Alternative MG2) and 6 drilling sections (Alternative MG2)
Waters	Drilling will be safer and with relatively simple procedures, so there are fewer risks of accidental pollution.	Increased drilling risks create a higher probability of water pollution.
Technical feasibility	Basic drilling equipment and relatively simple procedures are required for drilling the boreholes in relation to the Alpha platform.	Although this solution also requires 4 boreholes, its completion will be done with specialized equipment and special procedures resulting in additional manpower and maintenance.
Economic Sustainability	It has lower construction costs, compared to option C2, which is extremely important for the viability of the project and the achievement of its feasibility.	This solution requires significantly higher construction and operating costs. At the same time, it constitutes a more significant risk during drilling.
Overall Scoring	28	13

The final choice of the new rig location reflects a balanced solution that optimizes borehole accessibility, operational safety, and infrastructure integration. By repositioning the rig approximately 1 km south of the existing complex (Alternative TG1), the project ensures equal and technically manageable well lengths for both CO_2 injection wells and water producers - on average about 4 km. This distance falls within the capabilities of the available drilling units in the Mediterranean and Adriatic regions. The decision was also guided by a thorough review of key site selection criteria, including accessibility to underwater targets, isolation from existing oil production infrastructure, technical and geological assessments, and avoidance of conflicts with existing oil wells. it minimizes risks and ensures the long-term functionality of the CO_2 injection system while maintaining separation from hydrocarbon activities.

Similarly, the evaluation of the architecture of the drilling concluded that the design of five sections (Alternative TG2), remains the most appropriate option. While a six-section alternative was initially explored to mitigate risks in the extended 16-inch section, data from previous drilling confirmed that the formation of the Pliocene does not present significant geotechnical challenges. The six-section approach would jeopardise the integration design by reducing the size of the reservoir hole and limiting the deployment of key equipment at the bottom of the well. The continued use of the proven five-section design, already successfully implemented in previous Prinos boreholes, ensures technical feasibility, maintains operational efficiency and supports reliable Integrity of a Well.

5 COMPATIBILITY OF PROPOSED AMENDMENT WITH INSTITUTIONAL COMMITMENTS

5.1 OBJECTIVES & FEASIBILITY

In light of the **energy transition**, the reduction of greenhouse gas (GHG) emissions, and ultimately the achievement **of climate neutrality**, EnEarth has proceeded with the design of a full-scale CO_2 facility in Prinos (the "Project") capable of storing a significant amount of CO_2 with a consequent corresponding reduction in atmospheric CO_2 , both at regional and national level. The proposed CO_2 storage project in Prinos is expected to play an important role in achieving national GHG emission reduction targets, as well as contributing significantly to meeting the country's commitments/obligations under international conventions and agreements on GHG emission reduction and climate neutrality, as it is the first such initiative in Greece and the Eastern Mediterranean for CO_2 storage.

It should be noted that the proposed amendment to the project has been designed to serve the general Objective and Feasibility of the project, as set out in the approved EIA for the project. Consequently, with regard to the **Objective and Feasibility of the Project**, the provisions of **Section 4.1.1** of the EIA apply; with regard to the **Feasibility of the Project**, the provisions of **Section 4.1.2** of the EIA apply; and with regard to the **Expected Benefits at Local, regional, and national levels,** the provisions of **Section 4.1.3** of the EIA apply.

It should be noted that an additional objective of this EIA by AEPO is to satisfy the requirements of the AEPO for the project (XXXXXXXXXX), as included in **the** relevant **PO 4.2** , in order to minimize any possibility of unforeseen incidents arising from the coexistence of the existing Prinos complex underground gas extraction project wells and the CO(2)storage project wells.

More specifically, PO4.2 states the following:

"4.2. Conditions for the design of the facilities

> ***4.2.1.*** *The final design of the project must consider the complete separation of offshore facilities with CO_2 injection wells from the hydrocarbon extraction wells in Prinos, in order to minimize any potential for unforeseen incidents due to the coexistence of these wells. For this reason, the offshore part of the project needs to be reviewed so that the CO_2 be developed on an independent offshore platform, if possible at a distance of 500 m or more from the existing platforms, and the route of the relevant CO_2 and power supply cables, taking into account the existing routes between the coastline and the existing platform complex, so as to minimize any additional impact...*

5.2 HISTORICAL DEVELOPMENT OF THE PROJECT

H "Energean Oil & Gas - Aegean Energy Hydrocarbon Exploration and Production Company" (hereinafter "Energean"), an affiliate of EnEarth, holds, among other things, the rights to explore and exploit hydrocarbons in the offshore area of the Prinos oil fields pursuant to the agreement dated 23.11.1999 with the Greek State, as ratified by Law 2779/1999 (Government Gazette A 296/30.12.1999) and as currently in force.

Following the initial agreement and its ratification, a number of legal acts were carried out in order to reflect a number of changes from the original agreement. These acts are presented in **the table** below.

Table5 –1 : Legal acts governing the concession contract

Legal act	Reference number	Subject
Law 2779/1999	Government Gazette 296/30.12.1999	Ratification of the Agreement of 23.11.1999 between the Greek State and Kavala Oil S.A. and Annexes I and II for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4135/2013	Government Gazette 69/19.3.2013	Ratification of the first amendment agreement dated 31.10.2012 between the Greek State and the contractors Kavala Oil S.A. and Energean Oil & Gas SA for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4296/2014	Government Gazette 214/2.10.2014	Ratification of the second amendment agreement dated 30.12.2013 between the Greek State and the contractors Kavala Oil S.A., Energean Oil & Gas SA, and HELLENIC PETROLEUM for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4296/2014	Government Gazette 214 / 2.10.2014	Ratification of the third amendment agreement dated 11.09.2014 between the Greek State and the contractors Kavala Oil S.A. and Energean Oil & Gas S.A. Gas SA for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4409/2016	Government Gazette 136 / 28.07.2016	Ratification of the fourth amendment agreement dated 22 November 2015 between the Greek State and the contractors Kavala Oil S.A. and Energean Oil & Gas SA for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4585/2018	Government Gazette 216 / 24.12.2018	Ratification of the fifth amendment agreement dated 20.11.2018 between the Greek State and the contractors Energean Oil & Gas SA and Kavala Oil A.E. for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 4952/2022	Government Gazette 130 / 07.07.2022	Ratification of the sixth amendment agreement dated 19.06.2024 between the Greek State and the contractor Energean Oil & Gas SA for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).
Law 5115/2024	Government Gazette 98 / 01.07.2024	Ratification of the seventh amendment agreement dated 15.03.2024 between the Greek State and the contractor Energean Oil & Gas SA for the amendment of the agreement dated 23.11.1999 for the exploitation of the offshore area of the Thracian Sea, which was ratified by Law 2779/1999 (A'296).

In the context of the long-standing execution of Petroleum Operations (exploration and exploitation) within the Prinos Exploitation Area (as defined in the Agreement of 23 November 1999 under Law 2779/1999, as amended and in force), Energean has collected geological, geophysical, and drilling data for the Prinos

geological basin and, in particular, for the Prinos and Epsilon structures, which document that these structures are, in principle, eligible as CO storage sites$_2$ (for the reasons discussed in the approved EIA of the licensed project).

Consequently, as part of its activities in the area, Energean proceeded with the design and licensing of a **CO_2Storage Unit in Prinos,** making use of Article 173 of Law 4964/2022. More specifically, according to Law 4964/2022 (Government Gazette A 150/30.07.2022) entitled *"Provisions for the simplification of environmental licensing, establishment of a framework for the development of Offshore Wind Farms, tackling the energy crisis, protecting the environment and other provisions",* and more specifically on the basis of Article 173 thereof, the entities to which the Greek State (pursuant to Law 2289/1995 (A' 27)) has granted the right or license to explore and exploit hydrocarbons in a specific area, and which have sufficient data (in particular geological, geophysical, and drilling data) to document the eligibility in principle as a carbon dioxide (CO_2), geological formation or formations located in the subsoil of the concession area (onshore or offshore), shall acquire (under the conditions of that article) **the right to continue and complete the investigation of the specific area in order to determine its suitability for CO(2) storage**.

Based on the above, Energean requested EDEYEP on 31.08.2022 to activate the right to continue and complete the investigation of the structures of the Prinos, Epsilon fields and the underlying aquifer (the "Area") in order to determine their suitability as CO(2)storage sites.This request was accepted by the **Decision to Activate the Right to Investigate CO_2 Storage** (as approved by EDEYEP Decision No. 14577/29.09.2022 (Government Gazette 5247/B/11.10.2022)), which approved the eligibility in principle of the storage site, which is located within the boundaries of the Prinos concession and includes the structures of the Prinos, Epsilon fields and the underlying aquifer, as well as approving the continuation and completion of the investigation of the Area as a storage site for a period of twenty-two (22) months, starting on October 1, 2022, by Energean.

In accordance with paragraph 5 of Article 173 of Law 4964/2022, after the completion of the suitability investigation and before the expiry of the right to complete the investigation, the interested party shall submit an application to EDEYEP in order to determine the suitability of the geological formation as a CO(2)storage site and to activate the party's storage right. An interested party is defined as either the holder of the right to continue and complete the investigation (in this case, Energean) or an affiliated company whose sole purpose is CO(2)storage (in this case, EnEarth).With the progress and completion of the procedures for investigating the Area as a CO_2storage site,EnEarth, as an affiliate of Energean, submitted an application on 30.06.2024 to determine the suitability of the geological formation as a CO_2 and to activate the operator's storage right in accordance with paragraph 5 of Article 173 of Law 4964/2022.

As part of the environmental licensing of the project, EnEarth prepared and submitted to the DIPE the relevant EIA for the project, which was approved by Decision No. .....

5.3 EXISTING ENVIRONMENTAL PERMIT FOR PROJECT FACILITIES

Energean Oil & Gas - Aegean Energy Hydrocarbon Exploration and Production Company (hereinafter "Energean"), an affiliate of EnEarth, holds, among other things, the rights to explore and exploit hydrocarbons in the offshore area of the Prinos oil fields pursuant to the agreement dated 23.11.1999 with the Greek State, as ratified by Law 2779/1999 (Government Gazette A 296/30.12.1999) and as amended and currently in force. Following the initial agreement and its ratification, a number of legal acts were carried out in order to reflect a number of changes from the original agreement. These acts are presented in the relevant Table (Error! Reference source not found.).

As mentioned above, the project facilities (licensed project incorporating the proposed modifications) include:

- Onshore facilities: Modification of a certain area within the existing Sigma onshore facility for the construction of the CO_2collector and an unloading and compression area.
- Installation of a new offshore platform (Omega platform): A new offshore drilling platform will be installed either before drilling commences or after the four (4) wells have been completed. The new Omega offshore platform will consist of a metal jacket, will have 15 wellhead connections, will be founded on 4 piles at a depth of approximately 31 meters, will be installed approximately 1 km south of the existing Delta platform complex, will be unmanned and will have the minimum equipment required for the reception of CO_2 and its injection, as well as for transporting the produced water to the existing facilities on the Delta platform.
- Wells: two (2) CO_2injection wells and 2 water production wells on the new Omega offshore platform of the Prinos offshore complex.
- Offshore CO_2 transport pipeline: Subsea pipeline connecting the Sigma plant area to the Omega offshore platform, approximately 21 km long.
- Water transfer pipeline. The water produced from the two water production wells will be transferred from the new Omega platform to the existing Delta platform, so that it can be treated by the existing water treatment facilities and disposed of in accordance with the project's environmental permit. The total length of the pipeline for transporting the produced water is approximately 1 km.
- Power supply cables: Installation of an underwater power supply cable, approximately 1 km long, to connect the new Omega platform to the existing Delta platform.

Consequently, the operation of the existing offshore facilities, which will also form part of the licensed project, is governed by the PO of the AEPO for the **Prinos Offshore Development** project (AEPO DIPA/8413/24.04.2018 (ADA: ΨΓΛ14653Π8-Ζ79)). More specifically, the project will use the water treatment and disposal facilities of the existing Delta platform, to which the corresponding submarine power cable will also be connected.

Similarly, the onshore facilities to be constructed as part of the licensed project are located at **the Sigma Onshore Industrial Unit**, the operation of which is governed by the PO of the relevant AEPO (Ministerial Decision 213450/2013).

All onshore and offshore facilities of the licensed project are governed by the PO of the AEPO of the licensed project (AEPO DIPA/8413/24.04.2018 (ADA: ΨΓΛ14653Π8-Ζ79)).

5.4 LEGISLATIVE FRAMEWORK

5.4.1 Legislation on CO_2Storage in Geological Formations

5.4.1.1 Directive 2009/31/EC on the Storage of CO_2 in Geological Formations

The storage of carbon dioxide (CO_2) in geological formations was introduced in Europe by **Directive 2009/31/EC**. According to this Directive, **the capture and storage of carbon dioxide in geological formations (CCS)** is a bridging technology that will contribute to mitigating climate change. It consists of capturing carbon dioxide (CO_2)from industrial installations, transporting it to a storage site and injecting it into suitable underground geological formations for permanent storage.

According to initial estimates of the impact of the proposed Directive, included in the Commission's impact assessment, seven million tons of CO_2 could be stored by 2020 and 160 million tons by 2030 if greenhouse gas emissions are reduced by 20% by 2020 and if CCS technology receives national and Community support and proves to be environmentally safe. The CO_2 emissions avoided in 2030 would represent around 15% of the reductions required in the EU.

The objective of this Directive is to establish a legal framework for the environmentally safe storage of CO_2 in geological formations in order to combat climate change. The purpose of environmentally safe storage of CO_2 in geological formations is to permanently isolate CO_2 in a manner that prevents and, where that is not feasible, eliminates as far as possible negative effects and risks to the environment and human health.

The Directive applies to the storage of CO_2 in geological formations within the territory of Member States, their exclusive economic zones and their continental shelf within the meaning of the United Nations Convention on the Law of the Sea (UNCLOS).

Article 3 of the Directive defines, among other things, the following:

- "**CO_2 storage in geological** formations" means the injection and storage of CO_2 streams into underground geological formations.
- "Storage **site**" means a volume-defined area within a geological formation used for the storage of CO_2 in geological formations and the associated surface and injection facilities.
- A "storage **complex**" means the storage site and surrounding geological areas that may affect the overall integrity and safety of the storage (i.e., secondary containment formations).
- **A "geological** formation" means a lithostratigraphic subdivision within which distinct rock layers can be found and mapped.
- A "storage **permit**" means a written and reasoned decision (or decisions) authorizing the storage of CO_2 in geological formations at a storage site by the operator and specifying the conditions for its operation, issued by the competent authority in accordance with the requirements of this Directive.
- "transport **network**" means the pipeline network, including associated pressure boosting stations, for the transport of CO_2 to the storage site.

In accordance with **Article 6**, Member States shall ensure that no storage site is operated without a storage permit, that there is only one operator for each storage site and that no conflicting uses of the site are permitted.

Member States shall, in accordance with **Article 13**, ensure that the operator monitors the injection facilities, the storage complex (including, where possible, the CO_2), and, where appropriate, the surrounding environment for the purposes of:

- Comparing the actual and modeled behavior of CO_2 and formation water at the storage site.
- Detection of significant anomalies.
- Detection of CO_2migration.
- Detection of CO_2leakage.
- Detection of significant adverse effects on the surrounding environment, including in particular on drinking water, human populations or users of the surrounding biosphere.
- Evaluating the effectiveness of any corrective measures taken pursuant to Article 16.
- Updating the assessment of the short-term and long-term safety and integrity of the storage complex, including an assessment of whether the stored CO_2 will remain completely and permanently isolated.

Based on the above, the methodology used to prepare this Study for the Amendment of the AEPO of the project, following the corresponding approved Environmental Impact Study (EIS) of the project, is in line with the requirements and guidelines of the Directive in question.

5.4.1.2 Joint Ministerial Decision 48416/2037/E.103/2011 (Government Gazette 2516/B/7.11.2011)

Joint Ministerial Decision 48416/2037/E.103/2011 (Government Gazette 2516/B/7.11.2011) transposes and harmonises Directive 2009/31/EC into national law and lays down measures and conditions for the storage of carbon dioxide in geological formations.

According to **Article 14** of this Joint Ministerial Decision, monitoring of the activity is based on a **Monitoring Plan** drawn up by the operator in accordance with the requirements of Annex II to the Joint Ministerial Decision, including details on monitoring in accordance with the guidelines set out in Article 10 of Joint Ministerial Decision No. 54409/2632/2004, as applicable.

In particular, the operator is required to monitor the injection units, the storage complex and, where appropriate, the surrounding environment, as mentioned in **the** above **section**.

The Monitoring Plan referred to in Article 14, paragraph 2.2, shall be drawn up in accordance with the risk assessment analysis carried out in phase 3 of **Annex I** and updated in accordance with the criteria set out in **Annex II.**

According to **Article 17**, in the event of leaks or significant irregularities, the operator is required to immediately notify the competent authority and take the necessary corrective measures, including measures relating to health protection. In the event of leaks and significant irregularities that pose a risk of leakage, the operator shall also notify the competent authority in accordance with Joint Ministerial Decision No.

54409/2632/2004, as amended by Joint Ministerial Decision No. 9267/468/2007 (B' 286) joint ministerial decision and No. 57495/2959/2010 (B' 2030) joint ministerial decision.

A storage site, in accordance with **Article 18**, shall be closed if the requirements for granting the storage permit have been met, upon documented request by the operator and after approval by the competent authority, or if the competent authority so decides after revoking the storage permit pursuant to Article 12(3). After the closure of a storage site, the operator shall be responsible for:

- Monitoring, reporting, and taking corrective measures in accordance with the requirements of this Decision.
- Taking preventive or remedial measures in accordance with Articles 8 to 11 of Presidential Decree 148/2002009, until responsibility for the storage site is transferred to the competent authority in accordance with Article 19(1) to (5) of this Decision.
- To seal the storage site and remove the injection facilities.

The characterization and assessment of potential storage complexes and the surrounding area are carried out in three phases in accordance with **Annex I** to the Joint Ministerial Decision.

- **Phase 1**: Data collection
- **Phase 2**: Development of a three-dimensional static geological model of the earth
- **Phase 3**: Characterization of the dynamic behavior of storage, sensitivity characterization, risk assessment:
  - Characterization of the dynamic behavior of storage
  - Sensitivity characterization
  - Risk assessment

Based on the above, the methodology used to prepare this Study for the Amendment of the AEPO for the project, following the corresponding approved Environmental Impact Study (EIS) for the project, is consistent with the requirements and guidelines of the Directive in question.

5.4.2 Institutional Framework for Environmental Licensing

5.4.2.1 Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (EIA Directive)

The **Environmental Impact Assessment (EIA)** procedure was first introduced in Europe in 1985 by the EIA Directive (85/337/EEC) and is the main tool in the European Union's environmental policy, establishing the obligation to assess the environmental impact of projects/activities at the decision-making stage. The main features of the EIA Directive are:

- The diverse range of projects and activities, from industrial and other productive activities to infrastructure projects such as roads, dams, and ports, mainly in the form of public investment.

- The requirement for ex-ante impact assessment, so that environmental issues can be fully integrated into the design, implementation, and operation of projects.
- Opening up the process to the public, who want to be informed and involved in decision-making.
- The requirement for detailed and understandable information on environmental impacts, in other words the need for an environmental impact assessment.

The EIA process as set out in the relevant Directive can be summarized in **the** following **stages**:

i. The project developer may ask the competent environmental authority to specify the issues to be covered by the environmental impact assessment and the relevant information to be provided by the investor (scoping).

ii. The investor must provide the required information on the environmental impact of the project (Environmental Impact Assessment - EIA, Annex IV) to the competent authority.

iii. The competent environmental authorities, the public (and the Member States concerned) should be informed and consulted on the EIA.

iv. The competent environmental authority decides whether or not to approve the project, taking into account the results of the EIA consultation. The public is informed of the decision, which it may challenge in court.

The EIA Directive applies to a wide range of public and private projects, which are defined in Annexes I and II thereto. Projects listed in **Annex I** are considered to have significant effects on the environment and require compliance with the EIA procedure. For projects listed in **Annex II,** the national authorities must decide, through a screening process, whether the EIA procedure is required, taking into account criteria/thresholds or case-by-case examination, as well as the criteria in **Annex III.**

Twelve years after the adoption of the EIA Directive and following the activation of a whole new market for services in the field of environmental impact assessment and the conclusions drawn from what had been implemented up to that point, the EIA Directive was amended by Directive 97/11/EC in order to:

- Bring it into line with the Espoo Convention on the assessment of transboundary environmental impacts.
- Extend the application of the EIA procedure to more types of projects and activities.
- Improve and broaden the criteria under which a project is subject to an EIA.

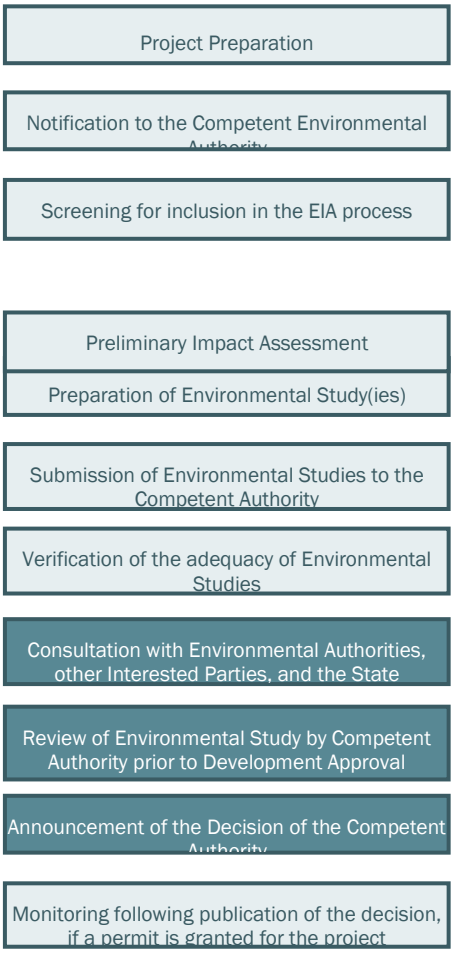
Subsequently, the Directive was amended twice more by Directive 2003/35/EC (public participation procedure harmonized with the provisions of the Aarhus Convention) and Directive 2009/31/EC (specifications for CO_2). Finally, it was codified by Directive 2011/92/EU of 13 December 2011.

The latest update was made with Directive 2014/52/EU, which entered into force on May 15, 2014, with the aim of simplifying the rules for assessing the potential environmental impact of projects. Member States must have completed its transposition into their legal frameworks by May 16, 2017. This update is in line with the promotion of smarter regulation to reduce bureaucratic procedures. It also improves the level of

environmental protection with the aim of making business decisions on public and private investment more certain, predictable, and sustainable in the long term. The new approach pays greater attention to the threats and challenges that have emerged since the original rules came into force some 25 years ago. This means that greater attention is paid to areas such as resource efficiency, climate change, and disaster prevention, which are now better integrated into the assessment process. The main changes in the latest update of the EIA Directive are as follows:

- Member States are now required to simplify their different procedures for assessing environmental impacts.
- Time limits are introduced for the various stages of environmental assessments: screening decisions should be taken within 90 days (although extensions are possible) and public consultation should last at least 30 days. Member States must also ensure that final decisions are taken within a "reasonable period of time."
- The screening procedure, which determines whether an EIA procedure is required, is simplified. Decisions must be duly justified in the light of the updated screening criteria.
- EIA reports will become more understandable to the public, particularly with regard to assessments of the current state of the environment and the alternatives considered for the project/activity in question.
- The quality and content of reports will be improved. Competent authorities should also demonstrate their objectivity in order to avoid conflicts of interest.
- The reasons for decisions to grant a permit should be clear and more transparent to the public. Member States may also set time limits for the validity of any reasoned conclusions or opinions issued as part of the EIA procedure.

If projects have significant negative effects on the environment, the implementing bodies and, by extension, the designers will be required to take the necessary measures to avoid, prevent, or reduce these effects. These projects should be monitored through procedures established by the Member States. To avoid duplication of monitoring and unnecessary costs, existing monitoring measures may be used. According to Article 1 of the Directive, this will apply to the assessment of the environmental effects of public and private projects that are likely to have significant effects on the environment. Although specific procedures may vary significantly between Member States, the main stages of the EIA process are common throughout the European Union. **Figure 5-1** presents a summary flow chart of the stages of the EIA process, distinguishing between mandatory phases (marked in yellow) and optional EIA procedures (not marked).



5 –1 : Flow chart of the EIA procedure in accordance with the EU Directive

Based on the above, the methodology for preparing this Study for the Amendment of the AEPO of the project, following the corresponding approved Environmental Impact Study (EIS) of the project, is consistent with the requirements and guidelines of both the Directive and, in general, the applicable national and Community legal framework for the EIA process.

5.4.2.2 Law 4014/2011 on Environmental Licensing of Projects and Activities

The national legislative framework for environmental protection was first enriched in 1986 with Law 1650/1986, which approximated the first EIA Directive while regulating a number of environmental issues that were quite radical for the time.1650/1986, which approximated the first EIA Directive while regulating a number of environmental issues that were quite radical for the time. The approach was quite detailed and, in matters where there was a degree of flexibility for Member States, the law leaned towards the stricter version. The amendments to the Directive led to amendments to national legislation, which were enacted by Law 3010/2002. The main changes introduced included compliance with the new Directive, decentralization, and the establishment of the audit procedure. Later, the legal framework was reformed by Law 4014/2011, which was accompanied by a series of Joint Ministerial Decisions, ministerial decisions, and circulars, which had the same goal as the basic law: to improve the overall result and increase the added value of the procedures. In particular, Law 4014/2011 and Ministerial Decision 5688/2018 (Government Gazette 988/B/21-03-2018) amending it introduced significant improvements and changes.

The Environmental Impact Assessment process in Greece for projects such as the proposed one is summarized in the following phases (in accordance with the applicable legislation) and is also presented diagrammatically in the following **Figure**:

1 Environmental Impact Study: The project promoter submits the EIS[44] for the project to the Ministry of Environment and Energy (YPE), Directorate of Environmental Licensing (DIPA)[45].

2 Completeness Check: The DIPA/YPE will check the EIA for completeness and may request additional information before forwarding it for consultation.

44 The content of the EIA is determined based on (a) the classification of the project (in accordance with Ministerial Decision DIPA/oik. 37674/27-07-2016, as amended by Ministerial Decisions oik. 2307 (Government Gazette 439/B/2018), Ministerial Decision YPEN/DIPA/64001/2029 (Government Gazette 4420/B/2018), Ministerial Decision YPEN/DIPA/94321/3907 (Government Gazette 5798/B/2018), Ministerial Decision YPEN/DDY/24593/2902/2020 (Government Gazette 1482/B/2020), YPEN/DIPA/74463/4562 (Government Gazette 3291/B/2020), Ministerial Decision 92108/1045/F.15/2020 (Government Gazette 3833/B/2020), Ministerial Decision YPEN/DIPA/99398/6484/2020 (Government Gazette 4656/B/2020), Ministerial Decision YPEN/DIPA/17185/1069 (Government Gazette 841/B/2022) Ministerial Decision YPEN/DIPA/64712/4464 (Government Gazette 3636/B/2022), Ministerial Decision YPEN/DIPA/53510/3616, Government Gazette (3327/B/2023) and (b) the detailed specifications set out in Joint Ministerial Decision 170225/2014 and Ministerial Decision 1915/2018 amending it for each type of project/activity.

45 The content of the EIA is determined by (a) the classification of the project (in accordance with Ministerial Decision 1958/2012) and (b) the detailed specifications set out in Joint Ministerial Decision 170225/2014 for each type of project/activity.

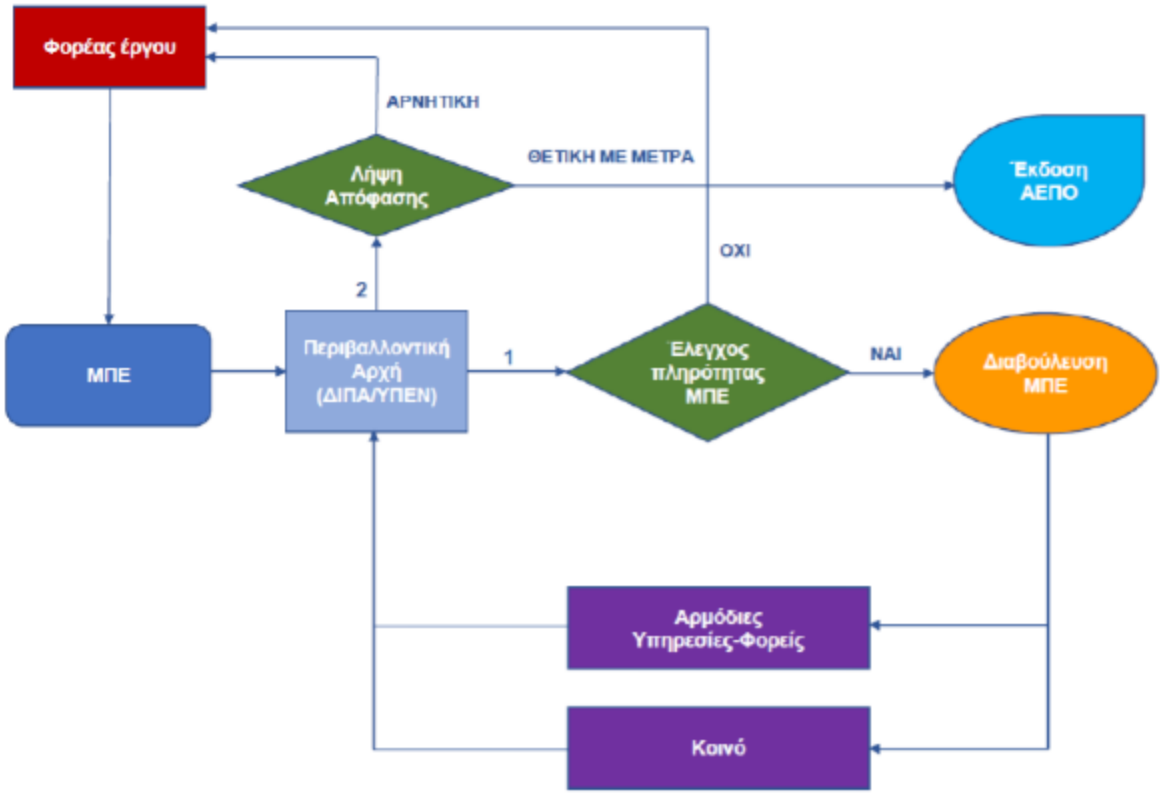
3 **Institutional Consultation**: Opinion/response from Central Authorities or other competent Ministries, Regional Authorities, and other organizations[46] .

4 **Public Consultation**: The project is presented to the Regional Council during an open hearing, where people can express their views.

5 **Decision on the Approval of Environmental Terms (AEPO)**: The DIP/YPEN will examine the results of the consultation (institutional and public) and issue its decision, which is co-signed by the other competent Ministries.

6 **Publication of Decision**: Publication of the decision through the competent Regional Council.

The procedure for amending and renewing approved EAPOs for **Subcategory A1** projects is provided for in Articles 5 and 6, respectively, of Law 4014/2011, as currently in force.



46 The consultants are predetermined by Joint Ministerial Decision 1649/45/2014 for each type and category of project.

5 –2 : Flow chart of the EIA procedure in accordance with the National Legislative Framework

With regard to the consultation process for the assessment of the EIA and the institutional briefing of the interested public, the provisions of Joint Ministerial Decision 1649/45/2014 apply, which defines and specifies the provisions of Article 19, paragraph 19 of Law 4014/2011 on:

- Means of consultation between the various authorities and
- Ways of informing the public and its participation in public consultation during the environmental licensing process.

The aforementioned Joint Ministerial Decision further specifies the consultations following the implementation of Article 18, paragraph 5 of Law 4014/2011 on the electronic environmental register. However, given that a transitional period is provided for the establishment of this register, the relevant procedures are also provided for during this period.

In addition, the authorities to be consulted are also specified and listed in Annex B of the Joint Ministerial Decision.

Based on the above, the preparation of this Study for the Amendment of the AEPO of the project, following the corresponding approved Environmental Impact Study (EIS) of the project, was carried out in accordance with the aforementioned guidelines of Law 4014/2011 on Environmental Licensing, as amended and in force.

5.4.2.3 Law 4685/2020 Modernization of environmental legislation and other provisions

Environmental licensing in Greece, despite the amendments made to the legislation and the quality of studies by private individuals, continues to be a time-consuming administrative process and, as such, a significant obstacle to the promotion of investment. Specifically, the environmental licensing process for new projects, which are essential for the development of the Greek economy, significantly exceeds the time stipulated by current legislation in all categories. In addition, the environmental licensing process for existing investments, i.e., the process for renewing or amending the Environmental Terms Approval Decision (ETAD), far exceeds the time now provided for by law. It is indicative that in 40% of cases, new opinions are requested from the competent authorities. As a result, existing investments are treated as new ones and are subject to the corresponding delays. With the aim of speeding up and simplifying procedures in order to address chronic everyday problems and create an investment-friendly environment in Greece, the provisions of Law 4685/2020 have been put into effect, which are a horizontal modernization intervention under EU law and introduce a faster, safer, and more effective environmental licensing framework. This chapter (5.2.2) shortens and simplifies the environmental licensing process, while fully respecting environmental protection. Provisions on the duration of Environmental Terms Approval Decisions, the procedure for their issuance, renewal, and amendment simplify the business environment and reduce the administrative burden on services, whose work is further lightened by the possibility of using private EIA assessors, activating and strengthening the relevant regulation that already existed in the original Law 4014/2011 (A' 209). The basic

philosophy underlying this Law in the part concerning environmental licensing is to relieve services and entrepreneurs of the burden of procedures that do not contribute substantially to environmental protection.

More specifically, the most important changes to environmental licensing brought about by the new Law are presented below:

Regarding Article 1: This provision extends the validity period of AEPOs and establishes favorable provisions for project operators with environmental certification (EMAS and ISO 14001), as, on the one hand, their compliance with environmental legislation and the terms of their license is better monitored and, on the other hand, a serious incentive is provided for seeking to maintain environmental certification. More specifically, with the replacement of case a of paragraph 8 of Article 2 of Law 4014/2011**, the duration of the AEPO is set at fifteen years instead of ten, which was the case until now,** provided that there is no change in the data on the basis of which it was issued. In addition, the validity of the AEPO is extended for six years for projects or activities that implement an Environmental Management System (EMS) in accordance with the standards of the Eco-Management and Audit Scheme (EMAS) and for as long as the EMS is in force. Finally, the validity of the AEPO is extended for four years for projects or activities that implement an EMS in accordance with the standards of ISO 14001 or other equivalent standards. Under the previous legislation, the duration of this extension was four and two years for EMSs in accordance with the EMAS and ISO 14001 standards, respectively. A relevant confirmatory act is issued for these extensions. The validity of the AEPO expires automatically in cases where the above Environmental Management Systems are not renewed in time during the above extension. In addition, the body is required to have the Environmental Management System in place for at least one year before the expiry of the AEPO renewal deadline. An important provision of this provision is that the new deadlines also apply to all AEPOs in force at the time of publication of this law. Regarding Article 2, delays in the process of issuing AEPOs for new projects or activities in both categories A1 and A2 make it necessary to change the current institutional framework, with the aim of simplifying procedures, shortening the timeframes, attracting investors, and facilitating the work of the competent authorities. This provision shortens the deadlines at the various stages of maintaining environmental permits. It is in line with EU law, which sets a single minimum deadline of thirty (30) days for consultation with the public concerned (Article 6(7) of Directive 2011/92, as amended by Directive 2014/52), but also stipulates that the competent authority shall decide within a maximum period of 90 days from the submission of all the necessary information by the project developer (Article 4(6) of Directive 2011/92). Reference to KESPA or PESPA is established, as appropriate, if there is a delay in providing essential opinions (such as, for example: forestry, archaeological services, due assessment for protected areas), so that the process is not derailed by the inaction of a single advisory service. It is worth noting that essential opinions are clarified in the context of assessing the environmental impact of a project or activity. In particular, the opinions of public bodies whose remit is directly related to the characteristics of the proposed project and its possible impact on the environment are considered essential. In order to reduce delays caused by the submission of additional information, an explicit provision is introduced that the submission of such information by the project or activity operator, at the request of the competent environmental authority, at any stage of the procedure, is mandatory for the project or activity operator, but in no case suspends the above deadlines. It is clear that the above amendments significantly simplify the licensing procedure for both category A1 and category A2 projects.

Regarding Article 8: This provision stipulates that, **from January 1, 2021,** onwards, the entire environmental licensing process shall be carried out through the Electronic Environmental Registry (EER).[h] **January 2021 onwards, the entire environmental licensing process will be conducted through the Electronic Environmental Registry (EER),** thus ensuring full transparency and faster processing. In particular, it introduces the obligation to post all documents relating to the environmental licensing process on the Electronic Environmental Registry. The obligation to post documents begins after January 1, 2021, and applies to documents relating to the issuance, renewal, or amendment of AEPOs and PPDs, including applications, environmental impact studies, administrative service opinions, AEPO plans, and all relevant correspondence. In addition, all of the above documents will be handled exclusively through the HPM, and public consultations will be conducted exclusively through the HPM, where required. In this way, the handling of files and licensing data is digitized and made faster and simpler, in line with the model of other European countries.

Regarding the changes that have taken place in the management of protected areas (CHAPTER C) in Greece, the management of protected areas has so far been carried out by the Protected Area Management Bodies (PAMAs), which are legal entities under private law.

In order to implement a new and modern system of governance for Protected Areas, it was deemed necessary to develop a comprehensive and unified plan through a scientific, advisory and coordinating body for the effective organization of the governance and management of these areas. For this purpose, a single body was established, the Natural Environment and Climate Change Agency (OFYPEKA), with a coordinating and executive role, which also cooperates with other competent bodies (ministries, first and second-level local authorities, environmental NGOs, civil society, and productive bodies in these areas). The existing Protected Area Management Bodies are incorporated into this Agency as 24 Protected Area Management Units, which operate at the departmental level and aim to implement management plans at the local level.

Regarding Article 26: Article 26 defines the **Governance System for Protected Areas,** which consists, in principle, at the national level, of the **Ministry of Environment and Energy and the newly established OFYPKA,** as well as the Ministries of Interior, Rural Development, Digital Governance, Shipping and Island Policy, and the Ministry of Tourism. At **regional level, this system consists of the Protected Areas Management Units, the Decentralised Administrations, the Regions and the Municipalities,** and is supported by academic and research institutions in Greece and abroad, environmental organizations, and non-profit organizations. In this way, the management model for these areas is reflected, which now aims at the cooperation of all relevant bodies.

Regarding Article 27: Article 27 establishes OFYPEKA, which includes the legal entity under private law named "National Center for the Environment and Sustainable Development" (EKPAA), established by Law 2742/1999 (A' 207), while a Protected Areas Management Department and a Climate Change Department are also established. OFYPEPA aims to implement the policy set by the Ministry of Environment and Energy for the management of protected areas in Greece, to address climate change and to promote and implement sustainable development actions. Its main objectives include: a) central coordination for the implementation of the strategy and policies for the management of Protected Areas and the fight against Climate Change, b) conducting scientific research/preparing studies for all public bodies in its areas of competence, c) reports and submissions to international bodies, in accordance with the country's obligations, and representation of the country in international and European groups and committees. Another important addition is the responsibility of OFYPE to organize the special free-access web portal provided for in paragraph 2 of Article

18 of Law 3937/2011 (A'60), on which it posts all available information on the conservation status and protection regime of Greek biodiversity, gathering scientific information and reliable statistical data from all relevant bodies, including data drawn from the EIA and the EIA, and organises it in a suitable infrastructure of thematic and spatial databases relating to protected areas. **A critical responsibility of OFYPE is to provide an opinion on the appropriate assessment of the impact of any project and/or activity in the protected areas under its responsibility that may affect the integrity of the area and the protected objects,** a responsibility that commences in accordance with paragraph 8 of Article 43 after its partial staffing.

Regarding Article 34: Article 34 provides for the establishment of 24 Protected Area Management Units operating at the Department level. They are the evolution of the Protected Area Management Bodies and are part of the hierarchical structure of OFYPKA. This addresses the issue of lack of coordination among the Management Bodies, while also serving the need to link the Central Organization with local structures. The management of protected areas must take place at two levels: coordination and administration at the central, operational, and local levels. At the same time, with the coordination and logistical support of the Central Organisation, the Regional Units will be able to participate and attract additional funding from European programmes more successfully. Among other things, the Units are responsible for implementing and monitoring management plans for protected areas within their territorial jurisdiction, as well as monitoring species and habitat types of EU interest in the areas under their territorial jurisdiction. consulting with the local community, productive bodies, and any other relevant bodies within their areas of responsibility, whenever necessary, with a view to integrated management, the effective protection and promotion of the values of protected areas, as well as the integration of environmental parameters into local development models and programs, informing and raising awareness among the population and productive bodies on issues related to the work and objectives of the MDPs, organizing and participating in training and education programs, as well as conferences, workshops, seminars, and other informational events to promote and highlight the objectives of protected area management, as well as participating in local fire prevention planning in their areas of responsibility in cooperation with the Ministry of Environment and Energy and the Ministry of Citizen Protection.

Based on the above, the preparation of this Study for the Amendment of the AEPO of the project, following the corresponding approved Environmental Impact Study (EIS) of the project, was carried out in accordance with the aforementioned guidelines of Law 4685/2020.

5.4.2.4 Law 4964/2022 "Provisions for the simplification of environmental licensing, establishment of a framework for the development of Offshore Wind Farms, tackling the energy crisis, protecting the environment and other provisions"

According to Article 173 of the law "*Carbon dioxide storage by entities holding hydrocarbon exploration and exploitation rights or licenses*," the following are defined, among other things:

"1. Entities that have been granted by the Greek State, pursuant to Law 2289/1995 (A' 27), the right or license to explore and exploit hydrocarbons in a specific area, and which have sufficient data, in particular geological, geophysical, and drilling data to document the preliminary eligibility of the site as a carbon dioxide ("CO(2)") storage site, geological formation or formations located in the subsoil of the concession

area (onshore or offshore), shall acquire, under the conditions laid down herein, the right to continue and complete the investigation of the specific area in order to determine its suitability for CO(2) storage.If the specific geological formation is found to be suitable as a CO_2 , following a relevant environmental assessment and licensing, the entities in question or their affiliated companies, in accordance with paragraph 5, shall acquire the right to store CO_2 under this law....."

"2. The duration of the storage right is set in principle at twenty-five (25) years from the date of the decision referred to in paragraph 6 and may be extended by amending that decision.....

"3. In order to activate the rights referred to in paragraph 1, the entity shall submit, within twelve (12) months from the entry into force of this law, an application to the Hellenic Hydrocarbon and Energy Resources Management Company S.A. (EDEYP S.A.)..."

.....

In areas where a strategic environmental assessment of the hydrocarbon exploration and exploitation program has been carried out, in order to adapt it to carbon dioxide storage, the environmental pre-assessment procedure of Article 5 of the joint decision of the Ministers of the Interior, Public Administration and Decentralization, and Environment, Physical Planning and Public Works, ref. no.oik.107017/28.8.2006 (B' 1225) joint decision of the Ministers of the Interior, Public Administration and Decentralization, Economy and Finance, and Environment, Spatial Planning and Public Works shall apply. If the site is found to be eligible in principle and any necessary proposals, measures, and guidelines for the prevention, limitation, and, as far as possible, mitigation of any environmental impacts are approved, the operator's right to continue and complete the investigation of the suitability of the site for CO(2)storage is activated.

.....

"5. Upon completion of the suitability investigation and before the expiry of the right to complete the investigation, the interested operator shall submit an application to EDEYEP in order to determine the suitability of the geological formation as a CO(2)storage site,to approve the relevant environmental conditions, and to activate the operator's storage right.....

The application shall include, in particular, the following:

a) Name and address of the interested party. If the applicant is a company affiliated with the party holding the right to complete the investigation, the application shall also include a detailed description of the corporate structure and relationship with the above party.

b) Evidence demonstrating the technical capacity and competence of the entity in relation to CO_2storage activities.

c) A technical report substantiating the suitability of the proposed site and CO_2 and assesses the expected safety of storage, in accordance with the criteria set out in Annex I to Joint Decision No. 48416/2037/E.103/2011.

(d) The total quantity of CO_2 injected and stored, as well as the planned sources and methods of transport, the composition of the CO_2 streams, the injection rates and pressures, and the location of the injection facilities.

e) A detailed description of any construction work and projects that may be required in the context of CO_2 storage activities. Facilities used by the operator for the purposes of the hydrocarbon exploration and exploitation license may be used in the context of CO_2 , without, however, being subject to the obligations imposed after the closure of a storage site for pure CO_2 , as provided for in paragraph 2 of Article 18 of Joint Decision No. 48416/2037/E.103/2011.

g) The proposed temporary plan, after the closure of the storage site, of paragraph 3 of Article 18 of Joint Decision No. 48416/2037/E.103/2011.

h) Evidence documenting that the financial guarantee referred to in Article 20 of Joint Decision No. 48416/2037/E.103/2011 is valid and genuine, prior to the start of injection.

For environmental licensing, Chapter A of Law 4014/2011 (A' 209) applies. For the issuance of an Environmental Terms Approval Decision (ETAD), the interested party shall submit to the competent authority an Environmental Impact Study (EIS), which shall additionally include: ***a) a description of the measures for the prevention of significant anomalies, b) a proposed monitoring plan pursuant to paragraph 2 of Article 14 and a proposed corrective measures plan pursuant to paragraph 2 of Article 17 of Joint Decision No. 48416/2037/E.103/2011, which are included in an annex to the EIA as integral parts thereof and are approved by the AEPO, c) any other data and necessary information to document that there is no significant risk of CO(2)leakage , nor any significant risk to the environment or health from the licensed activity, and d) an assessment of the cumulative and synergistic effects of the parallel exercise of activities, on the one hand, of hydrocarbon exploration and exploitation and, on the other hand, of CO_2 .***

6. Within two (2) months of the submission of the application and after the issuance of the AEPO, provided that the conditions of Article 9 of Joint Decision No. 48416/2037/E.103/2011 are met, EDEYP shall issue a decision whereby:

a) it is established that the proposed geological formation is suitable for use as a CO_2storage site, in accordance with the criteria set out in Annex I to Joint Decision No. 48416/2037/E.103/2011. A geological formation shall be selected as a storage site only if, under the proposed conditions of use, there is no significant risk of leakage or significant risk to the environment or health, and

b) the operator's right to store CO_2 in the geological formation deemed suitable for this purpose is activated. The decision of the EDEY shall contain the information referred to in paragraph 1 of Article 10, except for that referred to in point (j) of joint decision No. 48416/2037/E.103/2011. The decision of the EDEY also determines the amount of the financial guarantee that the project operator is required to pay and maintain, in accordance with Article 20 of Joint Decision No. 48416/2037/E.103/2011. The decision serves as a storage permit pursuant to Article 6 of Directive 2009/31/EC.

.....

The proposed modification of the project, following its initial design, complies with the provisions of Law 4964/2022 in order to obtain an environmental permit and grant the operator the right of exploitation.

5.4.2.5 Directive 2008/98/EC on Waste and Repealing Certain Directives (Waste Framework Directive)

The Waste Framework Directive provides the primary legislative framework for the collection, transport, recovery, and disposal of waste. Waste is defined as *"any substance or object which the holder discards or intends or is required to discard,"* while *"waste treatment"* is defined as *"any recovery or disposal operation, including preparation prior to recovery or disposal."* According to the Waste Framework Directive, a distinction must be made between:

- The temporary storage of waste pending its collection,
- Waste collection and
- The storage of waste pending treatment.

Furthermore, *"facilities or undertakings that generate waste in the course of their activities should not be considered to be engaged in waste management and subject to authorisation for the storage of their waste pending collection*." This means that offshore facilities only need a permit if they treat the waste (sewage, garbage) themselves.

Distinguishing further between collection and treatment, it should be noted that "*the temporary storage of waste included in the definition of collection refers to the activity of storing waste pending its collection at facilities where it is unloaded, with a view to preparing it for further transport for recovery or disposal elsewhere."* With regard to the objective of this Directive, a distinction should be made between the temporary storage of waste pending collection and the storage of waste pending treatment, depending on the type of waste, the size and duration of storage, and the purpose of collection.

The storage of waste prior to recovery for a period of three years or more and the storage of waste prior to disposal for a period of one year or more are covered by Council Directive 1999/31/EC of 26April 1999 on the landfill of waste.

It should be noted that Article 2(2)(d) of the Waste Framework Directive provides that, to the extent covered by other EU legislation, "waste resulting from the prospecting, extraction, treatment, and storage of mineral resources and the working of quarries covered by Directive 2006/21/EC" is excluded from the scope of the Directive. Nevertheless, according to Article 2(2)(b) of Directive 2006/21/EC on the management of waste from extractive industries (and amending Directive 2004/35/EC) ***"waste resulting from offshore prospecting, extraction, and processing of mineral resources"*** (author's italics) is excluded from its scope. Consequently, since waste generated at offshore installations (and transported to land) is not covered by the more specific Directive on waste from the extractive industries, operators of offshore oil and gas installations will have to comply with the requirements of the more general Waste Framework Directive. This means that the "original waste producer or other holder" (in practice: the operator) will be required to treat the waste themselves or to commission a private or public waste collection operator to treat it on their behalf, or to commission a representative or a facility or undertaking that carries out waste treatment operations in accordance with Articles 4 and 13 (Article 15(1)).

The proposed amendment to the project, following its initial design, is in line with the guidelines of Directive 2008/98/EC on waste. It should be noted that the management of the proposed amendment to the Project will be carried out in accordance with the provisions of the updated Waste Management Plan (WMP) accompanying this document (based on the relevant approved WMP included in the approved EIA for the project).

5.4.3 Legislative Framework for Impact Assessment

The impact assessment and licensing framework is governed by the following (including the ratifications of the aforementioned agreements, as applicable), as presented in **the table** below.

Table5 –2 : Current legal framework for impact assessment and licensing of offshore installations

Law/Decision and relevant European (EU)/International documents	Reference Number	Subject
Law 4014	Government Gazette 209/A/21-09-2011	On environmental licensing
Law 4685	Government Gazette 92/A/07-05-2020	On environmental licensing
Law	Government Gazette 160/A/18-10-1986	On environmental protection
Law	Government Gazette 91/A/25-04-2002	Harmonization of Law 1650 with Directives: 96/61/EC and 97/11/EC
Law	Government Gazette 60/A/31-03-2011	For the conservation of biodiversity
Ministerial Decision 1958 (as amended and in force)	Government Gazette 21/B/13-01-2012	On the environmental classification of projects and activities
Law 4936	Government Gazette 105/A/27-05-2022	National Climate Law
Law	Government Gazette 25/A/20-02-2018	Protected Area Management Bodies and other provisions
Joint Ministerial Decision 50743	Government Gazette 4432/B/2017	Revision of the national list of the European Natura 2000 Ecological Network
Joint Ministerial Decision 15393/2332	Government Gazette 1022/B/05-08-22002	Only Annex II applies: on categories of activities and projects subject to Integrated Pollution Prevention and Control (IPPC)
Ministerial Decision 48963	Government Gazette 2703/B/05-10-2012	Regarding the Specifications of the Contents of Environmental Licensing
Ministerial Decision 170225	Government Gazette 135/B/17-01-2014	Regarding the specification of indicators for environmental licensing studies
Joint Ministerial Decision 30651	Government Gazette 1817/B/02-06-2014	Regarding the specification of the requirements for the Electronic Environmental Registry
Law 3422	Government Gazette 303/A/13-12-2005	Ratification of the Aarhus Convention

Law/Decision and relevant European (EU)/International documents	Reference Number	Subject
Ministerial Decision 21697	Government Gazette 224/ΥΟΔΔ/03-05-2012	Composition of the Central Council for Environmental Licensing
Law	Government Gazette 24/A/13-02-2012	Environmental responsibility - framework for waste production and management
Law	Government Gazette 129/A/23-07-2021	Integrated framework for waste management
Commission Decision	2000/479/EC of 17 July 2000	Concerning the implementation of the European Pollutant Emission Register (EPER) in accordance with Article 15 of Council Directive 96/61/EC concerning integrated pollution prevention and control (IPPC)
KYA 172058	Government Gazette 354/B/17-02-2016	Establishment of rules, measures, and conditions for addressing risks from major accidents at facilities or units due to the presence of dangerous substances, in accordance with the provisions of Directive 2012/18/EU.
Joint Ministerial Decision 1915	Government Gazette 304B/02.02.2018	Environmental risk assessment
EC Regulation	Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18 January 2006	Concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC
Guidance document	European Commission, 31.05.2006	On the implementation of the European ELTIR
Law 743	Government Gazette 137/A/17-10-1977	On the protection of the marine environment
Law 2971	Government Gazette 2970/B/19-12-2001	Concerning the foreshore and beach and other provisions
Ministerial Decision 55/1998	Government Gazette 58/A/20.04.1998	On the protection of the marine environment (codification of Law 743)
Ministerial Decision 11/2002	Government Gazette 6/A/21-01-2002	National Emergency Action Plan for dealing with incidents of pollution from oil and other harmful substances
Ministerial Decision YPEN/DDFPB/50146/1786/	Government Gazette 3118/B/10-05-2023	Definition and approval of conservation objectives for bird species referred to in paragraphs 1 and 2 of Article 4 of Directive 2009/147/EC in Special Protection Areas (SPAs) of the NATURA 2000 national ecological network
Ministerial Decision YPEN/DDFPB/24776/985	Government Gazette 1807/B/22-03-2023	Setting conservation objectives for natural habitat types listed in Annex I and species listed in Annex II of Directive 92/43/EEC in Special Areas of Conservation and Sites of Community Importance of the national ecological network NATURA 2000

Law/Decision and relevant European (EU)/International documents	Reference Number	Subject
Joint Ministerial Decision 174505/607	Government Gazette 1311/B/2017	On air quality (Amendment of Joint Ministerial Decision 22306/1075/2007 and Joint Ministerial Decision 14122/549/E103/2011 in compliance with Directive 2015/1480/EU)
1976 Barcelona Convention, including pollution caused by the exploration and exploitation of hydrocarbons, Ratified by the Greek Parliament with **Law 855/1978** and **Law 3022/2002**	Government Gazette 235/A/23-12-1978 Government Gazette 144/A/19-06-2002 2013/5/EC	Ratification of the International Convention for the Protection of the Mediterranean Sea against Pollution and its amendments
International Convention on Oil Pollution Preparedness, Cooperation and Response (OPRC) 1990 Ratified by the Greek Parliament with **Law 2252/1994** and **Law 3100/2003**	Government Gazette 192/A/18-11-1994 Government Gazette 20/A/29-01-2003	Ratification of the OPRC international conventions and amendments
International Convention for the Prevention of Pollution from Ships, 1973, as amended by the **Protocol of 1978 (MARPOL 73/78)** Ratified by the Greek Parliament with Law **1269,** as amended and in force	Government Gazette 89/A/21-07-1982	Ratification of the International Convention for the Prevention of Pollution from Ships and amendments
ACCOBAMS	-	Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea, and Contiguous Atlantic Area.
Ministerial Decision 148/2009	Government Gazette 190/A/29-09-2009	Regarding environmental responsibility for the prevention and restoration of environmental damage

As documented in **the** relevant previous and subsequent **Sections**, the methodology used to prepare this Study for the Amendment of the AEPO of the project, following the corresponding approved Environmental Impact Study (EIS) of the project, is fully consistent with the requirements, specifications, and guidelines of the national Legislative Framework, European Directives, and international Conventions and agreements for the assessment of Environmental Impacts and the assurance of the required environmental protection (with emphasis on the marine environment).

5.4.4 Legislative Framework for the Prevention of Marine Pollution

5.4.4.1 Directive on the Safety of Offshore Oil and Gas Installations (2013/30/EC)

Following the Deepwater Horizon incident in the Gulf of Mexico in April 2010, the European Commission expressed its initial views on the safety of offshore oil and gas operations in its communication entitled "Facing the challenge of offshore oil and gas safety" (published on October 13, 2010).

The European Commission's communication concluded that the existing divergent and fragmented regulatory framework for the safety of offshore oil and gas operations in Europe, and recent safety practices in the industry did not sufficiently ensure the minimization of risks from offshore accidents across the Union.

On June 28, 2013, the European Commission published the Offshore Installations Directive. The purpose of this Directive is to reduce as much as possible the occurrence of major accidents related to offshore oil and gas operations and to limit their consequences.

Under Directive 2013/30/EU, the EU has established a set of rules, summarized below, to help prevent accidents and ensure a rapid and effective response in the event of an accident.

- Before starting exploration or production, companies must prepare **a Report on Major Hazards (RoMH)** for their offshore installation. This report must include a risk assessment and an emergency response plan.
- Companies must ensure that the necessary resources are available to deploy if needed.
- When granting licenses, EU countries must ensure that companies are well funded and have the necessary technical expertise.
- Operators' plans and designs for new wells should be independently verified to ensure the necessary safety levels. This should be done before drilling starts.
- National authorities must verify that safety provisions, environmental protection measures, and the preparedness of production and non-production facilities in emergency situations are being complied with. If companies do not meet the minimum standards, EU countries can impose sanctions, including suspension of operations.
- Information on how companies and EU countries keep facilities safe should be available to citizens.
- Companies will be fully liable for any environmental damage caused to protected marine species and natural habitats.

To further promote offshore safety, the European Commission is working with its international partners to implement the highest safety standards worldwide. Offshore inspectors from EU countries also cooperate with the European Union Offshore Oil & Gas Authorities Group (EUOAG) to exchange best practices and improve standards. Gas Authorities Group (EUOAG) to exchange best practices and improve standards.

The licensed project, as well as the amendment proposed in this context, are not directly related to the Directive in question, as they do not concern the exploration, extraction, and exploitation of hydrocarbons. However, the overall project (including the proposed amendment) is indirectly related to the Directive, as part of the offshore section of the (equipment for the treatment and disposal of produced water) is located in Offshore Oil and Gas Installations (Prinos offshore platforms), which comply with all the commitments

and specifications arising from Directive 2013/30/EC, as specified in their environmental permit (AEPO DIPA/8413/24.04.2018 (ΑΔΑ: ΨΓΛ14653Π8-Ζ79)) and documented by the relevant reports of the monitoring program in place.

5.4.4.2 Marine Strategy Framework Directive (MSFD), 2008/56/EC

The Marine Strategy Framework Directive (Directive 2008/56/EC) was adopted on June 17, 2008, after many years of preparation and extensive consultation with all stakeholders and the public, and entered into force on June 15, 2008. The Directive aims to achieve **Good Environmental Status (GES)** in EU marine waters by 2020 and to protect the resources on which marine economic and social activities depend. It is the first EU legal instrument related to the protection of marine biodiversity, as it includes the specific regulatory objective of "conserving biodiversity by 2020" as a cornerstone for achieving good environmental status in marine waters. The Directive establishes within a legislative framework the ecosystem approach to the management of human activities that have an impact on the marine environment, incorporating the concepts of environmental protection and sustainable use. In order to achieve its objective, the Directive establishes European marine regions and subregions based on geographical and environmental criteria. In particular, the Directive distinguishes four European marine regions – the Baltic Sea, the North-East Atlantic Ocean, the **Mediterranean Sea**, and the Black Sea – which are located within the geographical boundaries of existing regional marine conventions. Cooperation between Member States within a marine region and with neighboring countries sharing the same marine waters already takes place through these Regional Marine Conventions.

In order to achieve GES by 2020, each Member State (MS) is required to develop a strategy for its marine waters (Marine Strategy). Furthermore, given that the Directive follows an adaptive management approach, Marine Strategies must be updated and reviewed every 6 years. In this context, the Commission has developed a set of analytical criteria and methodological standards to help Member States implement the MSFD. These criteria and methodological standards were revised in 2017, leading to the new Commission Decision on Good Environmental Status. Annex III to the Directive was also amended in 2017 (**Directive 2017/845/EC)** to better link ecosystem components, anthropogenic pressures and impacts on the marine environment with the 11 qualitative descriptors of GES and the new Decision on Good Environmental Status.

The MSFD was transposed into national law through Law 3983/2011, as amended by Joint Ministerial Decision YPEN/DNEP/50529/2779/2018 (amendment of Annex III in accordance with Directive 2017/845/EC), which established the following quality description parameters for determining GES in the waters of **the Aegean Sea subregion – Eastern Mediterranean (Levantine Sea) :**

1 Biodiversity is maintained. The quality and frequency of habitats and the distribution and abundance of species are consistent with the prevailing physiographic, geographic, and climatic conditions.

2 The introduction of non-native species through human activities is at levels that do not adversely affect ecosystems.

3 The populations of all commercially exploitable fish, molluscs and crustaceans are within safe limits from a biological point of view.

4 All elements of marine food webs, to the extent that they are known, exist in conditions of normal abundance and diversity and at levels sufficient to ensure the long-term abundance of species and the maintenance of their full reproductive capacity.

5 Anthropogenic eutrophication is minimized.

6 The integrity of the seabed is such that the structure and functions of ecosystems are ensured and, in particular, benthic ecosystems are not adversely affected.

7 Permanent alteration of hydrographic conditions does not adversely affect marine ecosystems.

8 Pollutant concentrations are at levels that do not cause adverse effects.

9 Pollutants in fish and other seafood intended for human consumption do not exceed the limits set by Community legislation or other relevant standards.

10 The properties and quantities of waste at sea do not cause damage to the coastal and marine environment.

11 The introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

The corresponding Environmental Objectives and Indicators for each quality description parameter were established by Ministerial Decision 1175/2012 (see **Table** below), while Ministerial Decision 142569/2017 established the Program of Measures for achieving or maintaining GES in accordance with Article 12 of Law 3983/2011.

Table5 –3 : National Environmental Targets for achieving GES in the marine subregion of the Aegean Sea – Eastern Mediterranean (Levantine Sea) within the framework of the MSFD (Ministerial Decision 1175/2012)

Quality description parameter	Environmental objectives
1	1 Conservation of the Mediterranean monk seal *Monachus monachus* population in Greek waters. 2 Census of the population of the loggerhead sea turtle *Caretta caretta* that breeds on the Greek coast and conservation of nesting areas. 3 Conservation and mapping of *Posidonia oceanica* seagrass beds. 4 Inventory of the area occupied by Maerl-type biogenic sediments. 5 Conservation of benthic macrofauna communities and the structure of planktonic communities.
2	Inventory of invasive alien species and their environmental impact on marine ecosystems.
3	1 Monitoring of the indicators "Fishing mortality" (F/Fmsy) and "Reproductive biomass" (B/Bmsy) of characteristic benthic species. 2 Monitoring of the "Fishing exploitation" indicator for pelagic species. 3 Correlation of fishing activities with the specified indicators.

Quality description parameter	Environmental objectives
4	Monitoring and evaluation of the balance of biomass at higher trophic levels in relation to the total catch of benthic fish.
5	1 Reduction of organic load and nutrients entering the marine environment from point and non-point sources. 2 Reduction of nitrate pollution from agricultural activities.
6	1 Mapping of sensitive benthic habitats. 2 Maintaining the balance of benthic macrofauna.
7	Prevention of environmental impacts from anthropogenic permanent changes in hydrographic conditions of a local nature.
8	Specification of the effects of pollutants and determination of prevailing trends in the concentration of these substances in the water column, sediments, marine organisms, and ecosystems.
9	Maintaining polluting substances in fish and other seafood intended for human consumption at permissible levels.
10	Reduction of anthropogenic waste on coasts and in the marine environment.
11	Control of energy levels so that they do not adversely affect the marine environment.

In accordance with Article 11 of the MSFD, Greece is required to present a set of monitoring activities (monitoring programs) in its marine territorial waters in order to meet the requirements of the above 11 parameters of the MSFD.

The monitoring programs under the MSFD are a combination of new and existing monitoring activities arising from other legal obligations of Member States (MS), such as monitoring the marine areas of the Natura 2000 network for the implementation of the Habitats and Birds Directives (HD and BD), monitoring of coastal water systems in accordance with the Water Framework Directive (WFD) and the Data Collection Framework for Fisheries (DCF - COM 199/2008) for the implementation of the EU Common Fisheries Policy regulations (COM 1380/2013).

Taking into account the proposed measures and the Environmental Monitoring Program proposed in **Chapters 7** and **10**, respectively, the project does not conflict with the objectives and provisions of the above Directive.

5.4.4.3 Water Framework Directive (WFD) 2000/60/EU

The Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council of 23October 2000) was adopted to establish a framework for Community action in the field of water policy. The Directive commits Member States to achieving good qualitative and quantitative status for their waters (including marine waters up to 1 nautical mile from the coast). The Directive is a framework, as it includes the necessary steps to achieve the common objective, rather than adopting the more traditional approach of limit values. The Directive aims to achieve **"Good"** overall status in all groundwater and surface waters (rivers, lakes, transitional and coastal waters) in the EU. The WFD combines qualitative, ecological, and

quantitative objectives for the protection of aquatic ecosystems and the good status of all water resources, while establishing the concept of integrated management at the geographical scale of River Basin Districts (RBDs). In addition, it redefines the concept of a river basin district, which includes inland surface (rivers, lakes), groundwater, transitional (deltas, estuaries), and coastal ecosystems. The ecological and chemical status of surface water systems is assessed according to the following criteria:

- **Biological** quality elements (fish fauna, benthic invertebrates, aquatic flora).
- **Hydromorphological** quality elements, such as the structure of a river bank or the substrate of a river bed.
- **Physicochemical** quality elements, such as temperature, dissolved oxygen, and nutrient conditions.
- **Chemical quality** referring to environmental quality standards for specific pollutants in a river basin. These standards set maximum concentrations for specific pollutants. If even one exceedance is noted, the water system is not classified as having "good ecological status."

The standards and limit values define the applicable classes for each quality characteristic and are specified in the WFD Guidelines (2016). In addition, Article 6 of the WFD requires the creation of a register or registers of all areas within the WFD which are designated as special protection areas under specific EU legislation for the protection of their surface and groundwater or for the conservation of habitats and species directly dependent on water. The WFD was amended by Directive 2008/105/EC on environmental quality standards in the field of water policy.

National legislation was harmonized with the WFD through Law 3199/2003, Presidential Decree 51/2007, and Joint Ministerial Decision Η.Π. 51354/2641/E103/2010. The provisions of the above legislation incorporate the basic concepts of the WFD, defining the administrative structure and responsibilities of the parties involved, both at national and regional level. In this context, the competent authority (Directorate-General for Water of the Ministry of Environment and Energy) drew up the 2h Revision of the River Basin Management Plans (RBMPs) for the country's 14 river basins in accordance with the WFD and national legislation.

The study area of the licensed project falls within *Water Districts EL11 "Eastern Macedonia" and EL12 "Thrace,"* where the *2nd Revision of the River Basin Management Plans for these WD was approved by PYS 16 of 29.4.2024* (Government Gazette A 82/12.06.2024) and PYS 16 of 29.4.2024 (Government Gazette A 81/12.06.2024), respectively.

The compatibility of the licensed project, which was documented in the approved EIA, is not affected by the proposed amendment, as it does not include interventions that fall within its scope. In any case, taking into account the proposed measures and the Environmental Monitoring Program proposed in **Chapters 10** and **7**, respectively, it is concluded that the overall project (including the proposed amendment) is not contrary to the objectives and provisions of the WFD.

5.4.4.4 Directive 2014/89/EU on Maritime Spatial Planning (MSP)

Maritime Spatial Planning (MSP) is developed at a cross-border and cross-sectoral level so that human activities at sea are carried out in an efficient, safe, and sustainable manner. Maritime spatial planning will

contribute to the effective management of maritime activities and the sustainable use of marine and coastal resources by creating a framework for consistent, transparent, sustainable, and evidence-based decision-making. In this context, the European Parliament and the Council adopted Directive 2014/89/EU establishing a framework for maritime spatial planning in order to create a common framework for MSP in Europe. The MSP Directive entered into force in September 2014 and is the first legal requirement worldwide for countries to establish transparent planning systems at sea and to cooperate with their neighbors to implement them. MSDS must be implemented in the territorial waters of Member States by March 2021. The Directive focuses on four objectives linked to the legal bases: environment, fisheries, maritime transport, and energy. Member States may add additional areas to ensure that all activities are covered equally and that the interests of all stakeholders are taken into account. The Directive does not impose design details or management targets, as these should be decided by Member States. However, it requires the implementation of MSP in all EU waters and facilitates cross-border cooperation through common minimum requirements and a specific timeframe.

Directive 2014/89/EU on Maritime Spatial Planning (hereinafter MSP) was transposed into Greek law by Law 4546/2018 (Government Gazette 101/A/2018), as amended by Law 4759/2020, and is currently in force. According to Article 3 of Law 4546/2018, as amended by Article 19 of Law 4759/2020, MSP is the process by which the competent authority analyzes and organizes human activities in marine areas to achieve a synthesis of ecological, environmental, economic, social, and cultural parameters with the aim of promoting the sustainable development of marine economies and marine areas and the sustainable use of marine resources.

According to Article 4 of Law 4546/2018, as amended by Article 20 of Law 4759/2020, the **main objectives** of the MSP at national and regional level are:

- To support and promote sustainable development and spatial cohesion between the maritime and coastal areas, through the synthesis of ecological, environmental, economic, social, and cultural parameters, taking into account land-sea interactions, the ecosystem approach, and, more generally, the principles of sustainable management.
- Sustainable, rational, and integrated spatial development of activities in the marine environment, such as, among others, the energy sector, maritime transport and shipping in general, fisheries and aquaculture, sustainable tourism, sustainable extraction of raw materials, as well as the conservation, protection, and improvement of the natural, man-made, and cultural environment, taking into account in general the underwater cultural heritage, as defined by the provisions of Law 3028/2002 (A' 153). In this context, the harmonious coexistence of all relevant activities and uses is sought, and the conservation of marine biodiversity and resilience to the effects of climate change are ensured.

According to Article 5 of Law 4546/2018, as amended by Article 21 of Law 4759/2020, the MSC includes:

A. The **National Spatial Strategy (NSS)** for the Marine Area of Article 6 and

B. The Maritime Spatial Planning Frameworks (MSPF) of Article 6 of the above law.

When preparing the NSS for the maritime space and the MSF, existing national policies, in particular island policy, as well as regulations and mechanisms, may be included and utilized provided that they contribute

to the achievement of the objectives of the Integrated Maritime Policy and comply with the requirements of Article 7 of Law 4546/2018, as in force.

However, the corresponding Maritime Spatial Plans have not yet been drawn up and MSP issues are currently covered by the corresponding Special and Regional Spatial Planning Frameworks in force, which concern specific economic sectors (renewable energy sources, industry, aquaculture, etc.) and include spatial planning guidelines for the development of each sector in land, coastal, and marine areas (to a lesser extent). In order to achieve the objectives of the MSP as set out in Article 4 of Law 4546/2018, as well as to ensure consistency between the MSP and spatial planning for land areas, the competent authority, when drawing up the National Spatial Strategy for the Marine Area and the Marine Spatial Plans, should take into account (Article 7 of Law 4546/2018):

- Relevant activities and uses in marine waters and coastal zones,
- Land-sea interactions.
- Environmental, economic, social, and cultural parameters, as well as climate change and security issues.
- The secure energy supply of island regions and the mainland.

It should also:

- Ensure the participation of stakeholders, in accordance with Article 9.
- Organize the use of the best available data, in accordance with Article 10.
- Ensure cross-border cooperation with other Member States, in accordance with Article 11.
- Promote cooperation with third countries, in accordance with Article 12.

The **National Spatial Strategy (NSS)** for the Maritime Area has been drafted and approved by PYS 6 of 17.4.2025 (Government Gazette D 227/17.04.2025) and is described in more detail in **Section 5.6.3.5** of this document. However, at the national level, maritime uses have not been institutionalized through **Maritime Spatial Planning Frameworks (MSPF).** With regard to the definition of marine uses, an exception is the Special Framework for Spatial Planning and Sustainable Development (EPCHSAA) for Aquaculture, which was established in November 2011 (Government Gazette 2505/B/2011).

The main authority responsible for the preparation, implementation, and evaluation of the MSPs is the Ministry of Environment and Energy (Article 14(1) of Law 4546/2018). The implementation tasks are transferred hierarchically to the General Secretariat for Spatial Planning and Urban Environment – General Directorate for Spatial Planning – Directorate for Spatial Planning.

Given the establishment of the MSP for the marine area and the absence of approved corresponding THPs, the compatibility of the proposed project with the existing maritime spatial planning will be examined on the basis of the MSP itself and the corresponding **Special and Regional Spatial Planning Frameworks** in force**,** which concern specific economic sectors (RES, industry, aquaculture, etc.) and include spatial planning guidelines for the development of each sector in land, coastal, and marine areas (to a lesser extent).

The compatibility of the proposed project with the applicable Special and Regional Spatial Planning Frameworks is examined in the relevant paragraphs of **Section 5.10**, the conclusions of which show that

the project in question (including the proposed amendment) is fully compatible with the established spatial planning commitments.

5.4.4.5 Bathing Water Directive (2006/7/EC)

The Bathing Water Directive first came into force in 1975 and its main objective is to ensure public health and protect the aquatic environment of coastal and inland areas from pollution. Bathing waters can be coastal or inland (rivers, lakes). For waters to be covered by the Directive, its mandatory quality standards and monitoring and reporting obligations, swimming in them must either be expressly permitted or not prohibited and traditionally carried out by a large number of people. The bathing season in the EU generally runs from the end of May to the end of September. The original Directive was replaced by the New Bathing Water Directive 2006/7/EC, which updates the measures of the 1975 legislation and simplifies the management and monitoring methods. The new Directive also provides a more proactive approach to informing the public about water quality by using four quality categories for bathing waters: "poor," "sufficient," "good," and "excellent."

The new Bathing Water Directive was transposed into national law through Ministerial Decision No. 8600/416/E103/2009 on the management of bathing water, in accordance with the provisions of Directive 2006/7/EC. In this context, the competent Special Secretariat for Water (EGY/YPEN) created the Bathing Water Register to describe and present the basic characteristics of bathing waters, identify sources of pollution that may affect bathing water quality, and assess the magnitude of these impacts. The Register also serves as a guide for selecting appropriate measures to minimize pressures on bathing waters and manage resources more effectively.

The proposed amendment to the project, following on from the initial design, is consistent with the restrictions and guidelines of the Directive, as it takes into account the provisions of the above legislation concerning the protection of bathing waters

5.4.4.6 Environmental Liability Directive (ELD) (2004/35/EC)

The Environmental Liability Directive (ELD) 2004/35/EC entered into force in 2009. Unlike Directive 96/82/EC (Seveso II Directive), which applies to large high-risk installations, the Environmental Liability Directive (ELD) applies to all companies, regardless of size, operating in the energy sector, among others, as defined in Annex III to the Directive. The ELD defines environmental damage as:

- Damage that significantly affects the environmental (ecological, chemical, or quantitative) status of water resources, as defined in the EU Water Framework Directive and the Marine Strategy Directive.
- Damage to soil, which creates a serious risk to human health;
- Damage to protected species and natural habitats, which adversely affects conservation, as defined in the Birds Directive and the Habitats Directive.

The above definition includes the emission of pollutants into the atmosphere (as this affects the condition of the soil or water), into inland surface waters and groundwater, as well as any deliberate release of genetically modified organisms into the environment, as defined in Directive 2001/18/EC. The Directive applies to waters covered by Directive 2000/60/EC, according to which "surface waters" include territorial waters (Article 2(1) of Directive 2000/60/EC). This means that liability for environmental damage can be attributed within 12 nautical miles of the coast. Exceptions to the ELC include armed conflicts, natural disasters, liability for types of environmental damage covered by international conventions (e.g., marine pollution), and nuclear risks, which are covered by the Euratom Treaty.

With regard to preventive and remedial actions, the Directive provides as follows:

- If there is an imminent threat of damage, the undertaking must take the necessary preventive measures without delay.
- If damage has already been caused, the operator must immediately inform the authorities and take measures to manage the situation in order to prevent further environmental damage and threats to human health, as well as take appropriate remedial measures.

The EPRD was amended by Directives 2006/21/EC, 2009/31/EC, and 2013/30/EU. The EPRD was transposed into national law by Presidential Decree 148/2009.

The proposed amendment to the project, following its initial design, is consistent with the restrictions and guidelines of this Directive, as it takes into account the provisions of the above legislation concerning the assumption of environmental responsibility

5.4.4.7 Directive 2009/123/EC amending Directive 2005/35/EC on ship-source pollution and on the introduction of penalties, including criminal penalties, for infringements

The purpose of the Directive was to incorporate international standards on pollution from ships into EU law and to ensure that those responsible for discharging polluting substances are punished with appropriate penalties, including criminal penalties, in order to improve safety at sea and enhance the protection of the marine environment from pollution by ships. The Directive does not prevent Member States from taking more stringent measures against pollution from ships in accordance with international law. In accordance with Article 3 of the Directive, the latter applies, in accordance with international law, to discharges of polluting substances into:

- the internal waters of a Member State, including ports, to the extent that the MARPOL regime applies;
- The territorial waters of a Member State,
- Straits used for international navigation and subject to the regime of transit passage as defined in Part III, Section 2 of the 1982 United Nations Convention on the Law of the Sea, provided that such straits are under the jurisdiction of a Member State,

- the exclusive economic zone or equivalent zone of a Member State, established in accordance with international law, and
- The high seas.

The Directive applies to discharges of polluting substances from any ship, regardless of flag, with the exception of warships, naval auxiliary ships or other ships owned or operated by a State and used, for the time being, only on government non-commercial service. Member States shall ensure that discharges of polluting substances from ships, including minor discharges, in any of the above-mentioned areas are considered violations if committed intentionally, through conscious negligence, or gross negligence. Each Member State shall take the necessary measures to ensure that any natural or legal person who has committed an infringement within the meaning of paragraph 1 may be held liable. The discharge of polluting substances into any of the above-mentioned areas shall not be considered an infringement if it complies with the conditions laid down in Annex I, Regulations 15, 34, 4.1 or 4.3 or in Annex II, Regulations 13, 3.1.1 or 3.1.3 of Marpol 73/78. The discharge of polluting substances in areas (c), (d) and (e) shall not be considered an infringement by the shipowner, master or crew, provided that it complies with the conditions laid down in Annex I to Regulation 4.2 or Annex II, Regulation 3.1.2 of Marpol 73/78.

The Directive was transposed into national law by Law 4037/2012.

The proposed amendment to the project, following its initial design, is consistent with the restrictions and guidelines of this Directive, as it takes into account the provisions of the above legislation concerning pollution from ships.

5.4.4.8 Barcelona Convention

The Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention) was adopted on February 16, 1976, by the Conference of the Coastal States of the Mediterranean held in Barcelona. Two Protocols were adopted at this conference, aimed at preventing pollution from ships and aircraft (dumping) and at cooperation in combating pollution in cases of emergency. These institutional instruments entered into force on February 12, 1978. The Convention also provided for the establishment of additional legal instruments and was soon supplemented by the Protocol on Pollution from Land-Based Sources (1980), the Protocol on Specially Protected Areas (1982) and the Offshore Protocol (1994).

The **main objectives** of the Convention are:

- The assessment and control of marine pollution.
- To ensure the sustainable management of natural marine and coastal resources.
- To integrate the environment into economic and social development.
- To protect the marine environment and coastal zones by preventing and reducing pollution and, as far as possible, eliminating pollution from marine or land-based sources.
- Protecting natural and cultural heritage.
- Strengthening solidarity among the coastal States of the Mediterranean.
- Contributing to the improvement of the quality of life.

In 1995, the Contracting Parties adopted significant amendments to the 1976 Convention, which was renamed **the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean** and entered into force in 2004. In addition, in 1995 the Contracting Parties adopted the **Action Plan for the Protection of the Marine Environment and Coastal Areas of the Mediterranean** (MAP, Phase II), replacing the original MAP adopted in 1975. The Barcelona Convention has activated a total of seven Protocols addressing specific aspects of Mediterranean environmental conservation, complementing the legal framework of the MAP. These are:

1 Dumping Protocol: Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft (adopted in 1976, amended in 1995, and the amendments have not yet entered into force).

2 Land-based sources Protocol (LBS Protocol) (including Regional plans under Article 15 of the LBS), which entered into force in 2011: Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources and Activities, which entered into force in 1980 and was amended in 1996, with the amendment entering into force in 2008. Regional Plans were also adopted under the LBS Protocol to reduce or eliminate substances or their loads and marine litter.

3 SPA Protocol: Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA Protocol) adopted in 1995, replacing the relevant 1982 protocol and its Annexes (as adopted in 1996 and amended in 2009, 2012, and 2013).

4 Prevention and Emergency Protocol: Protocol on cooperation in preventing pollution from ships and combating pollution in the Mediterranean (Prevention and Emergency Protocol) in cases of emergency, which was adopted in 2002, replacing the relevant Protocol of 1976, and entered into force in 2004.

5 Offshore Protocol: Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf, the Seabed and the Subsoil (Offshore Protocol), which was adopted in 1994 and entered into force in 2011.

6 Hazardous Waste Protocol: Protocol for the Prevention of Pollution of the Mediterranean Sea through the Transboundary Movement and Disposal of Hazardous Wastes (Hazardous Waste Protocol), adopted in 1996 and entered into force in 2011.

7 ICZM Protocol: Protocol on Integrated Coastal Zone Management in the Mediterranean (ICZM Protocol), adopted in 2008.

On December 17, 2012, the Council approved the EU's accession to the Offshore Protocol, thus underlining the EU's commitment to reducing the environmental impact of offshore activities in the Mediterranean through effective regional cooperation. The institutional result of the above was the incorporation of the Offshore Protocol into EU law.

The Barcelona Convention, its amendments, and its protocols were ratified by Greece through Laws 855/1978, 3022/2002, and 1634/1986 (SPA Protocol).

The proposed amendment to the project, following its initial design, is consistent with the restrictions and guidelines of this Directive, as the provisions of the above legislation are taken into account.

5.4.4.9 Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances (SEVESO II Directive)

The Seveso II Directive requires EU Member States to identify high-risk industrial sites take appropriate measures to prevent major accidents involving dangerous substances and limit their consequences for people and the environment.

The project is not directly related to this Directive. However, the licensed project is **indirectly** related to the Directive, as its land section is located within the Sigma unit, which complies with all the commitments and specifications arising from the Seveso II Directive.

However, it should be noted that the present proposed amendment does not include any intervention in the licensed land-based part of the overall project.

5.4.4.10 IPPC Directive (2008/1/EC)

The Directive (known as the "IPPC Directive") establishes a permit for industrial and agricultural activities with high pollution potential. The granting of this permit is subject to compliance with certain environmental requirements, so that companies themselves take responsibility for preventing and reducing the pollution they may cause.

Integrated pollution prevention and control applies to industrial and agricultural activities, new or existing, with a high pollution potential, as defined in Annex I to the Directive (energy industries, metal production and processing, mining, chemical industry, waste management).

In order to obtain an operating permit, an industrial or agricultural facility must comply with certain fundamental obligations, mainly concerning:

- The use of all necessary pollution control measures, in particular the use of the best available techniques (so as to produce as little waste as possible, use the least hazardous substances, enable the recovery and recycling of emitted substances, etc.);
- Preventing any large-scale pollution.
- Prevention, recycling, or disposal of waste with the least polluting consequences.
- The efficient use of energy.
- Prevention of accidents and limitation of their consequences.
- The restoration of the site after completion of activities.

The project is not directly related to this Directive. However, the licensed project is **indirectly** related to the Directive, as its land-based part is located within the Sigma unit, which complies with all the commitments and specifications arising from the IPPC Directive.

However, it should be noted that the present proposed amendment does not include any intervention in the licensed land part of the overall project.

5.4.4.11 International Convention for the Prevention of Pollution from Ships (MARPOL)

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering the prevention of pollution of the marine environment from ships, whether from operational or accidental causes.

The MARPOL Convention was adopted on November 2, 1973, within the framework of the International Maritime Organization (IMO). The 1978 Protocol was adopted in response to a surge in tanker accidents in 1976-1977. Since the 1973 MARPOL Convention had not yet entered into force, the 1978 MARPOL Protocol absorbed the parent Convention. The combined instrument entered into force on December 2, 1983. In 1997, a Protocol amending the Convention was adopted and a new Annex VI was added, which entered into force on May 19, 2005. MARPOL has been updated from time to time with amendments.

The Convention contains regulations aimed at preventing and minimizing pollution from ships—both accidental pollution and pollution from routine operations—and currently includes six technical Annexes. Most Annexes include Special Areas with strict controls on operational discharges.

- Annex I Regulations for the Prevention of Pollution by Oil (entered into force on October 2, 1983)
  - Covers the prevention of oil pollution from operational measures, as well as from accidental discharges. The 1992 amendments to Annex I made double hulls mandatory for new oil tankers and set a phased implementation schedule for retrofitting existing tankers with double hulls, which was subsequently revised in 2001 and 2003.
- Annex II Regulations for the Prevention of Pollution by Noxious Liquid Substances in Bulk (entered into force on October 2, 1983)
  - Describes in detail the discharge criteria and measures to control pollution from noxious liquid substances carried in bulk. Approximately 250 substances were evaluated and are included in the list attached to the Convention. The discharge of residues is only permitted in reception facilities up to certain concentrations and under conditions (which vary according to the category of substances) that must be complied with.
  - In any case, the discharge of residues containing harmful substances is not permitted within 12 miles of the nearest coast.
- Annex III Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form (entered into force on July 1, 1992)
  - Contains general requirements for the issuance of detailed standards for packaging, labeling, documentation, quantitative restrictions, exemptions, and notifications.
  - For the purposes of this Annex, "harmful substances" means substances that are classified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code) or meet the criteria in the Appendix to Annex III.
- Annex IV Prevention of Pollution by Sewage from Ships (entered into force on September 27, 2003)

- It includes requirements for the control of marine pollution from sewage. The discharge of sewage into the sea is prohibited, unless the ship has an approved sewage treatment plant in operation or the ship discharges pulverized and disinfected sewage using an approved system more than three nautical miles from the nearest coast. Sewage that is not pulverized or disinfected must be discharged more than 12 nautical miles from the nearest coast.

- Annex V Prevention of Pollution by Garbage from Ships (entered into force on December 31, 1998)
  - This deals with various types of garbage and specifies the distances from the coast and the manner in which they may be disposed of. The most important feature of the Annex is the total ban it imposes on the discharge of any form of plastic into the sea.
- Annex VI Prevention of Air Pollution from Ships (entered into force on May 19, 2005)
  - It sets limits on emissions of sulfur oxide and nitrogen oxide from ship exhaust gases and prohibits the deliberate emission of ozone-depleting substances. In designated emission control areas, stricter standards apply for SO_x, NO_x and particulate matter. A chapter adopted in 2011 covers mandatory technical and operational energy efficiency measures aimed at reducing greenhouse gas emissions from ships.

The MARPOL Convention, its amendments, and protocols have been ratified by Greece through the following laws, presidential decrees, and ministerial decisions:

- Presidential Decree 404/1986 (Government Gazette 182/A/26-11-1986).
- Presidential Decree 254/1989 (Government Gazette 120/A/11-05-1989).
- Presidential Decree 288/1992 (Government Gazette 147/A/02-09-1992).
- Presidential Decree 103/1992 (Government Gazette 47/A/31-03-1992).
- Presidential Decree 46/1993 (Government Gazette 17/A/17-02-1993).
- Presidential Decree 361/1996 (Government Gazette 233/A/20-09-1996).
- Presidential Decree 54/1999 (Government Gazette 53/A/22-03-1999).
- Presidential Decree 128/2000 (Government Gazette 112/A/06-04-2000).
- Presidential Decree 206/2000 (Government Gazette 186/A/25-08-2000).
- Presidential Decree 312/2002 (Government Gazette 273/A/13-11-2002).
- Presidential Decree 114/2006 (Government Gazette 112/A/08-06-2006).
- Ministerial Decision 2431.02/02/05 (Government Gazette 331/B/15-03-2005).
- Presidential Decree 27/2007 (Government Gazette 19/A/30-01-2007).
- Ministerial Decision 2431.02.1/02/07 (Government Gazette 197/A/23-08-2007).
- Law 3104/2003 (Government Gazette 28/A/10-02-2003).

The Project complies with the restrictions and guidelines of the Convention, which aim to prevent and minimize pollution from ships.

The proposed modification of the project, following its initial design, complies with the restrictions and guidelines of this Directive, as the provisions of the above legislation are taken into account.

5.4.4.12 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention)

The Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) is one of the first global conventions for the protection of the marine environment from human activities and has been in force since 1975. Its aim is to promote the effective control of all sources of marine pollution and to take all practical measures to prevent marine pollution from the disposal of waste and other matter. Currently, 87 states are parties to the Convention, including Greece. In 1996, the "London Protocol" was agreed upon to further modernize the Convention and ultimately replace it. According to the Protocol, any dumping practice is prohibited except for any acceptable waste on the so-called "reverse list," which includes the following:

- Dredging materials.
- Urban sewage sludge.
- Fish waste.
- Vessels and platforms.
- Inert, inorganic geological materials (e.g., mining waste).
- Organic materials of natural origin.
- Bulky objects consisting mainly of iron, steel, concrete.
- Waste from carbon dioxide capture processes.

The Protocol entered into force on March 24, 2006, with 51 contracting parties. Greece ratified the London Convention through Law 1147/1981, but has not yet ratified the corresponding London Protocol.

The proposed modification of the project, following its initial design, is consistent with the restrictions and guidelines of the Convention, which aim to prevent marine pollution from the disposal of waste and other materials.

5.4.4.13 Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH)

The REACH Regulation, which entered into force on June[1,] 2007, requires manufacturers and importers of chemical products to assess the risks arising from the use of chemical products and to manage those risks. REACH applies to the manufacture, placing on the market, or use of substances on their own, in mixtures, or in articles, and to the placing on the market of mixtures. A "substance" is defined as a chemical element and its compounds in the natural state or as obtained from any manufacturing process.

Key elements of REACH are the registration requirements, according to which the production or import of chemical products in quantities of one ton or more per year must be registered. Substances of very high concern are also subject to an authorization process. In addition, the REACH Regulation implements a restriction process, whereby restrictions are placed on the conditions of manufacture, use(s) and/or placing on the market of a substance, or even a total ban on the manufacture, use or placing on the market of a substance.

While the draft EU Regulation does not specifically refer to REACH, it is considered relevant, as the Offshore Protocol requires the use of chemicals for the exploration and/or exploitation of resources that must be regulated, restricted, or prohibited.

The proposed modification of the project, following its initial design, is consistent with the restrictions and guidelines of this Regulation, as its design has incorporated all the specifications for the use of chemical substances.

5.4.4.14 Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC) 1990

In July 1989, a conference of leading industrial countries in Paris asked the International Maritime Organization (IMO) to develop further measures to prevent pollution from ships. This request was approved by the IMO Assembly in November of the same year, and work began on a draft convention aimed at providing a global framework for international cooperation in combating serious incidents or threats of marine pollution.

The parties to the International Convention on Oil Pollution Preparedness, Cooperation and Response to Marine Pollution by Oil (OPRC) must establish measures to respond to pollution incidents, either nationally or in cooperation with other countries.

Ships must have an emergency plan for responding to oil pollution, while operators of offshore installations under the jurisdiction of the Contracting Parties are also required to have oil pollution contingency plans or similar arrangements in place, which must be coordinated with national systems to ensure an immediate and effective response to oil pollution incidents.

In addition, ships are required to report pollution incidents to coastal authorities, and the Convention describes in detail the actions to be taken thereafter. The Convention calls for the establishment of oil spill response equipment reserves, the conduct of oil spill response exercises, and the development of detailed plans for responding to pollution incidents.

The Contracting Parties to the Convention are obliged to provide assistance to others in the event of a pollution emergency, and it is stipulated that any assistance provided shall be reimbursed.

In 2000, an OPRC Protocol relating to hazardous and noxious substances (OPRC-HNS Protocol) was also adopted.

The proposed modification of the project, following its initial design, is consistent with the restrictions and guidelines of this Convention, as its design has incorporated all the specifications for dealing with oil pollution.

5.4.4.15 United Nations Convention on the Law of the Sea (UNCLOS)

The United Nations Convention on the Law of the Sea (UNCLOS), also known as the Law of the Sea Convention or the Law of the Sea Treaty, is the international agreement that emerged from the third United

Nations Conference on the Law of the Sea (UNCLOS III), held between 1973 and 1982. The Convention on the Law of the Sea defines the rights and responsibilities of nations with regard to their use of the oceans worldwide, establishing guidelines for business, the environment, and the management of marine natural resources. The Convention, concluded in 1982, replaced four treaties from 1958. UNCLOS entered into force in 1994.

As of January 2015, 166 countries and the EU have acceded to the Convention. However, it is uncertain whether the Convention codifies customary international law.

5.4.4.16 Stockholm Convention on Persistent Organic Pollutants (POPs)

The Stockholm Convention on Persistent Organic Pollutants is an international environmental treaty that was signed in 2001 and entered into force in May 2004 with the aim of eliminating or reducing the production and use of persistent organic pollutants (POPs).

Key elements of the Convention are the obligation of developed countries to provide new and additional financial resources and measures to eliminate the production and use of intentionally produced persistent organic pollutants, to eliminate the unintentional production of pollutants, where feasible, and to manage and dispose of persistent organic pollutant waste in an environmentally sound manner. Attention is given throughout the Stockholm Convention, with specific references in the preamble, the objective, and the provision concerning the identification of new persistent organic pollutants.

5.4.4.17 International Convention for the Safety of Life at Sea (SOLAS) on Noise Emissions from Ships

The main objective of the SOLAS Convention, adopted in 1974, is to establish minimum standards for the construction, equipment, and operation of ships, which should be compatible with their safety standards. Flag States are responsible for ensuring that ships flying their flag comply with the requirements of the Convention, as evidenced by a series of certificates required under the Convention. The control procedures also allow contracting states to inspect ships of other contracting states in cases where there are serious indications of non-compliance with the requirements of the Convention - this procedure is known as port State control. The current SOLAS Convention includes articles setting out general obligations, amendment procedures, etc., as well as an Annex divided into 14 chapters.

In 2012, the IMO adopted a regulation of the SOLAS Convention, which requires that ships be constructed with the aim of reducing noise on board and protecting personnel from noise, in accordance with the Code on Noise Levels on Ships. The Code sets maximum noise levels in engine rooms, control rooms, workshops, accommodation, and other areas of ships. The Maritime Labour Convention of the International Labour Organization (MLC 2006) also sets requirements for the prevention of exposure to hazardous noise levels on ships.

The SOLAS Convention was ratified by Law 1045/1980 and a series of Presidential Decrees were issued adopting the amendments to the Convention (http://..yae. gr// solas).

The proposed modification of the project, following its initial design, is consistent with the restrictions and guidelines of the Convention.

5.4.4.18 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND)

Although the 1969 Civil Liability Convention (CLC) was a useful mechanism for ensuring payment of compensation for oil pollution damage, it does not adequately address all the legal, financial, and other issues raised during the Conference that adopted the CLC. The 1969 Brussels Conference is considered a compromise proposal for the creation of an international fund, where cargo insurance interests would be registered, which had the dual purpose of on the one hand, to relieve the shipowner of the burden of the new Convention's claims and, on the other hand, to provide additional compensation to victims of pollution damage in cases where the compensation provided for under the 1969 Civil Liability Convention was either insufficient or unattainable.

The Conference recommended that the International Maritime Organization develop such a system, and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage was adopted at a Conference held in Brusselsin 1971. It is complementary to the Civil Liability Convention.

The **purposes** of the Fund Convention are:

- To provide compensation for pollution damage to the extent that the protection provided by the 1969 Civil Liability Convention is inadequate.
- To provide relief to shipowners in respect of the additional financial burden imposed on them by the 1969 Civil Liability Convention. The relief is subject to conditions designed to ensure compliance with maritime safety and other conventions.
- The implementation of the relevant objectives set out in the Convention.

In accordance with the first of its purposes, the Fund is obliged to pay compensation to States and persons suffering damage from pollution if those persons are unable to obtain compensation from the owner of the ship from which the oil escaped or if the compensation payable by that owner is insufficient to cover the damage suffered.

Under the Fund Convention, victims of oil pollution damage may be compensated beyond the shipowner's liability limit. However, the Fund's obligations are limited. When there is no shipowner liable or the liable shipowner is unable to meet his liability, the Fund will have to pay the entire amount of compensation due. Under certain circumstances, the Fund's maximum liability may be increased.

With the exception of a few cases, the Fund is obliged to pay compensation to victims of oil pollution damage who are unable to obtain adequate or any compensation from the shipowner or his guarantor under the Civil Liability Convention.

The Fund's obligation to pay compensation is limited to pollution damage occurring in the territory, including territorial waters, of the Contracting States. The Fund is also obliged to pay compensation in respect of

measures taken by a Contracting State outside its territory.

The Fund may also provide assistance to Contracting States threatened or affected by pollution and wishing to take measures to combat it. Such assistance may be in the form of personnel, equipment, credit facilities, or other support.

In relation to its second main function, the Fund is obliged to compensate the shipowner or his insurer for part of the shipowner's liability under the Civil Liability Convention.

The Fund is not obliged to compensate the owner if the damage was caused by his own wilful misconduct or if the accident was caused, even in part, because the ship did not comply with certain international conventions. In addition, the Convention contains provisions on the claims procedure, rights and obligations, and jurisdiction.

Contributions to the Fund must be made by all persons receiving oil by sea in Contracting States.

Greece ratified the Convention, the Protocols, and the amendments thereto through Law 1638/1986, Presidential Decrees 270/1995, 270/1995, 286/2002, 291/2003, and Law 3482/2006.

The proposed amendment to the project, following its initial design, is consistent with the restrictions and guidelines of the Convention.

5.4.5 Institutional Framework for Human Rights and Social Welfare

5.4.5.1 International Institutional Framework for Human Rights

International human rights law is based on the Universal Declaration of Human Rights and consists of nine core international instruments with additional optional protocols. The relevant international human rights instruments are listed below:

- International Covenant on Civil and Political Rights (ICCPR): The ICCPR recognizes the dignity of every individual and promotes the protection of individuals' freedom from state interference and ensures that everyone can participate in civil society. Freedom of expression and freedom of assembly are part of these rights.
- International Covenant on Economic, Social and Cultural Rights (ICESCR) - The parties to the ICESCR agree to protect the enjoyment of these rights from violations by third parties.

5.4.5.2 International Regulations on Workers' Rights

The International Labor Organization (ILO) is a UN agency that sets labor standards, develops policies, and designs programs that promote decent work for all women and men.

The eight fundamental ILO conventions are as follows:

1 Convention on Freedom of Association and Protection of the Right to Organise, 1948 (No. 87)

2 Convention concerning the Application of the Principles of the Right to Organise and to Bargain Collectively, 1949 (No. 98)

3 Forced Labor Convention, 1930 (No. 29) (and the 2014 protocol)

4 Convention concerning the Abolition of Forced Labor, 1957 (No. 105)

5 Minimum Age Convention, 1973 (No. 138)

6 Convention concerning the Worst Forms of Child Labor, 1999 (No. 182)

7 Equal Remuneration Convention, 1951 (No. 100)

8 Convention concerning Discrimination in Respect of Employment and Occupation, 1958 (No. 111).

Greece has ratified the following ILO conventions:

- 71 Conventions and 1 Protocol, of which 51 are in force, 17 Conventions have been denounced, 3 bodies abolished; of the 71 Conventions and 1 Protocol ratified in Greece, none have been ratified in the last 12 months.
- Fundamental Conventions: 8 out of 8.
- Governance (Priority) Conventions: Greece has not ratified Convention C129 - Labor Inspection (Agriculture) of 1969.
- Technical Conventions: 60 out of 177.

5.4.5.3 International Institutional Framework for Access to Information and Participation of the Public and Interested Parties in Decision-Making

5.4.5.3.1 Aarhus Convention

The United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters was adopted on 25June 1998 in Aarhus, Denmark, at the Fourth Ministerial Conference under the "Environment for Europe" process.

The Convention:

- Links environmental and human rights.
- Recognizes that we have an obligation to future generations.
- Stipulates that sustainable development can only be achieved with the participation of all stakeholders.
- Links government accountability and environmental protection.
- Focuses on interactions between citizens and public authorities in a democratic context.

The subject matter of the Convention concerns the core of the relationship between citizens and governments and deals with government accountability, transparency, and responsiveness.

The Aarhus Convention grants rights to citizens and imposes obligations on Parties and public authorities

regarding access to information, public participation, and access to justice.

The Aarhus Convention also establishes a new process for public participation in the negotiation and implementation of international agreements.

Its three main pillars are as follows:

- **Access to information**: every citizen must have the right to broad and easy access to environmental information. Public authorities are required to provide all necessary information and to collect and disseminate it in a timely and transparent manner. This includes information on the state of the environment, policies and measures taken, or the state of human health and safety, where this may be affected by the state of the environment. Certain information is exempt from disclosure, such as in cases where disclosure would adversely affect international relations, national defense, public safety, the administration of justice, commercial confidentiality, or the confidentiality of personal data. Information may not be disclosed if its disclosure could harm the environment, such as the breeding sites of rare species.
- **Public participation in decision-making**: citizens have the right to participate in decision-making on environmental issues. Public authorities should ensure that arrangements are in place to allow the public to be informed and then to comment (if they so wish) on proposals for projects affecting the environment, or plans and programs relating to the environment. Any subsequent comments should be taken into account in the decision-making process. Decision-makers can benefit from the knowledge and experience of citizens. This contribution is a great opportunity to improve the quality of environmental decisions and outcomes and ensures procedural legitimacy.
- **Access to justice**: citizens have the right to judicial or administrative review procedures in the event that a Party violates or fails to comply with the principles of the Convention, i.e. they have the right to appeal when environmental law is violated and the right of access to review procedures to challenge public decisions taken without taking into account the other two pillars of the Convention.

The design, maturation process, and licensing of the proposed project modification, following the initial design, are fully consistent with the requirements of the Aarhus Convention.

5.4.5.3.2 European legislation

EU legislation on public consultation, public participation, and access to environmental information includes the following Directives:

- **Directive 2003/35/EC** of the European Parliament and of the Council of 26May 2003, providing for public participation in the drawing up of certain plans and programs relating to the environment and amending, with regard to public participation and access to justice, Council Directives 85/337/EEC and 96/61/EC. Directive 2003/35/EC refers to the second pillar of the Aarhus Convention.
- **Directive 2003/4/EC** of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC. Directive 2003/4/EC refers to the first pillar of the Aarhus Convention.

5.4.5.3.3 National legislation

Greece has ratified and transposed European legislation on the requirements for consultation and participation of the public and interested parties in environmental information through the following legislation:

- Joint Ministerial Decision (JMD) 1649/45/2014, as amended by JMD 5688/2018, includes provisions and specifications concerning: a) the means of consultation between the various authorities and b) the ways of informing the public and its participation in public consultation during the environmental licensing process.
- Joint Ministerial Decision 21398/2012 on the creation and operation of a special website for the publication of decisions on the approval, renewal, or amendment of environmental permits.
- Joint Ministerial Decision 9269/470/2007 on judicial proceedings for the protection of the public from administrative acts or omissions regarding the disclosure of information and participation in the environmental licensing process.
- Joint Ministerial Decision 11764/653/2006 transposes Directive 2003/4/EC on public access to environmental information.
- Law 3422/2005 ratifying the Aarhus Convention (Directive 2003/35/EC).
- Joint Ministerial Decision 3711/2021/2003 on media and public participation in the approval of environmental terms.

5.4.5.4 National Institutional Framework for Human Rights

The Greek authorities make every effort to ensure that the level of protection of fundamental rights is upheld by all state bodies and institutions, so as to guarantee the rules of a free, non-discriminatory democratic society. In the hierarchy of legal rules that guarantee the protection of fundamental rights, the Greek Constitution, as the supreme law, includes a special chapter on individual and social rights (Part B - Articles 4-25) (Hellenic Council for Refugees, 2019).

The Hellenic National Commission for Human Rights (EEDA), as an independent advisory body to the State on human rights protection issues, constitutes the National Human Rights Institution (EIDH) and, in accordance with UN principles, has a duty, within the powers conferred on it by its founding law, to monitor developments in its field of activity, to address the competent state services, and take initiatives to raise public awareness (Hellenic Council for Refugees, 2019). The EEA attaches particular importance to the international protection regime and has issued a series of relevant decisions (reports, statements, announcements), such as the recent reference report on refugees (September 2019) setting out the EEA's positions on the reception and accommodation of applicants for international protection, the detention of applicants for international protection, international protection procedures at first and second instance, unaccompanied minors, the transfer of third-country nationals at the Greek-Turkish border, and the integration of refugees in Greece (Greek Council on Refugees, 2019).

In addition, the National Action Plan on Human Rights was established by the Greek State for the period 2014-2016 in order to strengthen, implement, and protect fundamental rights in Greece.

5.4.5.5 National Institutional Framework for Social Welfare

National legislation on social welfare includes:

- Articles 29 and 30 of Presidential Decree 141/2013.
- Establishment of the Asylum Service by Law 3907/2011, which began operating in June 2013. It is the first independent structure in Greece responsible for examining requests for international protection. The same law also established the Appeals Authority, which examines, at second instance, appeals against decisions of the Asylum Service rejecting applications for international protection at first instance, as well as the Reception and Identification Service, which launched a system for the initial reception and registration of the details and needs of those entering Greece without legal formalities, including persons wishing to apply for asylum. Today, the operation of all three services is regulated by Law 4375/2016.
- Article 1 (IA) (2) of Law 4093/2012, as amended by Article 6 of Law 4472/2017.
- Article 10 of Law 3220/2004.
- Joint Ministerial Decision C4a/F. 225/161 (Government Gazette 108/B/15.2.1989).
- Article 235 of Law 4389/2016.
- Article 93 of Law 4387/2016.

5.5 INTERNATIONAL – COMMUNITY – NATIONAL ENVIRONMENTAL PROTECTION OBJECTIVES RELEVANT TO THE PROJECT

5.5.1 International – Community Environmental Protection Objectives Relevant to the Project

5.5.1.1 United Nations 2030 Agenda

The 2030 Agenda for Sustainable Development, the 17 Sustainable Development Goals, and the 169 sub-goals were adopted by the United Nations General Assembly on September 25, 2015, with Resolution "Transforming our world: the 2030 Agenda for Sustainable Development."

The 2030 Agenda is the most ambitious global agreement ever achieved by the UN, as it is an action plan for People, Planet, and Prosperity. Agenda 2030 promotes the integration of all three dimensions of sustainable development—social, environmental, and economic—into all sectoral policies, while promoting the interconnection and coherence of policies and legislative frameworks related to the Sustainable Development Goals (SDGs), policies, and legislative frameworks. Sustainable development can be understood by addressing challenges related to the following five pillars (5 P):

- People,
- Planet,
- Prosperity,
- Peace,
- Partnership.

The 17 SDGs (see figure below) were adopted by the 193 member states of the UN, including Greece, and are universal, with a timeline for implementation by 2030. They constitute a roadmap for achieving a better and sustainable future for all, are interlinked and indivisible, with the achievement of one Goal having an impact on others.

Source: UN Regional Information Center, https://unric.org/

Figure5 –3 : Sustainable Development Goals of the United Nations 2030 Agenda

The 2030 Agenda is the international community's agenda for achieving sustainable development for all — that is, economic growth that guarantees social well-being without exclusion and the protection of the environment and natural resources for the benefit of not only current but also future generations — by 2030.

All UN member states have made commitments to implement the SDGs, and the EU, together with its member states, has committed to taking the lead in implementing the United Nations' 2030 Agenda.

In November 2016, the European Commission presented its strategic approach to implementing the Sustainable Development Goals of the 2030 Agenda.

Key actions for implementing the 2030 Agenda are as follows:

- Inclusion of SDGs in all EU policies and initiatives, so that sustainable development is a fundamental guiding principle in all European Commission policies.
- Regular reporting on EU progress starting in 2017.
- Promoting the implementation of the 2030 Agenda together with EU Member State governments, the European Parliament, other European institutions, international organizations, civil society organizations, citizens, and other stakeholders.
- Establish a high-level platform involving a wide range of stakeholders to promote the exchange of best practices in all areas at national and European level.

- Formulating a long-term vision beyond 2020.

The SDGs are interlinked and therefore require a much more integrated approach across all policy areas, from tackling poverty and social exclusion (SDG 1) ensuring universal access to quality health services (SDG 3) and education (SDG 4), ensuring full employment and decent work for all (SDG 8), developing industry, innovation, and infrastructure (SDG 9), reducing social and regional inequalities (SDG 10), ensuring integrated water resource management (SDG 6), promoting renewable energy and energy efficiency (SDG 7), and protecting and sustainably managing the oceans (SDG 14). Finally, they also include horizontal goals, such as building efficient, reliable, and transparent institutions (SDG 16) and strengthening and promoting open, participatory, and democratic processes as a means of implementing them (SDG 17). It should be noted that the Goals relating to environmental issues correspond to approximately 7 of the total 17 Goals (see SDG 6 – water, SDG 7 – sustainable energy, SDG 11 – sustainable cities, SDG 12 – sustainable production and consumption patterns, SDG 13 – climate change, SDG 14 – life below water, SDG 15 – life on land), with environmental SDGs acting as a "catalyst" for achieving all other Goals.

The proposed amendment to the project, following on from the initial design, concerns the storage of carbon dioxide (CO2) and is therefore fully in line with the Sustainable Development Goals, as it aims to **mitigate climate change.** In particular, it is in line with the following SDGs.

The sub-targets of **SDG 11**, which concerns "Sustainable Cities and Communities," are consistent with the Project:

- 11.6 By 2030, reduce the adverse per capita environmental impact of cities, paying particular attention to air quality and the management of urban and other waste.
- 11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans aimed at social inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and the development and implementation of holistic disaster risk management at all levels, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030.

The sub-goals of **SDG 13**, which concerns "Climate Action," are consistent with the Project:

- 13.1 Strengthen the resilience and adaptive capacity of all countries to the risks and natural disasters arising from climate change.
- 13.2 Integrate climate change measures into national policies, strategies, and planning.

5.5.1.2 8th Action Program for the Environment

Environmental action programs have guided the development of EU environmental policy since the early 1970s.

In March 2021, EU member state ambassadors approved a mandate for the Council to negotiate with the European Parliament on an agreement on the8th Environment Action Program (EAP). The 8th EAP will serve as a guide for the development and implementation of environmental and climate policy until 2030.

The Commission's proposal for the 8thEAP does not, exceptionally, include a list of actions and is based on the European Green Deal and the list of actions it contains.

The 8th MFF aims to accelerate the green transition in a fair and inclusive manner, with the long-term goal for 2050 of 'Prosperity within the limits of our planet' as established in the 7th MFF.

The six priority thematic objectives of the 8th MFF concern:

- Reducing greenhouse gas emissions.
- Adapting to climate change.
- A development model that gives back to the planet more than it takes away.
- The ambition of zero pollution.
- Protecting and restoring biodiversity.
- Reducing the key environmental and climate pressures associated with production and consumption.

The proposed modification of the project, following its initial design, is fully consistent with and promotes the above objectives as it concerns CO2 storage and is an environmentally friendly technology. Furthermore, it should be emphasized that the project design will include measures to reduce potential environmental impacts, such as waste management and accident prevention/response/remediation measures, as described in **Chapter 10** of this

5.5.1.3 European Green Deal

Climate change and environmental degradation threaten the very existence of Europe and the world. To address these challenges, the European Green Deal aims to transform the EU into a modern, resource-efficient, and competitive economy by ensuring the following:

- Net-zero greenhouse gas emissions by 2050.
- Economic growth decoupled from resource use.
- No person or region left behind.

One-third of the €1.8 trillion investment from the Next Generation EU recovery plan, as well as the EU's seven-year budget, will finance the European Green Deal.

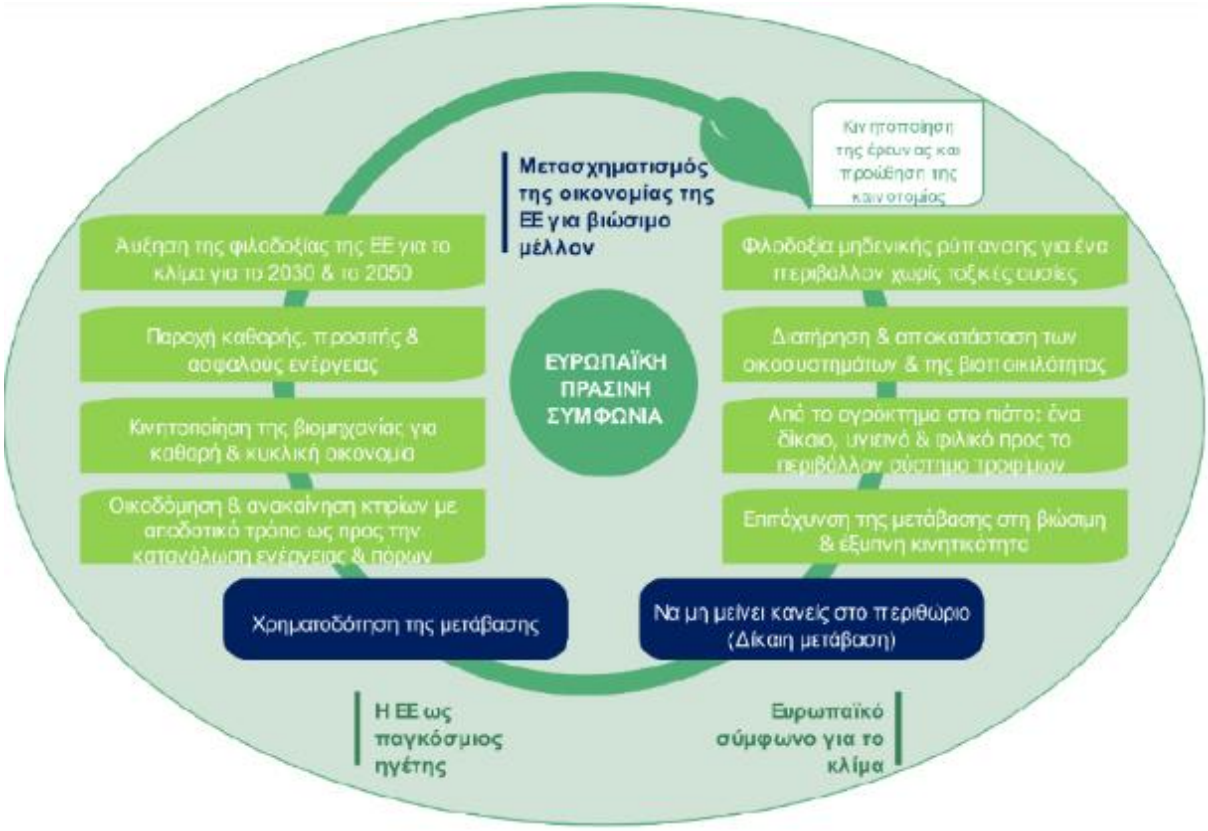
The European Green Deal provides an action plan to strengthen resource efficiency by transitioning to a clean, circular economy, restoring biodiversity, and reducing pollution.

The plan outlines the investments needed and the financing instruments available. It explains how a fair and inclusive transition can be ensured.

The EU has set itself the flagship goal of becoming the first climate-neutral continent by 2050. Achieving this goal requires action in all sectors of the economy, such as:

- Investing in environmental technologies.
- Supporting innovation in industry.
- Developing cleaner, more economical, and healthier forms of private and public transport.
- Decarbonising the energy sector.
- Ensuring the energy efficiency of buildings.
- Cooperation with international partners to improve global environmental standards.

The following **figure** illustrates the various elements of the Green Deal as set out in the European Commission Communication, COM (2019) 640.



Source: European Commission, https://commission.europa.eu/

5 –4 : Elements of the European Green Deal

The proposed modification of the project, following its initial design, is consistent with the above objectives as it promotes sustainable development and reduces the climate footprint. Furthermore, it should be emphasized that the project design will include measures to reduce potential environmental impacts, such as waste management and accident prevention/response/remediation measures, as described in **Chapter 10** of this

5.5.1.4 2030 Climate and Energy Framework

The 2030 Climate and Energy Framework includes EU-level targets and policy objectives for the period from 2021 to 2030.

As part of the European Green Deal, the European Commission proposed in September 2020 to increase the greenhouse gas emission reduction target for 2030 to at least 55% compared to 1990. It examined the actions needed in all sectors, including increasing energy efficiency and renewable energy, and launched the process of submitting detailed legislative proposals to implement and achieve the target. This will enable the EU to move towards a climate-neutral economy and deliver on its commitments under the Paris Agreement by updating Member States' targets.

The Commission proposes that the 2030 climate and energy framework should be based on the full implementation of the 2020 targets and on the following:

- A 40% reduction in greenhouse gas emissions by 2030 compared to 1990 levels, to be achieved through domestic measures alone. The measures include a combination of a 43% reduction in emissions compared to 2005 under the Emissions Trading System (ETS) and national actions by Member States to reduce emissions by 2030 in sectors outside the ETS.
- Increase the share of energy from renewable sources consumed in the EU to at least 27%, binding at EU level but not at national level, to give Member States flexibility to meet their targets in the most cost-effective way.
- Revision of the ETS through the creation of a new market stability reserve as well as a reduction in the annual emissions cap after 2020. A legislative proposal to establish the reserve was published alongside this communication.
- Further improvement of energy efficiency, which is essential for competitiveness, energy security, and sustainability. Revision of the 2012 Energy Efficiency Directive - later in 2014 will help shape future energy saving policy.
- New European governance system to achieve climate and energy targets. Member States must draw up national plans for competitive, secure, and sustainable energy. The plans will be reviewed and evaluated by the Commission.
- Key indicators to monitor progress on all aspects of competitiveness, security, and sustainable energy.

The 40% greenhouse gas target is implemented by the EU Emissions Trading System, the Effort Sharing Regulation. Targets are set for Member States' emissions reductions, land use, land use change, and forestry. The above climate legislation will need to be updated to implement the proposed target of reducing greenhouse gas emissions by at least 55%. This process is ongoing and the targets have not yet been formally redefined.

The proposed modification of the project, following its initial design, is consistent with the above targets as it promotes sustainable development and reduces the climate footprint. Furthermore, it should be emphasized that the project design will include measures to reduce potential environmental impacts,

such as waste management and accident prevention/response/remediation measures, as described in **Chapter 10** of this

5.5.1.5 28th United Nations Climate Change Conference (COP28)

Each year, the COP meets to set ambitions and responsibilities for climate action, as well as to identify and evaluate climate measures. The 2023 conference was hosted by the United Arab Emirates, which held the COP28 presidency.

The 28th United Nations Climate Change Conference (COP28) took place from November 30 to December 13, 2023, in Dubai, United Arab Emirates. The EU and its 27 Member States attended the event as parties to the United Nations Framework Convention on Climate Change (UNFCCC).

The main topics of COP28 were:

- Global stocktake of climate change mitigation efforts.
- Work program on climate change mitigation.
- Global goal for adaptation.
- Climate finance, including financial arrangements for loss and damage.

More specifically, in his speech to the COP28 plenary, President Charles Michel called for global action to be stepped up and accelerated in order to keep global temperature rise within 1.5°C. President Charles Michel underlined the EU's commitment to climate neutrality. He pointed out that the EU has already reduced greenhouse gas emissions by 30% compared to 1990 levels and has decided to triple energy from renewable sources and double energy efficiency. He also stressed the need to end our dependence on fossil fuels as soon as possible.

The EU is the world's largest provider of public climate finance. In Dubai, President Charles Michel underlined that the EU is delivering on its commitment to contribute to the USD 100 billion goal set in the Paris Agreement. EUR 23 billion has been committed this year by the EU. The EU and its member states have announced a contribution of €220 million to the loss and damage fund to help the poorest and most vulnerable countries.

The proposed amendment to the project, following on from the initial design, is in line with the objectives of COP28 as it promotes sustainable development, climate change mitigation, and reduction of the climate footprint.

5.5.1.6 "Fit for 55"

The European Climate Law makes it a legal obligation to achieve the EU's climate target of **reducing EU greenhouse gas emissions by at least 55% by 2030**. EU countries are working on new legislation to achieve this target and make the EU climate neutral by 2050.

The 'Fit for 55' package is a series of proposals to revise and update EU legislation and set out new initiatives to ensure that EU policies are consistent with the climate targets agreed by the Council and the European Parliament.

The package of proposals aims to create a coherent and balanced framework for achieving the EU's climate goals, which:

- Ensures a fair and socially equitable transition.
- Maintains and strengthens the innovation and competitiveness of EU industry, while ensuring a level playing field with third-country operators.
- Consolidates the EU's position as a global leader in the fight against climate change.

The proposed amendment to the project, following on from the initial design, is consistent with the objectives of Fit for 55 as it promotes sustainable development, climate change mitigation, and a reduction in the climate footprint.

5.5.2 International Conventions – Community Directives on Environmental Protection

5.5.2.1 Habitats Directive (92/43/EEC)

The Habitats Directive (more formally known as **Council Directive 92/43/EEC** on the conservation of natural habitats and wild fauna and flora) was adopted in 1992 in response to the Bern Convention. The Directive aims to protect approximately 200 habitat types and 1,000 species listed in its Annexes and considered to be of European interest, based on the criteria of the Directive, as follows:

- **Annex I** includes protected habitat types.
- **Annex II** includes approximately 900 species, whose habitats have been designated as Special Areas of Conservation (SACs) and are included in the Natura 2000 network. These areas should be managed in accordance with the ecological requirements of the species.
- **Annex IV** lists more than 400 species that should be subject to strict protection throughout their natural range within the EU, both inside and outside the Natura 2000 network.
- **Annex V** lists more than 90 species for which Member States must ensure that exploitation and removal from the wild do not adversely affect their favorable conservation status.

Directive 92/43/EEC forms the basis of European nature conservation policy and, together with the Directive on the conservation of wild birds, established the extensive European ecological network of protected areas known as Natura 2000 (**Special Protection Areas-SPAs, Special Areas of Conservation-SACs)**. Certain articles of the Habitats Directive (Articles 6, 12, 16, and 17) require Member States to submit reports on the status and degree of conservation of habitats and species, the compensatory measures taken by projects that have negative effects on Natura 2000 sites, or for any derogations from the strict protection measures for these sites.

The Habitats Directive was transposed into national law by Joint Ministerial Decision 33318/3028/1998 laying down measures and procedures for the conservation of natural habitats and wild fauna and flora, as amended by Joint Ministerial Decision 14849/853/E103/4-4-2008. In addition, Law 3937/2011 on the conservation of biodiversity established the National System of Protected Areas (including Natura 2000 sites), as amended by Joint Ministerial Decision 50743/2017 (revision of the national list of Natura 2000 sites), as well as general guidelines and regulations for their conservation.

The proposed modification of the project is located within the Natura 2000 protected area TKS & SPA GR1150014 "Marine Area of Kavala Thasos". The wider area includes the SPA GR1150010 "Nestos Delta and Keramoti Lagoons - Wider Area".

The proposed modification of the project, following its initial design, is in line with the guidelines and objectives of this Directive, as it does not have a significant adverse impact on **the Protected Objects** and the corresponding **Conservation Objectives** of these protected areas (as thoroughly documented in the SEA attached to the relevant Annex hereto), while, on the other hand, the design of the proposed project takes into account all relevant obligations and best technical options arising from the inclusion of the study area in a Special Protection and Management Regime.

The following **figure** shows the protected areas of the Natura 2000 network located in the wider study area of the proposed project modification.

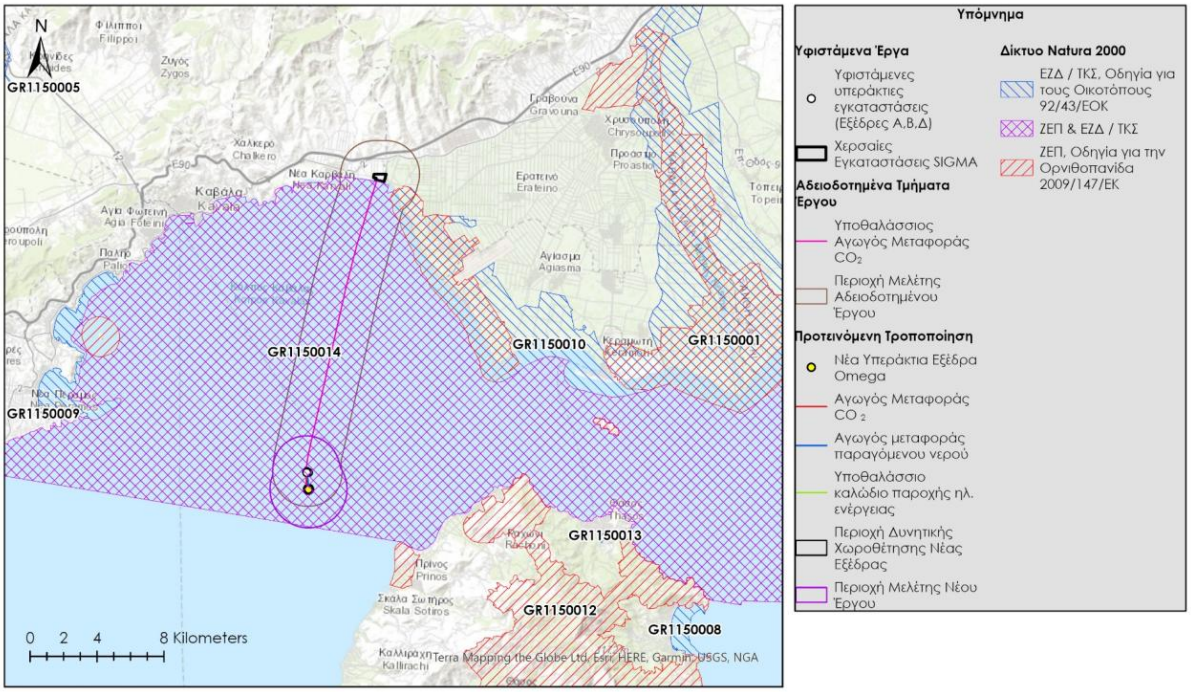


Figure5 –5 : Protected areas of the Natura 2000 network within the study area

As can be seen from the above **Figure**, the proposed modification of the project falls within the Natura 2000 network area with code GR1150014 and name "Marine Area of Kavala Thasos" (SPA & SAC), with a total area of 75,686.03 ha.

A more detailed description of the Natura 2000 Network areas is provided in the Project's Special Ecological Assessment Study (SEAS).

5.5.2.2 Wild Birds Directive (2009/409/EC)

The Birds Directive, officially known as Directive 2009/147/EC on the Conservation of Wild Birds, was adopted in 2009 and replaced Directive 79/409/EEC of 2April 1979 on the conservation of wild birds, which had been amended several times and had become unclear. The Directive aims to protect around 500 species of birds found in the EU and their critical habitats by establishing **Special Protection Areas (SPAs)** within the Natura 2000 network, regulating activities that directly threaten birdlife, and promoting scientific research.

- **Annex I**: 194 species and subspecies that are particularly threatened, for which Member States must designate SPAs for their survival and which are migratory species in their entirety.
- **Annex II**: 82 species of birdlife that may be hunted. However, hunting seasons are limited and hunting is prohibited when birds are most vulnerable: during their return to nesting areas, during breeding and during the rearing of their young.
- **Annex III**: includes activities that directly threaten bird species and are prohibited altogether, such as deliberate killing, capture, trade, or destruction of their nests. Under certain restrictions, Member States may allow some of these activities for the 26 species listed in this Annex.
- **Annex IV**: the Directive provides for the sustainable management of hunting, but Member States should abolish all forms of non-selective and mass killing of birds, in particular the methods listed in this Annex.
- **Annex V**: the Directive promotes research to further the protection, management, and exploitation of all bird species covered by the Directive and listed in this Annex.

The Birds Directive was transposed into national law through Ministerial Decision 414985/1985 on measures for the management of wild bird populations, Joint Ministerial Decision 37338/1807/E.103/2010 on the establishment of measures and procedures for the conservation of wild birds and their habitats in accordance with Directive 79/409/EEC, as codified by Directive 2009/147/EC and Joint Ministerial Decision 8353/276/E103/2012 amending Joint Ministerial Decision 37338/1807/2010. In addition, Law 3937/2011 on the conservation of biodiversity established the National System of Protected Areas (including Natura 2000 sites), as amended by Joint Ministerial Decision 50743/2017 (revision of the national list of Natura 2000 sites), as well as general guidelines and regulations for their conservation.

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The entire project (including the proposed amendment) is located within the Natura 2000 protected area TKS & SPA GR1150014 "Kavala-Thasos Marine Area," while the wider area also includes SPA GR1150001 "Nestos Delta and Keramoti and Thasopoula Lagoons" and SPA GR1150012 "Thasos (Mount Ypsario and coastal zone)".

The Project is in line with the guidelines and objectives of this Directive, as it does not have any significant adverse effects on **the Protected Objects** and the corresponding **Conservation Objectives** of these SPA areas (as documented in detail in the SEA attached to the relevant Annex hereto), and, on the other hand, the design of the proposed project takes into account all relevant obligations and best technical options arising from the inclusion of the study area in a Special Protection Area.

5.5.2.3 Convention on Migratory Species (CMS or Bonn Convention)

The Convention on the Conservation of Migratory Species of Wild Animals - more widely known simply as the Convention on Migratory Species (CMS) or Bonn Convention - aims to conserve terrestrial, marine and avian migratory species throughout their migratory range. It is an intergovernmental treaty, concluded under the auspices of the United Nations Environment Programme (UNEP), which concerns the conservation of wildlife and habitats on a global scale. The Convention was signed in Bonn in 1979 and entered into force in 1983. The Convention on Migratory Species is the only global, UN-based intergovernmental organization established exclusively for the conservation and management of terrestrial, aquatic and avian migratory species throughout their migratory range. The Convention on Migratory Species and its accompanying agreements set policy and provide further guidance on specific issues through Strategic Plans, Action Plans, resolutions, decisions, and guidelines. All Parties maintain on their websites a list of all decisions taken, guidance issues, and Action Plans approved by Member States.

The Convention on Migratory Species and its subsidiary agreements (see **Table** below) set policy and provide additional guidance on specific issues through Strategic Plans, Action Plans, resolutions, decisions, and directives. The subsidiary agreements to the Convention maintain lists on their respective websites of all decisions taken, guidelines, and Action Plans approved by Member States. Greece ratified the Convention on Migratory Species in 1999 through Law 2719/1999. It should be noted that of the subsidiary agreements to the Convention on Migratory Species, Greece is a Member State of the ACCOBAMS Agreement, which is the main tool for the conservation of cetaceans in the Mediterranean. In addition, Greece has signed but not yet ratified the AEWA Agreement on Migratory Waterbirds.

Table5 –4 : Subsidiary agreements arising from the Bonn Convention

Acronym	Agreement
ACAP	http://acap.aq/
ACCOBAMS	http://accobams.org/
AEWA	http://www.unep-aewa.org
ASCOBANS	http://www.ascobans.org
EUROBATS	http://www.eurobats.org
Gorilla Agreement	http://www.cms.int/gorilla
Wadden Sea Seals	http://www.waddensea-secretariat.org/management/seal-management

The overall project (including the proposed amendment) is compatible with and does not conflict with the guidelines and objectives of this Convention

5.5.2.4 Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea, and Contiguous Atlantic Area (ACCOBAMS)

The Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) is a cooperation tool for the conservation of marine biodiversity in the Mediterranean and Black Seas. The purpose of the Agreement is to reduce threats to cetaceans in the waters of the Mediterranean and Black Seas and to improve existing knowledge. According to the ACCOBAMS Conservation Plan (Annex 2 of the Agreement), the contracting parties are called upon to designate and manage areas that are habitats for cetaceans as specially protected areas. In this context, the study area of the northeastern Aegean Sea has been designated as a Critical Cetacean Habitat (CCH).

ACCOBAMS resulted from consultations between the four conventions:

- The Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean,
- The Bonn Convention on the Conservation of Migratory Species of Wild Animals,
- The Bern Convention on the Conservation of European Wildlife and Natural Habitats,
- Due to the migratory characteristics of these species, the agreement was drawn up under the auspices of the Bonn Convention (UNEP/CMS).

The area covered by the agreement consists of all the marine waters of the Black Sea, the Mediterranean Sea, and the adjacent Atlantic area west of the Strait of Gibraltar. The area includes the Pelagos Sanctuary, which is dedicated to marine mammals in the northwestern Mediterranean and was established by France, Italy, and Monaco. ACCOBAMS is the first agreement that commits countries in these regions to cooperate on cetacean conservation. An innovative approach of this agreement is the inclusion of non-coastal countries whose maritime activities may endanger the conservation of cetaceans.

In 2010, the parties to ACCOBAMS adopted a resolution to extend the geographical scope of the agreement area to the exclusive economic zones of Spain and Portugal. In 2022, the agreement has 24 parties: Albania, Algeria, Bulgaria, Croatia, Cyprus, Egypt, France, Georgia, Greece, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Portugal, Romania, Slovenia, Spain, Syria, Tunisia, Turkey, and Ukraine.

In 2023, according to Government Gazette 9/A/17.01.2023, the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea, and Contiguous Atlantic Area and the related Final Act, signed in Monaco on November 24, 1996, as well as the amendments adopted by the Meeting of the Parties to the Agreement on November 12, 2010, in Monaco, by Resolution A/4.1.

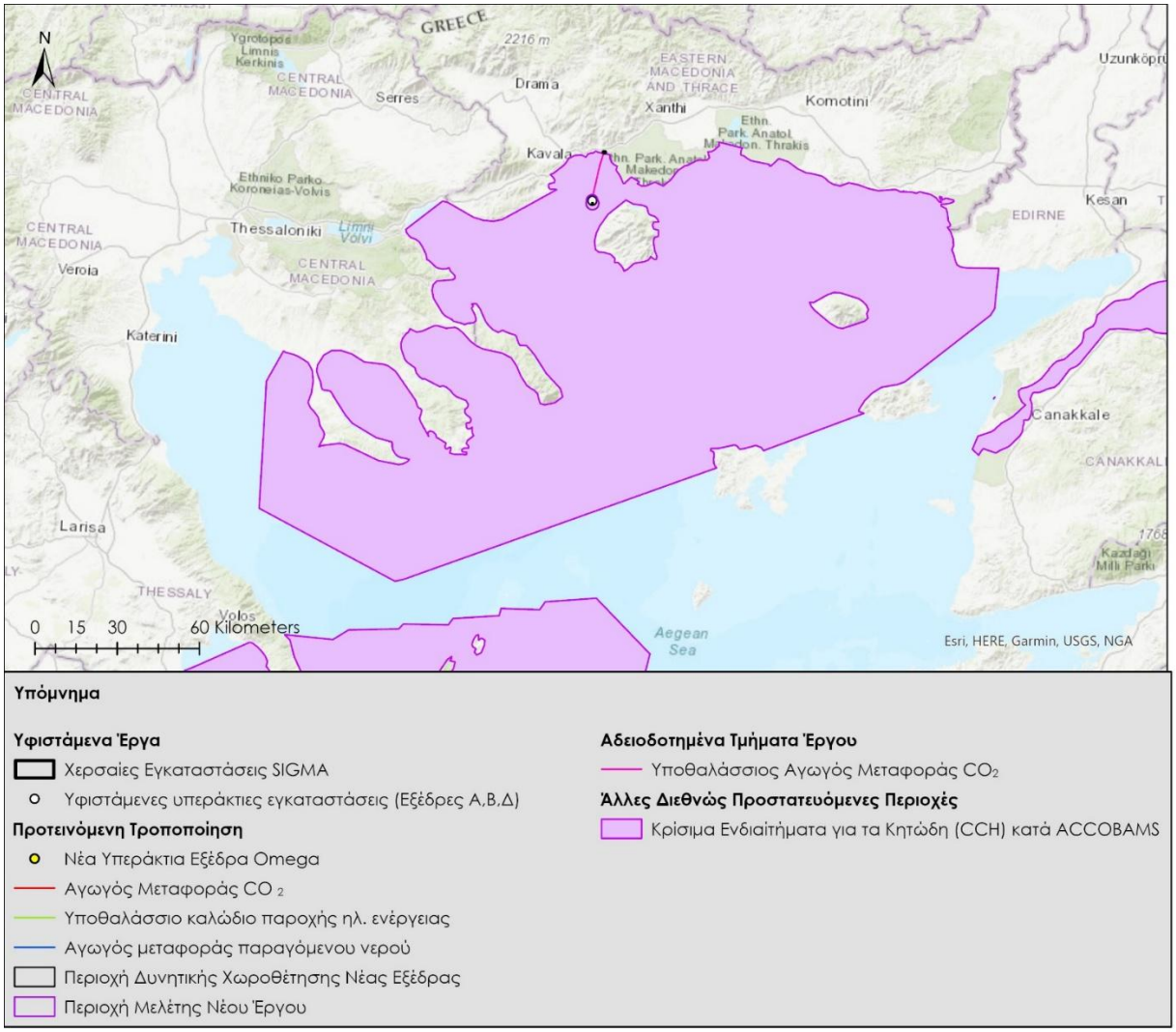
In accordance with Article 4 of Annex II to this Agreement, the Contracting Parties shall undertake coordinated, joint research on cetaceans and facilitate the development of new techniques to enhance their conservation. The Contracting Parties shall, in particular:

- Monitor the status and trends of species covered by this Agreement, particularly those found in poorly known areas or species for which little data are available, in order to facilitate the development of conservation measures.
- Cooperate to determine the migration routes and breeding and feeding areas of the species covered by the Agreement, in order to identify areas where human activities may need to be regulated accordingly;
- Assess the nutritional needs of species covered by the Agreement and adjust fishing regulations and techniques accordingly.
- Develop systematic research programs for dead, stranded, injured, or sick animals to determine the main interactions with human activities and identify existing and potential threats; and
- Facilitate the development of passive acoustic techniques for monitoring cetacean populations.

According to the Accobams Methodological Guide on "Underwater Noise Measures" published in 2022 (ACCOBAMS-MOP8/2022/Inf44), recommended measures are set out to mitigate the effects of underwater noise from human activities.

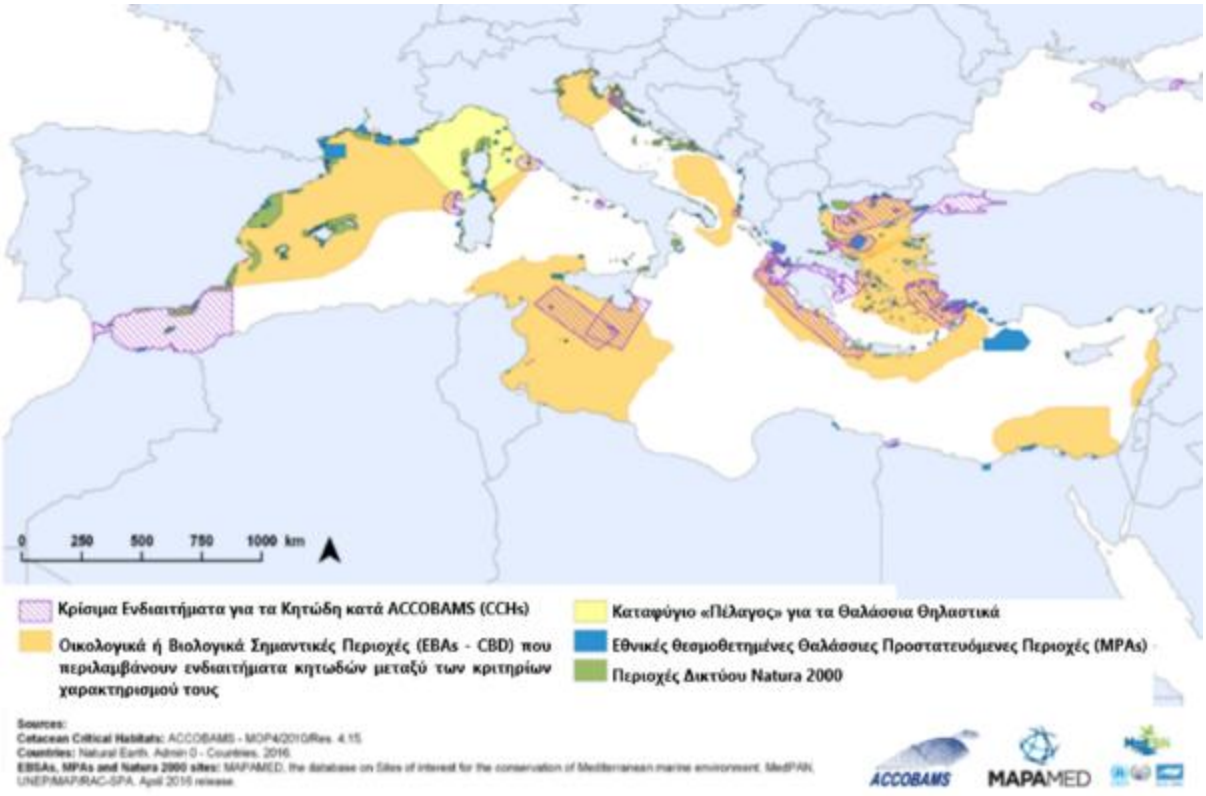
According to this Guide and based on the EU Marine Strategy Framework Directive, underwater noise caused by human activities is classified as impulsive (e.g., noise from drilling) and continuous noise (e.g., from ship traffic). The Guide describes practices and technologies that should be used during, instead of, or in addition to conventional techniques that generate underwater noise, with the aim of reducing the acoustic impact of human activities at sea.

Overall, the study area, as shown in **the** following **figure**, falls within Accobams Zone 9 in the northeastern Mediterranean (Thracian Sea).



(Source: Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area, https://accobams.org/)

Figure5 –6 : Critical Habitats for Cetaceans in the Northeast Mediterranean according to the ACCOBAMS Agreement



(Source: http:// www. accobams. org/ , 2019)

Figure5 –7 : Critical habitats for cetaceans in the Mediterranean according to the ACCOBAMS Agreement

The species characteristic of the Northern Aegean study area found in Zone 9 of Accobams are marine mammals. The project area includes only shallow (<50m) marine waters. Based on the types of marine habitats commonly used by species found in the wider project area, the cetacean species recorded during fieldwork are: The bottlenose dolphin (*Tursiops truncatus)*, the common dolphin (*Delphinus delphis)*, and the harbour porpoise (*Phocaena phocaena)*.

This is also indicated by an initial review of the available literature on the presence of cetaceans in the specific area. The presence of the Mediterranean monk seal (*Monachus monachus)* is also confirmed by the scientific literature available for the species. The presence of these species highlights the ecological value of the area and the need for ongoing protection and conservation efforts within the framework of international agreements such as ACCOBAMS.

As part of the proposed amendment, **a Special Ecological Assessment Study** has been prepared and is attached hereto, as various species of cetaceans that are an important part of the marine biodiversity of the area have been recorded.

The proposed amendment, following the initial design of the project, is in line with the guidelines and objectives of this Agreement, as, on the one hand, it does not cause significant adverse effects on the species of interest in the study area found in Zone 9 of Accobams (as documented in detail in the EIA attached to the relevant Annex and in the relevant sections of this document), and on the other hand, for the design of the proposed project (both the licensed project and the proposed amendment) take into account all relevant obligations and best technical options arising from the inclusion of the study area in Accobams Zone 9.

5.5.2.5 Ramsar Convention

The Convention on Wetlands of International Importance, especially as Waterfowl Habitat, also known as the "Ramsar Convention" – named after the Persian city where it was signed in 1971, provides for the protection of wetland ecosystems.

According to Article 1 of the Convention, wetlands are:

"...natural or artificial areas consisting of marshes with herbaceous vegetation, non-exclusively rain-fed marshes with peaty substrate, peaty areas, or water. These areas are permanently or temporarily flooded with water that is stagnant or flowing, fresh, brackish, or salty, and also include those covered by sea water whose depth at low tide does not exceed six meters. Wetlands may also include riparian or coastal zones adjacent to wetlands or islands or marine water bodies that are deeper than six meters at low tide...

The Convention was ratified by Greece with Legislative Decree 191/1974 (Government Gazette 350/A/11.20.1974), which was subsequently amended by Law 1751/1988 (Government Gazette 26/A/02.09.1988) and Law 1950/1991 (Government Gazette 84/A/05.31.1991) "On the Ratification of the Amendments to the Ramsar Convention." There are 10 Greek wetlands that have been designated since August 21, 1975 as wetlands of international importance (Ramsar wetlands), covering an area of 1,635,010 square meters. It should be noted that Greece, by signing and ratifying the Ramsar Convention, has undertaken to conserve and properly use all of the country's wetlands through local, regional, and international activities and collaborations.

In the project development area, within the boundaries of the Municipality of Nestos, there is one (1) Ramsar Wetland. This wetland, called "Nestos Delta and adjacent lagoons," with a total area of 21,930 ha, joined the Ramsar Convention in 1975.

The proposed amendment, following the initial project design, is in line with the guidelines and objectives of this Convention, as it does not cause significant adverse effects on the species of the Wetland of International Importance "Nestos Delta and adjacent lagoons" (as documented in detail in the EIA attached to the relevant Annex and in the relevant sections of this document), and on the other hand, for the design of the proposed project (both the licensed project and the proposed amendment), all relevant obligations and best technical options arising from the existence of the Wetland of International Importance have been taken into account.

5.5.2.6 Bern Convention

The Bern Convention on the Conservation of European Wildlife and Natural Habitats, also known as the Bern Convention, is an international legal instrument in the field of nature conservation, aimed at protecting the natural heritage of Europe and certain African countries. The Convention was signed on September 19, 1979, and entered into force on June 1, 1982. The Convention focuses in particular on the protection of natural habitats and endangered species, including migratory species.

The main objectives of the Convention are:

- Conservation of wild flora and fauna and their natural habitats
- Promoting cooperation between states,

- Focusing attention on endangered and vulnerable species, including endangered and vulnerable migratory species.

The Convention also takes into account the potential impact of other policies on natural heritage and recognizes the intrinsic value of wild flora and fauna, which must be preserved and passed on to future generations. Fifty countries and the EU have already signed the Convention and are committed to promoting national conservation policies, considering the impact of planning and development on the natural environment, promoting education and awareness of conservation, and coordinating relevant research activities. Greece signed the Convention in 1979 and ratified it with Law No. 1335/1983.

The proposed amendment, following the initial design of the project, is in line with the guidelines and objectives of this Convention.

5.5.2.7 Convention on Biological Diversity (CBD)

The Convention on Biological Diversity (CBD), informally known as the Biodiversity Convention, is a multilateral treaty. The Convention has three main objectives:

- Conservation of biological diversity,
- Sustainable use of its components, and
- Fair and equitable sharing of the benefits arising from genetic resources

The aim of the Convention is to develop national strategies for the conservation and sustainable use of biological diversity. The Convention is often considered the key document for sustainable development. The Convention was signed at the Earth Summit in Rio de Janeiro in June 1992 and entered into force on December 29, 1993. The Convention recognized for the first time in international law that the conservation of biodiversity is "a common concern of humankind" and an integral part of development. The Agreement covers all ecosystems, species, and genetic resources. It links contractual conservation efforts with the economic goal of using biological resources in a sustainable manner. It establishes principles for the fair and equitable sharing of benefits arising from the use of genetic resources, particularly those intended for commercial use. It should be noted that the Convention is legally binding and countries that accede to it ("Contracting Parties") are obliged to implement its provisions.

Greece signed the Agreement in June 1992 and ratified it with Law 2204/1994. In accordance with the requirements of the CBD, Greece adopted its first National Biodiversity Strategy in 2014 (Ministerial Decision 40332/2014) with the aim of halting the loss of biodiversity and the degradation of ecosystem services by 2026. The strategy will be implemented over a period of 15 years (2014-2029) and consists of 13 general national objectives, on the basis of which 39 specific objectives have been formulated concerning the following: (i) strengthening scientific knowledge, (ii) conserving national natural capital, (iii) national system of protected areas, (iv) conservation of genetic resources, (v) synergistic policies for biodiversity conservation, (vi) conservation of landscape diversity, (vii) biodiversity and climate change, (viii) biodiversity and invasive alien species, (ix) international and transboundary conservation, (x) public administration and biodiversity protection, (xi) integration of biodiversity conservation into society's value system, (xii) public participation in biodiversity conservation, and (xiii) valuation of ecosystem services and promotion of the importance of Greek biodiversity. Greece's 13 general national targets correspond to both the Aichi Biodiversity Targets and the EU Biodiversity Targets. The strategy is expected to be reviewed and amended every five years and action plans with a five-year timeframe are to be drawn up. Actions have been defined to achieve the 39 specific targets during the first five years (2014-2019), as well as some indicative implementation indicators. The Ministry of Environment and Energy is the competent authority for the implementation of the National Biodiversity Strategy.

The proposed amendment, following the initial project design, is in line with the guidelines and objectives of this Convention.

5.5.3 National Environmental Protection Objectives Relevant to the Project

5.5.3.1 National Strategy for Adaptation to Climate Change

The European Commission adopted the EU Strategy on Adaptation to Climate Change in April 2013 (COM (2013) 216). The EU Strategy aims to encourage action by Member States, to ensure that policy and decision-making is based on more complete data and information, and to integrate climate change adaptation considerations into all relevant policy areas.

In December 2014, the Ministry of Environment, Energy and Climate Change (now the Ministry of Environment and Energy / YPEN), the Biomedical Research Foundation of the Academy of Athens, and the Bank of Greece (BoG) signed a memorandum of cooperation concerning, among other things, the drafting of the National Strategy for Adaptation to Climate Change (ESPAKA).

The primary purpose of the NCSCC is to contribute to strengthening the country's resilience to the effects of climate change and to creating the conditions for decisions to be made on the basis of accurate information and with a long-term perspective, addressing the risks and exploiting the opportunities arising from climate change. The NCCA provides for an initial five-year horizon for developing adaptation capacity and for prioritising and implementing a first set of actions.

The main objectives of the NAPCA are:

- Improving decision-making through the acquisition of more complete information and scientific data relevant to adaptation
- Promoting the development and implementation of regional/local action plans in line with the NAPCA,
- Promoting adaptation actions and policies in all sectors, with an emphasis on the most vulnerable,
- Creating a mechanism for monitoring and evaluating adaptation actions and policies, and
- Informing and raising awareness among society.

Regional Plans for Adaptation to Climate Change (PESPCA), based on the climatic conditions and vulnerability of each region, precisely define the policy areas and geographical priority areas for action, specifying the measures to be taken, as well as the financial resources for implementing the measures, the implementing bodies, the bodies involved, etc.

The Regional Plan for Adaptation to Climate Change (RPACC) of Eastern Macedonia & Thrace was drawn up in December 2018 and revised in September 2023.

The main objective of the Regional Strategy for Adaptation to Climate Change of the Region of Eastern Macedonia and Thrace is to strengthen resilience in all priority areas and achieve sustainable development goals. The pillars – priority axes of the Regional Strategy for Climate Change of the Region of Eastern Macedonia and Thrace are as follows:

- Pillar – Priority Axis 1 (PA1): Leadership and strengthening of administrative capacity
- Pillar – Priority Axis 2 (PA2): Promotion and dissemination of knowledge & skills
- Pillar – Priority Axis 3 (PA3): Strengthening Resilience in Priority Areas

The proposed amendment, following the initial project design, is fully consistent with the guidelines and objectives of both the National Strategy for Adaptation to Climate Change (ESPA) and the Regional Plan for Adaptation to Climate Change (PESPCA) of Eastern Macedonia & Thrace and promotes their objectives.

5.5.3.2 National Energy and Climate Plan

By Decision No. 4/23.12.2019 of the Government Council for Economic Policy (Government Gazette B' 4893), the National Energy and Climate Plan (NECP) was ratified[47]. The National Energy and Climate Plan is a Strategic Plan for Climate and Energy issues and presents a roadmap for achieving specific Energy and Climate Targets by 2030. The NECP presents and analyzes priorities and policy measures across a wide range of development and economic activities, making it the reference document for the next decade.

The main objectives of the NECP for 2030 are as follows:

[47] Revised version of ESEK, August 2024
http://www.opengov.gr/minenv/wp-content/uploads/downloads/2024/08/Εθνικό-Σχέδιο-για-την-Ενέργεια-και-το-Κλίμα-ΕΣΕΚ.pdf

- Share of RES >35% of Gross Final Energy Consumption.
- Share of RES 61-64% of Gross Final Electricity Consumption.
- Final Energy Consumption 16.1-16.5 Mtoe (>38% compared to 2007 forecasts).
- Zero participation of lignite in electricity generation.
- >42% reduction in GHG emissions compared to 1990, >56% compared to 2005.

The priority of the NSRF in terms of planned policies and the implementation of specific measures is to achieve specific objectives relating to energy supply security, the functioning of energy markets and the role of consumers, enhancing the competitiveness of the economy, and promoting research and innovation.

In particular, the NAP sets a significantly higher central target for 2030 for climate change and emissions, with a reduction in greenhouse gas emissions with a reduction of more than 42% compared to 1990 emissions and more than 56% compared to 2005 emissions, thus exceeding even the central European targets, while it is worth noting that in the initial NAP plan these targets were significantly lower, resulting in reductions of 33% and 49% respectively. These new greenhouse gas emission reduction targets are also necessary to enable the transition to a climate-neutral economy by 2050, as the Greek Government aims to participate proportionally in the commitment to a climate-neutral economy at EU level. In parallel with climate change and adaptation policies, the NAP presents the initiatives that will be undertaken within the framework of the National Strategy for Adaptation to Climate Change (ESPA), which sets out the general objectives, guiding principles, and tools for implementing the necessary climate adaptation measures at national, regional, and local level.

In order to achieve the above objectives, the NAP presents and analyzes the individual Policy Priorities for the next period, as well as the corresponding **Policy Measures** planned for the implementation of the priorities and the achievement of the NAP objectives, in seven different thematic areas: 1. Climate Change, Greenhouse Gas Emissions and Absorption, 2. Renewable Energy Sources, 3. Improving Energy Efficiency, 4. Energy Supply Security, 5. Energy Market, 6. Agricultural Sector, Shipping, Tourism (new thematic area) and 7. Research, Innovation and Competitiveness.

With regard to the **project under consideration (including the proposed amendment),** it is stated in the "Research, innovation, and competitiveness" that innovative applications will be strengthened that contribute to mitigating the environmental footprint of businesses and the impact of climate change on the urban environment, as well as promoting the circular economy, with an emphasis on material recovery and the recovery and reuse of waste energy, as well as **innovative techniques for CO(2)capture and reuse**.

According to the update of the draft revised NECP (Revised version, August 2024) aimed at mitigating climate change, Greece is fully aligned with the policy and commitments of the European Union. In this context, it sets **a target of reducing GHG emissions in 2030 by 55%** compared to 1990 emissions. The draft revised NECP predicts that this target for 2030 will be achieved (~52%) without taking into account CO_2 from the LULUCF sector48 , and that the reduction could reach -59% if a greater contribution from LULUCF is achieved

48 Land Use, Land-use Change and Forestry, Land use, land-use change and forestry sector. This sector is a net carbon source in all years.

by then. This target is significantly higher than the existing NECP. The NECP target for reducing GHG emissions in 2040 is set at -72% without LULUCF and could reach -80% with LULUCF. The corresponding target for 2050 is set, according to the simulated scenario, at -88% without LULUCF and -98% with LULUCF, a performance that marginally approaches the 2050 climate neutrality target. By 2050, only small emissions remain in certain sectors where complete elimination is difficult. These emissions need to be offset through negative emissions (**i.e., through carbon storage, which reduces the concentration of carbon dioxide in the atmosphere)** and absorption.

Carbon dioxide capture from industrial exhaust/flue gases is the only way to reduce the footprint of certain industrial sectors, at least until alternative technologies based on redesigning production or products are developed. Captured CO_2can be used to synthesize synthetic fuels until 2040 in accordance with EU policy (in order to reduce the use of new fossil fuels in transport). It can also be stored in impermeable geological formations, as envisaged in the context of this project.

In this context, and given that the industry is subject to international competition, investment facilities are provided for the capture of CO_2emitted by these industrial facilities (in Greece, refineries and cement factories). Three projects have already been approved for co-financing by the Innovation Fund: i) the IRIS project for the capture of approximately 0.5 Mt per year of CO_2 at the hydrogen production unit with natural gas reforming of a refinery in Corinth, ii) the IFESTOS project to capture 1.9 Mt of CO_2per year at a cement production plant in Kamari, Boeotia, and iii) the OLYMPUS project to capture 1.0 Mt of CO_2 peryear at a cement plant in Milaki, Evia. At the same time, the first CO_2 storage unit in Prinos, Kavala, has already been included in the Recovery and Resilience Fund for co-financing and is awaiting licensing, the modification of which is the subject of this study. with storage of 1 Mt CO_2 in the first phase and 3-4 Mt CO_2 when fully operational.The total storage capacity is estimated at 60-70 Mt CO_2. The first phase (with a capacity of approximately 1 Mt per year) is scheduled to be completed by the end of 2025 and the second phase (full capacity) by the end of 2027. The relevant licensing and regulatory framework for the capture, transport, use, and storage of CO_2 is also being finalized.Responsibility for supervising the construction and operation of storage projects has also been assigned to a specialized public company (EDEYP). In addition, through the RePower pillar of the TAA, the network for the pipeline transport of captured $CO_2$from industrial facilities has been included for funding. This network is intended to transport carbon dioxide for liquefaction at a central plant in Revythousa. It is worth noting that the storage unit in Prinos, in combination with the pipeline network and the CO_2 liquefaction and temporary storage unit,is a project on the first list of projects of common interest.

Finally, it is worth noting that small-scale carbon dioxide capture technologies, which incorporate captured CO_2into solid or liquid chemical compounds, are also expected to be used in the shipping sector. Recent decisions by the International Maritime Organization (IMO/MEPC 80, July 2023) on binding targets for absolute reductions in greenhouse gas (GHG) emissions, including the goal of decarbonizing shipping (net zero) by 2050 and the indicative but ambitious interim targets for absolute greenhouse gas emission reductions in 2030 and 2040 make carbon capture (CCS) an important solution for shipping, at least until synthetic fuels mature. CCS technology has already been included in the IMO's sustainable pathways and is expected to be one of the options for shipowners to comply with the decarbonization targets for shipping.

In addition, **the Long-Term Strategy for 2050** is being developed within the framework of the National Energy and Climate Plan**,** which is a roadmap for climate and energy issues, in the context of the country's

participation in the collective European goal of a successful and sustainable transition to a climate-neutral economy by 2050 at the European Union level.

The long-term strategy for climate neutrality in 2050 includes **key policies** classified under the following **axes**:

1 Improving energy efficiency.

2 Electrification of transport and heating.

3 Renewable energy sources.

4 Clean mobility in the transport sector.

5 Industrial competitiveness and climate neutrality.

6 Network infrastructure and market integration policies.

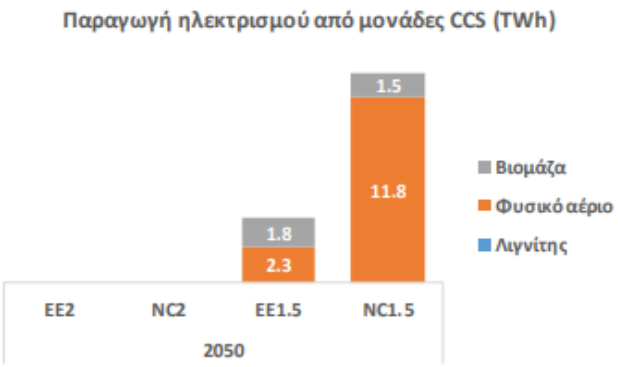
7 Bioeconomy.

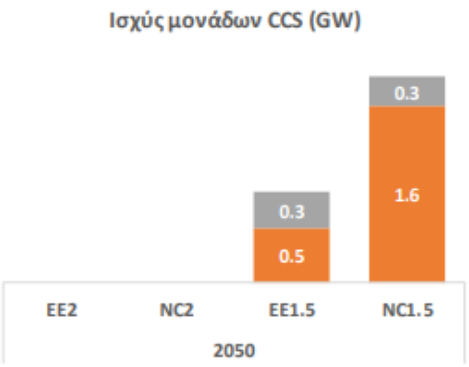
The Long-Term Strategy for 2050 (LS50) analyses scenarios for the development of the energy system and consumption patterns in end-use sectors, with the ultimate goal of transitioning to a climate-neutral economy by 2050 without presenting specific measures.

The **scenarios** of the long-term strategy are defined as follows:

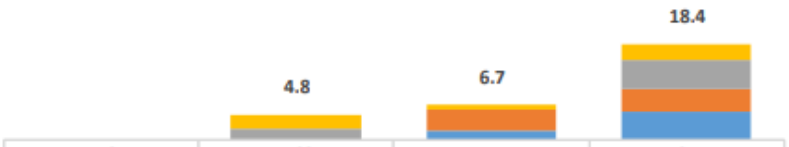
- ESEK-2030 scenario (No continuation/reinforcement of ESEK policies after 2030).
- ESEK-2050 scenario (Basic policies. Implementation of ESEK-2030 until 2050).
- EU2 scenario (Electrification and energy efficiency improvement for 2°C).
- NC2 scenario (New energy carriers for 2°C).
- EE1.5 scenario (Electrification and energy efficiency improvement for 1.5°C).
- Scenario NC1.5 (New energy carriers for 1.5°C).

The following **figure** summarises carbon dioxide capture in power plants and industrial processes, capture from the air and biomass, and its use and storage underground and in materials.



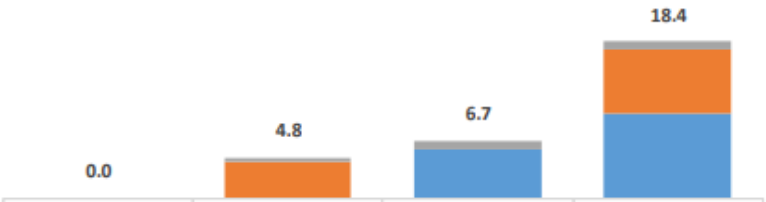


Δέσμευση CO2 (Mt)



	EE2	NC2	EE1.5	NC1.5
	2050			
Δέσμευση CO2 από βιομάζα	0.0	2.7	0.9	2.9
Δέσμευση CO2 από τον αέρα	0.0	2.1	0.0	5.6
Δέσμευση CO2 από βιομηχανικές διεργασίες	0.0	0.0	4.0	4.6
Δέσμευση CO2 από καύση ορυκτών καυσίμων	0.0	0.0	1.7	5.4
Σύνολο Δέσμευσης CO2	0.0	4.8	6.7	18.4

Χρήση CO2 (Mt)



	EE2	NC2	EE1.5	NC1.5
	2050			
Εγκλωβισμός CO2 σε υλικά	0.0	0.4	0.9	1.0
Χρήση CO2 για παραγωγή συνθετικών υδρογονανθράκων	0.0	4.4	0.0	7.4
Αποθήκευση CO2 σε υπόγειους σχηματισμούς	0.0	0.0	5.8	10.0
Σύνολο Χρήσης CO2	0.0	4.8	6.7	18.4

(Source: Long-term Strategy M50)

5 –8 : Carbon dioxide capture, storage, and utilization

According to the Ministry of Environment and Energy's Long-Term Strategy for 2050, "**climate neutrality**" (Net Zero) is equivalent to achieving zero total greenhouse gas emissions, where zero emissions are defined as the sum of positive and any negative emissions. "Carbon neutrality" is a similar concept but refers only to $CO_{(2)}$emissions. The climate neutrality of an energy form requires zero greenhouse gas emissions at all stages of production, conversion, transport, and use. The permanent storage of greenhouse gases in

underground formations or materials is considered to ensure climate neutrality, while the storage of carbon dioxide captured from the air or from biomass is considered to be a negative emission.

The proposed amendment, following the initial design of the project, is fully consistent with the objectives of the National Energy and Climate Plan and the objectives of the corresponding revised Plan and the Long-Term Strategy 2050, as it is an activity that contributes to reducing the climate footprint. The operation of the proposed Project also involves significant CO_2 storage,as the relevant CO_2 emissions have a negative balance. As is evident, the operation of the Project (including the proposed amendment) contributes both to achieving the overall reduction targets for GHG emissions and climate neutrality by 2050, as well as to offsetting any emissions that may exist after 2050.

5.5.3.3 Greek Action Plan to Combat Desertification

The United Nations Convention to Combat Desertification was ratified by Greece with Law 2468/1997, as our country is among those affected by desertification, as a combined result of its biogeoclimatic characteristics and the overexploitation of its natural resources.

Within the framework of this law, a "National Committee for Combating Desertification" was established for the first time in 1996, which was re-established by Decision No. 291203/2005 Decision of the Minister of Rural Development and Food and supplemented by YA 305116/2005 (Government Gazette 1472/B).

The activities and achievements of the National Committee for Combating Desertification include the drafting of the "Greek National Action Plan against Desertification (EESDE)", which was accepted by KYA 99605/3719/2001 (Government Gazette 974/B).

The Action Plan is a framework of measures aimed at preventing and halting desertification, which must be followed at national level, depending on the ecological and socio-economic environment of each threatened area. These measures take the form of integrated programs and are intended to cover all areas of activity (actions for agriculture, forests, livestock, water resources, fauna, specific socio-economic actions), be integrated into the development programs of each region, and be implemented within the framework of a time and spatial plan for each threatened area.

The National Action Plan stipulates that the implementation of measures to combat desertification will initially begin in pilot areas, where conclusions will be drawn as to the suitability and effectiveness of the proposed measures. The areas initially selected as pilot areas were the region of Crete east of the Heraklion-Tymvakio line, Attica, western Lesbos, the islands of the Central Aegean, the Kilkis region in Macedonia, and the hilly region of Central Thessaly.

In June 2021, the interim report of the National Committee for Combating Desertification (NCCD) was presented. This is a summary of ETHKE's positions and preliminary policy proposals to be taken into account in the formulation of the Strategic Plan for the new Common Agricultural Policy (CAP).

For the preparation of the Strategic Plan for the new CAP, it is proposed that soil protection be added to the strategic objectives of the Strategic Plan, and that the National Action Plan to Combat Desertification (NAPD) into national, regional, and local development plans, as well as into the National Spatial Plan, Special Spatial Plans, and Regional Spatial Plans.

As stated in the Report, CAP policy measures for the period 2023-2027 should aim to protect non-degraded land (low/very low risk of desertification), the restoration of degraded land (moderate risk of desertification) and the recovery of desertified land (high risk of desertification), as indicated in the United Nations Convention to Combat Desertification, in order to prevent the current situation from worsening and increase the chances of achieving the goal of zero land degradation after 2030.

To achieve the objectives of the Strategic Plan, it is proposed to:

- Adopting a holistic, multi-sectoral, spatial approach to rural development
- Ensuring the socio-ecological resilience of rural areas,
- Managing land resources with the aim of maintaining and improving soil ecosystem services to maximize the added value of the products produced and services offered, while preserving and protecting high-productivity land for agriculture.

According to the relevant announcement by the Ministry of Rural Development, the Commission is continuing its work on submitting specific proposals.

The proposed amendment, following the initial design of the project, does not conflict with the objectives and guidelines of the National Plan in question.

5.5.3.4 National Strategy for Biodiversity

The National Strategy for Biodiversity for the years 2014-2029 and the corresponding five-year Action Plan were approved in September 2014 by Ministerial Decision 40332 (Government Gazette 2383/B/8.9.2014).

The vision for 2050 based on the National Strategy for Biodiversity is as follows: Greece's biodiversity—and the ecosystem functions it supports, i.e., the country's natural, considered national, capital of the country - is assessed, subject to rational management, effectively protected, and restored both as an intrinsic value and because of its substantial contribution to prosperity and economic well-being. By 2050, the main objective is to prevent the destructive changes caused by biodiversity loss.

The **General Objective** of the Strategy includes:

- Halting biodiversity loss.
- Promoting biodiversity as national capital.
- Intensifying Greece's contribution to global efforts to prevent biodiversity loss.

The following **13 Strategic Objectives for Biodiversity** are set:

1 Increasing scientific knowledge.

2 Conservation of national natural capital.

3 National System of Protected Areas.

4 Conservation of genetic resources.

5 Synergy of policies with biodiversity conservation.

6 Preservation of landscape diversity.

7 Biodiversity and climate change.

8 Biodiversity and invasive alien species.

9 International and transnational cooperation.

10 Public administration and biodiversity protection.

11 Integration of biodiversity conservation into society's value system.

12 Participation of society in biodiversity conservation.

13 Valuation of ecosystem services and promotion of the value of Greek biodiversity.

The National Biodiversity Strategy will run for 15 years. At the same time, however, the foundations are being laid and the conditions created for actions beyond this horizon. The successful implementation of the National Strategy requires continuous monitoring and evaluation of its progress. The Ministry of Environment and Energy is responsible for both the National Strategy and the coordination of the ministries involved.

By taking measures to prevent and address environmental impacts, as provided for in the design of the licensed project and the proposed amendment, there will be no adverse effects that would conflict with the biodiversity conservation strategy.

5.5.3.5 National Marine Strategy

The MSFD (Marine Strategy Framework Directive) was incorporated into national legislation through Law 3983/2011 "National Strategy for the Protection and Management of the Marine Environment," as amended by Joint Ministerial Decision YPEN/DNEP/50529/2779/2018 (amendment of Annex III in accordance with Directive 2017/845/EC) and Law 4759/2020. The Special Secretariat for Water (EGY) of the Ministry of Environment and Energy (YPEN) was designated as the competent authority for the implementation of the Directive in Greece.

Law 3983/2011, as currently in force, established the following **Descriptors** for determining **Good Environmental Status** (hereinafter **GES)** in the waters of the Aegean and Ionian Sea sub-regions, as updated by Ministerial Decision YPEN/DPY/661/5/2022:

- **DESCRIPTOR D1 "Biodiversity":** Biodiversity is maintained. The quality and frequency of habitats and the distribution and abundance of species are consistent with the prevailing physiographic, geographic, and climatic conditions.
- **DESCRIPTOR D2 "Non-indigenous species":** The introduction of non-indigenous species through human activities is at levels that do not adversely affect ecosystems.
- **DESCRIPTOR D3 "Populations of commercially exploited fish stocks":** The populations of commercially exploited fish and shellfish species are within safe biological limits, with age and size distribution characteristics considered indicative of a healthy stock.

- **DESCRIPTOR D4 "Marine food web data":** All components of marine food webs, to the extent that they are known, exist in conditions of normal abundance and diversity and at levels sufficient to ensure the long-term abundance of species and the maintenance of their full reproductive capacity.
- **DESCRIPTOR D5 "Eutrophication":** Human-induced eutrophication and, in particular, its adverse effects, such as biodiversity loss, ecosystem degradation, harmful algal blooms, and oxygen depletion in the seabed, are minimized.
- **DESCRIPTOR D6 "Seabed integrity":** The level of integrity of the seabed ensures that the structure and functioning of ecosystems are preserved and that there are no adverse effects, particularly on benthic ecosystems.
- **DESCRIPTOR D7 "Change in hydrographic conditions":** Permanent changes in hydrographic conditions do not adversely affect marine ecosystems.
- **DESCRIPTOR D8 "Concentrations of Pollutants**": Concentrations of pollutants are at levels that do not cause adverse effects due to pollution.
- **DESCRIPTOR D9 "Contaminants in edible fish":** Contaminants in fish and other seafood intended for human consumption do not exceed the levels specified in Union legislation or other relevant standards.
- **DESCRIPTOR D10 "Marine litter":** The properties and quantities of marine litter do not cause damage to the marine and coastal environment.
- **DESCRIPTOR D11 "Underwater noise":** The introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

The specific Environmental Objectives for each Descriptor, as shown in **the** following **Table**, were set by Ministerial Decision 1175/2012 based on the initial assessment of marine waters carried out by the EEA in 2012 and are pending review. In 2016, Monitoring Programs were approved for the continuous assessment of the environmental status of marine waters in accordance with Law 3983/2011 (Ministerial Decision 126635/2016), which were subsequently updated by Ministerial Decision YPEN/DPY/661/5/2022 (replacing Ministerial Decision 126635/2016). The Monitoring Programs include the criteria, methodologies, and monitoring objectives for each Descriptor (current status and pressure).

Table5 –5 : Environmental Targets for achieving GES of Marine Waters in the Aegean and Ionian Seas

Descriptor	Environmental Objectives
D1	Conservation of the Mediterranean monk seal *Monachus monachus* population in Greek waters. Inventory of the population of the loggerhead sea turtle *Caretta caretta* that breeds on the Greek coast and conservation of nesting areas. Conservation and mapping of *Posidonia oceanica* seagrass beds. Inventory of the area occupied by Maerl-type biogenic sediments. Conservation of benthic macrofauna communities and the structure of planktonic communities.
D2	Inventory of invasive alien species and their environmental impact on marine ecosystems.
D3	Monitoring of the indicators "Fishing mortality" (F/Fmsy) and "Reproductive biomass" (B/Bmsy) of characteristic benthic species. Monitoring of the "Fishing exploitation" indicator for pelagic species. Correlation of fishing activities with the specified indicators.

Descriptor	Environmental Objectives
D4	Monitoring and evaluation of the balance of biomass at higher trophic levels in relation to the total catch of benthic fish.
D5	Reduction of organic load and nutrients entering the marine environment from point and non-point sources. Reduction of nitrate pollution from agricultural activities.
D6	Mapping of sensitive benthic habitats. Maintain the balance of benthic macrofauna.
D7	Prevention of environmental impacts from anthropogenic permanent changes in hydrographic conditions of a local nature.
D8	Specification of the effects of pollutants and determination of prevailing trends in the concentration of these substances in the water column, sediments, marine organisms, and ecosystems.
D9	Maintaining pollutants in fish and other seafood intended for human consumption at acceptable levels.
D10	Reduction of anthropogenic waste on coasts and in the marine environment.
D11	Control of energy levels so that they do not adversely affect the marine environment.

(Source: Ministerial Decision 1175/2012)

Finally, the corresponding Programs of Measures for achieving or maintaining Good Environmental Status in marine waters in accordance with Article 12 of Law 3983/2011 were approved by Ministerial Decision 142569/2017.

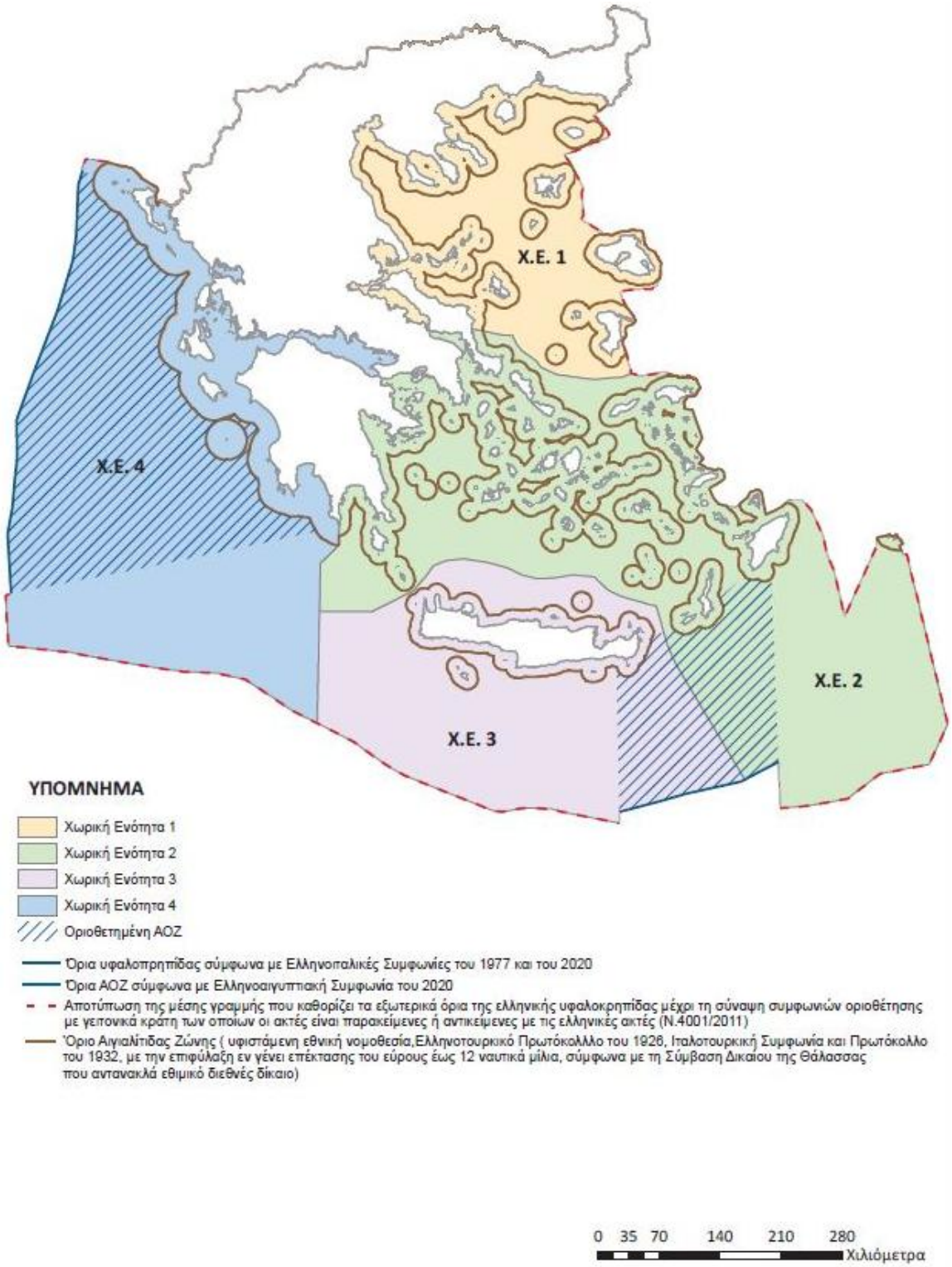
In accordance with Ministerial Decision 142569/2017 and Chapter 11 thereof, measures to reduce underwater noise are proposed. The marine environment is considered to achieve GES when high, medium, and low-frequency impulsive sounds generated in the marine environment by human activities (e.g., shipping, underwater hydrocarbon exploration) do not have adverse effects on vulnerable groups of marine organisms (key functional groups), such as cetaceans, to the extent that their lives are threatened or their reproduction is impeded, and continuous low-frequency sounds produced in the marine environment by human activities do not endanger vulnerable groups of marine organisms.

The 2012 Report (Initial Assessment) noted the lack of information for assessing the current state of marine noise. The monitoring program for the OPTS will highlight the lack of quantitative data on underwater noise in marine waters and may provide sufficient information to determine the BMS and appropriate targets. The measures proposed are as follows:

- Establish regulations to reduce underwater noise during hydrocarbon exploration.
- Establishment of regulations to reduce underwater noise from shipping in cooperation with the International Maritime Organization (IMO).

In April 2025, the new **National Spatial Strategy for the Marine Environment (NSSME)** was approved **by Act No. 6 of the Council of Ministers (Government Gazette D 227/17.04.2025)**. The National Spatial Strategy, according to Article 3 of Law 4759/2020 (A' 245), "is a text of basic policy principles for the development and planning of space and for the coordination of various policies with spatial implications" which "incorporates the national maritime spatial strategy and proposes the subdivisions of the maritime space."

Based on the spatial units defined within the NSRF, the proposed amendment falls within maritime spatial unit 1. This spatial unit contains the maritime waters that fall under the sovereignty of the Hellenic Republic or within which it exercises sovereign rights or jurisdiction, included in the subdivision "Aegean Sea - Eastern Mediterranean (Levantine Sea)" (paragraph 2 of Article 5 of Law 3983/2011, A' 144). This spatial unit includes the maritime front of the Regions of Eastern Macedonia and Thrace, Central Macedonia, Thessaly, part of the Region of Central Greece, and part of the Region of North Aegean.



(Source: Government Gazette D 227/17.04.2025)

Figure5 –9 : Maritime spatial units forming the basis of the National Maritime Spatial Strategy (NMSS)

General objectives of the NSSMS

The National Spatial Strategy for the Marine Environment (NSSME) aims at the rational distribution of human activities in marine zones, both spatially and temporally. The aim is to avoid conflicts and promote complementarity between different uses, such as fishing, shipping, tourism, and renewable energy sources, in order to achieve ecological, economic, and social objectives.

The central axis of the strategy is to ensure maximum resilience and sustainability of marine ecosystems and socio-economic systems. The approach is ecosystem-based and promotes sustainable development and the coexistence of related activities, in accordance with Law 4546/2018.

The MSFD seeks to exploit the economic potential of Greek marine areas with the aim of creating jobs and increasing GDP through sustainable development. Emphasis is placed on upgrading the marine environment, rational use of resources, and exploitation of renewable energy sources.

The strategy aims to maintain the health, productivity, and resilience of marine ecosystems by reducing the impacts of the climate crisis, preserving biodiversity and fish stocks, and reducing pressures on the marine environment. It promotes sustainable fisheries, shipping, tourism, and green energy, while also respecting national defense operations.

Maintaining healthy ecosystems ensures the continued provision of ecosystem services critical to economic and social well-being. The strategy promotes the participation of local communities and stakeholders in spatial planning in order to achieve sustainable and resilient management of marine resources, while making use of national and European resources.

The MSFD governance framework ensures equal access and participation of all stakeholders and society as a whole through meaningful consultations, unless there are reasons of national security that restrict it. The strategy uses all available means to maximize the sustainability of the marine environment.

Specific objectives of the MSFD

- A. Marine Protected Areas (MPAs)
- B. Promotion of maritime development and the blue economy: B1. Energy investments in the maritime space, B2. Maritime transport
- B3. Marine hydrocarbon extraction, B4. Marine tourism, B5. Exploitation of marine biological resources (aquaculture, fisheries, marine biotechnology)
- C. Ensuring equitable spatial development, social cohesion, and environmental justice: C1. Designing infrastructure that offers connectivity, C2. Protecting the marine landscape, C3. Restoring degraded marine ecosystems, C4. Protecting coastal populations from the effects of climate change, C5. Maritime surveillance and maritime security strategy
- D. Ensuring the sustainability of the marine ecosystem: D1. Marine Strategy Framework Directive, D2. Protected species, D3. Alien species, D4. Noise

Given the adoption of the MSFD for the marine environment and the absence of approved corresponding Marine Spatial Planning (MSP) frameworks, the compatibility of the proposed project with existing maritime spatial planning will be examined on the basis of the MSFD itself and the corresponding Special and Regional Spatial Planning Frameworks in force, which concern specific economic sectors (RES, industry, aquaculture,

etc.) and include spatial planning guidelines for the development of each sector in land, coastal, and marine areas (to a lesser extent).

Given the adoption of the NSRF for the marine area and the absence of approved corresponding Marine Spatial Planning Frameworks (MSPF), the compatibility of the project with existing maritime spatial planning will be examined on the basis of the MSP itself and the corresponding Special and Regional Spatial Planning Frameworks in force, which concern specific economic sectors (RES, industry, aquaculture, etc.) and include spatial planning guidelines for the development of each sector in land, coastal, and marine areas (to a lesser extent).

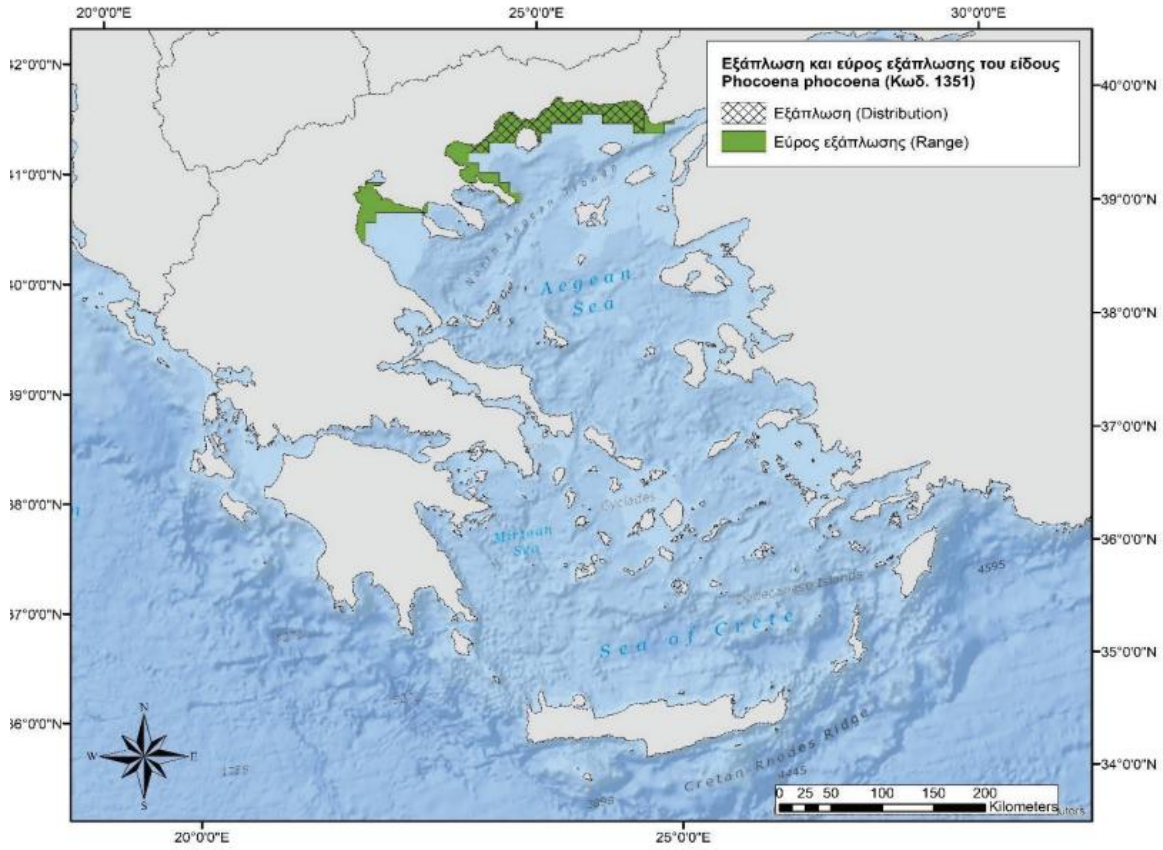
The proposed amendment, following the initial project design, is compatible with the objectives and guidelines set out in the National Maritime Strategy. In addition, as mentioned in Chapter 10 of this study, measures are planned to be taken to reduce underwater noise.

5.5.3.6 National Action Plan for Cetacean Species

In accordance with Ministerial Decision YPEN/DDFPB/2921/70 (**Government Gazette B' 73/17.01.2025**), the National Action Plan for the species Phocoena phocoena and Tursiops truncatus (Tursiops truncatus) was approved. The aim of the plan is to improve the conservation status of these two species in Greece through actions aimed at recovering their populations, conserving their habitats, and minimizing the negative impacts of human activities.

In the National Action Plan for the Mediterranean Monk Seal (Monachus monachus) (Joint Ministerial Decision YPEN/DDFPB/95178/2431/5-9-2024) and the National Action Plan for cetacean species: harbour porpoise (Phocoena phocoena) and bottlenose dolphin (Tursiops truncatus) (Joint Ministerial Decision YPEN/DDFPB/2921/70/17-01-2025), include lists of protection measures and actions that are implemented at the national level. The measures and actions proposed in the above National Action Plans are expected to contribute to improving the conservation status of these species. However, no specific measures or actions are planned for the Thracian Sea region.

According to the National Action Plan for cetacean species: harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (Tursiops truncatus) (Joint Ministerial Decision YPEN/DDFPB/2921/70/17-01-2025), and in particular with regard to the harbour porpoise, it appears that individuals of the species move within an area extending mainly to the northern Aegean Sea, with a presence throughout the year. The presence of bottlenose dolphins east of Thasos, in the Thracian Sea of the northern Aegean, has been confirmed both by strandings of dead or injured/living individuals (Komnenou et al., 1999, 2001, 2002; Drougas et al., 2001; Frantzis, 2001, 2009; ARION, unpublished data), as well as by acoustic recordings (Cucknell et al., 2016).



5 –10 : Map of the distribution and range of *Phocoena phocoena* in Greece, according to the 3rd (range) and 4th (distribution) National Reports under Article 17 of the Habitats Directive (Directive 92/43/EEC)

Regarding the Mediterranean monk seal, according to the data presented in the National Action Plan for the Mediterranean Monk Seal (*Monachus monachus*) (Joint Ministerial Decision YPEN/DDFPB/95178/2431/5-9-2024), and based on the research data available to date on the presence and use of shelters by the species, more than 100 sea caves suitable for reproduction have been recorded at national level, the use of which by the seal has been confirmed.

More specifically, the National Action Plan for Cetacean Species is described in the Special Ecological Assessment Study (SEAS) accompanying this MT AEPO.

5.6 INTERNATIONAL INDUSTRY STANDARDS AND INTERNATIONAL FINANCIAL INSTITUTIONS

5.6.1 Good Oilfield Practices (GOP) and Good International Industry Practices (GIIP)

The term "Good Oilfield Practice" is used by some national oil and gas regulatory authorities to describe the approach expected of operators working in their countries. Unfortunately, it is not a clearly defined concept and therefore its meaning can be interpreted in different ways.

A commonly accepted definition of "**Good Oilfield Practice**" is as follows:

"The practices and procedures used in the oil industry worldwide by prudent and diligent operators, under conditions and circumstances associated with Hydrocarbon Activities, primarily with the aim of ensuring:

- The weak sustainability achieved by conserving oil and natural gas resources, which involves the use of appropriate methods and procedures to maximize hydrocarbon recovery in a technically and economically viable manner, with corresponding control of reserve depletion and minimisation of surface losses,
- Operational safety, which involves the use of methods and procedures that promote occupational safety and accident prevention.
- Environmental protection, which requires the adoption of methods and procedures that minimize the impact of Hydrocarbon Activities on the environment.

Good International Industry Practice (**GIIP**) is defined as follows:

"The exercise of professional skill, diligence, prudence, and foresight reasonably expected of qualified and experienced professionals engaged in the same type of business under the same or similar conditions worldwide. The circumstances that skilled and experienced professionals may consider when evaluating the range of available pollution prevention and control techniques may include, without limitation different levels of environmental degradation and environmental carrying capacity, as well as different levels of economic and technical feasibility. The World Bank's Health, Safety & (HSE) Guidelines, established in 2007, are technical reference documents that provide examples of approaches based on International Industry Best Practice. The Equator Principles and the Performance Standards of the International Finance Corporation (IFC) refer to these guidelines for setting acceptable performance levels.

Conversely, there are no strict guidelines or established rules that define how "good oilfield practice" is achieved or how performance can be measured against such a standard. Good Oil Field Practice is not about following a specific procedure, but rather the approach taken by an operating company in carrying out its duties vis-à-vis the government that approved its operating license. By definition, adherence to the principles of International Industry Best Practice would constitute Good Oilfield Practice.

This is clearly a concept related to the way a facility is designed, the methods of construction, operation, and maintenance, as well as the way it is managed overall, and is therefore equally applicable at every stage of the asset life cycle.

Good Oilfield Practice is, by definition, something that is constantly changing. It requires operators to monitor successes and failures in the industry and to modify their internal practices accordingly. Regulators want to avoid failures that have occurred elsewhere in the world while ensuring that new, more effective approaches are implemented as quickly as possible. Good Oilfield Practice also encourages the use of recognised and well-tested standards during the design stage, internal management/control procedures during project execution, and the implementation of risk-based inspection systems for cost management once the facility is in operation.

Energean is committed to following "Good Oilfield Practices" throughout its daily activities, whether drilling new wells, installing new facilities, or managing existing facilities. This commitment is evident in the way the **Prinos Area Development Project** has been designed and implemented**.** This project has included:

- The recruitment of international personnel with proven experience in the development of similar fields.
- The use of internationally recognized contractors for specialized technical and non-technical work.
- The identification of appropriate international and industry standards against which new facilities will be designed and old facilities will be inspected.
- The design of internal controls that will allow for the review and approval of projects as they move from one decision stage to the next. Upgrading the newly acquired drilling rig to international standards, using equipment and personnel from the Original Equipment Manufacturers.
- The early integration of risk reduction techniques into the design process.
- A desire to maximize the positive impact of the project on the Greek economy by adapting the design to local industrial capabilities.

Energean's senior management and owners are committed to leveraging the operational excellence established by the previous owners of the Prinos basin assets acquired when Energean acquired Kavala Oil in 2007. The Prinos assets are technically complex, mainly due to the extremely acidic nature of the crude oil and associated natural gas produced. Kavala Oil and subsequently Energean had to establish and maintain world-class operational standards to ensure the safe operation of these facilities over a period of 30 years. This is evidenced by the company's excellent safety record and the absence of any accidental release of hydrocarbons into the environment. Prinos' assets coexist harmoniously with a vibrant tourism industry and fishing businesses, both on the coast and offshore.

The proposed modification of the project, following its initial design, **is not directly related** to Good Oilfield Practices (GOP) as it does not concern the exploration, extraction, and exploitation of hydrocarbons. However, the project is **indirectly** related to them, as part of its offshore section (equipment for the treatment and disposal of produced water) is located in Offshore Oil and Gas Facilities (Prinos offshore platforms), which comply with all commitments and specifications arising from Good Oilfield Practices (GOP) and Good International Industry Practices (GIIP).

5.6.2 ETA Standards

For the design of the project and the planning of its construction, operation, and decommissioning phases, as well as the drafting of the relevant Studies and Plans (including this EIA), Energean has taken into account the Performance Requirements (PR) of the European Bank for Reconstruction and Development (hereinafter EBRD).

The EBRD is committed to promoting "*environmentally responsible and sustainable development*." To this end, it has established a comprehensive set of Performance Requirements for key areas of environmental and social sustainability that projects are required to meet (EBRD Environmental and Social Policy 2019).

This EIA and the environmental and social assessment process in general have taken into account the ETAA's Performance Requirements (PR), in accordance with the ETAA's Environmental and Social Policy (2019) and its 10 key performance requirements below:

- PR1 – Assessment and Management of Environmental and Social Impacts and Issues
- PR2 – Labor and Working Conditions
- PR3 – Resource efficiency and pollution prevention and control
- PR4 – Health, Safety, and Security
- PR5 – Land acquisition, involuntary resettlement, and economic displacement
- PR6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PR7 – Indigenous Peoples
- PR8 – Cultural Heritage
- PR9 – Financial Intermediaries
- PR10 – Disclosure and stakeholder engagement

Key elements of these Performance Requirements are summarized in the following **Tables**.

Table5 –6 : Key elements of Performance Requirements 1 & 2

Performance Requirement 1	Performance Requirement 2
Identification and assessment of adverse and beneficial environmental and social impacts and issues related to the Project.	Adopt and maintain written policies and human resource management systems or procedures appropriate to the size and workforce to be employed, which describe the approach to human resource management in accordance with the requirements of this and national legislation.
Adopt measures to prevent or, where prevention is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment.	Provision of a written contract to employees at the start of the employment relationship, setting out their rights under national labor and employment law and any applicable collective bargaining agreements. Ensure rights related to employee associations. Implement an effective mechanism for submitting and handling workplace complaints.
Identify and, where possible, take advantage of opportunities to improve environmental and social performance.	Compliance with relevant requirements on non-discrimination based on individual characteristics such as gender, ethnicity, age, political beliefs, and sexual orientation in relation to employment. Compliance with the principles of equal opportunity and fair treatment in the context of labor relations. Taking measures to prevent and address all forms of violence and harassment.
Promoting improved environmental and social performance through a dynamic process of monitoring and evaluating performance.	Prohibition of child labor and forced labor, which consists of work or service that is not performed voluntarily and is demanded from a person under threat of violence or punishment, including through abusive and deceptive recruitment practices.

5 –7 : Key Performance Requirements 3 & 4

Performance Requirement 3	Performance Requirement 4
Promote practices for resource efficiency, pollution prevention and control in line with good international practices and best available techniques in this field (saving raw materials, energy, and water, and avoiding and reducing waste production.	Avoidance or reduction of negative impacts on health and safety and issues related to project activities. Provision of safe and healthy conditions for workers and the community. Identifying and assessing risks related to occupational safety and health, community health and safety, gender-based violence, and implementing appropriate measures to prevent or mitigate these risks.
Minimising waste production and reducing its harmfulness as far as possible. When waste production cannot be avoided but has been minimized, reuse, recycling, or recovery of waste and its use as a source of energy in a manner safe for human health and the environment is recommended. Safe use and management of hazardous substances and materials.	Reduction or elimination of the potential exposure of workers and the community to hazardous materials. When there is a possibility of exposure to hazards for workers and the community, demonstrate due care in managing their exposure by eliminating, replacing, or isolating the situation or substance causing the hazards.
Promote environmental and social assessment procedures for the Project. Select alternatives and implement cost-effective technical and economic options to avoid or minimize greenhouse gas emissions associated with the Project.	Identify and assess Project safety threats to workers and communities affected by the Project. Where risks have been identified, it is recommended that appropriate safety management arrangements be implemented in accordance with the GIP.
Identify the risks and potential impacts of climate change and implement appropriate measures to mitigate these risks and impacts in accordance with GIP (Good International Practice).	Identification and assessment of potential risks to traffic and road safety for workers and communities affected by the project throughout its life cycle.

5 –8 : Key Performance Requirements 5 & 6

Performance Requirement 5	Performance Requirement 6
Address impacts of project-related land acquisition, including restrictions on land use and access to assets and natural resources, which may cause physical displacement and/or economic displacement. Promote universal respect for and observance of human rights and freedoms, and in particular the right to private property, adequate housing, and the continuous improvement of living conditions.	The objective of the Requirement is: • To protect and conserve biodiversity by applying a precautionary approach; • Adopting a hierarchy of mitigation measures when designing and implementing projects with the aim of avoiding biodiversity loss and, where appropriate, achieving biodiversity gains. • To conserve ecosystems. And • Promoting good international practices on the sustainable management and use of living natural resources.
Implementation of measures to avoid or minimize displacement. Where displacement impacts occur, a relocation action plan (or Habitat Restoration Framework if relocation is not expected) should be prepared. The plan should include an inventory and a detailed initial socio-economic study. Those affected should be informed and consulted during the planning process. Special provisions should be made for consulting vulnerable groups and taking gender issues into account. Where land acquisition or restrictions on the use of land, other assets, and natural resources (permanent or temporary) cannot be avoided, the Project Owner shall offer compensation to the affected persons at the full replacement cost, as well as other assistance that may be necessary to help improve or at least restore their standard of living and livelihood.	Where the project is located within or has the potential to adversely affect an area that is legally protected and/or internationally recognized or proposed for such status by national governments, the Project Owner shall identify and assess the potential impacts associated with it and apply the mitigation hierarchy so that the impacts of the project do not compromise the integrity, conservation objectives and/or the importance of biodiversity in such an area.
Promote consultation with affected individuals and host communities to publicize relevant information about the Project alternatives under consideration.	Implementation of actions necessary to mitigate environmental and social impacts on issues related to sustainability. The implementation of the actions necessary to satisfy this Requirement will be managed by the Company's Environmental and Social Management System (ESMS).
Establishment of procedures for monitoring and evaluating the implementation of the potential resettlement plan and taking corrective measures, if necessary, during implementation. Monitoring of the land acquisition, resettlement, and livelihood improvement or restoration process will be conducted in accordance with PR1 and will involve key stakeholders, including affected communities.	Management of natural resources through the application of national regulatory requirements, GIP standards, and relevant EU environmental standards, as applicable to each Project.

5 –9 : Key elements of Performance Requirements 7 & 8

Performance Requirement 7	Performance Requirement 8
• Fully ensure respect for the dignity, rights, culture, customary laws, and livelihoods of indigenous peoples; • Anticipate and avoid risks and adverse impacts of projects on the lives and livelihoods of indigenous communities or, where avoidance is not feasible, minimize, mitigate, or compensate for them. • Promoting opportunities for indigenous peoples to participate in and benefit from project-related activities in an accessible, culturally appropriate, and inclusive manner. • Establish and maintain an ongoing relationship with indigenous peoples affected by a project throughout its life cycle. • Ensuring effective participation in the design of project activities or mitigation measures that could potentially affect them either positively or negatively.	Protect cultural heritage and develop the Project in such a way as to avoid or mitigate negative impacts on cultural heritage. Compliance with the provisions of government plans for areas that are legally protected for their cultural heritage or are internationally recognized, and compliance with national and local requirements relating to the relevant cultural heritage.
Establishment of an ongoing relationship with affected communities and indigenous peoples. Understanding and respect for relevant national law.	Assess risks and impacts on cultural heritage. Identify potential negative impacts on cultural heritage from the Project at an early stage of the environmental and social assessment.
Allowing sufficient time for indigenous peoples to engage in collective decision-making processes.	The Project Owner should consult with affected individuals, communities, and other stakeholders as appropriate.
Take measures and promote a consultation process on the potential impacts on indigenous populations.	Implementation of a chance finds procedure. In the event of such finds, activities will be suspended and the chance finds procedure will be implemented.

5 –10 : Key Performance Requirements 9 & 10

Performance Requirement 9	Performance Requirement 10
Implementation of a clearly defined environmental and social management system (ESMS) that will include an environmental and social policy for each sub-project of the main Project.	Identification of Project stakeholders who are affected or likely to be affected by the Project, including disadvantaged or vulnerable groups who may be affected differently or disproportionately by the Project.
	Ensuring information disclosure and meaningful consultation throughout the Project's lifetime so that stakeholders can participate appropriately in consultations on environmental and social issues that could potentially affect them. Provide relevant information, guidance, and training to employees and communities affected by the Project on health and safety risks, protective and preventive measures.
Ensuring that sub-projects are structured to meet national regulatory requirements on environmental and social issues, including, where applicable, national regulatory requirements on public consultation and disclosure	Establishing a Grievance Mechanism to receive and facilitate the resolution of concerns and complaints from stakeholders regarding the Project
Classification of the environmental and social risk of the proposed sub-projects (low/moderate/high) in accordance with the EIB's environmental and social risk classification list for financial institutions.	Provision to stakeholders, on an ongoing basis, of appropriate information on the environmental and social performance of the Project, the risks, impacts, and complaints arising in relation to the Project, in order to keep stakeholders informed. Monitoring any changes to the Project and updating the EIA accordingly.

5.6.3 Green Economy Transition (GET) Assessment

In 2015, ETAA presented its approach to the transition to a green economy, known as **the Green Economy Transition** (hereinafter **GET**), in order to ensure that the investments it finances deliver environmental benefits. The ETAA has developed principles and criteria that must be met so that all new projects are in line with the strategic objectives of the GET, i.e., they are harmonized with the effort to transition to a green economy.

In 2020, the Board of Directors approved the new GET approach for the period 2021-25 (GET 2.1) as part of EIB's Strategic and Capital Framework (SCF) 2021-25. The new approach aims to enhance the Bank's contribution to addressing the climate and environmental crisis.

Building on a solid track record of green financing and policy implementation, GET 2.1 is a comprehensive approach that is realistically grounded in the climate and environmental challenges of the economies in which the EBRD invests. Through this new approach, the Bank will work to accelerate the transition to a green, low-carbon, and resilient economy by:

- Aligning its activities with the principles of international climate agreements, notably the Paris Agreement.
- Strengthening the political commitment to developing long-term low-carbon strategies and greening financial systems.
- Promoting innovation in investments with a set of values consistent with climate change mitigation, such as green digital solutions, just transition, circular economy, natural capital, and green financing of the value chain.

The following **table** summarizes the principles and criteria that projects must meet in accordance with GET requirements.

5 –11 : Principles and criteria for project eligibility through the GET approach

Principle	Criteria
Level of detail	Only clearly defined environmental activities or components of the project that can be separated from non-environmental ones meet the GET requirements.
Environmental Benefits	Measurable net overall environmental benefits compared to the baseline scenario.
Minimum environmental performance and standards	Application of best available techniques per sector to EU environmental performance and social standards.
Multiple environmental benefits	No double counting of funding across multiple environmental benefits. The GET assessment is based on the main (primary) environmental benefit, while other types of environmental benefits are also recognized.

(Source: Implementing the Green Economy Transition. Technical Guide, July 2023)

An activity (other than climate change mitigation or adaptation activities) is considered to have environmental benefits in terms of the transition to a green economy if it results in a substantially positive environmental outcome that is not primarily climate change mitigation or adaptation. Other environmental activities are divided into four main categories, according to the EU **Taxonomy Regulation**:

- Sustainable use and protection of water and marine resources
- Resource efficiency and transition to a circular economy
- Pollution prevention and control
- Protection and restoration of biodiversity and ecosystems.

According to the GET requirements, there are 11 Tables with the various categories of Projects, as shown in **the** following **Table**. Each activity is required to meet all the specified criteria.

5 Table –12 : List of 11 Tables for GET Approach Projects

Table number	Description
Table 1	Action
Table 2	Extraction and production of metals for climate action
Table 3	Manufacturing activities
Table	Agriculture, forestry, land use, and fisheries
Table	Water supply and sewerage
Table	Solid waste management
Table 7	Transport
Table 8	Buildings, public facilities, and energy efficiency in end use
Table 9	Information and communication technology (ICT) and digital technologies
Table	Research, development, and innovation
Table	Cross-sectoral activities

(Source: Implementing the Green Economy Transition. Technical Guide, July 2023)

According to the above categorization of activities, the Project under consideration can be classified in the following subcategory of Table 11 of the GET.

5 –13 : Correlation of the Project with the list of activities in the 11 Tables of the GET approach

Category	Activity	Selection criteria and guidance
Reduction of greenhouse gas emissions	Transport, use, or permanent storage of CO_2	• Where the activity involves only transport, the project must demonstrate that the transported CO_2 will be used productively or permanently stored. • Where the activity involves the construction of new transport infrastructure, this must be intended for the transport of captured CO_2 . • Where the project involves utilization, the project output replaces primary raw materials. In addition, the project must demonstrate a significant reduction in net greenhouse gas emissions or carbon intensity (e.g., tCO_2e/unit of output), taking into account the life cycle sources of the materials, such as when Scope 3 emissions or Scope 1 emissions during construction are expected to be significant. • Productive use does not include fossil fuel production, such as enhanced oil recovery.

(Source: Implementing the Green Economy Transition. Technical Guide, July 2023)

5.7 EMISSIONS STANDARDS AND LIMITS IN ACCORDANCE WITH NATIONAL LEGISLATION

5.7.1 Air Quality Standards

In order to maintain air quality, the provisions and guideline values for air quality referred to below must be followed:

- Joint Ministerial Decision 14122/549/E103/24-03-2011 (B' 488) laying down measures to improve air quality, in accordance with the provisions of Directive 2008/50/EC.
- Joint Ministerial Decision 22306/1075/E103/29-05-2007 (B' 920) setting target values and assessment thresholds for concentrations of arsenic, cadmium, mercury, nickel, and polycyclic aromatic hydrocarbons in ambient air, in accordance with the provisions of Directive 2004/107/EC.
- PYS 25/18.3.88 (Government Gazette 52/A/22.3.88) and PYS 34/30.5.02 (Government Gazette 125/A/5.6.02), "Limit and guideline values for air quality in relation to sulfur dioxide, nitrogen dioxide and nitrogen oxides, particulate matter and lead.
- PD 1180/81 (Government Gazette 293/A/1981) on point source emissions of solids (suspended particulates) from construction sites and project facilities applies a limit of 100 mg/m³ (Article 2(d)).

The table below shows the established limits for atmospheric pollutant concentrations in accordance with Joint Ministerial Decision 14122/549/E.103/2011 (Government Gazette 488/B/2011).

Table5 –14 : Limit values for concentrations of air pollutants in the environment according to Joint Ministerial Decision No. 14122/549/E.103/2011

Pollutant	Limit value	Date of attainment of limit value	Tolerance margin
Carbon monoxide (CO) (mg/m³) (Directive 2008/50/EC)	10 Maximum daily 8-hour value	1/1/2005	60
Benzene (C_6H_6) (μg/m³) (Directive 2008/50/EC)	5 Annual average	1/1/2010	
Sulfur dioxide (SO_2) (μg/m³) (Directive 2008/50/EC)	350 Average hourly value, not to be exceeded more than 24 times per year	1/1/2005	150 μg/m³ (43%)
	12 Average daily value, not to be exceeded more than 3 times per year.	1/1/2005	
	50 Warning threshold, for 3 consecutive hours		
Nitrogen dioxide (NO_2) (μg/m³) (Directive 2008/50/EC)	20 Average hourly value, not to be exceeded more than 18 times per year	1/1/2010	

Pollutant	Limit value	Date of attainment of limit value	Tolerance margin
	40 Annual average value	1/1/2010	
PM10 particles (μg/m³) (Directive 2008/50/EC)	50 Average daily value, not to be exceeded more than 35 times per year	1/1/2005	50
	40 Average annual value	1/1/2005	20
Lead (Pb) (μg/m³) (Directive 2008/50/EC)	0 Annual average value	1/1/2005	100
Ozone (o3) (μg/m³) (Directive 2008/50/EC)	120 Maximum daily average value over 8 hours, not to be exceeded more than 25 times in 3 years	1/1/2010	
	180 Alarm threshold, hourly average value		

5.7.2 Acoustic Environment Quality Standards

The provisions of Joint Ministerial Decision 13586/724/28.3.2006 (B' 384) apply to the assessment and management of environmental noise, which set out measures, conditions, and methods for the assessment and management of environmental noise in accordance with the provisions of Directive 2002/49/EC.

Rules and procedures for establishing operating restrictions in relation to noise pollution are laid down in Presidential Decree 80/2004 (A' 63), which adapted Greek legislation to the provisions of Directive 2002/30/EC.

The provisions of Joint Ministerial Decision 37393/2028/29.3.2003 apply to noise emitted by project construction equipment, which specifies measures and conditions for noise emissions into the environment from equipment for use in outdoor areas (B' 1418), as amended by Joint Ministerial Decision 9272/471/2.3.2007 (B' 286). For construction works, the limit for the Leq index at a distance of 100 m from the boundaries of the construction site is **Leq = 65 dB(A),** based on the limits of PD 1180/81 (Government Gazette 293/A/06.10.1981) as the maximum permissible noise limit from industrial and all types of mechanical installations. The following also apply to noise from construction work:

- Presidential Decree 57/2010 (Government Gazette 97/A/25.6.2010) Adaptation of Greek legislation to Directive 2006/42/EC of the European Parliament and of the Council "on machinery and amending Directive 95/16/EC" and repealing PD 18/96 and 377/93, as amended by PD 81/2011, (Government Gazette 197/A/9.9.2011) "Amendment of Presidential Decree 57/2010 (97/A) in compliance with Directive 2009/127/EC of the European Parliament and of the Council "amending Directive 2006/42/EC".

- Ministerial Decision 56206/1613/1986 (Government Gazette 570B/9.9.1986) "Determination of noise emissions from construction site machinery and equipment in accordance with Directives 79/113/EEC, 81/1051/EEC, 85/405/EEC."
- YA 69001/1921/1988 (Government Gazette 751/B/18.10.88) on "EEC type approval for the noise level limit of construction machinery and equipment, and in particular motor-driven air compressors, tower cranes, electric welding generators, power generators and portable concrete breakers and jackhammers," as amended by Ministerial Decision 10399Φ5.3/361/91 (Government Gazette 359B/28.5.1991) "Determination of the noise level limit for tower cranes, supplementing YA 69001/1921/1988."
- Ministerial Decision 765/1991 (Government Gazette 81B/21.2.1991) "Determination of noise level limits for hydraulic excavators, cable excavators, loaders, and loader-excavators," as amended by Ministerial Decision 11481/523/97 (Government Gazette 295B/11.4.1997).

The maximum permissible limits for environmental transport noise are set out in Joint Ministerial Decision 211773/27.4.2012 (B 1367) for the determination of assessment indicators and maximum permissible limits for environmental noise indicators resulting from the operation of transport projects.

Thus, **the maximum permissible limits** for **traffic noise indicators** are set as follows:

- For the Lden indicator (24 hours): 70 dB(A),
- For the Lnight indicator (8-hour nighttime): 60 dB(A),

at a height of 4.0 ± 0.2 m (3.8 to 4.2 m) above ground level and at a minimum distance of 2 m from the most exposed (towards the respective linear source of traffic noise) facade (external wall or window frame) of residential buildings and other sensitive uses requiring protection.

Lden is an indicator of the overall noise level during the day, evening, and night, which is used to quantify the annoyance associated with noise exposure. Lnight is an indicator of the sound level at night. The values of the Lden and Lnight indicators are determined using a common methodology set out in Annex II to the Directive, using specific assessment methods and measurements.

5.7.3 Water and Wastewater Quality Standards

5.7.3.1 Water Quality Standards

5.7.3.1.1 Surface Water

The project study area falls within Water Districts (WD) EL11 "Eastern Macedonia" & EL12 "Thrace", for which River Basin Management Plans (RBMP) have been drawn up and approved, in accordance with the specifications of Directive 2000/60/EC, pursuant to Law 3199/2003 and Presidential Decree 51/2007.

The Eastern Macedonia River Basin District (EL11) consists of one (1) river basin, that of Strymon (EL1106), while the Thrace River Basin District (EL12) consists of five (5) river basins, those of Nestos (EL1207), Rem.

Xanthi – Xeroremata (EL1208), Komotini – Loutro Evrou (EL1209), Evros (EL1210) and Thasos – Samothraki (EL1242).

In particular, the land-based facilities belong to the Nestos river basin EL1207.

According to Measure **M12B1102**[49] of the1stRevision of the River Basin Management Plan (RBMP) of the Water District (YD) of Thrace (Government Gazette 2290/B/2013), which is replaced by **M12B0702** of the 2ndRevision of the SDWMP of the WD of Thrace, in the river basins of WD EL12, a study is to be carried out by the competent Decentralized Administration (Water Directorates, YPE-EGY) to set emission limits for priority substances and other pollutants affecting surface waters, as established by Joint Ministerial Decision 51354/2641/E103/2010, as applicable, and the physicochemical parameters. When setting emission limit values, the following shall be taken into account:

1 The Environmental Quality Standards established by Joint Ministerial Decision 51354/2641/E103/2010 (Government Gazette 1909/B/2010), as amended by Ministerial Decision 182314/1241/2016 (Government Gazette 2888/B/2016).

2 The provisions of Directive 91/271/EEC.

3 The dilution achieved during the summer period from the minimum flow of the river and the maximum flows of liquid waste from various industrial and other activities.

4 The sensitivity of the area.

5 The estimated daily and estimated annual pollutant load of the facility.

6 The concentration of the basic pollutant load parameters.

7 The correlation with drinking water protection areas.

The Emission Limit Values will be maximum values that must be met in all cases by liquid waste from industrial and other activities carried out within the catchment area.

5.7.3.2 Groundwater

Groundwater is subject to the quality standards laid down in Ministerial Decision 1811/2011 (Government Gazette 3322/B/2011), which were adopted in implementation of paragraph 2 of Article 3 of Joint Ministerial Decision 39626/2208/E130/2009 (Government Gazette 2075/B/2009) (see **Table** below).

[49] *It is not included in the 2nd Revision of the SDAP of the Thrace Region (EL12) as a standalone measure. Aspects of the measure will be included in the program in combination with measure M12B0702.*

Table5 –15 : Quality standards of Ministerial Decision 1811/2011 for groundwater

Parameter	Quality Standards
Nitrates	50 mg/l
Active substances in pesticides (including metabolites, degradation products, and reaction products)	0.1 mg/l 0.5 μg/lt (total*)
pH	6.5 - 9.5
Conductivity	2,500 μScm
Arsenic	10 μg/lt
Cadmium	5 μg/lt
Lead	25 μg/lt
Mercury	1 μg/lt
Nickel	20 μg/lt
Total chromium	50 μg/lt
Aluminum	200 μg/lt
Ammonium	0.5 mg/l
Nitrites	0.5 mg/l
Chloride ions	250 mg/l
Sulfate ions	250 mg/l
Sum of trichloroethylene and tetrachloroethylene	10 μg/l

*This refers to the sum of all individual pesticides detected and quantified during monitoring.

5.7.3.3 Wastewater Standards

5.7.3.3.1 Wastewater Emission Limit Standards

The liquid waste emission limit standards are defined in Health Regulation E1b/221/65 on "Liquid Waste Disposal." In particular, the quality standards and emission limits for wastewater discharged into waters intended for swimming and any other use other than water consumption are as follows:

- pH 6.5 - 8.5.
- Dissolved oxygen 5 mg/l.
- Coliform bacteria 0 - 50 / 100ml.
- Absence of suspended solids or sludge deposits originating from liquid waste or industrial waste.
- Non-toxic, non-hazardous, or non-thermal wastewater.

In addition, liquid waste must be treated effectively before being discharged into the final receiving body. The specific limits for the discharge of wastewater into the Gulf of Kavala are specified in detail by the Prefecture of Kavala in a Prefectural Decision (see **table** below).

Table5 –16 : Limit values for liquid waste discharge

Parameter	Limit
pH	6.6 – 8.5
Temperature	35oC
Floating solids	>0.5 cm none
Suspended solids	70mg/l
BOD5	40 mg/l
COD	120 mg/l
Fats and oils (animal-vegetable)	20 mg/l
Mineral oils – hydrocarbons	10 mg/l
Aluminium (AL)	5 mg/l
Arsenic (A5)	0.5 mg/l
Barium (Ba)	2 mg/l
Boron (B)	2 mg/l
Cadmium (Cd)	0.5 mg/l
Chromium 3++ (Cr3+)	2 mg/l
Chromium 6++ (Cr6+)	0.2 mg/l
Total iron (Fe)	20 mg/l
Dissolved iron	4 mg/l
Manganese 2	2 mg/l
Mercury	0.01 mg/l
Nickel	2 mg/l
Lead	0.1 mg/l
Copper	2 mg/l
Selenium	0.1 mg/l
Tin	10 mg/l
Zinc	1 mg/l
Cyanide compounds.	0.5 mg/l
Chlorine (free)	2 mg/l
Sulphides	2 mg/l
Sulfide	2 mg/l
Fluoride	10 mg/l
Phosphorus	30 mg/l
Total ammonia	30 mg/l
Nitrite nitrogen	3 mg/l
Nitrate nitrogen	30 mg/l
Total Phenols	0.5 mg/l
Aldehydes	1 mg/l
Aromatic solvents	0.4 mg/l
Nitrogenous solvents	0.2 mg/l

Parameter	Limit
Chlorinated solvents	
Total toxic substances	3 mg/l
Total coliform bacteria	500 K/100ml
Fecal coliform bacteria	100 K/100ml

5.7.3.3.2 Ship sewage, International Convention for the Prevention of Pollution from Ships, MARPOL 73/78, Annex I, IV, V

Annex I Regulations for the Prevention of Pollution by Oil (entered into force on October 2, 1983)

Covers the prevention of oil pollution from operational measures as well as accidental discharges. The 1992 amendments to Annex I made double hulls mandatory for new oil tankers and set a phased implementation schedule for retrofitting existing tankers with double hulls, which was subsequently revised in 2001 and 2003.

Annex IV Prevention of Pollution by Sewage from Ships (entered into force on September 27, 2003)

It includes requirements for the control of marine pollution from sewage. The discharge of sewage into the sea is prohibited, unless the ship has an approved sewage treatment plant in operation or the ship discharges pulverized and disinfected sewage using an approved system more than three nautical miles from the nearest coast. Sewage that is not pulverized or disinfected must be discharged more than 12 nautical miles from the nearest coast.

Annex V Prevention of Pollution by Garbage from Ships (entered into force on December 31, 1998)

Various types of garbage are included, and the distances from the coast and the manner in which they may be disposed of are specified. The most important feature of the Annex is the total ban it imposes on the discharge of any form of plastic into the sea.

5.7.4 Alert Thresholds for Short-Term Response Measures

5.7.4.1 Gaseous Pollutants

Joint Ministerial Decision 14122/549/E103/2011 has set alert thresholds for limiting pollution in cases where, mainly due to extremely adverse meteorological conditions, a significant increase in pollution levels is expected. The limits for emergency measures established by the above Joint Ministerial Decision relate to NO_2, SO_2 and O_3 pollutants.No alert threshold is provided for particulate matter (PM_{10}) by European and Greek legislation. **The table** below shows the alert thresholds for the activation of short-term response measures to combat air pollution.

Table5 –17 : Alert thresholds for air pollutants for the activation of short-term response measures

Pollutant	Average period	Limits
SO_2	1 hour	500 μg/m³ (*)
NO_2	1 hour	400 μg/m³ (*)
O_3	1 hour	240 μg/m³ (*)

(*) Exceedance of this value for 3 consecutive hours

Given that Community legislation does not set limits for informing the public and issuing alerts for PM_{10} and for tackling air pollution from particulate matter, Joint Ministerial Decision 70601 (Government Gazette 3272/B/2013) was issued, establishing PM_{10} , specifies measures for informing and protecting the population, as well as measures to reduce emissions of particulate matter from combustion sources, industry and craft industries, and vehicle traffic, depending on the concentration levels.

Table5 –18 : PM10 alert concentration limits

Pollutant	Time Base	Limit
PM_{10}	24h	51-75 μg/ m^3 Recommendations for vulnerable population groups
		76-100 μg/ m^3 Recommendations for vulnerable population groups and the general population
		101-150 μg/m^3 Recommendations for vulnerable population groups and the general population, measures to reduce emissions of particulate matter from combustion sources, industrial and craft activities, and traffic
		>150 μg/ m^3 Recommendations for vulnerable population groups and the general population, measures to reduce emissions of suspended particulate matter from combustion sources, industrial and craft activities, and traffic

5.7.4.2 Noise

The limits of PD 1180/81 (Government Gazette 293A/1981) for mechanical noise and Joint Ministerial Decision 211773/2012 for noise from road transport operations apply.

5.7.4.3 Liquid waste

The limits specified in Health Regulation E1b/221/65, as described in **Section 5.8.3.3,** apply.

5.7.4.4 Water

The limits described in **Section 5.8.3** apply.

5.8 Location of the Project in Relation to the Natural and Man-made Environment of the Area

5.8.1 Established Settlement Boundaries and Approved Urban Plans

The existing facilities and the total area of the planned and possible future development of the CO_2 in Prinos (including the proposed modification) are located in the Gulf of Kavala, 8 km west of Thasos and 18 km south of the Kavala coastline. The Gulf of Kavala is part of the Thracian Sea and is located in the northeastern Aegean Sea.

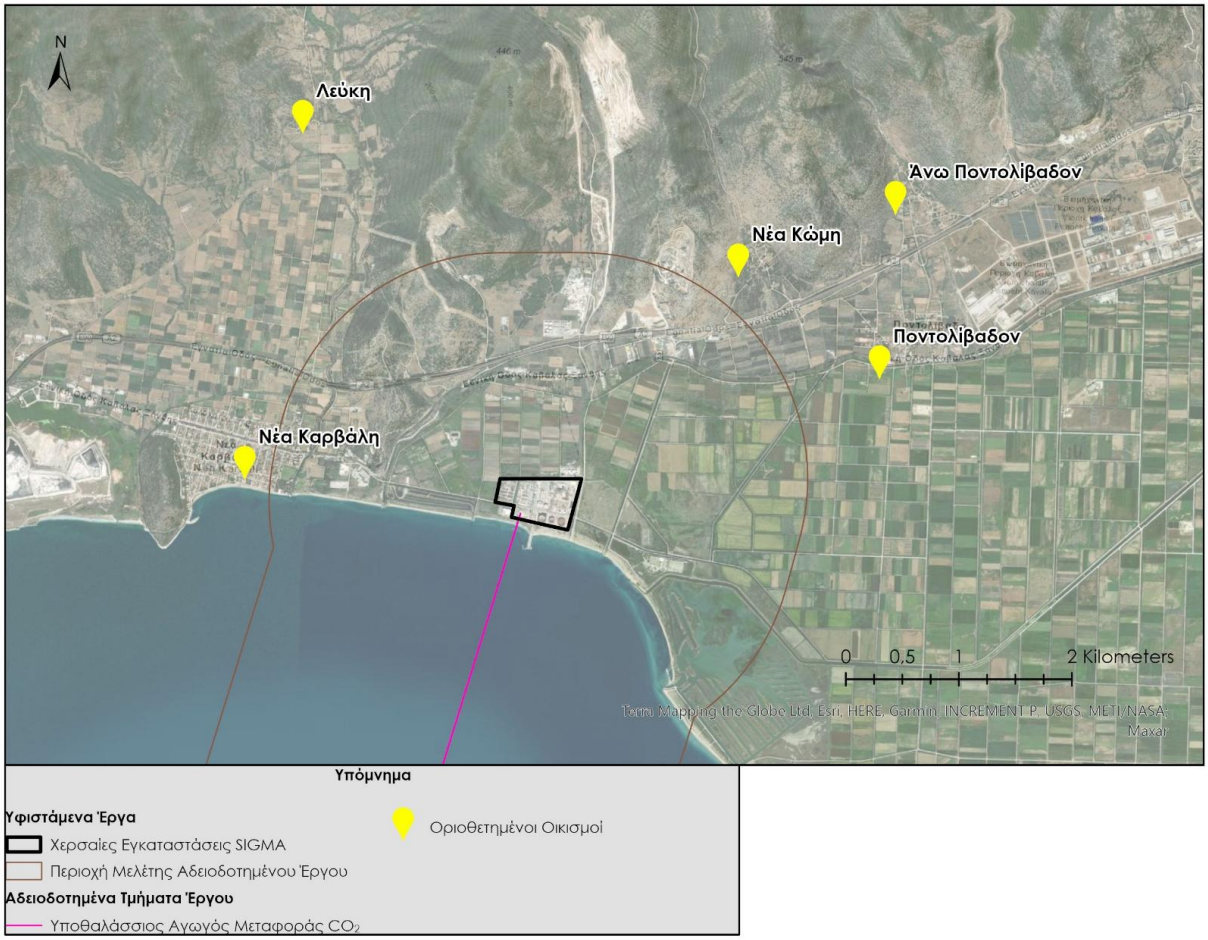
The onshore facilities of the licensed Project are located on the border between the Municipality of Kavala and the Municipality of Nestos. It should be noted that the present proposed amendment does not include any intervention in the land facilities of the licensed project, which remain unchanged, as described in the approved EIA of the project and licensed by the relevant AEPO.

The licensed (planned and possible future) and existing offshore facilities, as well as the interventions of the proposed amendment, are located in the region of Eastern Macedonia and Thrace, in the southern coastal part of the Regional Unit of Kavala, near the borders of the Municipalities of Kavala (north), Pangaeo (north-northwest), Nestos (north-northeast), and Thasos (east-southeast).

The Regional Unit of Kavala consists of 3 municipalities and 11 municipal units (MU):

- Municipality of Paggaio
  - Municipal Unit of Eleftheroupoli
  - Municipal Unit of Eleftheron
  - Municipal Unit of Orfanou
  - Municipal Unit of Paggaio
  - Municipality of Pieria
- Municipality of Kavala
  - Municipal Unit of Kavala
  - Municipal Unit of Philippi
- Municipality of Nestos
  - Municipal Unit of Keramotis
  - Municipal Unit of Oreinou
  - Municipality of Chrysoupoli

The following **figure** shows the nearest settlements to the onshore facilities of the licensed Project. As can be seen, the nearest settlement is Nea Karvali, which is approximately 2.6 km away from the onshore facilities.



(Source: ELSTAT, 2021)

5 –11 : Settlements near land facilities

City Plans: For the Municipality of Kavala in the Prefecture of Kavala, to which the land facilities belong, a General Urban Plan has been drawn up and approved (hereinafter referred to as GUP) (Decision No. 5248p.e./04-02-2013) and published in the Government Gazette 69/AAP/11-03-2013. The boundaries of the GUP coincide with the administrative boundaries of the Municipality of Kavala and include the city of Kavala and the settlements of Aspro Ammos, Paliou, Nea Karvali, Chalkero, Lefki, and Ano Lefki.

A Local Urban Plan has been approved for the community of Nea Karvali in the Municipality of Kavala, which was published in the Government Gazette 487/Δ/1989-08-07 under the title "Approval of a local urban plan in the community of Nea Karvali in the municipality of Kavala for the designation of a site for the construction of a regional market."

A General Urban Plan (GUP) has been drawn up and approved for the settlement of Chrysoupoli in accordance with Government Gazette 814/Δ/26-08-1987.

Finally, a Residential Control Zone (ZOE) has been designated in the area outside the plan and outside the boundaries of settlements existing prior to 1923 in the Municipality of Kavala (Prefecture of Kavala) and the communities of Amisiana, Amigdalona, Nea Karvali, Chalkero, Kokkinochoma (Prefecture of Kavala) in accordance with Government Gazette 326/Δ/1995.

Delimited settlements: The delimited settlements described in **the** following **table** are located in the wider area of the licensed land facilities. According to data from the Hellenic Statistical Authority (ELSTAT, 2021), the total population of the Municipality of Kavala for the year 2021 was estimated at 54,065 inhabitants, that of the Municipality of Nea Karvali at 2,003 inhabitants, and that of the Municipality of Nestos at 20,311 inhabitants. The closest settlement to the facilities is the settlement of Nea Karvali.

Table5 –19 : Nearest settlements to the Kavala Municipal Unit

Settlement	Distance from land facilities (km)	2021 Population Census
Nea Karvali	2.6	2,003
Pontolivadon	3	250
Nea Komi	2.7	55
Chalkeon	6.6	175
Lefki	4	57
White Sand	7.8	51
Kavala	11.5	54,065

5.8.2 Boundaries of Areas of the National System of Protected Areas of Law 3937/2011

The Project (licensed project and proposed amendment) is located within the Natura 2000 protected area TKS & ZEP GR1150014 "Marine Area of Kavala Thasos," as shown in **the** following **Figure**. The wider area includes the Natura 2000 sites SAC GR1150010 "Nestos Delta and Keramotis Lagoons - Wider Area," SPA GR1150001 "Nestos Delta and Keramotis Lagoons and Thasopoula Island" and SPA GR1150012 "Thasos (Mount Ypsario and coastal zone)".

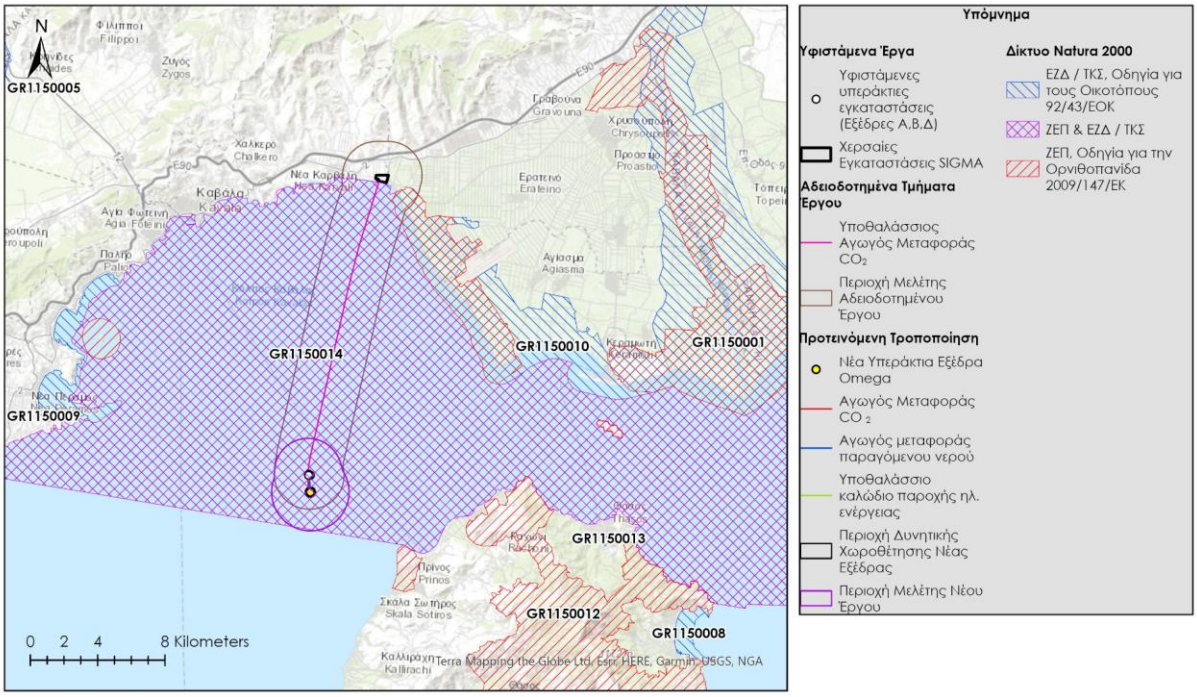


Figure5 –12 : Protected areas of the Natura 2000 network within the study area

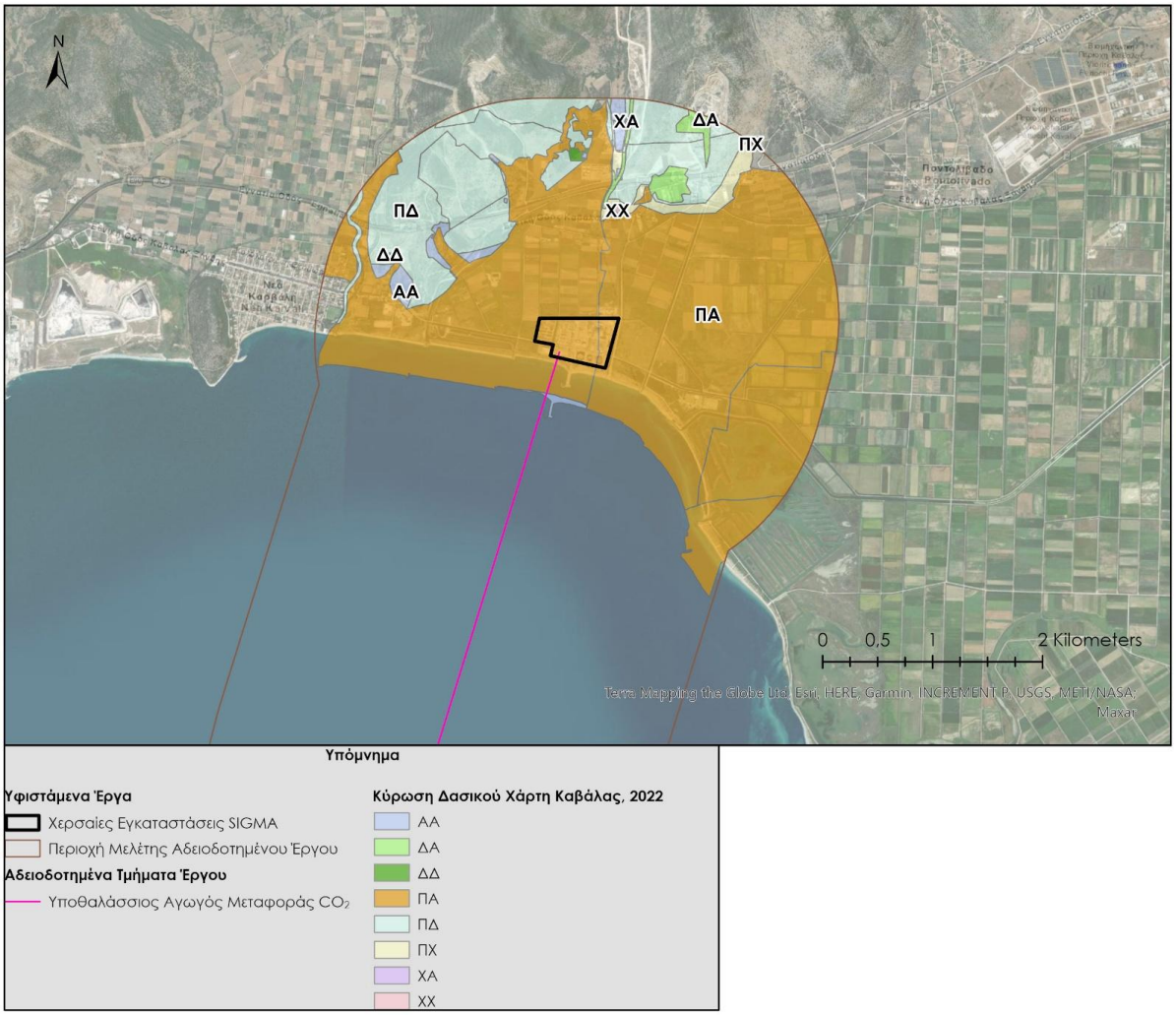
A more detailed description of the Natura 2000 Network areas is provided in the Project's Special Ecological Assessment Study (SEAS).

It should be noted that EP01B (concerning the demarcation of protection zones that divide protected areas internally) has been approved, but no Presidential Decree has yet been issued. In any case (according to the analysis in **Section 6.9.1.1.6** of this document and the MEOA attached in **Annex 12.4)**, the proposed modification of the project falls within zone ZBDPTH-05, which is **a Sustainable Natural Resource Management Zone** and is therefore fully compatible with the provisions of EPM01B.

5.8.3 Forests, Forest and Reforestation Areas

By decision no. 385085/31-10-2022 of the Secretary General of Forests of the Ministry of Environment and Energy (Government Gazette 777/Δ΄ /7-11-2022), the Forest Maps of the Regional Units of Kavala and Thasos were ratified. Based on the provisions of the above decision and in accordance with data posted on the website of the Hellenic Cadastre, the following excerpt was produced using the geospatial data of the Hellenic Cadastre, which depicts the land facilities of the Project.

As has been repeatedly noted, the proposed amendment does not include any intervention in the land facilities of the licensed project, which remain unchanged, as described in the approved EIA of the project and licensed by the relevant AEPO.



(Source: Ratification of the Kavala Forest Map 2022)

Figure5 –13 : Forest and non-forest areas within the wider region

The licensed land facilities are located within areas with codes AA: Other types of coverage in older aerial photographs and PA: Final acts and classification decisions – non-forest (as shown in **the figure** above), which are not subject to the restrictions of forest legislation.

The following **tables** show the percentages and coverage of the immediate study area of the licensed project by forest, reforestation, or other types of land.

Table5 –20 : Percentage and area of forest land within the immediate study area of the licensed project by category

Character code	Character description	Area in the immediate study area (km2)	Percentage of occupation in the immediate study area (%)
PA	Final acts & classification decisions - Non-forest	9.495	74.01
BC	Final acts & classification decisions – Grasslands	0.207	1.61

Character code	Character description	Area in the immediate study area (km2)	Percentage of occupation in the immediate study area (%)
XX	Grassland areas in older aerial photographs / Grassland areas in recent aerial photographs and in autopsies or in the land maps of Law 248/1976.	0.006	0
NA	Forests and forest areas in older aerial photographs or pre-existing data / Other types of cover in aerial photographs and on-site inspections or in the land maps of Law 248/1976.	0.184	1.4
X	Grasslands in older aerial photographs / Other types of coverage in aerial photographs and inspections or in the land maps of Law 248/1976.	0.012	0.09
PD	Final acts and decisions on classification – forest	2.703	21.07
AA	Other types – coverage in older aerial photographs / Other types – coverage in recent aerial photographs.	0.17	1.3
DD	Forests and forest areas in older aerial photographs or pre-existing data / Forests and forest areas in recent aerial photographs and in on-site inspections or in the land maps of Law 248/1976.	0.044	0

Table5 –21 : Percentage and extent of forest areas within the immediate study area of the licensed project as a whole

Character description	Character code	Area in the immediate study area (km2)	Percentage of occupation in the immediate study area (%)
Forests and forest areas	AD, DA, DD, PD	2.93	22.85
Other types of land	AA, PA	9.673363	75.39
Grassland	PC, HA, XX	0.225	1.75
Forest areas suitable for reforestation	AN-AD, DA-AN, DD-AN, PD-AN	0	0
Other types of land	AA-AN, PA-AN	0	0

5.8.4 Social Infrastructure and Public Utility Facilities

5.8.4.1 Road Network

The road network of the Region of Eastern Macedonia and Thrace, which includes national and provincial roads, has a total length of 3,191 km (828 km National Network and 2,363 km Provincial Network).

The national and provincial road network is well connected to the Egnatia Motorway via 20 grade-separated interchanges (GI) that have been built. The most important road infrastructure in the Kavala area is the

Egnatia Road. The road and its vertical axes are a modern motorway connecting Kavala with Igoumenitsa to the west and Kipoi to the east. It is part of the trans-European transport networks, connecting four ports, six airports, and nine vertical axes that ensure access to the countries of southeastern Europe. A complementary project to relieve traffic congestion in the city is the completion of the Kavala Ring Road.

The network is sufficiently dense, in good condition, and allows for smooth access. The coastal areas are connected to each other via regional roads.

Apart from the Egnatia Motorway, access to the project area is provided by the Kavala-Xanthi National Road.

The table below shows the length of the road network that runs through the Municipality of Kavala.

Table5 –22 : Length of the road network of the Municipality of Kavala

Name	km
National Roads	
E.O.2 Kavala – Nestos Bridge	40
National Road 12 Stavros Amygdaleonas – Marmara Skari (Lydia Exit)	18
Kavala Ring Road	3
Strymon Bridge – Eleftheroupoli – Kavala	40
Regional/Local Roads	
Amygdaleonas – Platamonas – Dipotamos – Skopos – Kechrokampos - Stavroupoli	60
Amigdaleonas – Zygos – Kryoneri – Limnia – Vounohori – Lykostomo	21
Nea Karvali – Lefki – Elafochori – Makrychori – Skopos	30
Platamonas – Lycostomo to Adrian	6
Kavala – Palio – N. Iraklitsa – N. Peramos – Elaiochori – Folea – Towards Egnatia – Loutra Eleftheron – Karyani – Orfani	69
Eleftheroupoli - Antifilippoi - Georgiani - Nikissiani	18

(Source: Kavala Municipality Operational Plan 2021-2023, Phase A)

5.8.4.2 Ports - Coastal connections

In the Region of Eastern Macedonia & Thrace (PAMTH), the main ports are those of Alexandroupolis and Kavala. The ports of the Region also include those of Porto Lagos, Thasos, Kamariotissa (on Samothrace), Keramoti, Prinos, and the port of Eleftheron-Peramos.

The majority of domestic coastal shipping traffic in the Region of Eastern Macedonia and Thrace in 2022 is recorded in the Units of Kavala (48%) and Thasos (44%).

The Port of Kavala is a Port of International Interest according to the national port classification No. 8315.2/02/07/02.02.2007 Joint Ministerial Decision (Government Gazette 202/B/16.02.2007). The Central Port of Kavala "Apostolos Pavlos" is a distinct part of the Port of Kavala that serves its passenger and tourist traffic.

The port of Nea Karvali, called "Filippos II," is used for commercial purposes. The ports of Keramoti (Keramoti - Thasos Ferry) and the central port of Thasos are also considered important for use by passengers and the fishing fleet. The port of Prinos and the ports of the Regional Unit of Thasos, as well as the port of Nea Peramos, mainly serve local passenger transport. The latter also serves the transport of workers to the oil extraction facilities.

Four ferry routes depart from the port of Kavala: "Kavala – Lemnos," "Kavala – Samothraki," "Alexandroupoli – Kavala," "Kavala – Ormos Prinos – Thasos."

The nearest port to Nea Karvali, "Filippos B," is located approximately 6.2 km southwest of the licensed land facilities of the Project.

5.8.4.3 Air connections

There are two airports in the Region of Eastern Macedonia and Thrace, in Kavala and Alexandroupolis. Of the two, only Kavala Airport handles international cargo traffic.

The Regional Unit of Kavala has a national-civil airport, which serves air transport in the region. The "Alexander the Great" airport is located in Chrysoupoli and is essentially the main point of entry for foreign tourists to the region, especially to Thasos. It was built in the late 1970s and initially served only charter flights.

There are no airports in the study area. The nearest airport to the study area is Kavala State Airport, which is approximately 7.5 km from the licensed land facilities of the Project.

5.8.4.4 Rail connection

Rail transport is underutilized, especially in terms of passenger traffic. The railway infrastructure connects all cities in the Region of Eastern Macedonia and Thrace, except Kavala, but it is old and lacks intermodality. The existing railway line connects Thessaloniki with Ormenio Evros, then with the Greek-Bulgarian border, and passes through all urban centers except Kavala.

There is no railway network in the study area. However, it should be noted that in 2022, the Ministry of Environment and Energy approved the environmental terms for the section of the new railway line from Thessaloniki to Nea Karvali. The new Thessaloniki-Kavala-Xanthi railway line is part of the so-called Eastern Egnatia Railway and starts at the exit of the Nea Filadelfia railway station and ends in the Toxotes area of Xanthi, where it is planned to connect with the existingThessaloniki-Alexandroupolis line.

5.8.4.5 Water Supply Networks

The Municipality of Kavala is served by the Kavala Public Water Supply and Sewerage Company (hereinafter DEYAK), which has been operating since 1984. According to data from the Kavala Municipality Operational Program 2021-2023 (Phase A), the average annual water consumption for 2015 was estimated at 4,265,454 m^3 , while the length of the municipality's water supply network is approximately 300,000 km. In addition, the settlements of the Municipality of Kavala are supplied with water from springs and boreholes (a total of 19 boreholes recorded in the Operational Program).

In the immediate vicinity of the Project's land facilities, there are three (3) active water abstraction points, as shown in **the** following **Figure** and **Table** from the National Register of Water Abstraction Points (EMSY).

5 Table –23 : Water abstraction points near land facilities

No	EMSY code	Distance from land-based facilities	Coordinates (EGSA 87)
1	1200011770795	< 0.5 km	X: 545495 Y: 4533809
2	1200012050924	1 km	X: 545725 Y: 4534829
3	1200003076622	1.15 km	X: 545480 Y: 4534941

(Source: National Register of Water Supply Points (EMSY)

(Source: National Register of Water Intake Points (EMSY))

Figure5 –14 : Water abstraction points near land-based facilities

5.8.4.6 Sewerage Networks

The following wastewater treatment plants (see **table** below) are located and operate in the wider study area and within the Prefecture of Kavala and Thasos, which comply with the limits of Directive 91/271/EEC.

According to the Special Secretariat for Water, the nearest WWTP is located approximately 7.5 km southwest of the licensed land facilities of the Project.

Table5 –24 : Wastewater Treatment Plants (WWTP) near the study area

WWTP name	WWTP Code	Type of Treatment	Total Inflow to WWTP (m^3/day)	Receptor
CHRYSOUPOLI	EL115011018	Secondary treatment with nitrogen removal and disinfection	1,951	EL1150110180
KAVALA	EL115001016	Secondary treatment with nitrogen and phosphorus removal	13,500	EL1150010160
PALEO TSIFLIKI	EL1150010111	Secondary treatment with nitrogen and phosphorus removal	1,200	EL11500101117
NEA PERAMOS KAVALA	EL1150030115	Secondary treatment with nitrogen and phosphorus removal and disinfection	1,834	EL11500301150
THASOS	EL1150040116	Secondary treatment with nitrogen and phosphorus removal and disinfection	1,123	EL1150040116
PHILIPPI	EL1150100118	Secondary treatment with nitrogen and phosphorus removal and disinfection	2,430	EL1150100118
ELEFTHEROPOLI	EL1150020114	No data	2,400	EL11500201140

(Source: Special Secretariat for Water, Wastewater Treatment Plants Operation Monitoring Database, June 19, 2024)

Figure5 –15 : Wastewater Treatment Plants (WWTPs) in the wider study area

5.8.5 Sites of Archaeological Interest

The main archaeological sites in the Prefecture of Kavala are summarized in **the** following **table**.

Table5 –25 : Main archaeological sites in the Prefecture of Kavala

Archaeological site	Type of protection	Protection status
Archaeological site of Philippi. Located on the provincial road between Kavala and Drama. The archaeological site includes the remains of the ancient city of Philippi, which include the acropolis, the walls, the theater, the market, and the cemeteries, East and West, as well as the hills and the field of the Battle of Philippi, while also including the Byzantine cemetery and burial chapel, the Basilicas outside the walls, the burial monument of C. Vibius Quartus, the prehistoric settlement of Dikili Tash, the Arch of the Via Egnatia, and the river Zygaktis.	• Type of protection by the Ministry of Culture: Declaration • Competent Authority: Ephorate of Antiquities of Kavala • World Heritage Site: YES • European Cultural Heritage: YES	• Ministerial Decision 15794, Government Gazette: 35/B/1962-02-02 • Ministerial Decision 15813, Government Gazette: 36/B/1962-02-03 • Ministerial Decision 15813, Government Gazette: 179/B/1962-05-26 • ΥΠΠΟΑ/GDAPK/DIPKA/TAX/F18/ 171892/91557/11622/5399, Government Gazette: 357/AAP/2013-10-09
Ancient city and port of Thasos (underwater site). The commercial and military port of Thasos is located at the site of the modern port of the city, and the first fortification of the port dates back to the late 6th/early 5th century BC. In general, this monument is cited as an example of the "closed" military ports that were an integral part of ancient cities and were constructed throughout antiquity, from archaic times to the late Hellenistic period.	• Type of protection by the Ministry of Culture: Declaration • Competent Authority: Ephorate of Underwater Antiquities	• ΥΠΠΟ/ARCH/A1/F18/52652/2146, Government Gazette: 74/B/1987-02-05 • Ministerial Decision ΥΠΑΙΘΠΑΓΠΓ/GDAPK/DIPKA/GAX/ Φ43/69887/33898/4701/2361, Government Gazette: 166/AAP/2013-05-15
The Alyki peninsula is located in the southeast of Thasos and, after the town of Thasos, is one of the most important archaeological sites on the island, with significant visible monuments dating from the 7th century BC to the 7th century AD.	• Type of protection by the Ministry of Culture: Declaration • Competent Authority: Ephorate of Antiquities of Kavala	• ΥΑ9763, Government Gazette: 415/B/1962-11-19 • ΥΑ Φ31/28167/2649/74, Government Gazette: 166/B/1977-03-03 • Ministerial Decision ΥΠΠΕ/A1/F18/14306/532, Government Gazette: 244/B/1985-05-02

The marine area of the Gulf of Kavala, where all offshore installations (existing, new licensed projects, and new ones in the proposed amendment) are located, has been thoroughly explored and **there are no indications of significant underwater archaeological finds**. Over time, the shallow waters and the type of seabed do not allow for the preservation of any ruins.

The following archaeological sites and monuments are also located in close proximity to the study area (the relevant distances are shown in **the** following **table**):

Table5 –26 : Archaeological sites and monuments within or close to the study area

No	Monument - Temple	Distance from land facilities (km)	Study Area
1	Chalkeo, Kavala	6	Outside
2	Eskitepe Lefki, Kavala	3.6	Out
3	Nea Karvali, Kavala	1.15	Inside
4	Remains of the ancient city of Akontisma, Nea Karvali, Kavala	0.98	Within
5	I. Church of Saint Gregory, Nea Karvali, Kavala	2.26	Out
6	Pontolivado, Kavala	3.	Out
7	Nea Komi, Kavala	2.4	Out

Traditional settlements are residential complexes of particular historical, urban, architectural, folkloric, social, and aesthetic significance, which developed between the 16th and 19th centuries. The following **table** presents the settlements that have been designated as **Traditional** in the Prefecture of Kavala, pursuant to Presidential Decree 19-10-1978 (Government Gazette 594/Δ/13.11.1978).

Table5 –27 : Traditional settlements in the regional units of Kavala and Thasos

O.T.A	Traditional Settlement	Proposed as noteworthy in 1975 / Degree of protection[50]
ELEFTHERUPOLIS	• KIPIA (BOSTANLI) • CHRYSOKASTRO	• Econ./BP3 • Oik./BP3-Per.chor./BP3
THASOU	• ALYKI • THEOLOGOS • KASTRO • MARIAI • PALEOCHORION • PANAGIA (ANASTASION) • POTAMIA • PRINOS	• Oik./BP2-Per. area/BP1 • Oik./BP2-Oik. Dept./BP1-Per. area/BP2 • - • Oik./BP2-Per.chor./BP2 • - • Finance/BP3-Finance Dept./BP2-Peripheral Areas/BP1 • Finance/BP3 • Finance/BP1-Regional/BP1
KAVALA	• OLD KAVALA	• Dept. of Finance/BP2
MOUNTAIN	• KECHROKAMPOS • KRYONERION (KARGA) • MAKRYCHORION • PLATAMON	• Oik./BP3-Oik./BP2 • Oik./BP3-Per. area/BP2 • Oik./BP3-Oik./BP2 • -
ORFANOU	• PODOCHORIO	• Oik./BP2-Per.chor./BP3
PAGGAIO	• PALAIOKHORION	• -

50 https://portal.tee.gr/portal/page/portal/teetkm/GRAFEIO_TYPOY/TEXNOGRAFIMA_2007/%D4%C5%D7%CD%CF%C3%D1%C1%D6%C7%CC%C1%20336/12-13_0.pdf

O.T.A	Traditional Settlement	Proposed as noteworthy in 1975 / Degree of protection[50]
PIEREA	• MOUSTHENI • DOMATIA (SAMAKOVO) • MELISSOKOMEION • MESOROPI • PYRGOKHORION	• Oik./BP3-Oik./BP2 • Oik./BP3-Oik./BP2-Per.ch./BP2 • - • Oik./BP3-Per.chor./BP2 • Oik./BP3-Per.chor./BP3
PHILIPPOS	• ZYGOS • KORIFAI	• - • Oik./BP3-Oik./BP2

(Source: http://estia.minenv.gr/)

The proposed modification of the project will not cause any damage to the protected monuments of the archaeological site, as they are located at a considerable distance from the location of the proposed interventions. Furthermore, it should be noted that the proposed project interventions will be of short duration and cover a limited area.

In any case, in order to ensure the protection of the cultural environment of the study area in accordance with the requirements of Law 3028/2002, as amended and in force, as detailed in **Chapter 10**, the proposed interventions will be carried out under the supervision of the competent archaeological services after timely and written notification/notification prior to the commencement of the works, under the responsibility of the project promoter.

5.9 APPLICABLE SPATIAL AND URBAN PLANNING REGULATIONS IN THE PROJECT AREA

This **section** presents the basic spatial planning options that have been established at the level of Strategic Spatial Planning for the study area in accordance with Law 4447/2016 and examines the compatibility of the project under study with these.

5.9.1 Provisions and Guidelines of the General, Special, and Regional Frameworks for Spatial Planning and Sustainable Development

5.9.1.1 General Framework for Spatial Planning and Sustainable Development (GFSPSD)

The current General Framework for Spatial Planning and Sustainable Development (GFSPSD), approved by Parliament Decision No. 6876/4871/2008 (Government Gazette 128/A/03-07-2008), in accordance with Article 12(3) of Law 4447/2016, as applicable, it takes the place of the National Spatial Strategy and includes a set of texts and plans that record and evaluate the factors that influence the long-term spatial development and structure of the national territory, assesses the spatial impact of international, European, and national policies, and sets out the key priorities and strategic directions for integrated spatial development and the sustainable organization of the national territory over a 15-year period.

More specifically, in view of the acute problems caused by rapid climate change, the following **objectives** are set:

- Continuous concern for energy conservation,
- Promotion of alternative energy sources that are more environmentally friendly, especially renewable energy sources
- Strengthening natural feedback mechanisms (forests, wetlands, etc.)
- Adaptation of the country to the new conditions brought about by climate change and addressing the consequences thereof (fires, floods and erosion, drought, salinisation, desertification and other natural phenomena) by creating appropriate preventive mechanisms, infrastructure and action plans.

With regard to the spatial organization and development of the industrial sector (mining – manufacturing) in accordance with **Article 7**(C) of the GCHSAA, the following basic objectives and targets are set:

- Promotion of a polycentric model of spatial organisation of industry with a view to increasing its contribution to regional development and exploiting the comparative advantages of different regions.
- Resolving land use conflicts and ensuring conditions for the coexistence of activities, taking into account the uniqueness and availability of resources for the development of each productive activity and weighing up the costs and benefits at a socio-economic and environmental level.
- Strengthening competitiveness and entrepreneurship in the industrial sector through appropriate spatial planning and focusing on activities that meet local needs and offer a comparative advantage in international markets.

- Improving and coordinating the institutional provisions of individual spatial policies in order to promote entrepreneurship more fully and achieve transparency and legal certainty in the spatial planning of industrial activities.
- Integration of the environmental dimension into industrial sector activities through the application of modern exploitation and production techniques, as well as anti-pollution technology and environmental restoration techniques.

In accordance with **Article 10** of the GCHSAA on climate change mitigation, in addition to measures relating to the protection of water, soil, and the atmosphere, the following are also promoted:

- Plans for the use of renewable energy sources.
- Promotion of less energy-intensive means of transport.
- Infrastructure for the widespread use of natural gas (especially in electricity generation).
- Mandatory reduction of greenhouse gas emissions from industry.
- Application of best available techniques in industries.
- Energy saving measures.
- Measures to prevent forest fires and reforestation.
- Applications of bioclimatic architecture, etc.
- Strengthening natural feedback mechanisms (forests, wetlands, etc.) and their biodiversity.

The proposed amendment to the project, following on from the initial design, aims to mitigate the effects of climate change through carbon dioxide storage and is therefore not at odds with the objectives set by the GCHSDA for the same purpose.

5.9.1.2 Regional Framework for Spatial Planning and Sustainable Development (RFSPSD)

In the Region of Eastern Macedonia and Thrace, within the framework defined by Law 4447/2016, with Ministerial Decision YPEN/DCHORS/68605/1092 (Government Gazette 248/AAP/25-10-2018), the Regional Spatial Framework (RSF) of the Region of Eastern Macedonia and Thrace was approved. The RSP of Eastern Macedonia and Thrace aims to formulate a comprehensive strategic program of spatial policies for the region, which will serve as the basic framework for spatial, urban planning, and development choices for the period of its validity. At the same time, the RSP is also approved environmentally by the region itself, as it revises and replaces the previous Regional Framework for Spatial Planning and Sustainable Development.

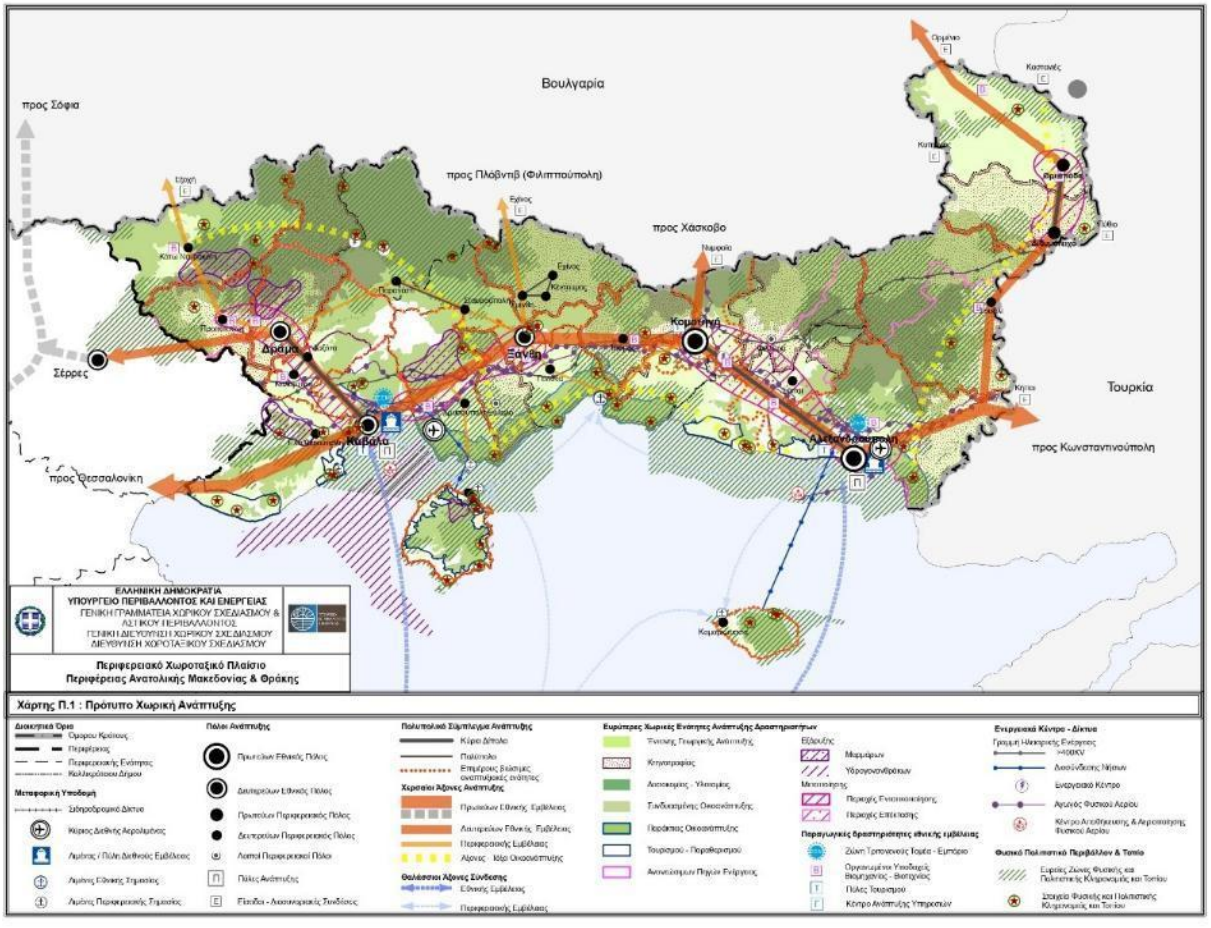
The Region of Eastern Macedonia and Thrace is divided into six regional units (Drama, Kavala, Thasos, Xanthi, Rodopi, and Evros). Its seat is Komotini and its largest city is Alexandroupoli.

The spatial development model of the Region of Eastern Macedonia and Thrace shows a strong structure of urban centers around the Egnatia Road axis, as shown in **the** following **figure**. The concentration of the largest percentage of employment and, consequently, of regional GDP in the main urban centers has reinforced dependence on them, while at the same time failing to create sustainable functional units in areas

outside the development axis. As regards the main urban centers, it was not possible to assume the specific role envisaged for each of them in the previous Regional Framework.

Kavala is defined as a Secondary National Pole and a gateway of international and interregional importance for the Region, both in relation to Bulgaria and the Eastern Balkans and to Central Europe. This perspective is supported by its key position in the system of development axes, the airport of Chrysoupoli, its ports (urban port - commercial port "Philip II") and the AEI, TEI departments and research institutes. Its strengthening as a gateway is related to the interconnection between the port "Philippos II" and the railway network, the improvement of the port's infrastructure and facilities, and the interconnection of the city with the Kavala - Drama - Serres road axis. It is also related to the improvement of the infrastructure and facilities of the urban port for its operation as a cruise port and marina.

With regard to infrastructure, it is worth noting that the Region has invested heavily in its integration into international transport networks. However, the delay in the development of the vertical axes of the Egnatia Motorway and combined transport significantly reduces the expected positive results, given the inadequate use - due to a lack of suitable infrastructure - of the ports of Kavala and Alexandroupolis. The Region of Eastern Macedonia and Thrace aims to reverse the above and strengthen its infrastructure in the future.



(Source: Map P.1 of the Regional Spatial Framework, 2018)

5 –16 : Spatial Development Model of the Region of Eastern Macedonia and Thrace

Article 1 defines the following **general objectives** of the RSP:

- Strengthening the position and role of the region in the international, community, and national arena within the framework of territorial cohesion policies for integrated, balanced, and sustainable development, with controlled competitiveness of spatial systems and interregional space.
- Halting the recession, strengthening social cohesion, and ensuring the sustainable economic prosperity of the region.
- Strengthening territorial cohesion at the intra-regional level through the creation of sustainable development units and the balanced and complementary distribution of productive activities in the area.
- Prudent and effective management of resources, including land resources, promoting cooperation between them and reuse in both the production process and residential development.
- Addressing the challenges of climate change and limiting the environmental impact of the energy and transport sectors by prioritizing the development of renewable energy sources and the redesign of the transport system within the framework of regional planning.
- Protecting, promoting, and exploiting the rich natural and cultural environment, which is recognized as an important development resource and comparative advantage of the region.
- Recognition of the landscape as an important factor in prosperity and quality of life and promotion of its protection and enhancement as an equal component of spatial planning and development planning policies. Sustainable management of space and provision of guidelines for the organisation of space, the development of productive activities, and the protection of the natural and cultural environment and landscape for the purposes of planning, setting hierarchical priorities and making use of the available spatial and environmental planning tools.

According to **Article 15** of the NSRF, a Regional Adaptation Plan is being developed to address the effects of climate change. For areas of agricultural and livestock activities, the main objective is the sustainable management of soil, water resources, and biodiversity in agricultural ecosystems and pastures through the appropriate adaptation of cultivation techniques. The development of a Sustainable Rural Development Program at the regional level is being promoted for adaptation to climate change and risk management from natural disasters. For forest areas, the biodiversity of forest ecosystems will be safeguarded and fires will be limited. For coastal zones, risk zones will be defined according to the characteristics of each area and their vulnerability. For urban areas, the plan provides for the adaptation of design to possible changes in the microclimate of the built environment and the reduction of the thermal and energy needs of buildings through energy saving.

Finally, it should be noted that, according to **Article 19** of the PDP, a condition is set whereby: **the design and implementation of projects and actions under the Plan should take into account the guidelines for addressing and adapting to climate change.** At a minimum, projects should be compatible with national and local greenhouse gas emission reduction plans and national energy planning, as well as with the national

climate change adaptation plan (Articles 42 and 45 of Law 4414/2016) and the corresponding regional adaptation plans (Article 43 of Law 4414/2016

The proposed amendment to the project, following on from the initial design, aims to mitigate the effects of climate change through carbon dioxide storage and is therefore not in conflict with the objectives set by the PPCHSA for the same purpose.

5.9.2 Special Frameworks for Spatial Planning and Sustainable Development

This **section** examines the compatibility of the project with the provisions and guidelines of the following **Special Frameworks for Spatial Planning and Sustainable Development (EPCHSAA)** that have been established to date and may be relevant to the activities and facilities of the project under study:

- SPFSD for Industry (Joint Ministerial Decision 11508/2009, Government Gazette 151/AAP/2009).
- EPCHSAA for Renewable Energy Sources (Joint Ministerial Decision 49828/2008, Government Gazette 2464/B/2008), (currently under review)
- EPCHSAA for Aquaculture (Joint Ministerial Decision 31722/2011, Government Gazette 2505/B/2011)

It is important to note that the competent Ministry of Environment and Energy has currently initiated the process of drafting the **EPCHSAA for Mineral Raw Materials**. The aim is to formulate policy guidelines for the spatial structure of the sector, in conjunction with existing land uses, based on sustainable development, the promotion of the country's comparative advantages, the preservation and protection of cultural and natural heritage, as well as the formulation of a spatial organization model which will promote and enhance competitiveness and the enrichment of resources of strategic importance and will be in line with the national strategic plan for the exploitation of mineral wealth, providing legal certainty, which is a prerequisite for attracting investment.

5.9.2.1 Special Framework for Spatial Planning and Sustainable Development for Renewable Energy Sources (RES)

The EPCHSAA for Renewable Energy Sources (EPCHSAA - RES), as approved by Joint Ministerial Decision 49828/2008 (Government Gazette 2464/B/2008), concerns the overall spatial planning of all categories of RES projects in Greece. According to Article 1, the minimum objective of the EPCHSAA is to achieve Greece's contractual targets for combating climate change and promoting RES, as derived from its European and international obligations.

It should be noted that the Special Spatial Framework for Renewable Energy Sources (EHP-RES) is currently under review, with no known final date for its approval.

The proposed amendment to the project, following its initial design, is not directly related to the SRSP in question, as it does not concern an RES project. However, it should be noted that, on the one hand, it

indirectly contributes to the achievement of the objectives of the specific FRSP (e.g., combating climate change) and, on the other hand, it does not adversely affect its forecasts and planning in any way.

5.9.2.2 Special Framework for Spatial Planning and Sustainable Development for Aquaculture

The EPCHSAU, which was published in accordance with Government Gazette 2505/B/2011, concerns the categorization of four specific aquaculture sectors:

1 Marine aquaculture (excluding shellfish farming).

2 Shellfish farming.

3 Freshwater aquaculture.

4 Cultivation of aquatic organisms in natural brackish ecosystems.

The EPCHSAU examines the spatial planning framework on two levels:

- Spatial planning and spatial organization of units in the marine area.
- Spatial planning and spatial organization of the main production activities, ancillary and support facilities in the terrestrial area.

The EPCHSAU identifies and categorizes areas suitable for aquaculture development (PAY) based on their characteristics and the degree of development of aquaculture activity. These areas indicate the suitability of the areas for aquaculture development. From a spatial planning perspective, they are broader areas for the search for sites for hosts (POAY or PAIM) and individual units.

These areas are classified into five (5) categories:

1 Highly developed areas that require interventions for improvement, modernization of infrastructure, protection, and upgrading of the environment.

2 Areas with significant potential for further development of marine aquaculture.

3 Inaccessible areas with significant potential for the development of marine aquaculture.

4 Areas that are particularly sensitive in terms of the natural environment, where the conditions for the establishment and operation of aquaculture units need to be adapted to the specific characteristics of the site and the environment.

5 Areas of point locations.

The standard for the location of marine aquaculture units includes the installation of units within **Aquaculture Development Areas** (**ADA**) and the installation of individual units.

Specifically, the units will be installed:

- Within ADAs:

i. In Organized Aquaculture Development Areas (OADA), as specified in Article 10 of Law 2742/1999 (as applicable).

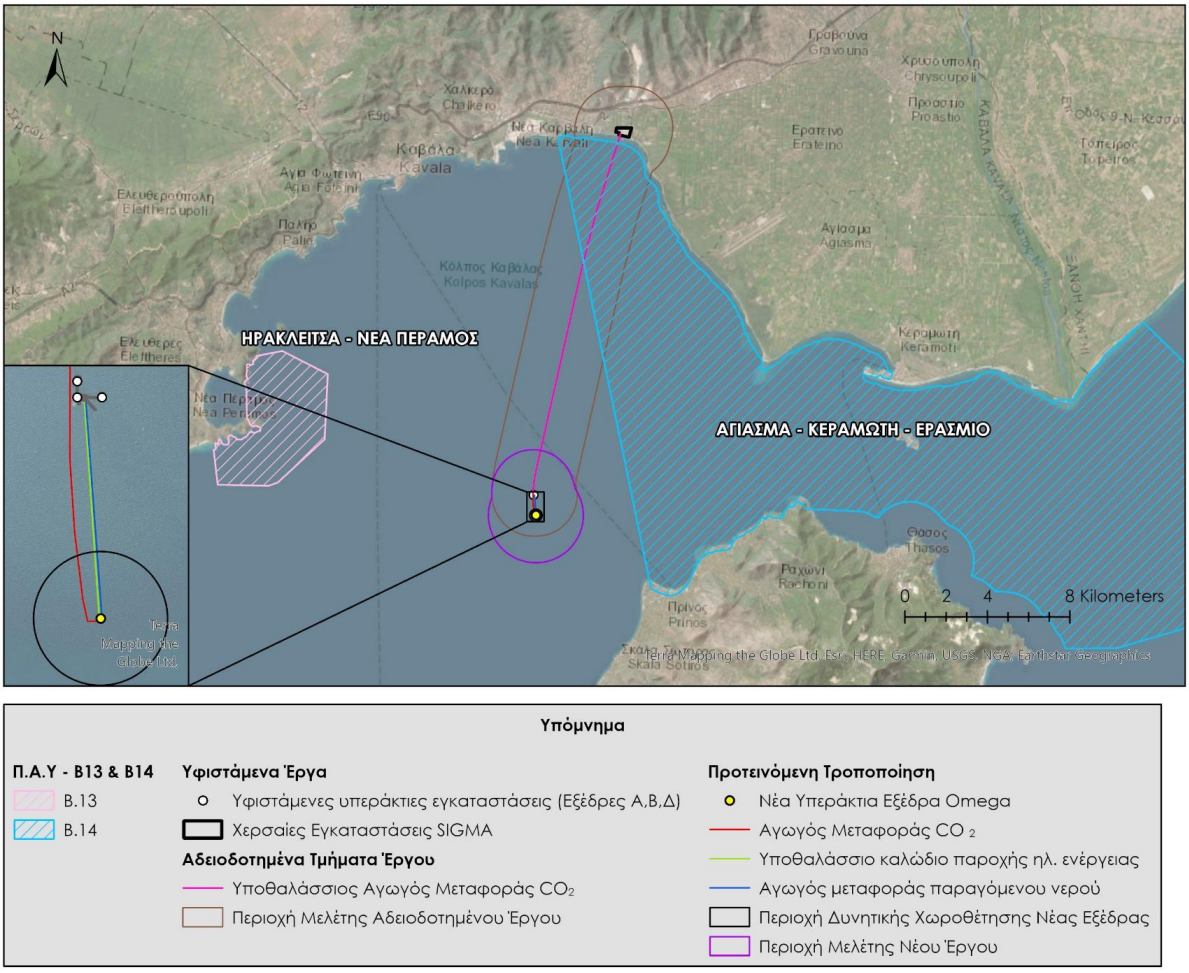
ii. In areas of Informal Concentrations of Units (PASM), which are a transitional stage towards the organisation of POAY.

iii. Individually.

- In individual locations, within or outside the P.A.Y., for which specific criteria will apply.

According to the Draft Special Framework for the Spatial Organization of Aquaculture Activities (Government Gazette 2505 B/04.11.2011), part of the licensed project falls within PAU B14 "Agiasma-Keramoti-Erasmio" (fish farming, shellfish farming, other aquatic organisms), while it is 10.6 km away from area B13 "Iraklitsa-Nea Peramos," as shown in **the** following **figure.** These PAUs are classified as B, i.e., areas for the development of aquaculture with room for further growth.

Both the Omega platform and the CO_2 (additional section) transfer pipes for the produced water, as well as the power cable, are located outside the aquaculture development area.



Υπόμνημα

Π.Α.Υ - Β13 & Β14
- Β.13
- Β.14

Υφιστάμενα Έργα
- Υφιστάμενες υπεράκτιες εγκαταστάσεις (Εξέδρες Α,Β,Δ)
- Χερσαίες Εγκαταστάσεις SIGMA

Αδειοδοτημένα Τμήματα Έργου
- Υποθαλάσσιος Αγωγός Μεταφοράς CO_2
- Περιοχή Μελέτης Αδειοδοτημένου Έργου

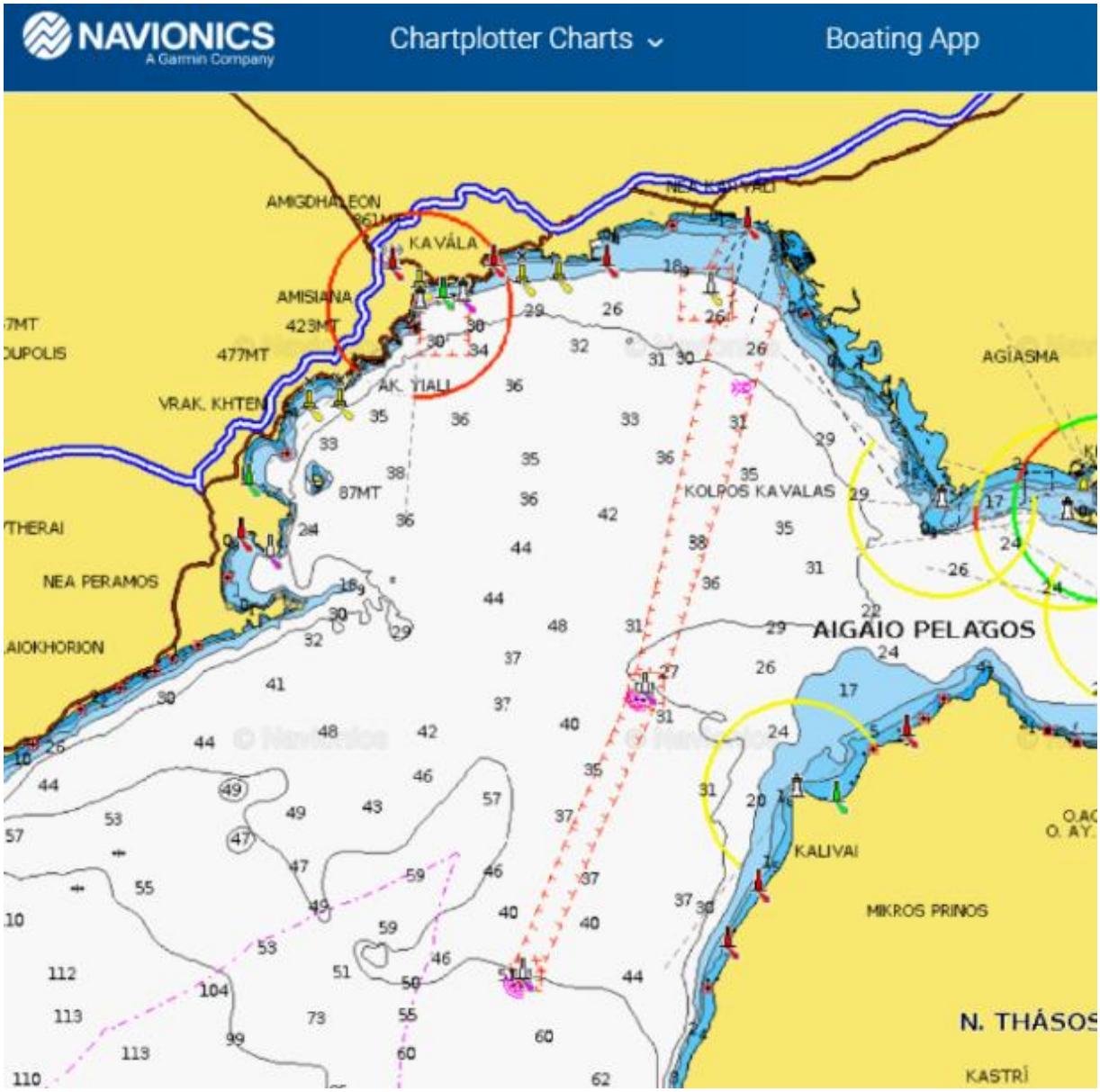
Προτεινόμενη Τροποποίηση
- Νέα Υπεράκτια Εξέδρα Omega
- Αγωγός Μεταφοράς CO_2
- Υποθαλάσσιο καλώδιο παροχής ηλ. ενέργειας
- Αγωγός μεταφοράς παραγόμενου νερού
- Περιοχή Δυνητικής Χωροθέτησης Νέας Εξέδρας
- Περιοχή Μελέτης Νέου Έργου

(Source: Government Gazette 2505 B/04.11.2011, own processing)

Figure5 –17 : Aquaculture Development Areas (ADA)

According to the following **Figure** (https:// webapp. navionics. com/# boating@8& key= qjywF%7 BlquC) for the already operational project that has already been environmentally licensed (AP 8413/24-04-18, ADA: ΨΓΛ14653Π8-Ζ79 on the subject of "Approval of environmental terms for the Prinos Offshore Development project") defines a zone within the PAU (between the red lines) through which pipelines pass, in which mooring and all forms of fishing are prohibited.

This section of the pipeline (which passes through the established zone and will not further affect the uses of the PAU) is licensed under XXXXXX and is not altered in any way under this amendment. Therefore, the proposed amendment, following the design of the licensed project, is assessed as compatible with the EPCHSAU.



(Source: Navionics)

Figure5 –18 : No-anchorage and no-fishing zone in the project area

Within the framework of the 1st Management Plan, concerning marine waters, the following were included in the MPA as protected areas under Directive 2006/113/EC the coastal water systems related to the PAUs in Table 1 of the Annex to Joint Ministerial Decision 31722/4.11.2011.

According to the Detailed Documentation Text of the Update of the MPA of the 2nd Revision of the SDLAP[51] , **in the Thrace River Basin District (EL12)** there are currently a total of twenty-nine (29) aquaculture units in

[51] *It should be noted that the Detailed Documentation Text of the "Update of the Register of Protected Areas" of the 2nd Revision of the SDAP for the Thrace River Basin (EL12) has not yet been posted. However, it is available in the*

operation, 24 of which are registered in the Register of Aquaculture Product Production Companies with Veterinary Code Numbers for Fish . Of the 29 units, nine (9) are fish farms (6 freshwater and 3 marine) and twenty (20) are coastal mussel farms. All marine aquaculture farms are located within Aquaculture Development Areas (ADA) B.14 and D.2 of Joint Ministerial Decision 31722/4.11.2011.

In addition, there are twenty-five (25) potentially exploitable lagoons within the boundaries of the Thrace Water District (EL12). Of these, eighteen (18) lagoons and two (2) lakes, Ismarida and Vistonida, are currently being exploited. The exploited lakes and lagoons cover a total area of approximately 77,200 stremmas. The most important of these is Lake Vistonida, covering an area of 45,000 acres. At the same time, the lagoons of Agiasmos, Eratino, and Vassova in the wider Keramoti area, as well as the lagoons of Rodopi (Porto Lagos, Lagos, Ismarida, etc.).

According to the 2nd Revision of the SDAP (EL11), there are a total of sixteen (16) aquaculture units operating **in the Eastern Macedonia Water District (EL11)**, there are a total of sixteen (16) aquaculture units, of which three (3) are fish farms, seven (7) are mussel farms, and six (6) are spirulina farms. In addition, within the coastal water system "Strymonikos Gulf" (EL1106C0001N), there is one (1) fish farm for Mediterranean marine fish and five (5) mussel farms. This includes the four (4) coastal water systems of the Eastern Macedonia Water District (EL11). Special Framework for Spatial Planning and Sustainable Development for Industry

5.9.2.3 Special Framework for Spatial Planning and Sustainable Development for Industry

The Special Framework for Spatial Planning and Sustainable Development for Industry (EPCHSA-B) was approved by Joint Ministerial Decision 11508/2009 (Government Gazette 151/AAP/13-4-2009) and includes guidelines concerning the macro-spatial organisation of industry, as well as its spatial planning at local level in conjunction with land use, with a time horizon up to 2021. The EPCHSAA-B states, among other things, that the petroleum and coal derivatives sectors are stagnant (paragraph B.9), while in paragraph B.17 it states that *"the importance of ensuring an adequate supply of electricity (conventional or from RES) and fuel to industrial and other professional facilities and warehouses is paramount."*

According to this Special Spatial Framework, the Region of Eastern Macedonia and Thrace is characterised by **a development deficit** and the strategy will focus on increasing GDP and convergence. Priority will be given to the completion of transport infrastructure, including vertical road axes and multimodal transport, including the adaptation of the design of the Egnatia connection sections to areas of economic activity.

The **land use** policy includes the following **guidelines**:

- Prevention of the development of manufacturing units along open motorways and other key road networks that are important elements of the spatial organisation of industry.

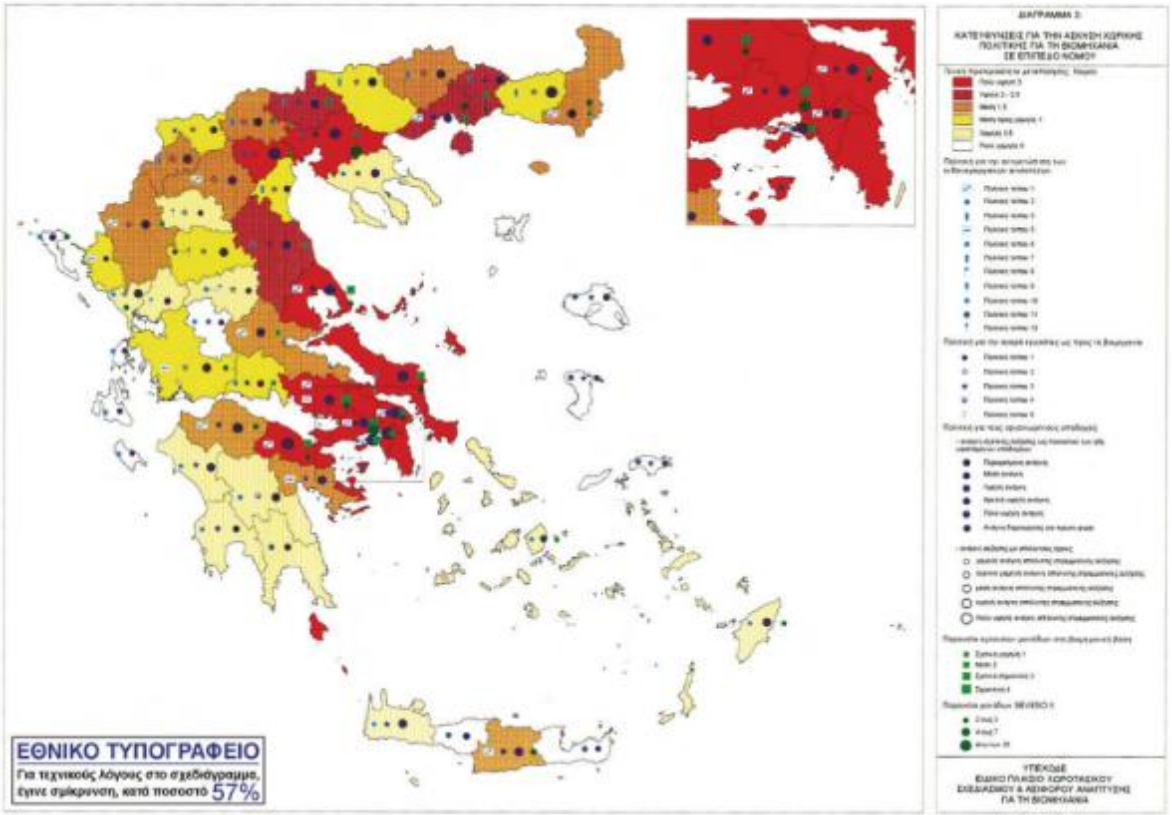
relevant texts that have been put up for consultation on the official website of the Ministry of Environment and Energy (https://wfdver.ypeka.gr/el/project/consultation-el12-45-2revision-protected-areas-gr/).

- The location of new units based on the general provisions of the legislation on building outside the plan is not acceptable in the peri-urban area of Kavala or in the peri-urban zones of larger centers.
- The size of the existing manufacturing base requires the facilitation of the on-site transformation of existing scattered units.

In general, spatial inequalities in industry (of medium intensity) are essentially intra-prefectural in nature and must be addressed at the appropriate level.

In particular, the Prefecture of Kavala, to which the land facilities of the Project belong administratively, is characterized by a high priority for the implementation of spatial policy for manufacturing (see **Figure** below). The spatial organisation of manufacturing is concentrated in a wide zone centred on Kavala but covering the entire southern part of the prefecture, with the Egnatia Road as its axis, and continuing outside the prefecture towards the west (as part of a wider inter-prefectural manufacturing axis). The completion of the latter creates further conditions for strengthening this zone.

It should be noted that industrial activity has been institutionalized in the prefecture of Kavala since 1977 with the Kavala Industrial Area, where there is a significant need for urbanized infrastructure, both for new units and for relocations.



(Source: Map 2 of EPCHSAA-B, 2009)

5 –19 : Guidelines for the implementation of spatial policy for industry at the prefecture level

Specifically for the Prefecture of Kavala, Annex I of the EPCHSA-B provides the following guidelines:

- Sectoral priorities: Although relatively small in absolute terms, the industrial base is characterized by a degree of integration, with the presence of clusters 2, 3 and 4, the lack of activities in cluster 1 and economies of scale are limiting factors in terms of the prospects for the long-term preservation of the prefecture's traditional industrial specialization. In this context, the sectoral priorities are to support clusters 2 (mainly) and 3, as well as intra-sectoral modernization. Finally, the prefecture specialises very strongly in two mining sectors, 11 (oil extraction, etc.) – the only one in the country – and 14 (other mining and quarrying activities), which have led to the strong development of the related manufacturing sectors 23 (manufacture of refined petroleum products), 24 (manufacture of chemicals) and 26 (non-metallic minerals). These dependencies reflect spatial constraints and must be supported by spatial policies.
- Land use and relationship with other activities: Tourism has a relatively strong presence, while there is potential for the tourist exploitation of mountain resources and the inland area in general, as well as for the expansion of tourist activity towards the coastal area. The characteristics of the industry, both environmental and spatial, make land use conflicts between the two activities possible. Detailed spatial planning in the southern part of the prefecture is necessary in this context.
- Environmental impact of industry: Significant. Special anti-pollution measures are required. The existence of a large number of SEVESO units also requires the effective preparation of a Large-Scale Technological Accident Response Plan (hereinafter referred to as SATAME).
- Policy for areas with particularly low industrial presence (intra-prefectural inequalities): Type 1 policy.
- Industry and labor market: Type 3 policy.

The Kavala Industrial Area (152Δ/1981, Government Gazette 1465Δ/2003) is located within the Regional Unit of Kavala. It has been developed in an area of 2.08 km^2in the settlement of Pontolivado, northeast of the city of Kavala, on the (old) Kavala-Xanthi National Road.

The aquaculture area appears in the Special Framework for the Spatial Organization of Aquaculture Activities (Government Gazette 2505 B/04.11.2011), specifically in areas B13 and B14. The offshore development area is located outside the aquaculture activity zone.

The Kavala Industrial Park was established by Joint Ministerial Decision (JMD) 22773/1887/24-10-2005 (Government Gazette B-1466), which specifies the location, area, boundaries, type of Industrial Area, environmental conditions, and bodies responsible for the establishment and implementation of the Industrial Park.

The above Special Framework for Spatial Planning and Sustainable Development for Industry complements the already approved:

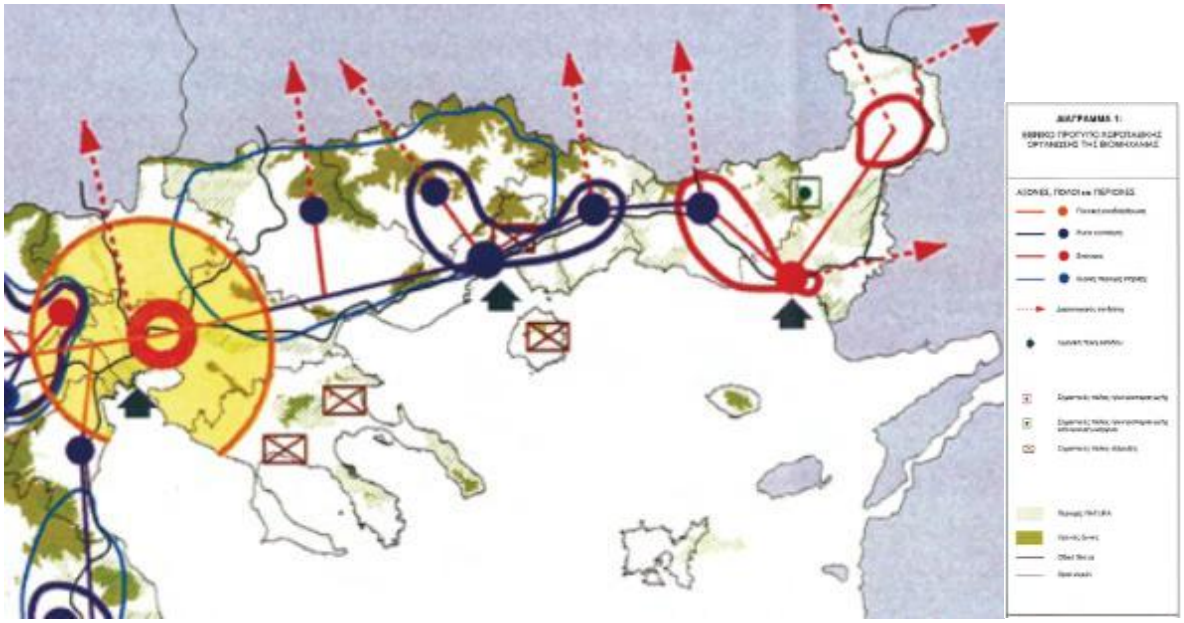
- General Framework for Spatial Planning and Sustainable Development (Government Gazette 128/3.7.2008)

- Special Framework for Spatial Planning and Sustainable Development for Aquaculture (Government Gazette 2505/B/4.11.2011)
- Special Frameworks for Spatial Planning and Sustainable Development for Tourism (Government Gazette 1138B/11.6.2009, Government Gazette 3155B/12.12.2013)
- Special Framework for Spatial Planning and Sustainable Development for Renewable Energy Sources (RES) (Government Gazette 2464B/3.12.2008)

Finally, existing and planned future activities related to the oil and natural gas industry in the wider region of Kavala and Eastern Macedonia include:

- Underground storage facilities,
- DESFA pipelines,
- The Trans Adriatic Pipeline (TAP), and
- The Interconnector Greece-Bulgaria (IGB) pipeline.

Finally, it should be noted that the Burgas-Alexandroupolis oil pipeline and the South Stream pipeline have already been approved.



(Source: National Framework for Spatial Planning and Sustainable Development for the Industrial Sector)

5 –20 : National spatial organization of industry

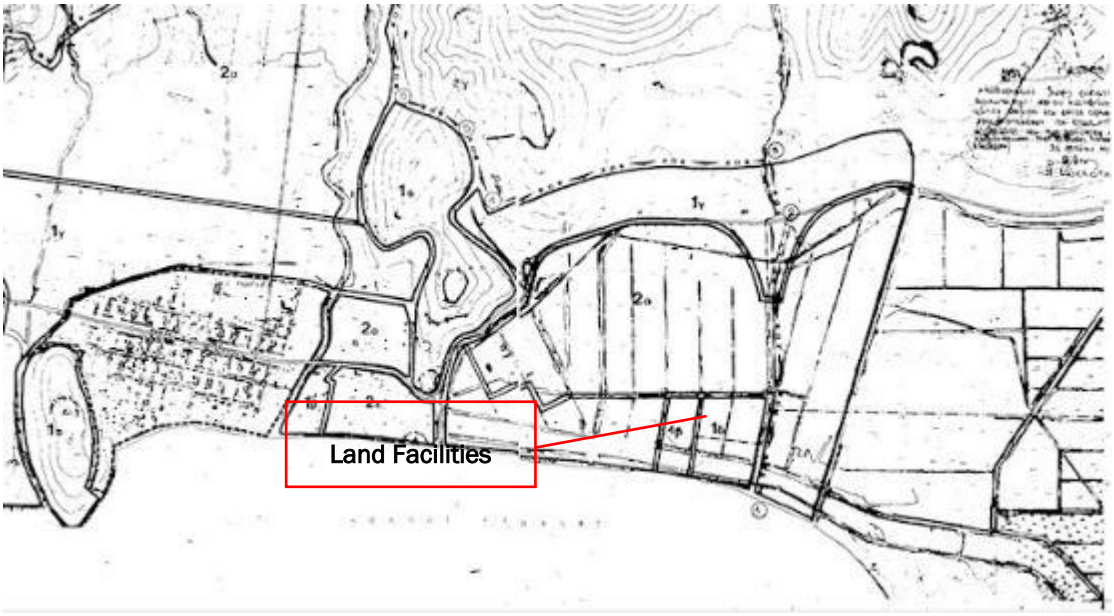
The land facilities of the licensed project comply with the guidelines and requirements of both the General Urban Plan of the Municipality of Kavala and the aforementioned EPCHSA-B, as certified by the relevant AEPO of the project.

Furthermore, as has been repeatedly noted, the present proposed amendment does not include any intervention in the land facilities of the licensed project, which remain unchanged, as described in the approved EIA of the project and licensed by the relevant AEPO.

Therefore, the project as a whole (including the proposed amendment) is fully compliant with the specifications, requirements, and guidelines of the aforementioned EPCHSA-B.

5.9.3 Institutional Land Use Status of the Study Area

The SIGMA land facilities of the Project are located within the ZOE of the Municipality of Kavala, which is defined by Government Gazette 437-Δ-1989, as shown in **the** following **Figure**.



(Source: Map P11-A of the ZOE of the Municipality of Kavala (Government Gazette 437-Δ-1989)

Figure5 –21 : Areas of the Municipality of Kavala's ZOE within the study area

As can be seen from the above **Figure**, the land facilities of the Project fall within Area 1d of the ZOE of the Municipality of Kavala, with the use of "existing nuisance uses."

The following have been determined for **the** wider **land area of the Project**:

- The General Urban Plan (GUP) of the Municipality of Kavala (decision no. 5248p.e./04-02-2013), which was published in the Government Gazette 69/AAP/11-03-2013.
- For the community of Nea Karvali in the Prefecture of Kavala, a Local Street Plan has been approved, which was published in the Government Gazette 487/Δ/1989-08-07 with the title "Approval of a local street plan in the community of Nea Karvali, Kavala, for the designation of a site for the construction of a regional market."
- Residential Control Zone (ZOE) in the area outside the plan and outside the boundaries of settlements existing prior to 1923 in the Municipality of Kavala (Prefecture of Kavala) and the communities of Amisiana, Amygdaleona, Nea Karvali, Chalkeo, Kokkinochoma (Prefecture of Kavala) in accordance with Government Gazette 326/Δ/1995.
- The General Urban Plan (GUP) of the settlement of Chrysoupoli, which was published in Government Gazette 814/Δ/26-08-1987.

It should also be noted that the Local Spatial Plan (LSP) of the Municipality of Kavala is currently being prepared, based on Law 4447/2016 "*Spatial Planning - Sustainable Development and other* provisions", which also includes the Municipality of Philippi.

The LSP aims to define the guiding principles of urban planning for sustainable residential development. In particular, it aims to:

1 The gradual promotion and organisation of the area

2 Ensuring the residential organisation of settlements with the desired correlation of residential parameters, environmental protection and the prevention of unregulated construction, by defining development criteria that contribute to the greatest possible economy of residential expansion,

3 The upgrading of the environment, especially in degraded areas, by ensuring the necessary social facilities, technical infrastructure, and control of uses in accordance with urban planning standards and suitability criteria, and

4 Protecting, promotion, and environmental upgrading of centers, cultural hubs, and traditional cores of settlements, green spaces, and other elements of the natural, archaeological, historical, and cultural environment of cities, settlements, and rural areas.

According to the aforementioned General Urban Plan of the Municipality of Kavala, the land uses specified therein are presented in **the** following **Table**.

Table5 –28 : Land uses of the General Urban Plan of the Municipality of Kavala

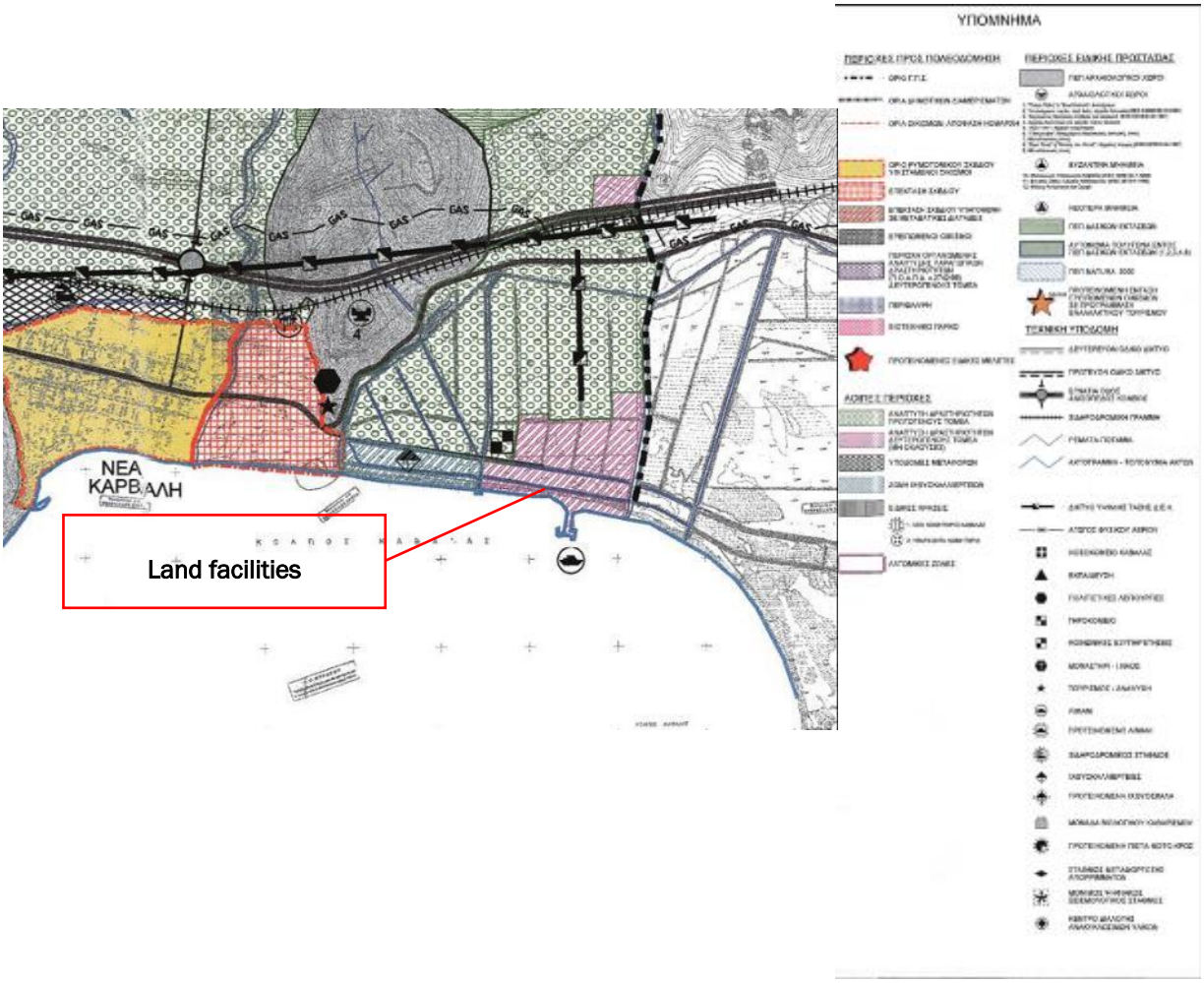
Land use	Total area (m2)	Area distribution
Unknown	12,661.6	0.1
Sports	156,039.5	1.7
Other use (Planned parking space)	1,054.4	0.01
Park	69,861.3	0.8
Purely residential	431,103.3	4.7
Recreation	5,701.5	0.06
Urban green spaces	1,150,955.8	12.6
General housing	5,118,925.5	56.2
Tank	1,616	0.02
Administration	32,217.4	0.4
Special Urban Planning Area	57,071.1	0.6
Education	524,266.0	5.6
City Center	301,060.7	3.3
Social services	119,777.2	1
Port	6,258.1	0.07
Other uses (proposed parking area)	688.3	0.01

Land use	Total area (m2)	Area distribution
Healthcare	62,039.6	0.7
Master Plan Area Kavala Port Authority	57,579.2	0.6
Cultural functions	80,653.1	0.9
Planned beach extension Beach	38,818.3	0.4
Planned bus station bus	4,667.9	0.05
Welfare	45,455.9	0.5
Fire Station	2,846.6	0.03
Watercourses	27,849.0	0.3
Part of settlement subject to transitional provisions	13,517.5	0.1
Local neighborhood center – neighborhood	484,766.7	5.3
Tourism – Recreation	282,521.5	3.1
Parking	18,215.4	0.2

The majority of the area covered by the Municipal Master Plan of Kavala is used for general (56.2%) and purely residential (4.7%) purposes, while other significant areas are used for urban green spaces (12.6%), education (5.6%), and local community centers (5.3%). The above uses account for approximately 84.4% of the total area of the Municipality of Kavala's General Urban Plan.

The main land uses near and within the Project's land facilities, according to the Land Use Map of the aforementioned GSP, are presented in **the** following **Figure**.

According to this map, the Project's land facilities are included in **the Secondary Sector Activities Development Area (non-polluting).**



(Source: Land Use Map, Municipal Master Plan of Kavala (Government Gazette 69/AAP/11-03-2013)

Figure5 –22 : Institutionalized land uses near the Project's land facilities

The spatial planning applicable to the wider project area is determined by:

- In the Special Framework for Spatial Planning and Sustainable Development for Industry, which considers the prefecture of Kavala to be an important oil extraction area.
- In the Special Framework for Spatial Organization of Aquaculture Activities (B' 2505/2011), according to which the offshore development area is located outside the aquaculture activity zone.
- In the Regional Framework for Spatial Planning and Sustainable Development (PPCHSA) of the Region of Eastern Macedonia and Thrace (B' 1471/2003), with the guidelines and specifications of which the existing offshore and onshore hydrocarbon facilities in the Gulf of Kavala are harmonized.

According to the General Urban Plan of the Municipality of Kavala (Government Gazette 69/AAP/11-03-2013), the area of the Project's onshore facilities falls within **the "Area for the Development of Secondary Sector Activities (non-polluting)**". This zone is defined as an area for urban development in accordance with Law 2742/1999 and the requirements of the Special Spatial Plan for Industry (Joint Ministerial Decision 11508/2009 – Government Gazette 151/AAP/13-4-2009) and includes the area west of Nea Karvali,

between the Egnatia Highway and the transport zone of the new port, through its designation as a "General Purpose Receptor."

This area already houses the "Hellenic Fertilizers ELFE" industrial plant, as well as the existing BIO.PA., which is part of the wider area. During urban planning, the boundaries of the existing lake and the boundaries of the neighboring properties will be precisely defined. Furthermore, within the area under urban planning, a "Commercial Center" is planned, in accordance with the provisions of Law 3333/2005. The new site is subject to the building regulations of the Industrial Park. For the location of low and medium nuisance units in the Area and until its urban planning, the provisions of the current legislation on off-plan construction shall apply.

Finally, new activities falling under the SEVESO II Directive are excluded. The categories of projects and activities that are permitted are: Category B and Category A2 (Joint Ministerial Decision 15393/2332, Government Gazette 1022/5-8-2002)For these categories, and in accordance with Joint Ministerial Decision 13727/724/2003 (Government Gazette B 1087/2003), the power or production units referred to in the low and medium disturbance categories apply.

Given that the land area of the licensed project is located within the **Secondary Sector Activities Development Area (non-polluting),** both the existing hydrocarbon extraction facility and the land area of the licensed CCS project comply with the specifications of the GSP, as:

- **Existing Sigma Facility**. The compatibility of the existing Sigma facility is covered by both the transitional provisions of the GSP, which states *"11. Legally existing craft and industrial buildings may operate, be modernized, and be expanded in accordance with the provisions of Law 3325/2005 (Government Gazette 68 A),"* as well as by Article 7 of Law 3325, which states: *"4. Activities, including those falling within the scope of Joint Ministerial Decision 172058/11.2.2016 (meaning SEVEZO), which were legally established and operate in areas without specified land uses, may continue to operate in the event that the land use is determined by first-level urban planning with which they become incompatible and are not required to relocate, provided that their removal is not expressly imposed. The expansion of these activities is possible within the area or site where they operated prior to the designation of land use and within the limits of the degree of nuisance, as determined on the basis of the latest valid operating permit or notification.*
- **Onshore part of the licensed CCS project**. The onshore facilities of the licensed CCS project are not part of a new industrial activity in the relevant Zone of the GSP, as although it is a **category A1** project, it belongs to **Group 11, Transport of energy, fuels, and chemicals**, and not to **Group 9, Industrial and related activities.** In addition, the CCS activity does not exist in Ministerial Decision 3137/191/F. 15/2012 and its amendments (Matching of categories of industrial and craft activities and electricity generation activities with the degrees of nuisance referred to in urban planning decrees), i.e. it is not classified as a degree of nuisance. Therefore, according to the General Urban Plan of the Municipality of Kavala (Government Gazette 69/AAP/11-03-2013), within the Secondary Sector Activities Development Area (non-nuisance), the permitted uses are those included in "Articles 2, 3, 4 of Presidential Decree 24/1985 (Government Gazette 270/Δ΄/1985), namely: agricultural and livestock buildings, slaughterhouses, agricultural warehouses, tanks, greenhouses, pumping stations, water tanks, wells, **industrial facilities. "**

In conclusion, it follows from the above that the implementation of the licensed project's facilities is in accordance with the spatial planning regime of the study area and is therefore fully compatible with its spatial planning requirements.

At the national level, no **marine uses** have been legislated, with the exception of the Special Framework for Spatial Planning and Sustainable Development (EPCHSAA) for Aquaculture, which was legislated in November 2011 (Government Gazette 2505/B/2011).

The main uses that can be developed **in the marine area** are as follows:

- Fishing
- Aquaculture
- Shipping and maritime transport
- Military uses and activities
- Research and protection of the marine ecosystem and underwater antiquities
- Energy production from renewable energy sources
- Extraction of hydrocarbons and aggregates
- Tourism/recreation

Given the establishment of the MSP for the marine area, but also the absence of approved corresponding THPs, the compatibility of the proposed project with the existing maritime spatial plan will be examined on the basis of the MSP itself and the corresponding **Special and Regional Spatial Planning Frameworks** in force, which concern specific economic sectors (renewable energy sources, industry, aquaculture, etc.) and include spatial planning guidelines for the development of each sector in land, coastal, and marine areas (to a lesser extent).

At the national level, no marine uses have been institutionalized, with the exception of the **Special Framework for Spatial Planning and Sustainable Development (EPCHSAA) for Aquaculture**, which was established in November 2011 (Government Gazette 2505/B/2011). According to the Draft Special Framework for Spatial Planning of Aquaculture Activities (Government Gazette 2505 B/04.11.2011), part of the project falls under P.A.Y. B14 "Agiasma-Keramoti-Erasmio" (fish farming, shellfish farming, other aquatic organisms), while it is 10.6 km away from area B13 "Iraklitsa-Nea Peramos. These P.A.Y.s are classified as B, i.e. areas for the development of aquaculture with scope for further development.

In conclusion, the land facilities of the licensed project are in accordance with the spatial planning regime of the study area and are therefore fully compatible with its spatial planning requirements, as certified by the relevant AEPO (Environmental Impact Assessment) of the project. Furthermore, as has been repeatedly noted, the present proposed amendment does not include any intervention in the land facilities of the licensed project, which remain unchanged, as described in the approved EIA of the project and licensed by the relevant AEPO.

In addition, it is important to note that all coastal and offshore facilities of the project (licensed project and proposed amendment) will be developed in locations with existing facilities, in locations where restrictions already apply due to the existence of the Prinos offshore oil and gas extraction project, in locations that have been licensed by the project's AEPO, and finally in locations where no marine uses have been established that would affect its development.

Therefore, the project as a whole (including the proposed amendment) is fully compliant with the specifications, requirements, and guidelines of the aforementioned EPCHSAA-B.

5.9.4 Special Management Plans

5.9.4.1 National Waste Management Plan (ESDA)

The National Waste Management Plan (ESDA) was approved by Ministerial Council Act No. 39/31-08-2020 (Government Gazette 185/A/2020) and amended by P.Y.S. 5 of 18.4.2023 /2023 (Government Gazette 94/A` 18.4.2023). It was drawn up in accordance with Articles 22 and 35 of Law 4042/2012 (Government Gazette 24/A/2012) for the implementation of Article 28 of Directive 2008/98/EC with a time frame of 2020-2030. The ESD includes strategic guidelines for limiting the negative effects of waste production and management, reducing the overall impact of natural resource use and improving their efficiency in order to achieve the desired high level of protection of the environment and human health.

In this context, the main objective of the new WFD is to reduce the landfilling of MSW to less than 10% by 2030. This target will be achieved through a series of measures to prevent waste generation, introduce new and strengthen existing separate waste streams, promote reuse, increase recycling rates, promoting the market for secondary materials, informing and raising awareness among citizens, rapidly developing networks for the collection of bio-waste and recyclable materials, creating modern waste and bio-waste management facilities (MEA and MEB), significantly upgrading the Recycling Material Sorting Centers (KDAU) and, in this context, utilizing the Waste Treatment Units (MEAs) and Recycling Recovery Units (MAAs) for the sorting of recyclable materials, the calculation per municipality of the quantity of recyclable materials and the corresponding impurities that correspond to it, and the energy utilization of alternative (secondary/waste-derived) fuels and processing residues.

Particular importance is also given to recycling and sorting at source (SAS) with separate collection of bio-waste for the whole country by the end of 2022. At the same time, it provides for intensified efforts for the separate collection of four streams of recyclables and priority for strengthening the collection of recyclable materials.

Under the new ESD, waste is grouped into the following streams, as shown in **the table** below.

Table5 –29 : Categories and quantities of waste produced at national level according to the new ESD

Waste category	Production in the reference year 2018 (tn)	Percentage of total
Municipal waste		
Municipal solid waste	5,523,809	17.9
Urban sludge	11,021	0.4
Industrial waste (excluding waste subject to alternative management or other categories)		
Non-hazardous industrial waste	7,469,790	24
Industrial hazardous waste	99,655	0.3
Agricultural and livestock waste		

Waste category	Production in the reference year 2018 (tn)	Percentage of total
Agricultural and livestock waste	12,469,086	40.3
Other hazardous waste		
Waste containing asbestos, waste packaging of hazardous substances, waste containing polychlorinated biphenyls/terphenyls	2,994	~0
Excavation, construction, and demolition waste		
Construction and demolition waste & excavation waste	4,943,092	16
Other waste streams covered by alternative management		
Waste (lubricating) oils, end-of-life vehicles, vehicle and industrial accumulator waste, electrical and electronic equipment waste, used vehicle tires	303,602	1
Hazardous waste from healthcare facilities (EAYM)		
Purely infectious hazardous waste, mixed hazardous waste, and other hazardous waste	17,770	0.1
Total production	30,943,819	100

(Source: Government Gazette 185/A/2020)

The main waste streams that may be produced during the construction of the Project, which fall under the classification of the approved ESD, are as follows:

- I. Municipal Waste.
- II. Excavation, Construction, and Demolition Waste (ECDW).
- III. Other waste streams falling under alternative management.

The Project (licensed and proposed amendment) meets the ESD requirements for prevention, minimization, and proper management of the above streams, as each stream produced will be managed in accordance with the provisions of the applicable legislation as specified in the Waste Management Plan (WMP) of the project accompanying this document.

The WMP includes practices for preventing and minimizing waste production and the methodology for managing each waste stream. The final disposal of each waste stream will be carried out by appropriately licensed entities and alternative management systems in accordance with the applicable legislation.

5.9.4.2 National Hazardous Waste Management Plan (ESDEA)

The National Hazardous Waste Management Plan (ESDEA) was approved by Ministerial Decision 62952/5384/2016 (Government Gazette 4326/B/2016) and was drawn up in accordance with Article 31 of Law 4342/2015 for the implementation of Articles 22 and 23 of Law 4042/2012, as applicable. The

objective of the ESDAP is to promote the waste hierarchy provided for in Directive 2008/98/EC in order to reduce the impact on the environment and public health, while at the same time ensuring that waste management contributes positively to economic and social development. Within the framework of the ESDEA, hazardous waste is grouped into the following streams:

- Industrial hazardous waste (IHA).
- Hazardous waste from healthcare facilities (EAYM).
- Hazardous waste from public utility facilities, public services, etc. (PUF).
- Hazardous waste included in alternative management:
  - Waste oils (AEO).
  - Waste accumulators from vehicles and industry (ASOV).
  - Waste portable batteries and accumulators (WBA).
  - Waste included in alternative management that is hazardous or produces hazardous waste during decontamination: Hazardous waste from the decontamination of end-of-life vehicles (ELV). Waste lamps containing hazardous substances, Hazardous waste from the decontamination of electrical and electronic equipment (WEEE).
- Waste containing asbestos (hazardous C&D waste).
- Small quantities of hazardous waste in municipal solid waste (MSW).
- Packaging waste containing hazardous substances.
- Waste containing polychlorinated biphenyls/polychlorinated terphenyls (PCB/PCT).

The main streams of hazardous waste expected to be generated during the construction of the project and falling under the above ESDEA classification are as follows:

- Waste packaging containing hazardous substances.
- Drilling waste containing hydrocarbons
- Hazardous waste subject to alternative management (AE, WEEE, lamps, etc.).

The project (licensed and proposed amendment) meets the ESDEA's proposed specifications for the prevention, minimisation and proper management of the above streams, as any hazardous waste stream produced will be managed in accordance with the provisions of the applicable legislation, as specified in the Waste Management Plan (WMP) of the project accompanying this document.

5.9.4.3 Regional Waste Management Plan (RWMP) for the Region of Eastern Macedonia – Thrace

Joint Ministerial Decision No. 61076/5267 (Government Gazette B/4123/21-12-2016) approved the update of the Regional Waste Management Plan (RWMP) for the Region of Eastern Macedonia and Thrace.

The current RWMP indicates the appropriate measures that promote, in a hierarchical and combined manner: a) prevention, b) reuse, c) recycling, d) other types of recovery, such as energy recovery, and e) safe final disposal at the regional level.

The general objectives of the PESDA for the Region of Eastern Macedonia and Thrace are:

- Sustainable waste management throughout the Region.
- Prevention - reduction of municipal waste production, with priority given to the prevention and continuous reduction of packaging waste, (biowaste) food waste, paper, and WEEE, with particular emphasis on informing and guiding common targets and implementing specialized actions.
- Expansion and modernization of the municipal waste collection and transport network.
- Strengthening actions that promote the reuse of unwanted products that do not need to be discarded as waste.
- Strengthening recycling by encouraging alternative management systems for packaging and other products.
- Utilisation of the various materials contained in municipal waste (recycling) and energy recovery from them, in order to save resources and energy and reduce the final disposal rate.
- Safe final disposal: environmentally acceptable final disposal in landfills of that part of municipal waste that is not subject to further treatment.
- Environmental damage remediation: cessation of operation, gradual restoration, and environmental upgrading of sites contaminated by uncontrolled disposal of municipal waste.
- Application of the principle of proximity.
- Informing and raising public awareness so that citizens actively participate in and take responsibility for solid waste management.
- Full harmonization with Joint Ministerial Decision 29407/3508/2002, which requires significant upgrading and transformation of management bodies, changes in the project design and licensing process, immediate introduction of waste treatment technologies, changes in the costing of services provided, and sets stricter rules for the operation of landfills with the ultimate goal of constructing as few landfills as possible, operating them to higher standards, and gradually converting them into waste treatment facilities.

According to this PESDA, the total MSW production for the Prefecture of Kavala in 2015 and the MSW production forecasts for 2015-2020 are presented in **the** following **tables**.

Table5 –30 : Categories and quantities of MSW produced at regional level according to the PESDA

Waste category	Production in the reference year 2015 (tons)
Regional Unit of Kavala	
Total MSW	52,118
Share in % of total production in the Region of Eastern Macedonia and Thrace	21.2
Waste from industries/private individuals/companies	9
Recyclables	79
Glass	12
WEEE	49
Green Waste/Home Composting	2,049

(Source: Government Gazette 4123/B/2016)

Table5 –31 : Estimated amount of MSW generated by 2020 according to the PESDA

	2015	2016	2017	2018	2019	20
Kavala Regional Unit	52,118	52,879	53,651	54,434	55,229	56,035
Thasos Regional Unit	10,855	11,013	11,174	11,337	11,503	11,671
PAMTH	245,960	249,551	253,194	256,891	260,642	264,447

(Source: Government Gazette 4123/B/2016)

In addition to the current PESDA, in June 2021, the Regional Association of Solid Waste Management Agencies (FODSA) of Eastern Macedonia & Thrace published the PESDA Guide so that there would be comparable targets between the current situation in 2025 and further in 2030. Thrace, in order to establish comparable targets between the current situation in 2025 and beyond 2030. The main findings of the Guide are set out below:

- In the Region of Eastern Macedonia - Thrace, none of the MEA-MEVA projects provided for in the 2016 PESDA have been completed. The MEAs/MEBAs of the Eastern Sector, as well as the MEBAs of Prosotsani and Paranesti, have been contracted. The MEA/MEVA of the Western Sector and the MEVA of Drama are at a high level of maturity, while the remaining projects are at a very low level (MEA of Northern Evros and MEA of Samothrace) or zero maturity. (MEA Thasos, MEA Xanthi, MEVA Northern Evros, MEVA Xanthi and Komotini, MEVA Thasos and MEVA Paggaio). For the purposes of assessing the degree of achievement of the 2030 targets, it has been assumed that all the projects provided for in the 2016 PESDA will have been completed and put into operation by 2030.
- The total capacity of the planned MEBAs, as well as the capacity at project level, is sufficient to achieve the bio-waste recycling target for 2030.
- The residual target can be achieved through energy recovery.

The Project's waste management system (licensed and proposed amendment) is consistent with the above guidelines of the updated PESDA, as already mentioned, during construction and operation, practices are planned to prevent and minimize the waste produced and to manage each stream appropriately in accordance with the legislation in force, as specified in the project's Waste Management Plan (WMP) accompanying this document.

5.9.4.4 Local Waste Management Plan (LWMP) of the Municipality of Kavala

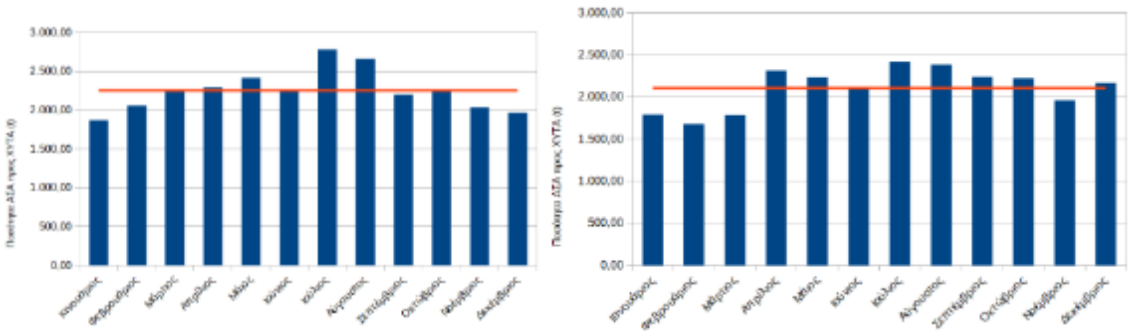
The main national objectives for the management of Municipal Solid Waste (MSW) of the Local Waste Management Plan (LWMP) of the Municipality of Kavala (2021) are summarised below:

- Implementation of the waste management hierarchy, where landfill – always and only after appropriate pre-treatment of waste – will be the last resort. The maximum percentage of municipal waste going to landfill in 2030 shall not exceed 10%.
- Mandatory universal separate collection of bio-waste by December 31, 2022.
- Recycling of packaging waste must reach 65% by weight by 2025 and 70% by weight by 2030, with specific targets set for individual packaging waste streams.
- Increase in the preparation for reuse and recycling of MSW to at least 55% by weight by 2025 and 60% by weight by 2030.
- Energy recovery from MSW residues and secondary (waste-derived) fuels.
- Safe final disposal in Landfills/Residue Disposal Sites (LDS/RDS) for the whole country.
- Permanent closure and restoration of all existing uncontrolled waste disposal sites by 2022.

The main objective of the Local Plan, beyond obvious compliance with the requirements of Law 4819/2021 (Government Gazette 129 A'), is:

- Source separation (SS) of organic biodegradable waste.
- Source separation of recyclable materials (paper, glass, plastic, and metals), in addition to packaging, through an extensive network of Recycling Corners and Green Points.

The monthly variation in MSW produced in the Municipality of Kavala and entering the Kavala Landfill facilities during the period 2019-2020 is summarized in the following diagrams. The same charts show (in red) the average annual production of MSW entering the Kavala landfill facilities.



Source: Municipal Solid Waste Management Plan of the Municipality of Kavala 2021

5 –23 : Monthly variation in municipal solid waste loads to the Kavala landfill for 2019 (left) and 2020 (right)

It should be noted that, based on the provisions of the Waste Management Plan (WMP) for the Project accompanying this document, the quantities of municipal waste produced, both during construction and operation, will have a negligible impact on the municipality's municipal waste management system and final disposal/landfill facilities.

According to the relevant data, the monthly distribution of MSW production in the Municipality of Kavala entering the Kavala landfill facilities during the period 2017-2020 is summarized in **the table** below.

As shown in **the table**, during the tourist season from May to September, approximately 46% of the total annual production is expected, while in the two months of July – August, approximately 19.8% of the total annual MSW production in the Municipality of Kavala is expected. In contrast, MSW production appears to be minimal during the period January–February (approximately 6.8% and 6.6% of total annual MSW production, respectively).

Table5 –32 : Monthly distribution of municipal solid waste entering the Kavala Landfill (2017–2020)

Month	Distribution of MSW production (% of total annual production)
January	6.80
February	6.59
March	7.66
April	8.37
May	9.15
June	8.42
July	10.02
August	9.75
September	8.66
October	8.77
November	8.17
December	7.65
TOTAL	100

The Project's waste management system is consistent with the guidelines of the Local Plan, as already mentioned, during construction and operation, practices are planned to prevent and minimize waste production and to manage each stream appropriately in accordance with current legislation, as specified in the Project's Waste Management Plan (WMP) accompanying this document.

5.9.4.5 River Basin Management Plans for Water Districts (RBMPS)

The study area of the licensed project falls within the Water Districts (WD) of Eastern Macedonia (EL11) and Thrace (EL12), for which River Basin Management Plans (RBMP) have been drawn up in accordance with the specifications of Directive 2000/60/EC, pursuant to Law 3199/2003 and Presidential Decree 51/2007, and have been approved by Decision 1005/12-09-2013 of the National Water Committee.

The2ndRevision of the River Basin Management Plan for the Eastern Macedonia Water District (EL 11) was approved and published in accordance with Government Gazette A 82/12.06.2024, while the 2nd Revision of the River Basin Management Plan for the Thrace Water District (EL 12) was approved and published in accordance with Government Gazette A 82/12.06.2024.th Revision of the River Basin Management Plan for the Water District of Thrace (EL 12) was approved and published in accordance with Government Gazette A 81/12.06.2024.

The Eastern Macedonia Water District (EL11) consists of one (1) river basin, that of Strymon (EL1106), while the Thrace River Basin District (EL12) consists of five (5) river basins, those of Nestos (EL1207), Rem. Xanthi – Xeroremata (EL1208), Komotini – Loutro Evrou (EL1209), Evros (EL1210) and Thasos – Samothraki (EL1242).

The land facilities of the licensed project fall entirely within the Nestos LAP, while the study area of the licensed project falls within both the Nestos LAP and the Strymonas LAP.

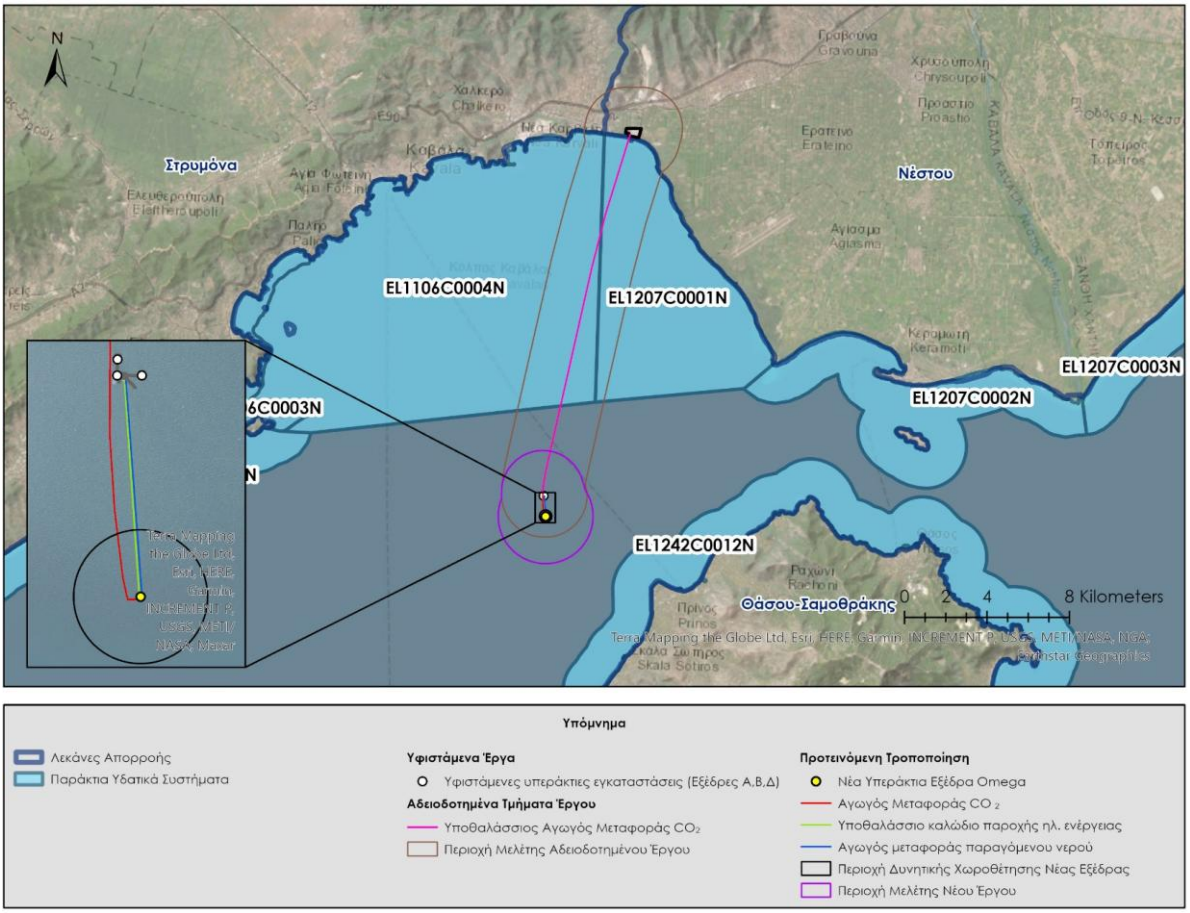
No river water bodies are recorded within the Project study area. The river water body with code EL1106R0009010092N and name Asprochoma P. is located west of the Project's land facilities, at a distance of approximately 1.7 km.

No lake or transitional water bodies are located within the study area.

Within the study area of the licensed Project, the transitional water body of the wider Keramotis area (EL1207T0001N) is located, with a total area of 7.7 $km^{(2)}$, which is approximately 14.5 km from the new Omega platform.

The study area of the licensed project falls within two coastal water bodies of the Nestos and Strymonas river basins. Specifically, it is located within the coastal waters of the Western Gulf of Kavala (EL1106C0004N) and the Eastern Gulf of Kavala (EL1207C0001N).

The area of the new Omega platform does not fall within any coastal WS, as shown in the following figure. The closest coastal water body to the area is the Thasos Coast, code EL1242C0012N, of the Thasos-Samothrace Water Management Authority, with a total area of 198.^{30} km^2.



((Source: Flood Risk Management Plans (FRMP) YD EL12)

Figure5 –24 : Coastal water bodies near the project area

The licensed study area falls within three (3) underground water systems: the Nestos Delta WSS (EL1200060), the Mountain Basin WSS (EL1200070) and the Symbolo-Kavala WSS (EL1100130). **The land facilities fall entirely within the Nestos Delta WFD.**

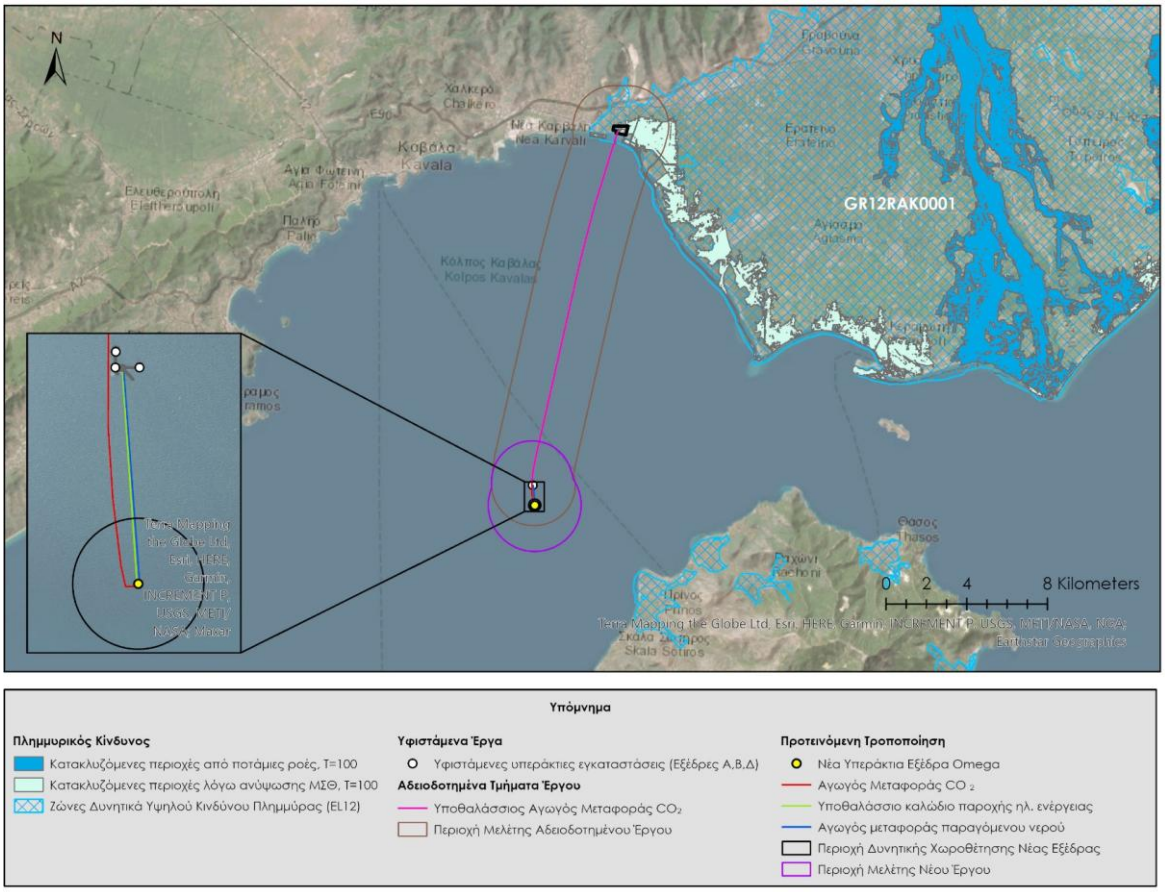
In addition, the Nestos Delta Water Protection Area (EL1200060) is protected by the following Basic Measures.

- **M12B0501**: Restrictions, terms, and conditions for the construction of groundwater abstraction works (boreholes, wells, etc.) for new uses, as well as the extension of existing water use permits in GWS areas with poor quantitative status.
- **M12S0801**: Prohibitions, restrictions, and conditions for the construction of new water abstraction works
- **M12S0802**: Special arrangements for the protection of the status of water bodies in good quantitative status but facing increased quantitative pressures

The proposed amendment to the project, following on from the initial design, does not conflict with the provisions and measures of the 2nd Revision of the relevant SDAPs.

5.9.4.6 Flood Risk Management Plan for the Water District (SDKP)

Part of the study area of the licensed Project (land facilities) falls within WD12 "Thrace," for which a Flood Risk Management Plan (FRMP) has been prepared and approved in accordance with Government Gazette 2688/B/2018. The land facilities are located within the boundaries of the Potentially High Flood Risk Zone (hereinafter referred to as PHFRZ) named "***Xanthi-Komotini Plain (Low Zones of the Nestos, Kosynthos, Kompsatos, Aspropotamos, Bosbozi, Filiouri rivers and riparian areas of Lake Vistonida***" and code GR12RAK0001, as shown in **the** following **Figure.** It should also be noted that the land facilities fall within the flooded areas for T=100 years (flooding due to MSL rise).



(Source: Flood Risk Management Plans (FRMP) YD EL12)

Figure5 –25 : Excerpt from the Nestos River Basin Flood Risk Map

The measures proposed in the Flood Risk Management Plan relating to the operation of the project and its protection from the risk of possible flooding are given below.

Table5 –33 : Flood Risk Management Plan (FRMP) measures related to the project

Measure Code	Measure Name	Comments
EL_12_35_28	Coastal zone monitoring	Development and maintenance of a common database for monitoring the coastline and coastal zone of the ZDYKP. Coastal zone monitoring will also contribute to climate change adaptation (sea level rise and protection against sea flooding).
EL_12_42_20	Incorporation into Internal Emergency Plans and SATAME of the effects and protective measures against pollutant spills following flooding, based on the Risk Maps	Internal Emergency Plans are a requirement for SEVESO units. More detailed information is provided in Chapter 8.
EL_12_43_21	Awareness campaigns for the public, local authorities, and communities regarding flood risk	-
EL_12_44_24	Strengthening the technical, organizational, and administrative capacity of stakeholders involved in flood protection issues	-
EL_12_53_26	Upgrading/creating a mechanism for assessing damage and compensation to buildings due to flooding	-

The land facilities of the licensed project comply with the relevant Flood Risk Management Plan (FRMP), as its design incorporates all the measures proposed in the FRMP, with an emphasis on the effects of the elevation of the MSL, as certified by the relevant AEPO for the project.

Furthermore, as has been repeatedly noted, the present proposed amendment does not include any intervention in the land facilities of the licensed project, which remain unchanged, as described in the approved EIA of the project and licensed by the relevant AEPO.

Therefore, the project as a whole (including the proposed amendment) is fully compliant with the specifications, requirements, and guidelines of the relevant Flood Risk Management Plan (FRMP).

5.9.5 Organized Activity Hosts

In accordance with the guidelines of the revised Regional Spatial Framework (RSF) of Eastern Macedonia, published in the Government Gazette 248/AAP/2018, the following are proposed for the spatial structure of productive activities:

- **Primary sector**: Restructuring of the primary sector, reducing dependence on subsidies, increasing competitiveness and extroversion, and linking it to the secondary sector with the aim of producing and marketing products with increased added value. Promotion of mixed farming, increasing employment and productivity in livestock farming, and further exploitation of comparative advantages in fisheries.
- **Secondary sector**: Restructuring of the secondary sector – transformation into an important industrial hub, with recognition of sectors linked to the primary sector, regional specialisation and export orientation. Promotion of organised spatial planning and environmental consolidation and functional upgrading of existing clusters with optimal use of existing receptors and creation of the necessary infrastructure.

- Mining activities: Sustainable exploitation of mineral wealth through the restructuring and optimisation of mining methods in the region's main industry, marble, while improving the effectiveness of environmental and landscape protection and restoration. With regard to marble quarries, the sustainable further development of mining activities is being promoted (marble quarries in the regional units of Kavala, Thasos, and Drama stand out) through the establishment of organized zones.

The following are proposed for organised activity hosts:

- Actions to improve the attractiveness of organised activity hosts.
- Strengthening and, where necessary, consolidating and upgrading existing hosts in accordance with Law 3982/2011.
- Integration of informal "concentrations" into organised hosts and interconnection of activities with other sectors in which the Region has - or can acquire - a competitive advantage.
- Promotion of the location of large industrial units within organised facilities in order to avoid their scattered location.

The Prefecture of Kavala as a whole is an important area for oil extraction and other mining and quarrying activities, which has consequently developed industrial activities for the production of chemical products and the exploitation of mineral resources.

The Kavala Industrial Area (Government Gazette 152D/1981, Government Gazette 1465D/2003) is located within the Regional Unit of Kavala, as shown in the following figure. It has been developed in an area of 2.08 km^2in the settlement of "Pontolivado," northeast of the city of Kavala, on the (old) Kavala-Xanthi National Road. The Kavala Industrial Area is one of 29 organized industrial areas managed by ETVA (Business & Industrial Parks) with specific building regulations in accordance with Government Gazette 152D/23-3-1981, 1465D/31-12-1981, 1465D/31-12-1981, 146 Industrial Parks) with specific building conditions in accordance with FEK 152D/23-3-1981, 1465D/31-12-2003.

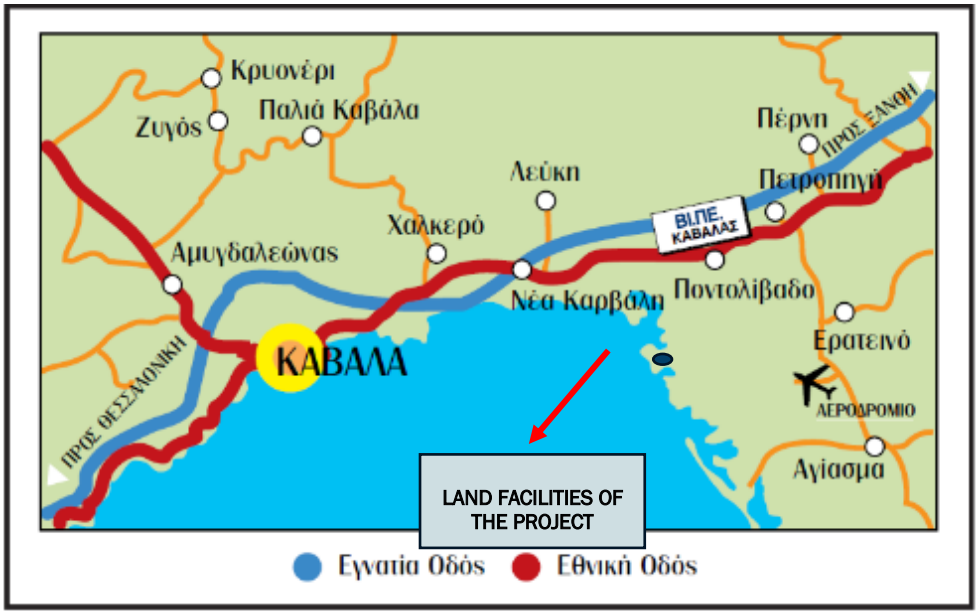
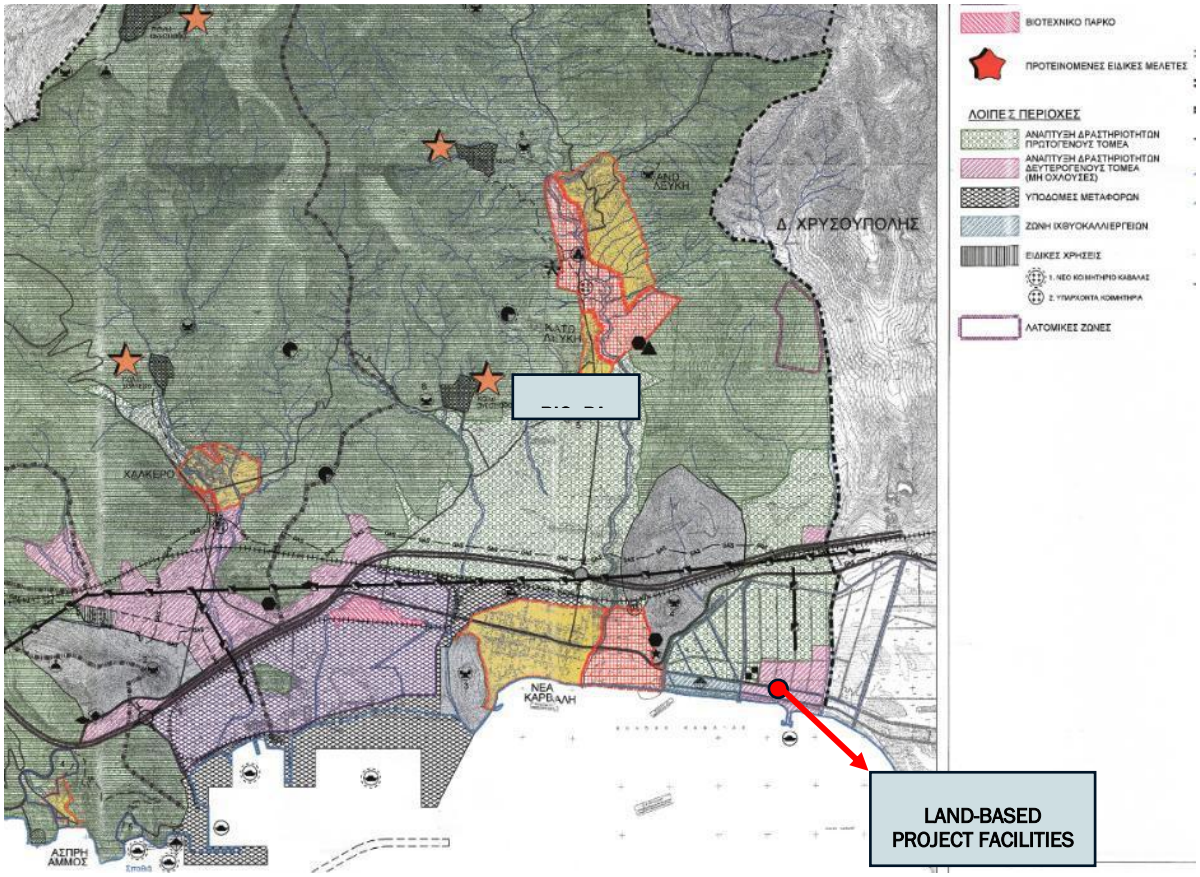


Figure5 –26 : Kavala Industrial Area (Source: Business & Industrial Parks ETVA VI.PE, https://www.etvavipe.gr/, 05/06/2024)

The Kavala Industrial Park was established by Joint Ministerial Decision (JMD) 22773/1887/24-10-2005 (Government Gazette B-1466), which specifies the location, area, boundaries, type of Industrial Area, environmental conditions, and bodies responsible for the establishment and implementation of the Industrial Park.



(Source: Land Use Map, Municipal Land Use Plan of Kavala (Government Gazette 69/AAP/11-03-2013)

Figure5 –27 : Location of BIO. PA. Kavala

Finally, it should be noted that the nearest established aggregate quarry is located, according to the "latomet" portal of the Ministry of Environment and Energy at the location of Pikro Nero[52] at a distance of approximately 2 km from the land facilities, as well as the quarry at the location of Nea Komi [53] at a distance of approximately 2 km, while at a distance of approximately 3.5 km is the quarry area at the location of Lygaries Nea Komi[54.] .

52 N. KORAKA S.A. Quarries (area 138,000 m^2)
53 VOUGIOUKLI Quarries S.A. (area 25,000 m^2)
54 N. KORAKA S.A. Quarry Area

5.10 Conclusions of the Assessment of the Project's Compatibility with the Applicable Spatial, Environmental, and Urban Planning Regulations of the Study Area

According to the above in **Sections 5.5** to **5.10**, the project under study (licensed project including the proposed amendments) complies with the guidelines and priorities of the current strategic and regulatory spatial planning at national, regional, and local level, while it is compatible and compliant with the established spatial and urban planning commitments at local level, as reflected in the existing land uses in the project area. In addition, the project under study (licensed project including the proposed amendments) is compatible with the international, EU, and national environmental protection objectives applicable in the area.

5.11 CORRELATION WITH OTHER PROJECTS

The CO_2storage field is located within the Prinos basin, in the Gulf of Kavala, in the North Aegean Sea. The area of interest for the CO_2 storage exploration site is located within the Prinos Concession, where Energean has held 100% of the interests and management rights for oil and gas exploration and development activities since 2007. The potential CO_2 storage site is located within the Prinos structure and the underlying aquifer.

The operation of the facility is planned to be developed in two distinct phases (Phase 1 and Phase 2) for reasons of scalability and adaptation to market conditions.

- Phase 1: The initial nominal capacity of the Project will be up to **1 MTPA** for 20 years (starting in late 2025 to early 2026). $CO_{(2)}$will be supplied mainly in bulk via a third-party pipeline that will reach the site under suitable conditions for injection. Small quantities of $CO_{(2)}$will also be delivered to the Sigma onshore facilities by truck through pilot projects.
- Phase 2: The project is expected to be gradually expanded to a final nominal capacity of up to **3 MTPA**. The facility will be modified to accept liquefied CO_2, which will be delivered by sea to a newly built pier. For this purpose, marine berthing and unloading facilities for liquefied $CO_{(2)}$will be constructed,as well as new storage and processing facilities (pumping, heating) within the Sigma plant site. The liquefied $CO_{(2)}$ will be temporarily stored, processed onshore, and then transported to the offshore facilities via the pipeline constructed as part of Phase 1.
  To accommodate the capacity of Phase 2, further upgrades to the Project facilities will be required as follows:
  - Upgrade of the onshore liquefied CO_2storage and handling facilities, liquefied CO_2berthing and unloading facilities,and ancillary facilities.
  - Possible installation of a new platform to cover the maximum capacity of Phase 2.
  - At least four new CO_2 injection wells and four new water production wells.
  - Possible expansion of the water treatment facility.

However, as already noted, the subject of the approved Environmental Impact Study (EIS) and this EIA is Phase 1 of the Project, which is described in the relevant Sections herein. The licensing of the next phase of the Project (Phase 2) is not the subject of this document and will be implemented at the appropriate stage of the design's maturity.

The CO_2sources and the main host processes during Phase 1 of operation will be as follows:

- Supply of bulk CO_2 via pipeline, through a land-based receiving station within the Sigma facilities.
- Receipt of CO_2 cargoes from trucks with ISO containers at the Sigma land facilities. The ISO containers will be loaded onto ships with cranes, transported and unloaded at the new Omega platform.

This proposed Project may interact with other projects or activities on three levels:

- 1º Level. Interaction with future infrastructure and activities to be developed at a later stage of the overall Project, part of which is the Project under consideration in this context.
- 2º Level. Interaction with other projects and activities that exist in the immediate or wider area of the Project.

- **3ο Level**. Interaction with projects of a similar nature and size that are being implemented or planned at the national level.

The above levels of interaction will be analyzed in more detail in the following paragraphs. More specifically:

1ο Level. Interaction with future infrastructure and activities to be developed at a later stage of the overall Project's maturity, part of which is the Project under consideration in this study.

After the end of exploitation, the next stage is the dismantling of the Project facilities, the relevant infrastructure, and the corresponding equipment, their removal, and the restoration of the area.

Although, as has been repeatedly emphasized, the subject of the approved Environmental Impact Study (EIS) and this MT AEPO is Phase 1 of the Project (the licensing of Phase 2 of the Project is not the subject of this document and will be implemented at the appropriate stage of its design maturity, through a request to amend the approved environmental terms and a new, independent EIS), however, data on the implementation of the entire Project are presented, on the one hand to provide a complete picture of the progress of the planned overall Project, and on the other hand to make clear the extent and volume of the proposed intervention in relation to the overall development over time, as well as the overall range of prospects and future possibilities opened up by the implementation of the Project.

2ο Level. Interaction with other projects and activities existing in the immediate or wider area of the Project. The **Prinos offshore development project** and the **Sigma onshore industrial unit,** as described below, are located in **the immediate area of the Project**.

According to the applicable AEPO DIPA/8413/24.04.2018 (ADA: ΨΓΛ14653Π8-Ζ79), the **Prinos Offshore Development project** concerns the existing offshore oil and gas extraction facilities located in the Gulf of Kavala, in the northeastern Aegean Sea, and its expansion with two new platforms, one of which is long-term. The total production capacity is 27,000 barrels/day of stabilized crude oil.

The existing offshore project consists of the following individual facilities:

- **Kappa** platform located in the sweet natural gas field, not derived from an oil field, in South Kavala.
- A 12 km, 6" pipeline (8-12 barg operating pressure) that transports sweet natural gas and condensate from South Kavala (Kappa platform) to the Delta platform in Prinos.
- **Alpha** and **Beta** production platforms, twelve drilling heads (wells) each, which are part of the Prinos complex, are connected by bridges to the Delta platform and are designed to accommodate drilling, repair, maintenance, and any other suitable drilling rigs.
- The **Delta** processing platform contains all the offshore initial processing facilities and currently receives the oil, natural gas, water, and condensate produced from the Prinos, North Prinos, and Epsilon fields. The Delta platform is connected by bridges to the Alpha and Beta platforms and to its flare. New vertical connection pipes (risers) are being added to the Delta platform to enable the reception of fluids produced by the Lambda platform (and possibly the Omicron platform) and to send natural gas (gas lift) and water for injection to the Lambda platform. A vertical protective pipe is also being added for the installation of the multi-carrier cable that will carry power, data, communications, and auxiliary fluids to the Lambda platform.
- Prinos platform complex **flare**.

- 18 km, 12" pipeline (8 barg operating pressure) for the transport of sour natural gas from the Delta platform to the onshore facilities.
- 18 km, 8" pipeline (20-40 barg operating pressure) for transporting crude oil from the Delta platform to the onshore facilities.
- 18 km, 5.3" pipeline for transporting sweet natural gas (gas lift) from the onshore facilities to the Delta platform.
- Two submarine power cables, each with a capacity of 10 kVA, from the onshore facilities to the Prinos platform complex.

The **Sigma onshore industrial unit** includes facilities for desalination, dehydration, stabilization, and desulfurization of the crude oil produced, conversion of the acid gas produced into sweet gas, the production of liquid and solid sulfur, as well as the necessary facilities for the safe storage and handling of the crude oil, natural gas, and sulfur produced.

Consequently, the Project interacts directly with elements of the Prinos offshore development project and the Sigma onshore industrial unit, and therefore the scope and intensity of these interactions will be examined in **the** relevant **Sections** of **Chapter 9** of the.

In **the wider study area** (which for the purposes of this Section consists of the Gulf of Kavala), there are a number of infrastructures and activities that could potentially interact with the proposed Project, specifically the following:

- The ports of Kavala (the commercial port "Philippos II" and the passenger port "Apostolos Pavlos").
- Keramotis passenger port.
- Part of the PATHE motorway.
- Wastewater treatment plants (WWTP).
  - Kavala WWTP (GR115001016) with discharge into the sea.
  - WWTP of Paleo Tsiflikio (GR 11500101117) with discharge into the sea.
  - WWTP of Philippi (GR 1150100118) with flow discharge.
  - WWTP of Nea Peramos (GR 1150030115) with flow discharge.
  - EEL Chrysoupoli (GR 115011018) with flow discharge.
  - EEL Limenas Thasou (GR 1150040116) with discharge into the sea.
- Hellenic Fertilizers (ELFE), originally founded in 1961 (as Phosphate Fertilizer Industry S.A. (PFI)), began operating in Nea Karvali in 1965. The facilities include:
  - Ammonia production unit.
  - Nitric acid and nitrate fertilizer production unit.
  - A sulfuric acid production unit.
  - A phosphoric acid production unit.
  - A compound fertilizer production unit.
- Coral Oil, located adjacent to the SIGMA facilities, and Revoil, approximately 1.5 km to the north, which operate as fuel storage and distribution sites.

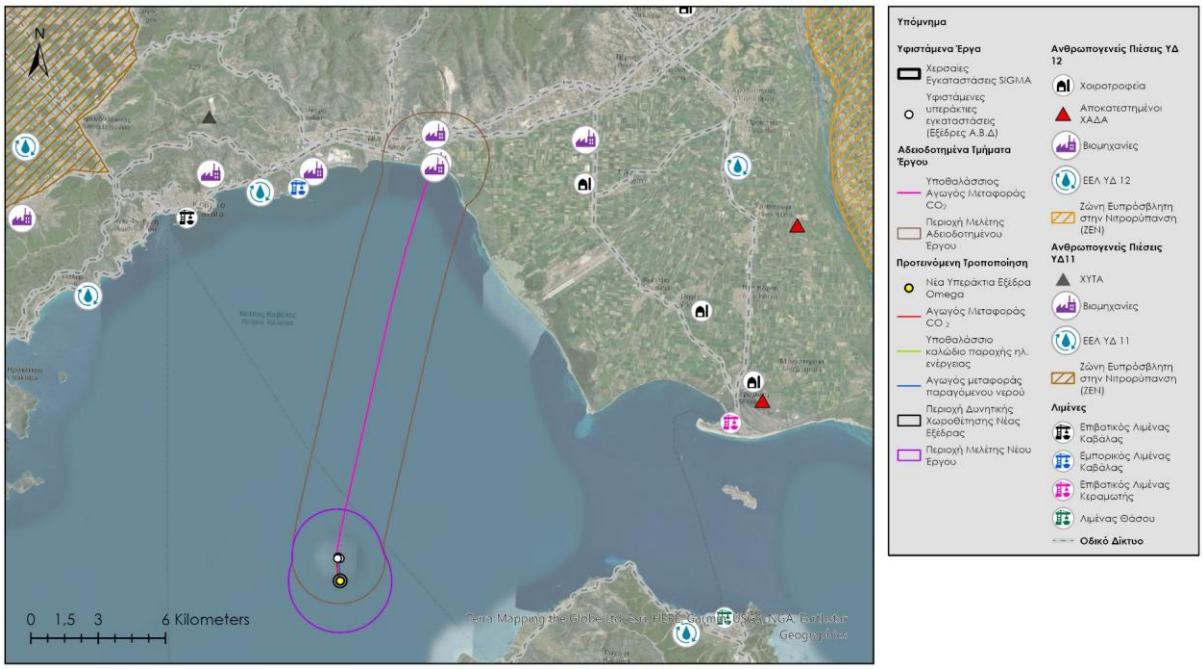
The majority of the above-mentioned projects are not directly or indirectly related to the Project. However, fuel storage and distribution sites can have a negative impact in the event of an accident, mainly due to fire.

To this end, all necessary measures for the prevention and mitigation of emergency conditions must be taken, as provided for existing facilities and presented in Chapter 10. However, no impacts from $CO_{(2)}$leakage are expected at these sites.

The industrial facility Hellenic Fertilizers (ELFE) could have strong positive synergies with the Project, as it is a significant producer of CO_2 that could be captured and stored in the Project with mutual positive effects.

Similar, mostly positive interactions are also expected to arise with the transport infrastructure of the wider region (the commercial port of "Philippos II", the passenger port of "Apostolos Pavlos" and part of the PATHE motorway), as part of the $CO_{(2)}$ cargo will be transported by trucks with ISO containers.

Consequently, the above projects and activities are considered likely to contribute to the overall environmental impact on the wider Project area (mostly positive interactions) and, therefore, the scope and intensity of these interactions will be examined in **the** relevant **Sections** of **Chapter 9** of this study.



5 –28 : Infrastructure and other activities in the wider Project area

3º Level. Interaction with projects of a similar nature and size that are being implemented or planned at national level.

The proposed CO_2 in Prinos is the first initiative of its kind in Greece and the southeastern Mediterranean and therefore cannot record interactions with projects of a similar nature and size at national level, as no such projects exist, are not being implemented and are not planned at this time. According to the revised NSRF, two projects have already been approved for co-financing by the Innovation Fund: the IRIS project for $CO_{(2)}$ capture at a hydrogen production unit at a refinery in Corinth, and the IFESTOS project for CO_2 capture at a cement production plant in Boeotia. However, as these projects are at a very early stage of planning, it is not possible to assess their potential impact in combination with the proposed project. Nevertheless, it is

important to note that in any case, due to the nature and general technical characteristics of these projects, any potential cumulative environmental and social impacts are expected to be **mostly positive.**

Recently, developments have been taking place both at **national level** (National Climate Law (4936 FEK A 105/27.5.2022) as amended and in force, ESEK, MS 2050, Regional Plans for Adaptation to Climate Change, etc.), as well as at **European** level (European Green Deal, Framework for Climate and Energy for 2030, EU Strategy on Adaptation to Climate Change) and **international** [Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC)] a coordinated effort focused on energy transition, reducing GHG emissions and ultimately achieving climate neutrality.

In this context, EnEarth has designed and plans to implement a full-scale CO_2 facility in Prinos, capable of storing a significant amount of CO_2 with a corresponding significant offset of emissions, both at regional and national level. Therefore, the Project has a strong direct and indirect interaction with a wide range of actions, activities, and infrastructure aimed at halting/addressing climate change and achieving climate neutrality.

In conclusion, although there is no interaction between the Project and projects of a similar nature and size at national level, as such projects do not exist, are not being implemented and are not currently planned, it is nevertheless easy to see that it has a strong direct and indirect interaction with a wide range of actions, activities, and infrastructure (at national, European, and international level) aimed at halting/combating climate change and achieving climate neutrality in terms of their environmental footprint.

6 CURRENT ENVIRONMENTAL SITUATION

6.1 GENERAL INFORMATION

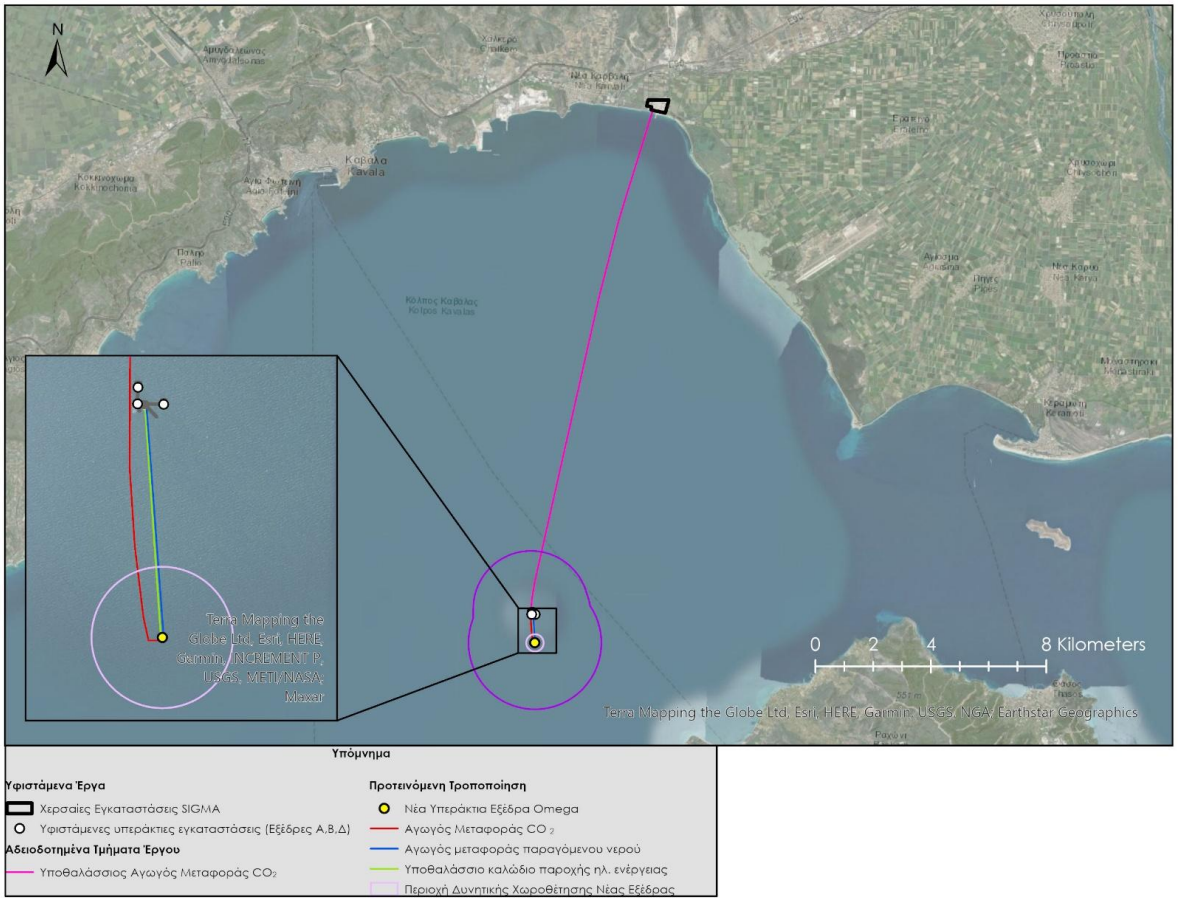
This **chapter** records, analyzes, and evaluates the parameters of the natural and man-made environment in the study area, only in relation to the proposed modification of the project or activity, as described in **Chapter 3** of this document, and the environmental media of the natural and man-made environment that it affects. Consequently, the Study Area within the framework of this EIA of the project has been defined on the basis of the proposed modifications to the design of the licensed project.

With regard to the definition of **the Study Area**, based on Annex II to the "Basic Specifications for EIA of Category A Projects and Activities" of the YPEKA Decision with Ref. No. 170225/2014 (Government Gazette 135 B' /20.01.2014) *"Specification of the contents of environmental licensing files for Category A projects and activities of the Decision of the Minister of Environment, Energy & Climate Change No. 1958/2012 (B' 21) as in force, in accordance with Article 11 of Law 4014/2011 (A' 209) and any other relevant details,"* the minimum radius of influence for point and area projects or activities of Subcategory A1 for areas outside settlement boundaries or town plans is set at 2 km from the boundaries of the site, while for linear projects or activities it is 1 km around their axis, respectively.

Therefore, within the framework of this Study, the total area enclosed by the 2 km zone around each element of the proposed modification of the licensed project design (Omega offshore platform, extension of the CO_2 , produced water transfer pipeline and power supply cable), as shown in **the** following **Figure**, which also depicts the corresponding study area defined in the approved EIA for the project.

However, the description of the current environmental situation discussed in this **Chapter** was chosen not to be strictly limited to the study area, but to present available data and characteristics of the wider area of implementation of the proposed modification, in order to obtain as complete a picture as possible of its impact on all the parameters that shape the natural and man-made environment of the wider area. Therefore, for the sake of completeness, in many cases an expanded **Wider Study Area** is also described based on bibliographic data.

It should be noted that, within the framework of the proposed amendment, an exclusion zone will be established in accordance with the other offshore facilities in the area, as well as the licensed project. This zone will be defined in cooperation with the Maritime Authorities (Port Authority and Coast Guard, under the supervision of the competent Ministries) before the start of the project implementation works.



6 –1 : Project Study Area

The existing environmental and social conditions in the area of the proposed modification are the reference point for examining the potential environmental and social impacts caused by the installation and operation of the Project, including the proposed modification. Data collection was based on both secondary data (bibliography, approved EIA of the licensed project, corresponding Environmental Impact Studies of existing projects in the study area, research results, etc.) and on primary data, which resulted from fieldwork carried out in the context of this study, as well as from the Environmental Monitoring Program of the offshore project of Prinos. More specifically, the following were used as sources of primary data:

- Primary data from the Environmental Monitoring Program (EMP) of the offshore Prinos project (which is implemented in accordance with the environmental licensing requirements of the project and also concerns the area of implementation of the present proposed amendment). The activities carried out as part of the EMP for the offshore Prinos project (marine ecology, physicochemical analyses of sediment and seawater, research in the Natura 2000 network area, bird watching, etc.), as well as their results, are presented in detail in **the sections** corresponding to each environmental parameter under consideration.
- Primary data collected during the fieldwork for this study (including the fieldwork for the project's EIA) with the aim of specifying and updating the existing conditions/baseline values of the area under consideration and to be used both for assessing the environmental impact of the proposed modification of the project and for monitoring the development of its possible impact on

environmental parameters. This fieldwork, during which data were collected to determine the baseline values and reference conditions for the study area, included field observations, sampling, and laboratory analyses. The activities carried out as part of the fieldwork, as well as their results, will be presented in detail in the sections corresponding to each environmental parameter examined, as well as in the relevant EIA report attached to the relevant Annex hereto.

Before collecting the reference data, specific areas were defined for study. The determination of the coverage of the main study area is based mainly on the following factors: the physical characteristics of the project site, the biological characteristics, the nature of the receptors and their sensitivity, the prevailing meteorological conditions, and the area of potential impact.

6.2 CLIMATIC AND BIOCLIMATIC CHARACTERISTICS

6.2.1 Climatic Characteristics

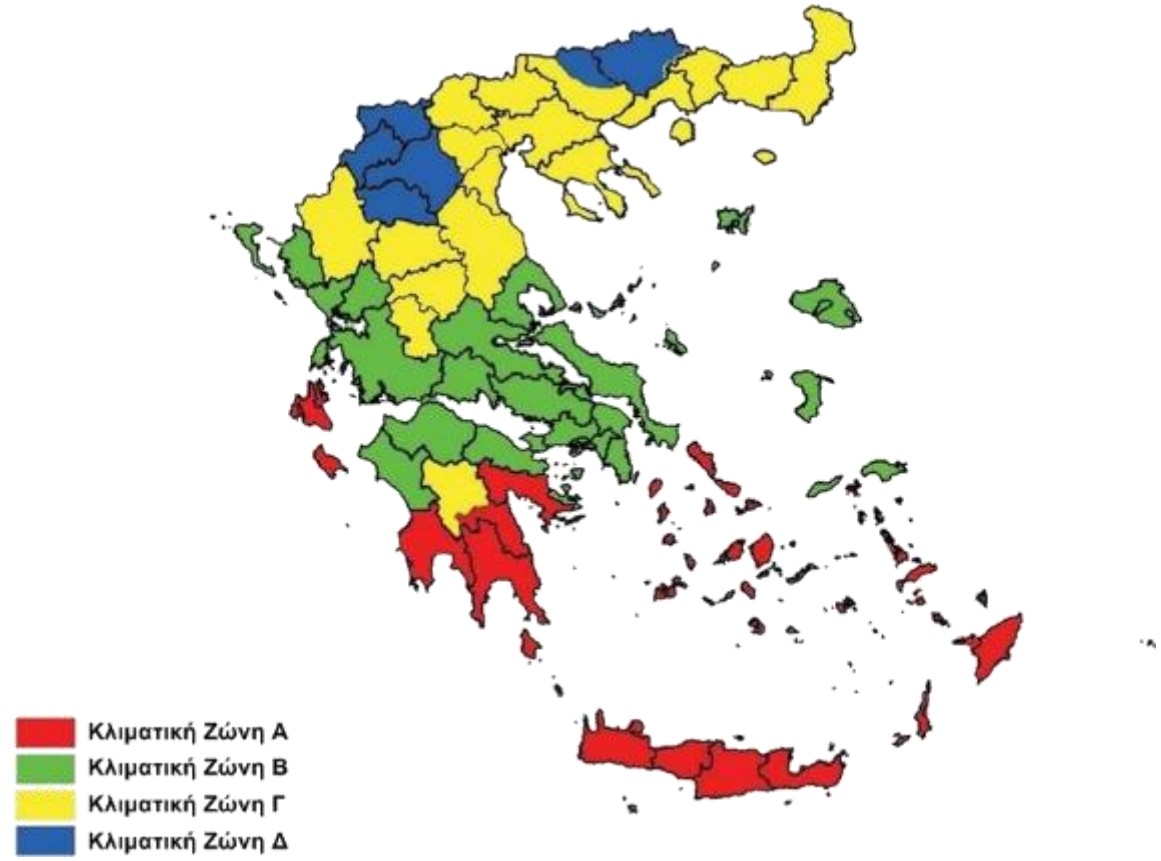
6.2.1.1 General Information

The climate of the coastal zone of the Regional Unit of Kavala, where the proposed amendment is located, is classified as Mediterranean, with hot, dry summers (circulation of subtropical and hot dry air), cold and wet winters (circulation of relatively cool air from the temperate zone) with rainfall of approximately 300-400 mm. The corresponding continental part of the Regional Unit tends to be different, presenting a corresponding continental climate, characterized by cool, wet winters, dry summers, and rainfall approximately double that of the coastal zone.

To investigate the climatic conditions of the area, data were examined from the Kavala Meteorological Station (MS) (operated by the National Meteorological Service), which is located at position λ: 24.62 and φ: 40.92 (in the WGS84 projection system) and is located at an altitude of 4 m.

6.2.1.2 Climate Zone

According to the "Regulation on Energy Performance of Buildings KENAK" (approval: Government Gazette 2367/B/12-7-2017), Greece is divided into four (4) climate zones based on heating degree days. The Kavala Regional Unit is located in climate zone C, as shown in the following figure.



(Source: KENAK, 2017)

Figure6 –2 : Schematic representation of climate zones in Greece

6.2.1.3 Temperature

According to statistics from the Hellenic National Meteorological Service (from the Kavala Meteorological Station, data from a 52-year period), January is estimated to be the coldest month in the Project area, with an average minimum temperature of 1.8°C and an average monthly temperature of 5.6°C, while the warmest month is July, with an average maximum temperature of 30.1°C and an average monthly temperature of 26.1°C. In absolute terms, for the same period, the maximum recorded temperature is 39°C during July and the corresponding minimum is -8°C in January and -8.8°C in December.

It should be noted that although the coldest months occur during the winter (December, January, and February), the minimum temperature can fall below zero in March and April due to the onset of cold winds.

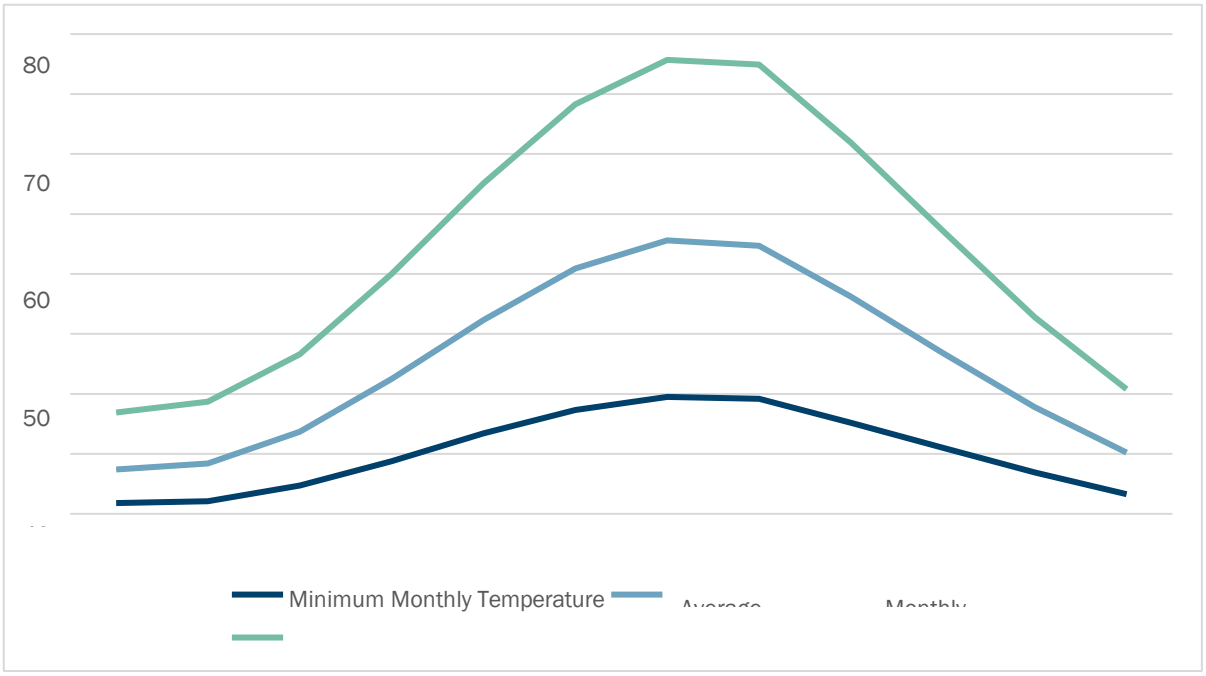
The following **Table** and **Figure** present the meteorological temperature data for Kavala for a period of 52 years (from 1958 to 2010).

Table6 –1 : Temperature data from the Kavala Meteorological Station for the period 1958-2010

	IAN	FEB	MAR	APR	MA	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Minimum Monthly Temperature	1.8	2.1	4.7	8.8	13.4	17.3	19.5	19.2	15.2	11	6.9	3.3

Average Monthly Temperature	5.6	6.3	9	13	18.9	23.6	26.1	25.5	21	15.8	10.9	6.9
Maximum Monthly Temperature	9.5	10.3	12.9	17	22.8	27.4	30.1	30.2	25.7	20.4	15	10.6

(Source: Kavala Meteorological Station, National Meteorological Service)



(Source: Kavala Meteorological Station, National Meteorological Service)

6 –3 : Schematic representation of climate zones in Greece

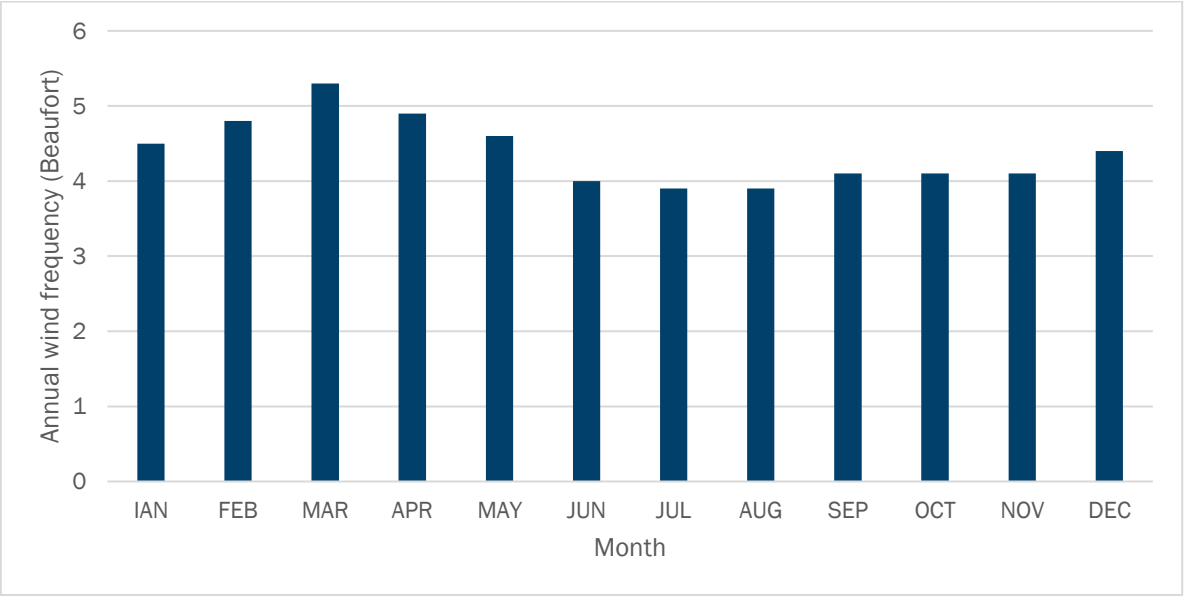
6.2.1.4 Wind

According to wind data from the Kavala Meteorological Station, winds in the study area are predominantly easterly for most months. The average monthly wind speed ranges from 3.9 km/h to 4.8 km/h, while the average annual wind speed is 4.4 km/h. The following **figure** shows the annual diagram of the average wind speed at the Kavala Meteorological Station, while the following **table** shows the average and highest wind speeds, as well as the prevailing direction per month.

Table6 –2 : Average monthly meteorological data values for the Kavala station

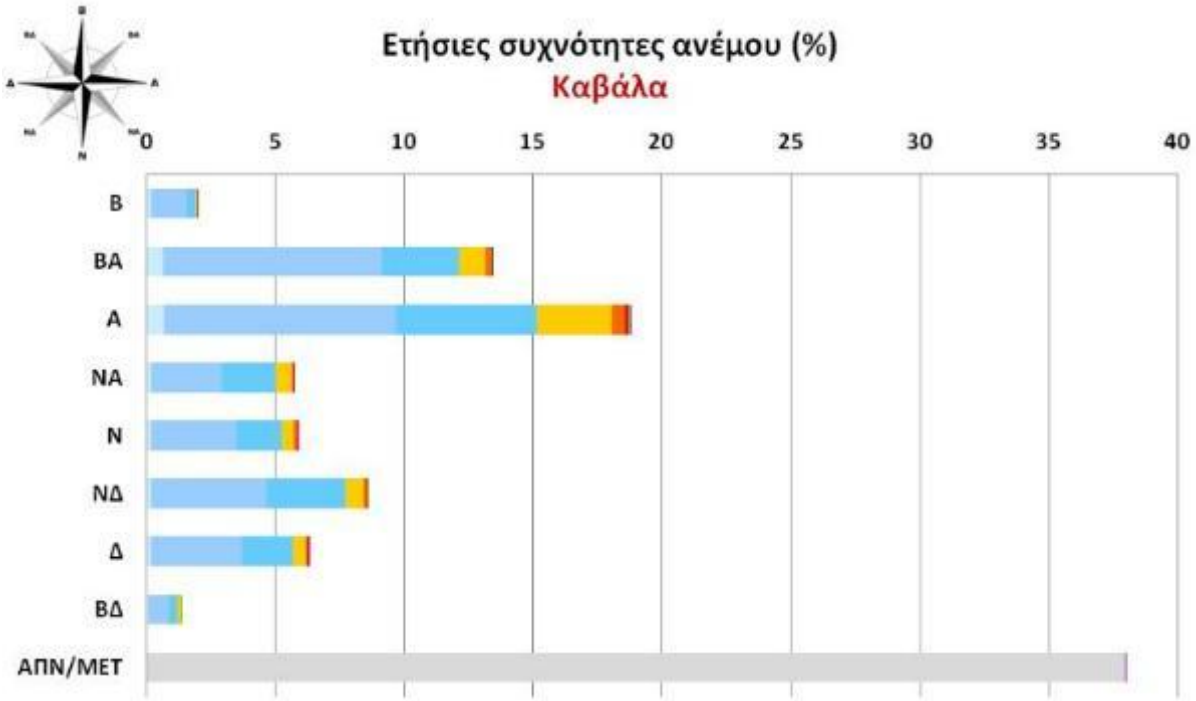
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Prevailing Wind Direction	A	A	A	A	A	ND	A	A	A	A	A	A
Average Monthly Wind Intensity	4.5	4.8	5	4	4	4.0	3.9	3.9	4.1	4.1	4.1	4.4

(Source: Kavala Meteorological Station, National Meteorological Service)



6 –4 : Distribution of wind data 1958–2010

The following figure shows the annual wind frequencies in Beaufort in relation to wind direction, as recorded at the Kavala Meteorological Station.



	ΑΠΝ/ΜΕΤ	ΒΔ	Δ	ΝΔ	Ν	ΝΑ	Α	ΒΑ	Β
Απνοια	37.96								
1b	0.01	0.07	0.18	0.20	0.18	0.16	0.71	0.65	0.18
2b	0.00	0.79	3.54	4.47	3.33	2.76	9.00	8.49	1.41
3b	0.00	0.32	1.99	3.05	1.78	2.09	5.45	2.98	0.32
4b	0.00	0.15	0.48	0.74	0.46	0.65	2.87	1.04	0.08
5b	0.00	0.01	0.08	0.09	0.08	0.06	0.54	0.20	0.01
6b	0	0.01	0.01	0.02	0.03	0.01	0.14	0.03	0.00
7b	0	0.00	0	0.01	0.00	0.00	0.02	0.01	0
8b	0	0	0	0	0.00	0.00	0.01	0.00	0
>=9b	0.00	0	0.00	0	0.00	0.00	0.01	0.00	0.00

(Source: Kavala Meteorological Station, Hellenic National Meteorological Service)

Figure6 –5 : Annual wind frequencies

6.2.1.5 Humidity and precipitation

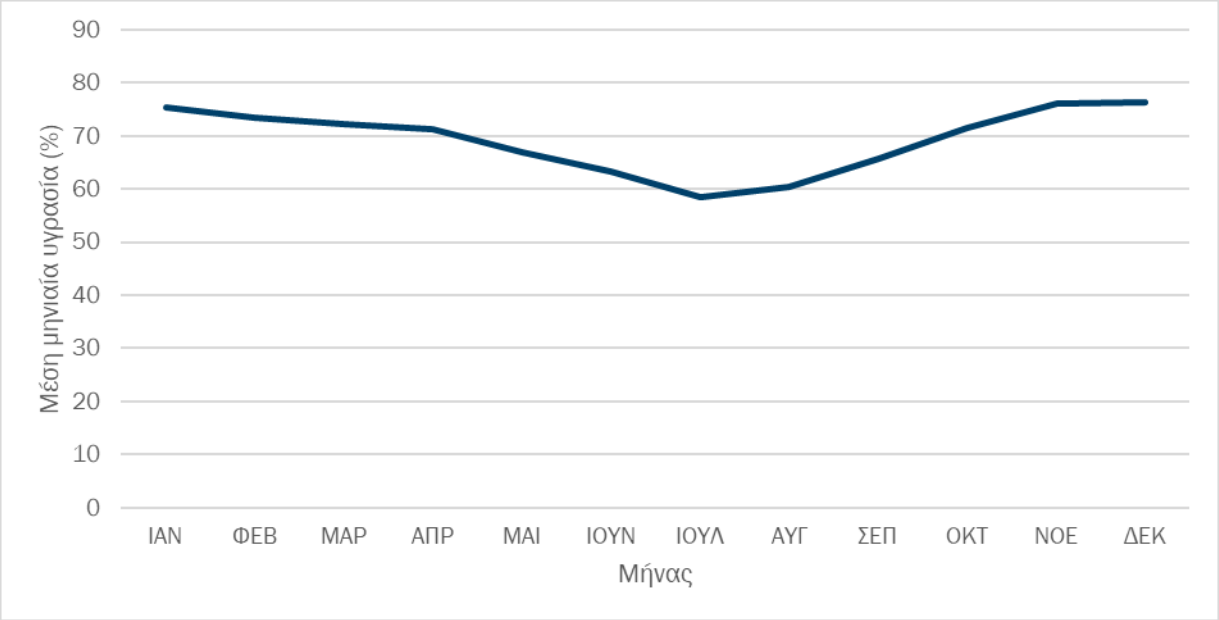
According to measurements by the Kavala Meteorological Station, the average relative humidity in the study area is estimated at 69.3%. The maximum values are observed during the winter months. In addition, the annual rainfall, according to measurements taken by the Kavala Meteorological Station, is 466.2 mm, and the average number of days with rainfall in the area is 92.5 days. The following **table** shows the average monthly values for humidity, height, and number of rainy days per month of measurement, as recorded daily by the Kavala Meteorological Station.

Table6 –3 : Average monthly values for humidity, height, and number of rainy days

Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Relative Humidity (%)	75.4	73.4	72.2	71.2	67	63.3	58.4	60.4	65.7	71.6	76.2	76.3
Average Monthly Precipitation (mm)	41.3	49	36	33	30.2	26.2	22.4	17	24.8	44.5	62.3	78.4
Average Monthly Number of Rainy Days (d)	8.8	8.9	9	9	8.9	7	4.6	3.4	5	7.6	9.7	10.1

(Source: Kavala Meteorological Station, National Meteorological Service)

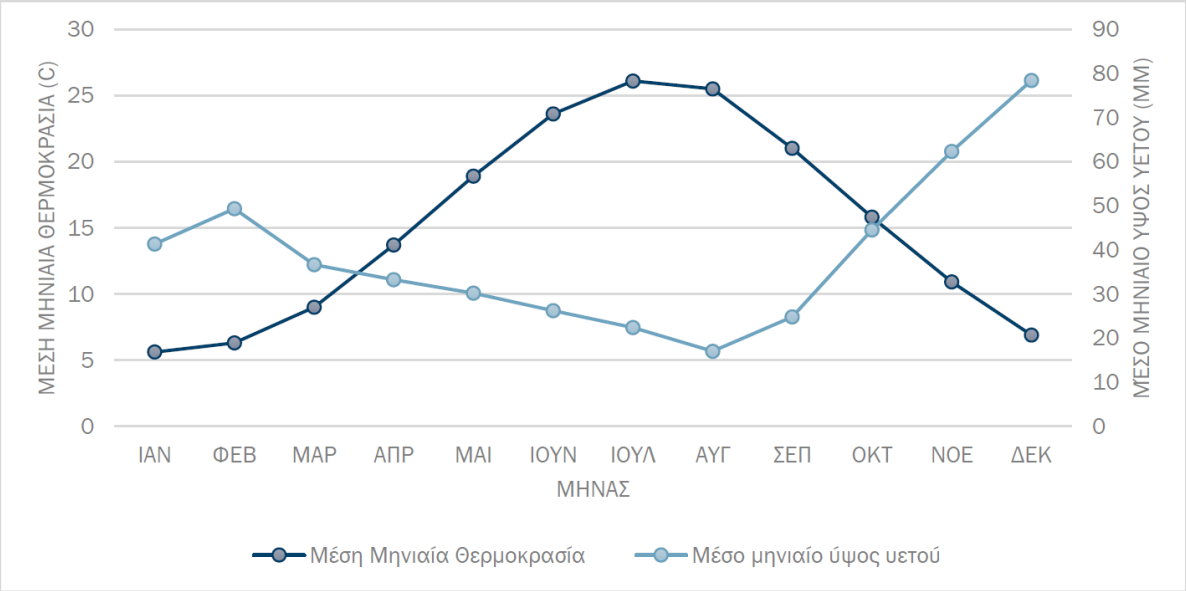
The following **figure** shows the distribution of average monthly humidity, which ranges from 63.3% to 76.3%.



6 –6 : Distribution of average monthly humidity

The Gaussen-Bagnouls ombrothermic diagram below shows the average monthly rainfall in mm and temperature in degrees Celsius (oC). The diagram shows the months of the year on the X-axis and has two Y-axes. The left side shows the average monthly rainfall (P) in mm and the right side shows the average monthly temperatures (T) in oC on a double scale of rainfall P = 2T. According to Bagnouls & Gaussen (1957), a month is characterized as "dry" when the total precipitation during that month is equal to or less than twice the average temperature of Pmm ≤ 2T oC. When the precipitation curve is lower than the temperature curve, then P < 2T applies and this period is considered to be dry. The area between these two curves shows the duration and intensity of the dry period. As shown in the diagram below, the dry-hot period for the study area lasts from late April to October.

The following **figure** shows the Gaussen-Bagnouls ombrothermic diagram for the study area. The diagram shows the monthly distribution of the average monthly temperature T in °C and the average monthly rainfall P in mm.



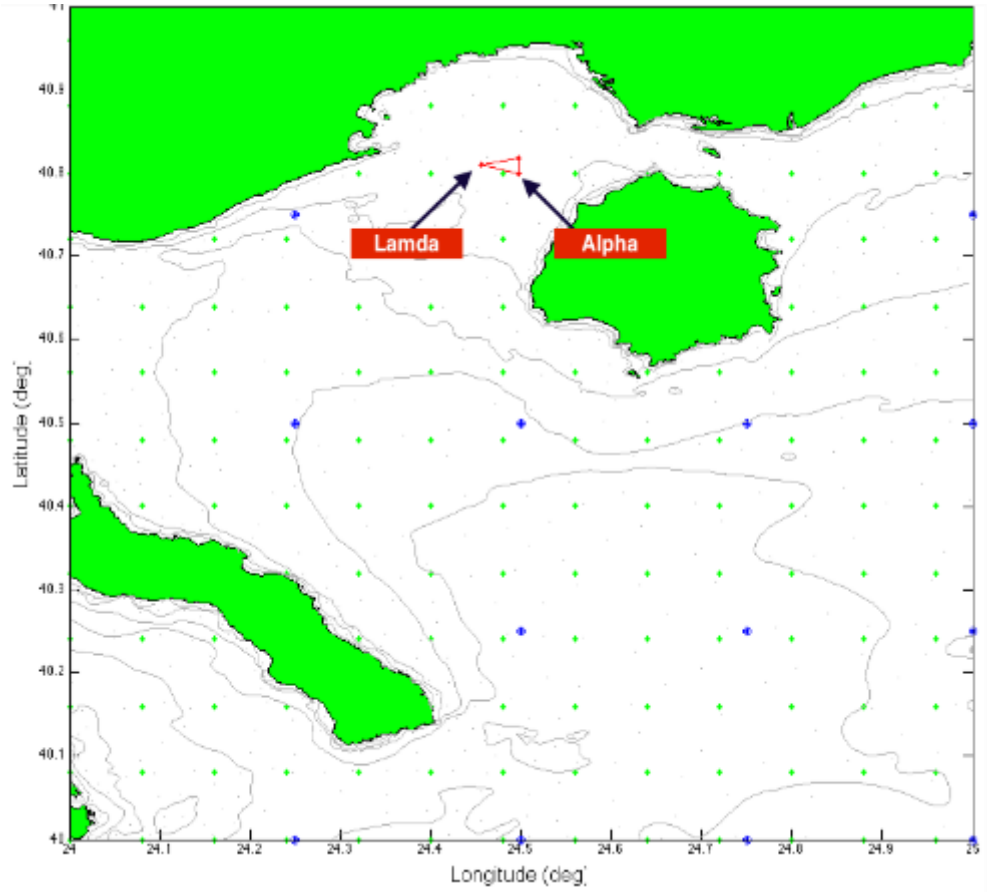
(Source: Kavala Meteorological Station, Hellenic National Meteorological Service)

6 –7 : Average monthly temperature and average precipitation – Ombrothermic Diagram

6.2.2 Oceanographic Characteristics

6.2.2.1 General Information

As part of the Environmental and Social Impact Assessment (ESIA) for the Prinos Offshore Development Project, Energean commissioned ARGROSS UK in 2015 to conduct a special meteorological/oceanographic (oceanographic) study for the Gulf of Kavala, where the offshore facilities related to the Project under study are located and developed (proposed pipeline route, existing platforms). The following **figure** shows the areas of interest and reference locations as included in the special meteorological/oceanographic study.



(Source: Environmental and Social Impact Assessment (ESIA) for the Prinos Offshore Development Project, Energean 2015)

6 –8 : Areas of interest in the meteorological/oceanographic study

The meteorological/oceanographic study was based on global computer simulation data using the Climate Forecasting System (CFS). This system is a model that captures the global interaction between the Earth's oceans, land, and atmosphere and provides hourly data with horizontal resolution of up to half a degree (approximately 56 km) around the Earth for many variables. It also uses the latest scientific approaches to obtain or assimilate observations from data sources, including surface observations, balloon observations, aircraft observations, and satellite observations.

In addition to the global data from the CFS, data from local meteorological stations in the Kavala area (Thasos Island, Kavala Airport) and national meteorological stations were used to calibrate and compare computer simulations.

This meteorological/oceanographic study contains statistical return data with the relevant directions for 1 year, 10 years, 100 years, and for wind speeds, wave height/period, current velocities, and tidal variations. In addition, it contains monthly distributions of atmospheric temperature, sea surface/subsea temperature, water density, and salinity.

The main findings of this study are summarized in the following **sections**.

6.2.2.2 Waves

With regard to the waves that develop in the area, according to the meteorological/oceanographic study by BMT ARGROSS UK (Prinos Offshore Development Project EIA, 2015), the annual frequency of significant wave heights (hs) at the location of the offshore platform – Prinos Lambda (Longitude: 24.4556801°E, Latitude 40.8106498°N – WGS84 global projection system) is given in **the** following **Table.** The significant wave height is less than 1 m, while extreme storms occur more frequently in the winter months and are characterized by southerly winds.

6 –4 : Annual frequency of significant wave heights

Wave Height Hs (m)		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
6,5	7,0	0	0	0	0	0	0	0	0	0	0	0	0	0
6,0	6,5	0,018	0	0	0	0	0	0	0	0	0	0	0	0,002
5,5	6,0	0	0,019	0	0	0	0	0	0	0	0	0	0	0,002
5,0	5,5	0	0	0	0	0	0	0	0	0	0	0	0	0
4,5	5,0	0,018	0,019	0	0	0	0	0	0	0	0	0,018	0,018	0,006
4,0	4,5	0	0,058	0,053	0	0	0	0	0	0	0,018	0,054	0,140	0,027
3,5	4,0	0,088	0,154	0,035	0	0	0	0	0	0	0,070	0,018	0,175	0,045
3,0	3,5	0,105	0,250	0,105	0,036	0,018	0	0	0	0	0,175	0,109	0,158	0,079
2,5	3,0	0,245	0,250	0,123	0,073	0,018	0	0	0	0,018	0,070	0,199	0,351	0,112
2,0	2,5	0,666	0,654	0,473	0,073	0,053	0	0	0	0,054	0,123	0,707	0,473	0,271
1,5	2,0	1,718	1,615	1,455	0,580	0,456	0,018	0,018	0,018	0,145	0,491	2,065	2,016	0,879
1,0	1,5	7,398	7,039	5,891	3,931	2,104	0,453	0,579	0,403	1,359	3,576	5,851	9,607	4,006
0,5	1,0	32,241	30,423	29,383	23,696	18,496	13,533	17,111	17,865	22,246	29,453	27,319	32,837	24,537
0,0	0,5	57,504	59,519	62,483	71,612	78,857	85,996	82,293	81,715	76,178	66,024	63,659	54,225	70,036
		100	100	100	100	100	100	100	100	100	100	100	100	100

Υπόμνημα
Συχνές εμφανίσεις
κόκκινο - 12 πιο συχνές
κίτρινο - επόμενες 24 πιο συχνές
πορτοκαλί - επόμενες 21 πιο συχνές
μπλε - όλες οι υπόλοιπες

(Source: Environmental and Social Impact Assessment (ESIA) for the Prinos Offshore Development Project, Energean 2015)

The maximum wave heights for the corresponding extreme recurrence conditions are given in **the** following **Table**. The maximum wave height predicted was 6.7m from the south. The highest waves during the year are from the south, despite the prevailing wind direction, which is north-east. Waves from the south have a long swell as they have time to develop within the Aegean Sea, while waves caused by north-easterly winds are smaller, as their location is very close to the coastline and wave formation is limited. It should be noted that Thassos offers shelter from south-bound waves.

Table6 –5 : Maximum wave height (m) for the corresponding extreme recurrence conditions

Directions from	Repetition period (years)			
	1	10	50	100
Storm duration (hours)	4.8	3.3	2.5	2.2
North	1	1.6	2.1	2.3
Northeast	1.7	2	2.8	3
East	1.6	2.2	2.7	2.9
Southeast	1.2	2	2	2.8
South	3.7	5.3	6.3	6.7
Southwest	1.8	2.4	2.8	3
West	0.6	1.3	1.8	2
Northwest	0.3	0.8	1.3	1.5
Multiple directions	3.7	5.3	6.3	6.7

(Source: Environmental and Social Impact Assessment (ESIA) for the Prinos Offshore Development Project, Energean 2015)

6.2.2.3 Tidal Data

According to the meteorological/oceanographic study conducted as part of the EIA for the Prinos Offshore Development Project (2015), the tidal ranges (based on data extracted from January 1992 to December 2014) in the study area are estimated to be relatively small. The following **table** presents the tidal water level components.

Table6 –6 : Tidal water level components

Tidal definition		Level (relative to Mean Sea Level - MSL)	Level (relative to Lowest Astronomical Tide - LAT)
High astronomical tide (HAT)	AAP	0.23	0.46
Mean High Tide (average of high tide only) - MHT	MHS (high) *	0.19	0
Average Conjugate Deviation (average of low and high tides) - MCD	MPS (mixed)	0.17	0.40
Average High Tide (average of all high tides) - AHT	MAP	0.13	0.35
Average Low Tide (average of all low tides) - ALT	MTL	0.09	0
Average Squared Flood Level - ASFL	MPT ***	0.02	0.25
Average Sea Level - ASL	MSL	0.00	0.23
Average Square Root of Squares - ASRS	MRT ***	-0.02	0
Average Upper Shallow (average of all high shallow) - MAR	MAR	-0.09	0
Average Lower Shallow (average of all shallow areas) - MKL	MAR	-0.13	0

Tidal definition		Level (relative to Mean Sea Level - MSL)	Level (relative to Lowest Astronomical Tide - LAT)
Average Conjugate Shallow Depth (average of low and high shallow depth) - MCS	MRS (gross) ***	-0.17	0
Average Couple Shallowness (average of low shallowness) - MCS	MS (low)	-0.19	0.04
Lowest astronomical tide (LAT)	LOT	-0.23	0

** Actual definition of MBS, but in some mixed semi-diurnal tidal regimes it may be lower than MAP, which is not expected.*
** Actual definition of MBS, but in some mixed semi-diurnal tidal regimes it may be higher than MCR, which is not expected.*
**** There is no need to separate the quadrature tides as the constants are very similar.*

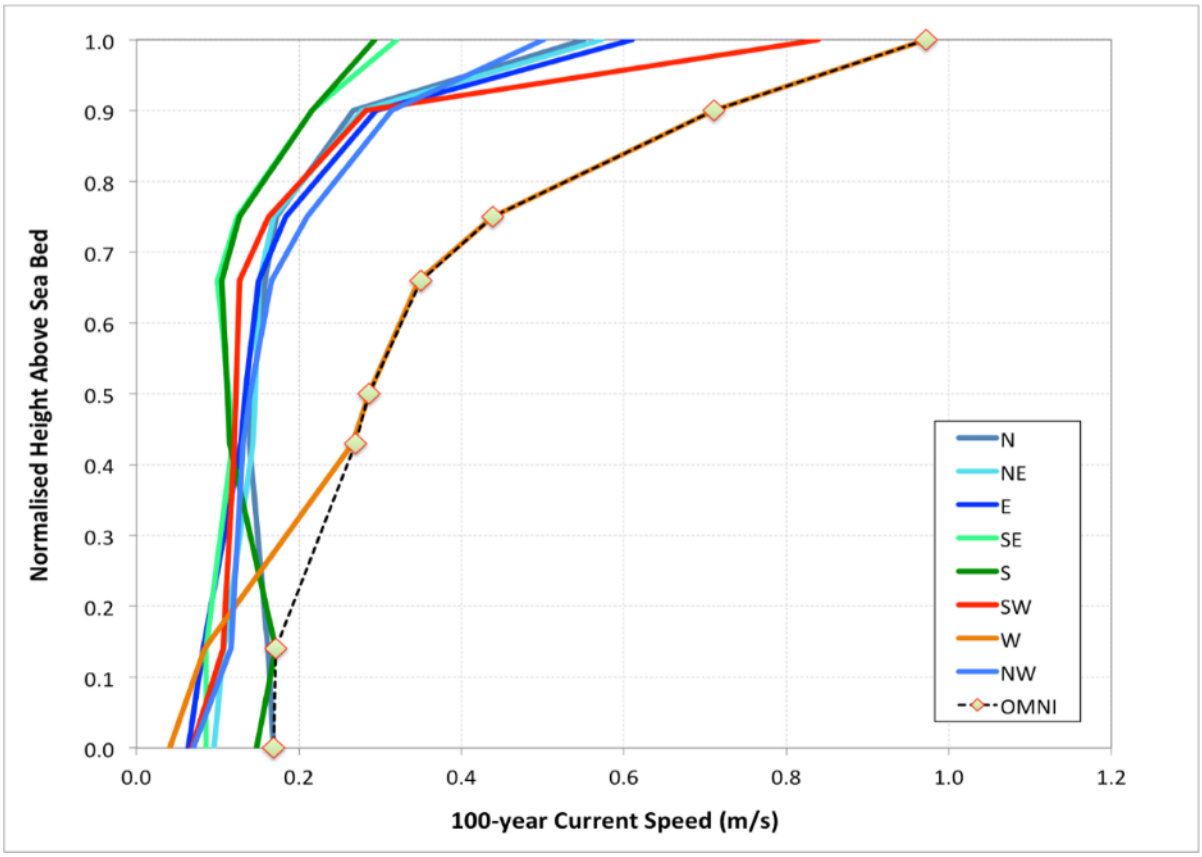
(Source: Environmental and Social Impact Assessment (ESIA) for the Prinos Offshore Development Project, Energean 2015)

6.2.2.4 Currents

According to the meteorological/oceanographic study conducted as part of the EIA for the Prinos Offshore Development Project (2015), tidal currents are considered essentially independent of the recurrence period and are usually added subsequently. However, in the study area, these currents are negligible and have been omitted from further analysis.

In the areas of interest of the meteorological/oceanographic study, the water depth is quite shallow and the current flow is oriented in the same directions for most of the vertical profile (small changes in bottom flow are observed, but at these depths the currents are small) so that the analysis of extreme values at each depth can be addressed independently. The resulting extreme values are then combined to form the extreme value profiles per direction.

The following **figure** shows the profile of the vertical currents per direction. The dominant base flow is westward and equal to the omnidirectional flow throughout the upper 75% of the water column. At depth (below 25% of the water column), the current changes to a north/south orientation, but by the time it reaches this stage, the flow has decreased significantly.



(Source: Environmental and Social Impact Assessment (ESIA) for the Prinos Offshore Development Project, Energean 2015)

6 –9 : Vertical current profiles per direction

6.2.3 Bioclimatic Characteristics

With regard to conditions in Mediterranean regions, the Emberger index is commonly used, based on its synthetic formula, precipitation, average temperature, and taking into account the average minimum temperature of the warmest and coldest months of the year. Thus, the Mediterranean regions are divided into different bioclimatic zones.

This index is calculated as follows:

$$Q_2 = \frac{P}{(\frac{M+m}{2})(M-m)} \Rightarrow Q_2 = \frac{2000P}{M^2 - m^2}$$

Where:

- P = average annual rainfall (mm)
- M = average value of maximum temperatures in the warmest month*
- m = average maximum temperatures of the coldest month*

* Variables M and m are expressed in absolute degrees of temperature, with 273°K corresponding to 0°C

The **quotient Q** is used as a coordinate on the coordinate axis, with the **index m**, which in this case is expressed in degrees Celsius (°C). The above values are placed on the axes of a pre-prepared diagram, which distinguishes between bioclimatic floors.

Based on the Emberger formula, for the period 1984-1999 (based on data from the Kavala Meteorological Station), the Q index is calculated as follows:

$$Q = 2{,}000 \times 403.2 / (273+29.7)^2 - (273+3.0)^2 = 52.19$$

Plotting the index value on the Emberger climate chart[55] , we observe that the Regional Unit of Kavala belongs to **the semi-arid bioclimatic zone**, which is characterized by cold winters.

More specifically, the characteristic climate of the coastal zone of the region is characterized by hot, dry summers (circulation of subtropical and hot dry winds), cold and wet winters (circulation of relatively cool winds from the temperate zone), and rainfall of approximately 300-400 mm. The corresponding continental part of the region tends to be different and is characterized by cool, wet winters, dry summers, and rainfall approximately double that of the coastal zone.

[55] Bioclimatic floors "The bioclimate of Greece. Climate and natural vegetation relationships. Bioclimatic maps, forest research," Volume 1, 1980, Mavromatis G.

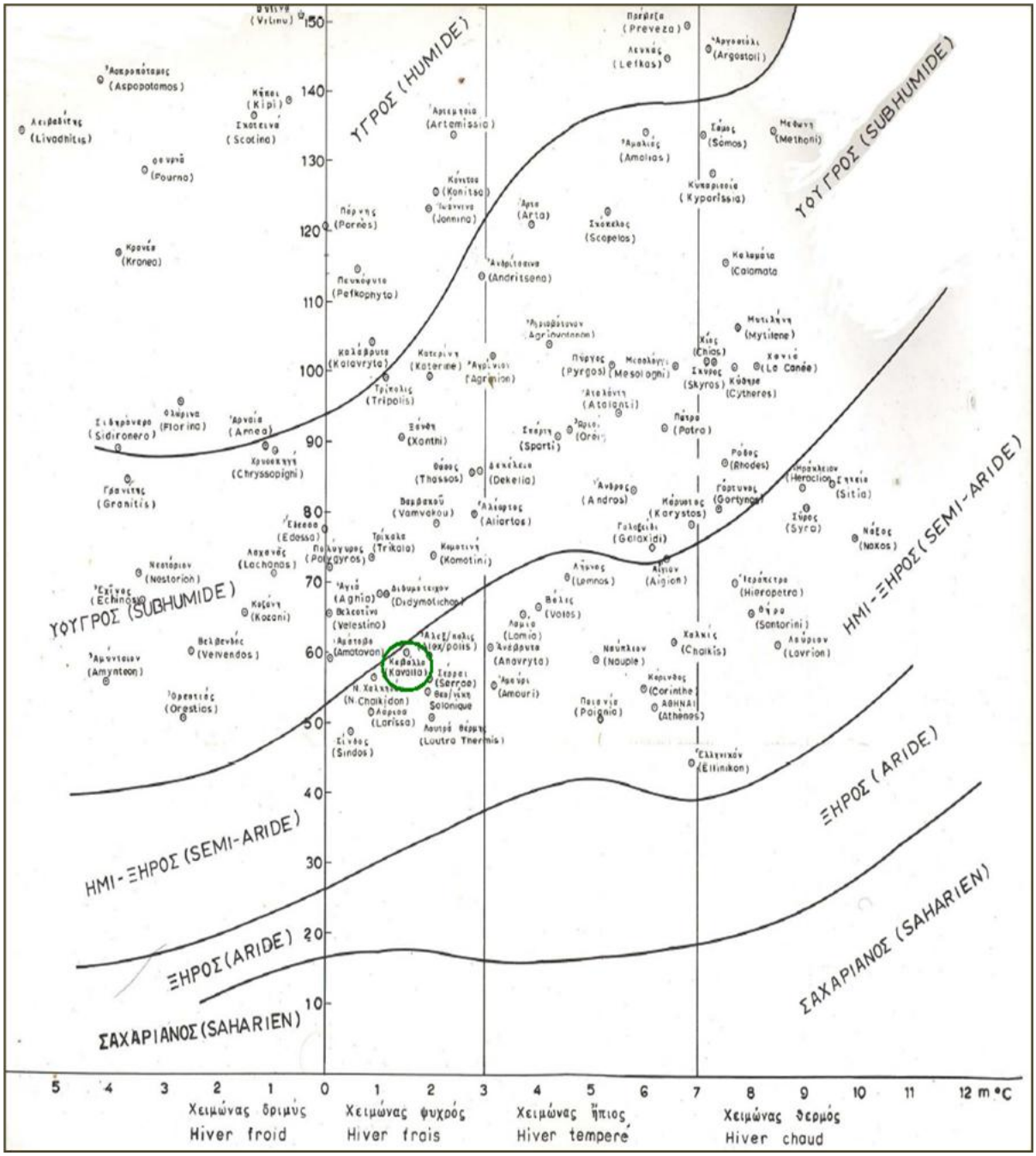


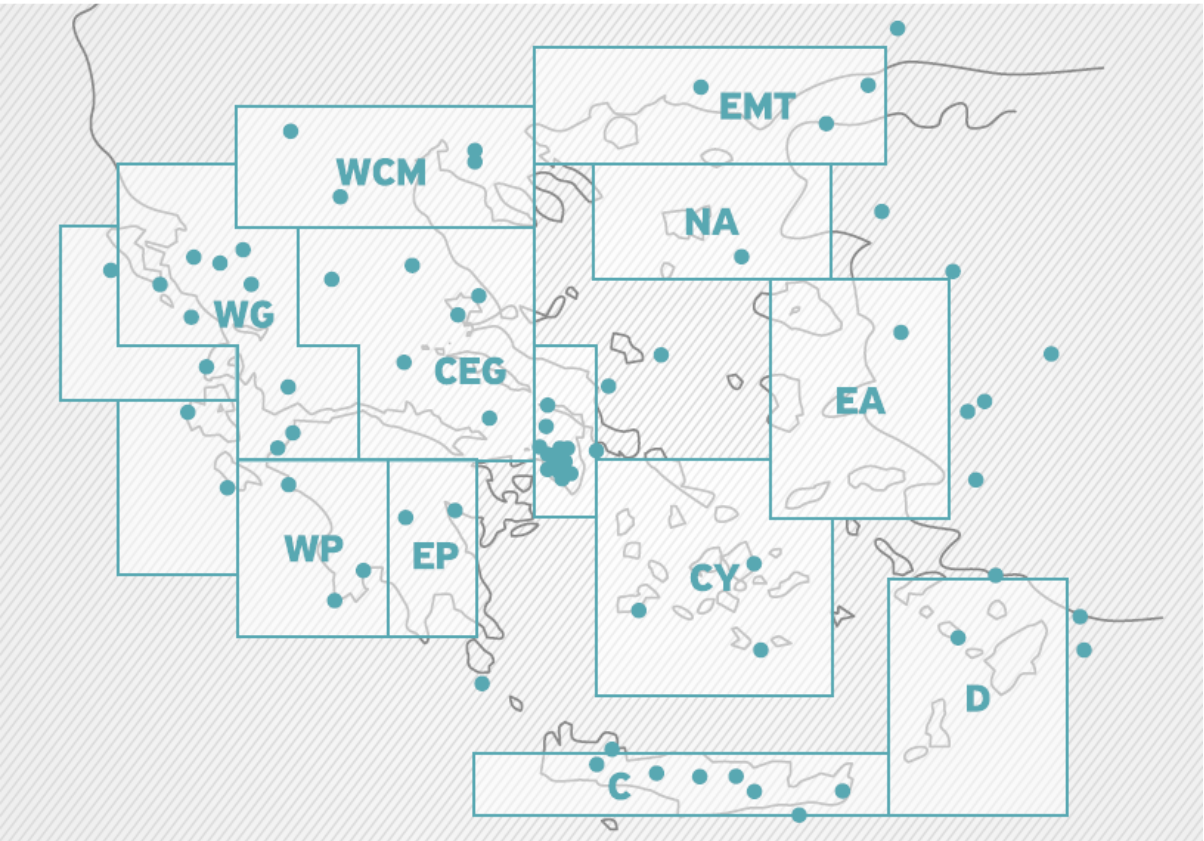
Figure6 –10 : Emberger – Sauvage bioclimatic diagram in relation to the location of the Kavala MS

6.2.4 Climate Change - Extreme Weather Events

6.2.4.1 Climate Change

The development of a strategy for adaptation to climate change is a national and regional obligation, arising from the Framework Convention on Climate Change (UNFCCC, 1992), the Paris Agreement (2015), the Glasgow Climate Pact 2021 (COP26 Glasgow Climate Pact, 2021) and EU commitments. With the PESKPA of Eastern Macedonia & Thrace (September 2023) , the Region's strategy for addressing the threat of climate change is being implemented, with **the primary objective** of reducing the Region's vulnerability to the effects of climate change and protecting it against such effects.

The overall objective of the PESPKA is to contribute to strengthening the resilience of the Region of Eastern Macedonia and Thrace (PAMTH) to climate change in all sectoral policies, as described in the National Strategy for Adaptation to Climate Change, which means increasing preparedness and capacity to address the impacts of climate change at local and regional level, developing a coherent approach and improving coordination. According to the PESPKA, the Committee for the Study of the Effects of Climate Change[56] has divided Greece into climate regions based on climatic and geographical criteria. The Region of Eastern Macedonia and Thrace (REMTH) is a distinct climate zone (**EMT**) as shown in the following **figure.**



[56] EMEKA, 2011: Environmental, Economic, and Social Impacts of Climate Change in Greece, National Bank of Greece, Athens 2011, 520 pp.

(Source: EMEKA, 2011)

6 –11 : Climate zones in Greece

Based on the estimates of the IPCC's Fifth Assessment Report (AR5), four (4) climate scenarios for greenhouse gas emissions have been proposed (Representative Concentration Pathways - RCPs) have been proposed, which are linked to time series of concentrations of greenhouse gases, suspended particles, and chemically active gases in the atmosphere, as well as to changes in land use. The key parameters that determine these four different scenarios are population growth, economic activities, lifestyle, energy sources, technological development, future land use, and overall climate change policy. These scenarios include one reduction scenario (RCP2.6), two stabilization scenarios (RCP4.5 and RCP6.0), and one scenario of increasing greenhouse gas concentrations (RCP8.5).

The following is a summary of the estimates of expected climate change (from the **Intermediate scenario (RCP4.5)** and the **Adverse scenario (RCP8.5))** for the period 2021-2030 compared to the average monthly values for the period 1961-1990.

Temperature

Climate simulations based on both (2) GHG concentration development scenarios, RCP4.5 and RCP8.5, show as a general result an increase in the average air temperature throughout the Region of Eastern Macedonia – Thrace in the future climate compared to the historical climate. In both (2) scenarios, the temperature increase is greater in continental areas that are far from the influence of the sea. The largest increases are expected in the Regional Unit of Drama and in the northern areas of the Regional Unit of Evros, while smaller increases are expected in Thasos and the areas of Kavala and Rodopi. The following **table** summarises the average values and standard deviations of air temperature at 2m (°C) per Regional Unit (RU) of the Region of Eastern Macedonia and Thrace for the periods 1961-1990, 2021-2050, and 2071-2100.

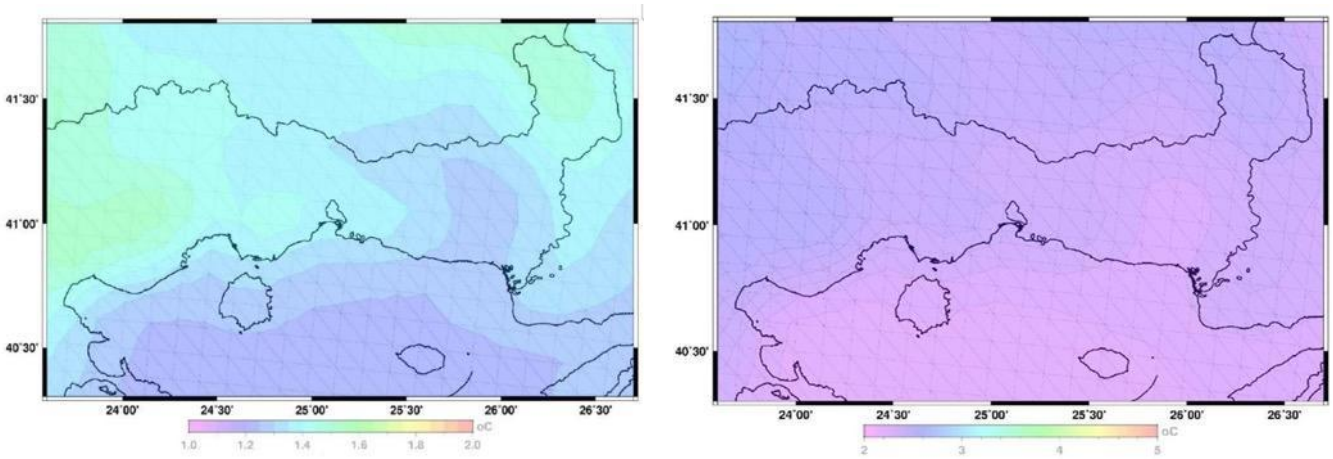
Table6 –7 : Average values and standard deviations of air temperature per RE for the periods 2021-2050 and 1961-1990, 2071-2100 and 1961-1990

Regional Unit	1961 – 1990		2021				2071			
			RCP4.5		RCP8.5		RCP4.5		RCP8.5	
Evros	10.99	±0.85	12.36	±0.85	12.79	±0.84	13.36	±0.84	15.31	±0.83
Thasos	13.44	±0.10	14.74	±0.08	15.12	±0.08	15.72	±0.08	17.30	±0.05
Rodopi	10.42	±1.32	11.75	±1.34	12.18	±1.33	12.77	±1.33	14.63	±1.29
Xanthi	9.66	±2.02	11.04	±2.04	11.47	±2.02	12.06	±2.02	13.94	±1.96
Kavala	10.94	±1.43	12.35	±1.43	12.75	±1.42	13.35	±1.42	15.19	±1.35
Drama	7.27	±1.87	8.72	±1.89	9.14	±1.89	9.77	±1.87	11.77	±1.87

(Source: Regional Climate Change Adaptation Plan (PESPKA) for Eastern Macedonia and Thrace, 2023)

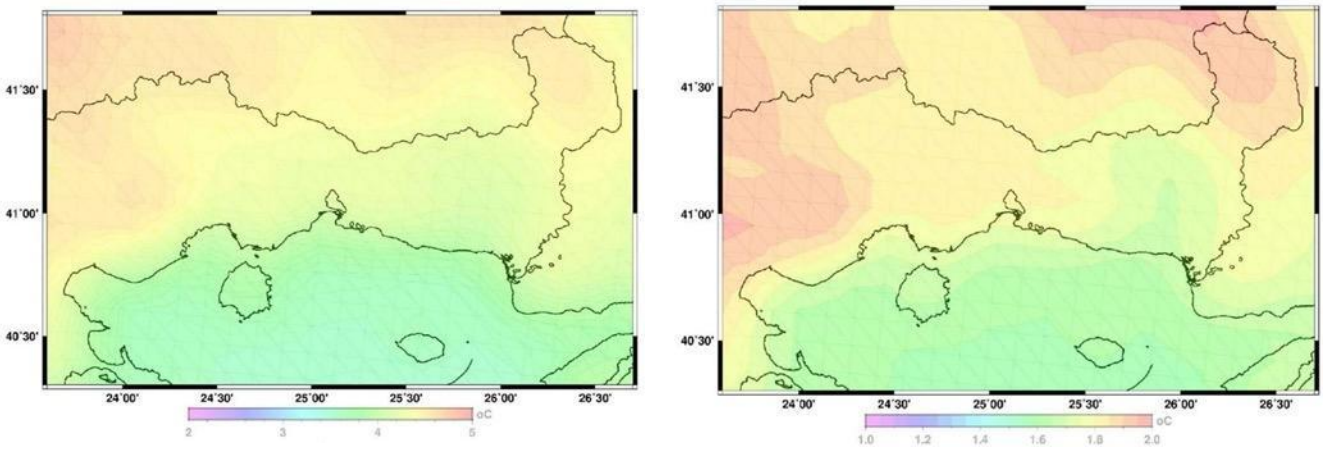
Based on Scenario RCP4.5, temperatures in the Region are expected to increase by 1.2-1.6 oC in the period 2021-2050 and by 2.1-2.6 oC in the period 2071-2100 compared to the historical climate of the period 1961-1990 **(Figure 6-12)**. Similarly, based on the adverse RCP8.5, the temperature is estimated to be 3.5-

4.5 oC higher in the period 2021-2050 and 1.8-2.0 oC higher in the period 2071-2100 compared to the period 1961-1990 (**Figure 6-13**).



(Source: Regional Climate Change Adaptation Plan (PESPKA) for Eastern Macedonia and Thrace, 2023)

Figure6 –12 : Average annual temperature – change (°C) between the periods 2021-2050 and 1961-1990 (left), 2071-2100 and 1961-1990 (right) for Scenario RCP4.5



(Source: Regional Climate Change Adaptation Plan (PESPKA) of Eastern Macedonia and Thrace, 2023)

6 –13 : Average annual temperature – change (°C) between the periods 2021–2050 and 1961–1990 (left), 2071–2100 and 1961–1990 (right) for the RCP8.5 scenario

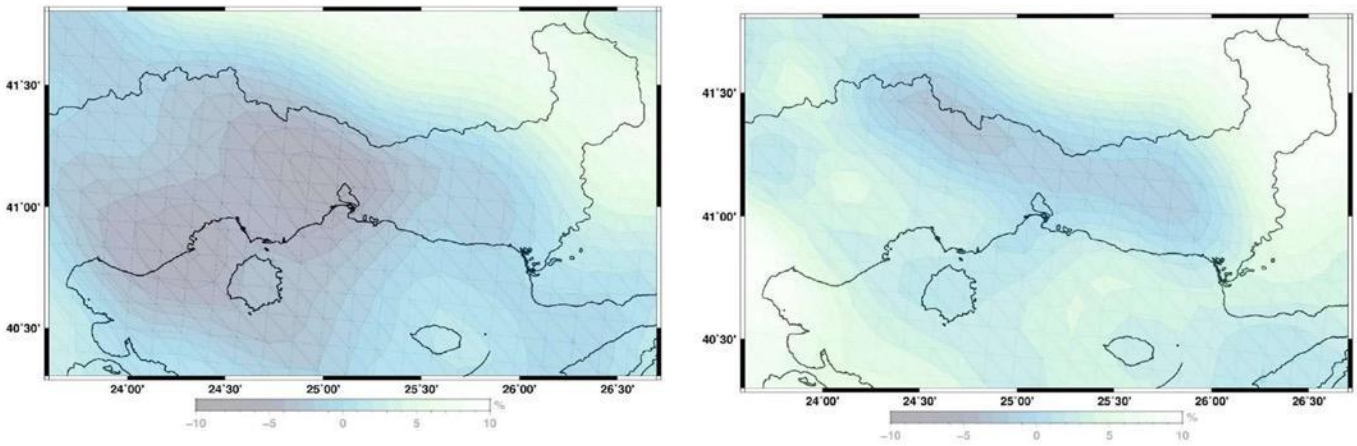
Precipitation

Based on the results of climate simulations, total precipitation during the year is expected to decrease at the regional level for both GHG concentration scenarios, especially towards the end of the century. The decrease in annual precipitation is expected to be significant in the RCP8.5 scenario and milder in the RCP4.5 scenario. The largest reductions in precipitation are predicted in both scenarios in the areas of Xanthi and Kavala, followed by the areas of Drama and Thasos, while milder reductions are expected in the area of Rodopi. In the Evros region, only in the case of the RCP8.5 scenario for the period 2071-2100 are reductions in total precipitation expected on an annual basis.

In the case of the mild RCP4.5 scenario, a reduction in annual precipitation is predicted for most of the region in both periods (2021-2050 and 2071-2100) compared to the historical climate of the period 1961-

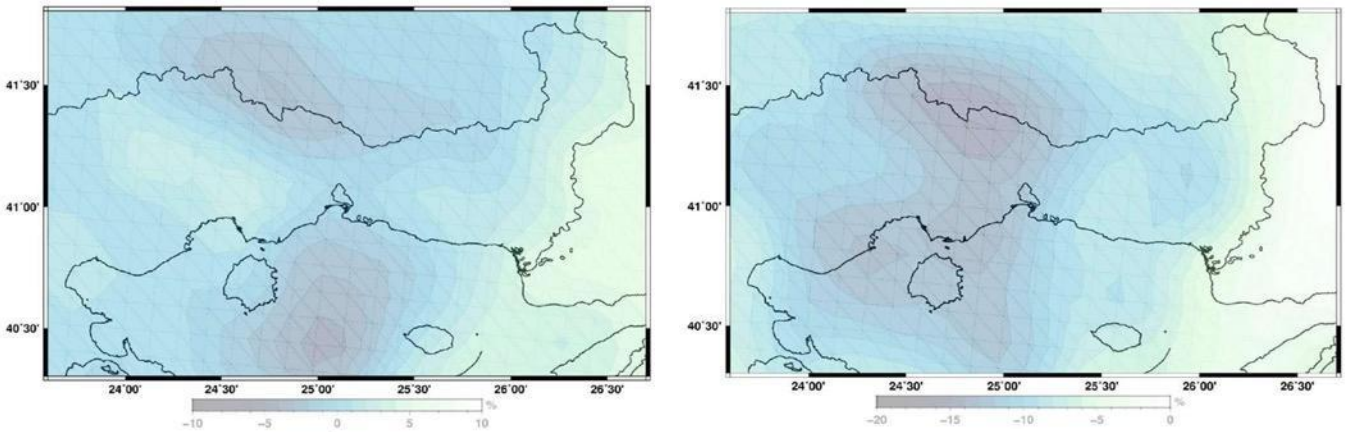
1990, with the exception of the northern areas of Evros. The decrease in the period 2021-2050 is of the order of 5% in the areas of Xanthi and Kavala and 2% - 4% in Thasos, Drama, and Rodopi, while an increase of 3.4% is predicted in Evros. In the case of the unfavorable RCP8.5 scenario for the period 2021-2050, no significant changes are expected, with total precipitation for the period 2071-2100 expected to decrease significantly across almost the entire region. The expected reductions will exceed 11% in the Regional Units of Xanthi, Kavala, Drama, and the region of Thasos, while in the regions of Rodopi and Evros they will be smaller, ranging around 10% and 6% respectively.

The following **figures** show the change in annual and average annual precipitation between the periods 2021-2050 and 1961-1990, 2071-2100 and 1961-1990 according to the results of climate simulations for the RCP4.5 and RCP8.5 scenarios.



(Source: Regional Climate Change Adaptation Plan (PESPKA) for Eastern Macedonia and Thrace, 2023)

6 –14 : Change in average annual precipitation between the periods 2021–2050 and 1961–1990 (left), 2071–2100 and 1961–1990 (right) for Scenario RCP4.5



(Source: Regional Climate Change Adaptation Plan (PESPKA) for Eastern Macedonia and Thrace, 2023)

6 –15 : Change in average annual precipitation between the periods 2021–2050 and 1961–1990 (left), 2071–2100 and 1961–1990 (right) for Scenario RCP8.5

On a seasonal basis, in both periods and for both scenarios, the greatest reduction in precipitation, both in percentage terms and in absolute numbers compared to the historical climate, is expected in autumn in all Regional Units, while an increase is expected in the winter months. Significant percentage decreases compared to the historical climate of the period 1961-1990 are expected in Scenario RCP8.5 and during the summer months, but due to the low amount of precipitation during this period, they are not expected to be significant in absolute terms. The following **table** shows the percentage change in total seasonal and annual precipitation (mm/year) per Regional Unit for the periods 2021-2050 and 2071-2100 compared to the period 1961-1990, according to the results of climate simulations for Scenarios RCP4.5 and RCP8.5.

Table6 –8 : Change in total seasonal and annual precipitation (mm/year) per Regional Unit for scenarios RCP4.5 and RCP8.5

Regional Unit	Season	2021 - 2050		2071 - 2100	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
Drama	Winter	8.4	23.7	9.7	4.5
	Spring	6.0	-0.8	10.2	-10.5
	Summer	-1.4	1.7	2.2	-15.4
	Fall	-25.9	-24.8	-20.1	-28.2
	Year	-2.6	0.3	-2.6	-11.4
Evros	Winter	23.4	26.6	13.0	10.1
	Spring	4.4	0.9	17.3	0.2
	Summer	1.5	13.5	0.2	-11.5
	Fall	-18.8	-24.6	-13.2	-27.8
	Year	3.4%	2.7	3.4	-5.9
Thasos	Winter	10.0	21.4	9.5	2.7
	Spring	11.2	3.6	16.7	-7.1
	Summer	-4.6	28.1	20.0	-16.9

Regional Unit	Season	2021 - 2050		2071 - 2100	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
	Fall	-30.4	-30.4	-21.9	-33.1
	Year	-3.8	-0.2	-3.8	-12.7
Xanthi	Winter	12.8	25.3	10.4	6.8
	Spring	4.3	-0.7	10.7	-12.7
	Summer	-3.4	3.7	0.6	-19.6
	Fall	-35.2	-31.1	-25.8	-34.9
	Year	-5.0	-0.8	-5.0	-13.5
Kavala	Winter	9.3	24.5	11.5	4.3
	Spring	7.6	3.8	13.2	-9.6
	Summer	-4.9	10.5	7.5	-16.5
	Fall	-32.9	-29.2	-20.1	-33.2
	Year	-4.9	1.4	-4.9	-12.5
Rodopi	Winter	21.4	26.6	11.1	10.7
	Spring	0.4	-2.6	8.1	-9.9
	Summer	-2.1	8.8	-1.1	-19.2
	Fall	-30.8	-29.8	-22.9	-30.2
	Year	-1.9	0	-1.9	-9.6

(Source: Regional Climate Change Adaptation Plan (PESPKA) for Eastern Macedonia and Thrace, 2023)

Snowfall

Based on the results of climate simulations, significant reductions in snowfall are expected in both scenarios under consideration. According to the mild RCP4.5 scenario, all Regional Units are expected to experience percentage reductions of 20-36% compared to the historical climate during the period 2021-2050, and reductions of 30-47% during the period 2071-2100. The reductions are even greater in the case of the RCP8.5 scenario, where they are expected to range between 20-38% compared to the historical climate in the period 2021-2050, and to reach 56-72% by the end of the century (2071-2100) are expected to reach 56-72%.The largest reductions in snowfall in absolute terms are expected in the mountainous areas of Drama and Xanthi, i.e. in the areas where historically the most snowfall has been recorded at the regional level.

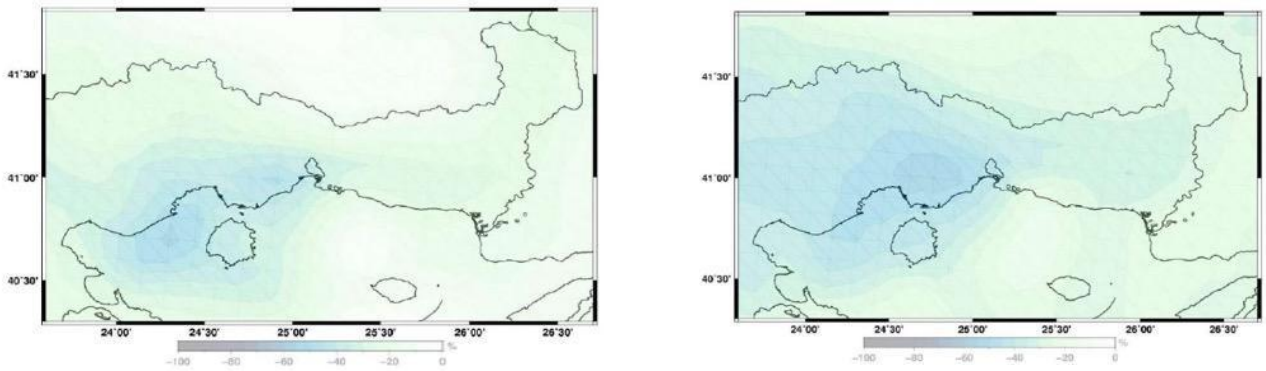
The following **table** summarises the changes in average annual snowfall per Regional Unit for the periods 2021-2050 and 2071-2100 compared to the period 1961-1990, as derived from the results of climate simulations for the RCP4.5 and RCP8.5 scenarios and presented in the PESPKA of Eastern Macedonia and Thrace (2023).

Table6 –9 : Change in average annual snowfall between the periods 2021-2050 and 1961-1990 (left), 2071-2100 and 1961-1990 (right) for the RCP4.5 and RCP8.5 scenarios

Regional Unit	1961 – 1990		2021				2071			
			RCP4.5		RCP8.5		RCP4.5		RCP8.5	
Evros	73.3	±32.8	581	±27.6	57.9	±25.3	51.8	±22.5	32.1	±13.9
Thasos	31.4	±2.5	202	±2.1	22.6	±1.9	18.5	±1.8	10.7	±1.4
Rodopi	66.9	±42.2	549	±38.6	49.1	±33.6	45.3	±29.7	27.6	±18.3
Xanthi	91.7	±62.8	728	±55.7	61.6	±45.7	56.3	±41.7	32.6	±25.1
Kavala	51.1	±19.1	329	±15.5	31.9	±12.6	27.1	±10.8	14.3	±6.4
Drama	151.6	±83.6	1189	±70.6	103.7	±62.6	93.9	±56.1	52.8	±34.9

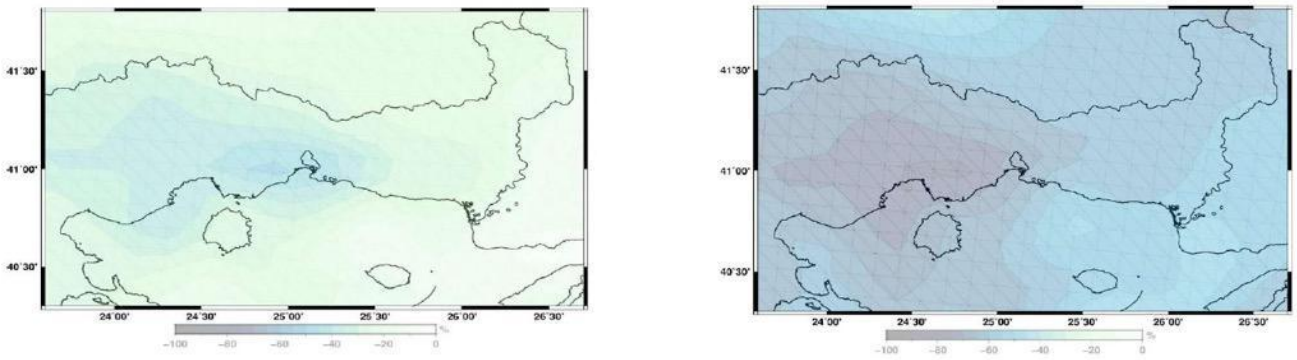
(Source: Regional Climate Change Adaptation Plan (PESPKA) for Eastern Macedonia and Thrace, 2023)

The following **figures** show the changes in average annual snowfall per Regional Unit for the periods 2021-2050 and 2071-2100 compared to the period 1961-1990, as derived from the results of climate simulations for the RCP4.5 and RCP8.5 scenarios.



(Source: Regional Climate Change Adaptation Plan (PESPKA) of Eastern Macedonia and Thrace, 2023)

6 –16 : Change in average annual snowfall between the periods 2021–2050 and 1961–1990 (left), 2071–2100 and 1961–1990 (right) for Scenario RCP4.5



(Source: Regional Climate Change Adaptation Plan (PESPKA) for Eastern Macedonia and Thrace, 2023)

6 –17 : Change in average annual snowfall between the periods 2021–2050 and 1961–1990 (left), 2071–2100 and 1961–1990 (right) for the RCP4.5 scenario

Sea level rise

Throughout the 21stcentury, sea and ocean temperatures are projected to rise, particularly near the surface, and for all scenarios of atmospheric CO2 concentration development, with the largest increases in tropical and subtropical regions (Stocker et al., 2013). The global average sea surface temperature in the period 2081-2100 is estimated to be1°C higher than in the period 1986-2005 in the case of the mild RCP 2.6 scenario and more than 3°C in the case of the worst-case scenario RCP8.5 (Collins et al., 2013). According to the results of the CMIP5 simulations included in the IPCC's 5th Assessment Report on climate change, and in combination with models simulating the dynamic evolution of the mass of large volumes, it is estimated that by the end of the century the average global sea level will rise in the period 2081-2100 compared to the average value for the period 1986-2005 by an average of:

- 40 cm in the RCP2.6 scenario,
- 48 cm in the RCP4.5 and RCP6.0 scenarios
- 63 cm in the RCP8.5 scenario

The temporal evolution of the rise in global mean sea level for the two scenarios examined in the Regional Climate Change Adaptation Plan for the Region of Eastern Macedonia and Thrace (RCP4.5 and RCP8.5) is presented in **the table** below for the individual years 2020, 2050, and 2080 and the periods 2021-2050 and 2081-2100 compared to the year 2000.

Table6 –10 : Estimated rise (average and range) in global mean sea level in cm for the years 2020, 2050, 2080 and the periods 2021-2050 from 2000.

Scenarios	2020	2021-2050	2050	2080	2081-2100	2100
RCP4.5	7	15	23	40	48	54
RCP8.5	7	15	25	50 +/- 13	63	74

(Source: Regional Climate Change Adaptation Plan (PESPKA) for Eastern Macedonia and Thrace, 2023)

For the period 2020-2050, the difference between the two (2) scenarios is negligible and results in an increase of 23-25 cm from 2000, with a maximum value of 31 cm in the unfavorable RCP8.5 scenario. Towards the end of the century, the differences between the two scenarios are significant, resulting in an average rise of 54 cm in the mild RCP4.5 scenario and 74 cm in the adverse RCP8.5 scenario, with a maximum range of 98 cm in 2100.

The table below lists the coastal areas of medium and high vulnerability to sea level rise (SLR) according to the Report on the Impacts of Climate Change by the Research and Analysis Organization "Dianeosis" (2017).

6 –11 : Coastal Areas of Medium and High Vulnerability to Sea Level Rise (SLR)

Region	Tourism Development Index EPCHSAA Tourism	Coastal Areas of Medium Vulnerability AST	High Vulnerability Coastal Areas AST
Region of Eastern Macedonia & Thrace	A1. Developed tourist areas	-	-
	A2. Developing tourist areas	Municipality of Alexandroupolis (Municipal Unit of Alexandroupolis) Municipality of Maroneia-Sapes Municipality of Nestos (Municipal Units of Keramotis and Chrysoupoli) Municipality of Paggaio	Municipality of Alexandroupolis (Municipal Units of Traianoupoli, Municipal Units of Feron) Municipality of Topiros

(Source: Regional Climate Change Adaptation Plan (PESPKA) for Eastern Macedonia and Thrace, 2023)

Wind Speed

The average wind speed at the regional level is not expected to change significantly in either of the two scenarios for the evolution of CO2 concentrations across the entire region. In Scenario RCP4.5, a slight increase in average annual wind speed is expected, up to a maximum of 3% in the period 2021-2050 and up to a maximum of 4% in the period 2071-2100 in most of the region, with the exception of the Evros and Rodopi areas. In the RCP8.5 scenario, a slight increase of up to 5% is expected in the period 2021-2050 in most of the Region, while in the period 2071-2100 a slight decrease of 1% is expected in most of the Region, with the exception of the northern mainland areas.

The average wind speed based on the RCP4.5 scenario for the periods 2031-2060 and 2071-2100 is shown in **the** following **figure**.

(Source: Regional Climate Change Adaptation Plan (PESPKA) of Eastern Macedonia and Thrace, 2023)

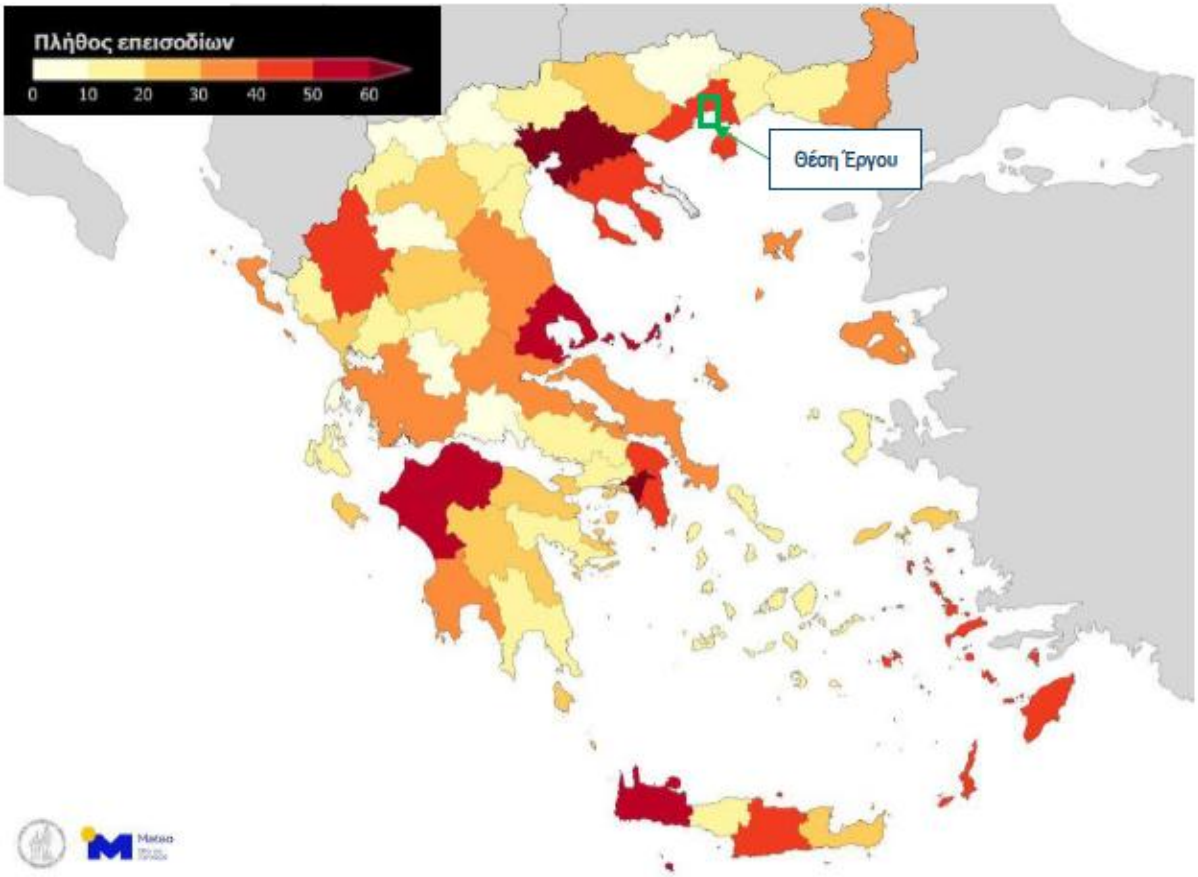
6 –18 : Average wind speed for the years 2031–2060 (m/sec)

(Source: Regional Climate Change Adaptation Plan (PESPKA) for Eastern Macedonia and Thrace, 2023)

Figure6 –19 : Average wind speed for the years 2071-2100 (m/sec)

6.2.4.2 Extreme Weather Events

Over the last 20 years, the frequency and intensity of extreme weather events at national and regional level have increased significantly due to climate change. According to the report by the National Observatory of Athens (NAA, 2023) on weather events with socio-economic impacts in Greece between 2000 and 2023, a total of 580 cases of weather events with negative socio-economic impacts and more were recorded. Extreme weather events resulted in 285 human casualties, mainly caused by floods, lightning, and windstorms. The following **figure** shows the number of weather events per Regional Unit.

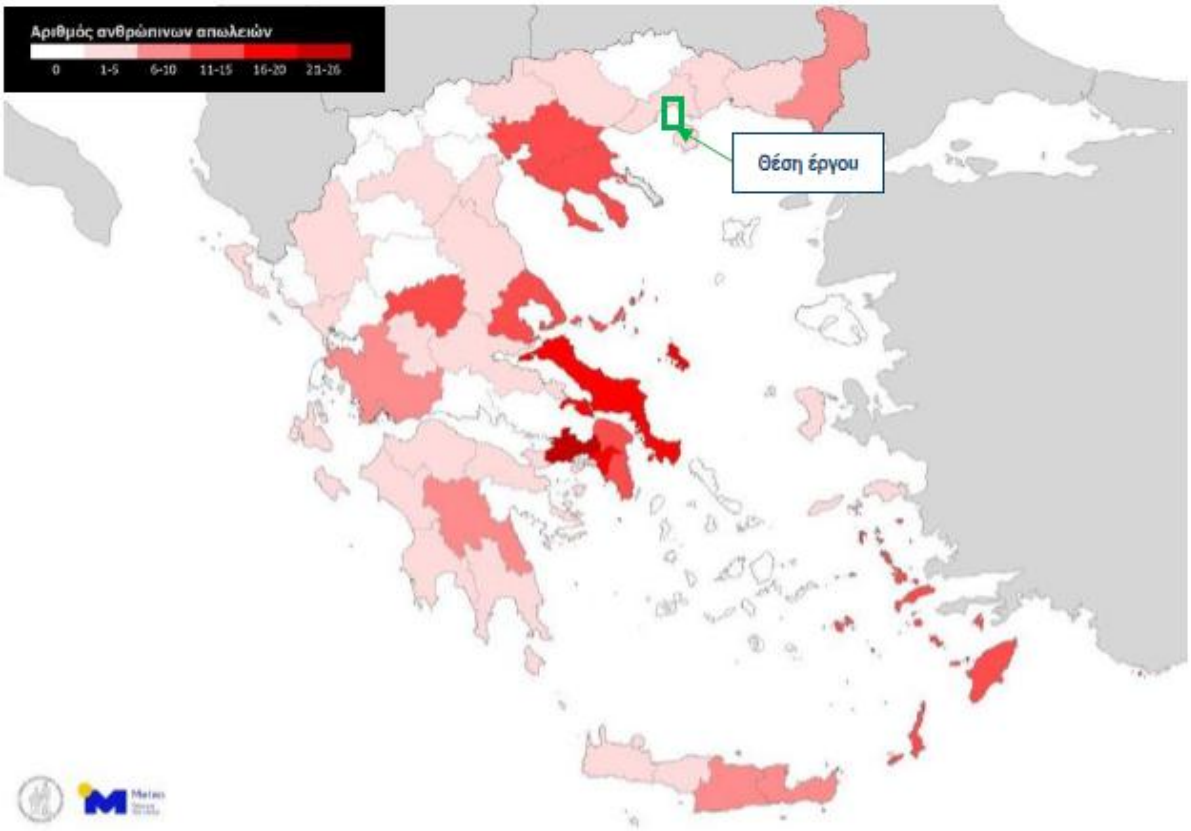


(Source: Meteo, National Meteorological Service, https:// www. meteo. gr/ article_ view. cfm? entryID=3065, June 6, 2024)

Figure6 –20 : Geographical distribution of the number of weather events per prefecture in the period 2000-2023

35% of the 580 incidents caused serious socio-economic impacts falling under category 3, which represents incidents that have either severely affected a large part of the country or caused loss of life. The increase in events in the second decade of the period 2000-2023 reached 70%. In the first decade, 215 weather events were recorded, and in the second, 365. There was also a significant increase in serious incidents in the second decade, with the rate reaching 44%. The serious incidents had serious consequences. The percentage of deaths from weather events increased in the second twelve-year period by 77% compared to the first, with the number of lives lost reaching 182, compared to 103 in the first twelve-year period. The highest number of events occurred in 2014, while the highest number of human casualties was recorded in the prefectures of Attica and Evia.

The following **figure** shows the geographical distribution of human losses from weather phenomena per Regional Unit.



(Source: Meteo, National Meteorological Service, https://www.meteo.gr/article_view.cfm?entryID=3065, June 6, 2024)

Figure6 –21 : Geographical distribution of human casualties from weather phenomena per Regional Unit

According to the above, the Regional Unit of Kavala has a high frequency of extreme weather events, with 40-50 recorded events in the period 2000-2023, while the number of human casualties ranges from one (1) to five (5). **The** following **figure** shows the weather events that have been recorded to date in the wider area of the Project.

(Source: Meteo, National Meteorological Service, https://meteo.gr/weatherEvents.cfm, June 18, 2024)

Figure6 –22 : Weather events with social and economic impacts in the wider study area of the Project

According to the Meteo service of the National Observatory of Athens (NOA, 2024)[57] , to date in 2024, there have been ten (10) significant weather and climate events, which, however, were not recorded in the wider area of the proposed project modification.

6.3 LANDSCAPE & MORPHOLOGICAL CHARACTERISTICS

6.3.1 Landscape Characteristics

6.3.1.1 Landscapes of Outstanding Natural Beauty

The landscape is an important component of the environment and the surrounding area of the population, whether it is considered ordinary or of outstanding beauty, according to the European Convention on Landscape. The Convention has been incorporated into Greek law by Law 3827/2010 (Government Gazette 30/A/25.2.2010) and its objectives include promoting the protection and management of the landscape and cultural heritage, as well as cooperation between member states.

In addition, current Greek legislation on landscape includes Law 1465/1950, which supplements Law 5351/1932 and provides for the designation of Landscapes of Outstanding Natural Beauty (LONB) by the Ministry of Culture (YPPO).

[57] https://meteo.gr/weather_cases.cfm

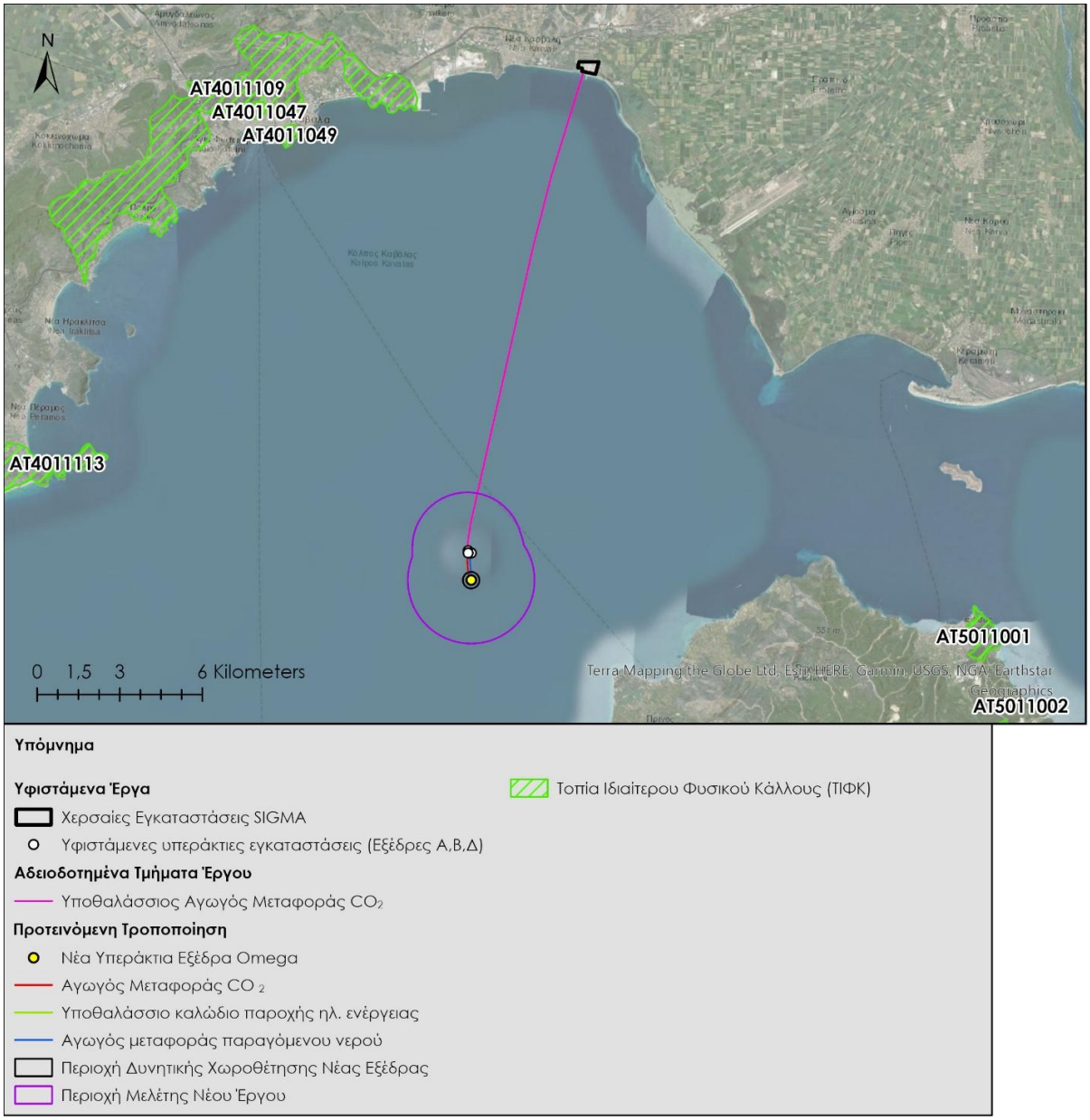
Landscapes of Outstanding Natural Beauty are areas of great aesthetic and cultural value, which contribute to the protection and efficiency of natural resources due to their special natural or man-made characteristics. These areas include traditional settlements, archaeological sites, monuments, and areas of environmental interest.

Furthermore, Law 3937/2011 "Conservation of biodiversity and other provisions" (Government Gazette 60/A/31.03.2011) provides for the protection of remarkable landscapes, which include aesthetic forests, peri-urban forests, geoparks, wilderness landscapes, agricultural landscapes, and urban landscapes, preserved natural monuments and Declared Landscapes of Outstanding Natural Beauty (TIFK) under Law 1465/1950.

As part of the research program "Creation of a database for Greek Nature" of the National Technical University of Athens (NTUA), and in collaboration with the scientific team of the "CORINE Habitats," a database of the most important areas in Greece in terms of natural value, including natural landscapes, was created: the FILOTIS database.

There are no declared Landscapes of Outstanding Natural Beauty (LONB) or Preserved Natural Monuments within the study area.

According to the FILOTIS database, the closest Landscape of Outstanding Natural Beauty to the study area—at a distance of approximately 14.5 km—is the LONB named "**Nea** Peramos" (code AT4011113) (see **Figure** below**)**.



(Source: "FILOTIS" database, https://filotis.itia.ntua.gr/, 14/6/2024)

Figure6 –23 : Landscape of Outstanding Natural Beauty (LONB)

6.3.1.1.1 Landscapes of the Regional Plan for the Protection and Management of the Environment (RPPME) of the Region of Eastern Macedonia & Thrace

According to the Revised PPCHSA of the Region of Eastern Macedonia and Thrace, Article 16 "Strategic Guidelines for the Landscape" categorizes landscapes into **four zones**: landscapes of International Value (**IV**), National Value (NV) and Regional Value (**RV**), as well as zones of particularly degraded landscapes (**PD**).

In order to optimally compare the remarkable landscapes of the Region, individual areas were created within the framework of the Special Section on Landscape of the Revised PPCHSA, which have the general characteristics that define a specific and particular character as well as clear geographical boundaries. The following **table** presents the landscape zones located in the Region and characterized/evaluated based on

their value as International, National or Regional value or as Particularly Degraded, in accordance with the Revised PPCHSAA of the Region of Eastern Macedonia and Thrace.

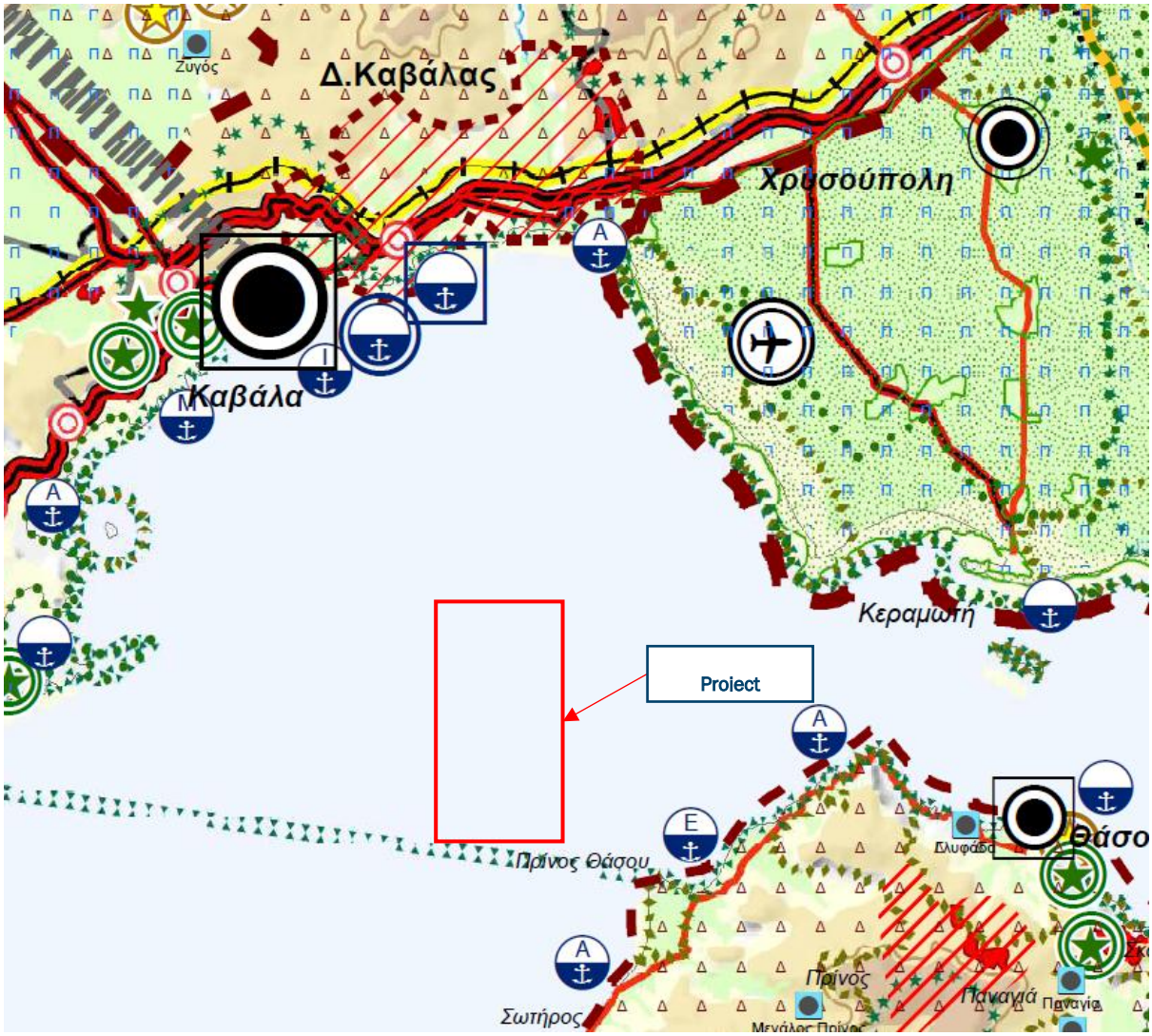
Table6 –12 : Special landscape areas located in the Region of Eastern Macedonia and Thrace

Landscape categories based on their value	
International value	Drama-Kavala zone: Philippi Nestos Zone: Nestos Delta Evros Zone: Evros Delta Samothraki Zone: Samothraki
Of national importance	Nestos Zone: Nestos Straits Rodopi-Evros Zone: Maroneia Zone Thasos Zone: Thasos
Regional value	Nestos Zone: Thesauros and Platanovrysi dams Rodopi mountain range zone: Mountain settlements of Rodopi Xanthi-Komotini Plain Zone: Porto Lagos, Lake Vistonida, lakes and lagoons and lakeside settlements
Particularly degraded	Drama-Kavala zone: Egnatia (Kavala section)

(Source: Revised PPCHSAA for the Region of Eastern Macedonia and Thrace)

Map P2.d of the Assessment and Revision of the Spatial Planning and Sustainable Development Framework of the Region of Eastern Macedonia and Thrace for the Landscape is presented in **the** following **Figure**.

As can be seen in **the figure** below, near the offshore facilities of the proposed amendment, there is **an Area of International Value (ΔΑ)**, the Nestos Area, as well as Thasos, which is **an Area of National Value (ΕΑ).**



(Source: Revised PPCHSA of the Region of Eastern Macedonia & Thrace)

Figure6 –24 : Special landscape zones in the area of the Project's land facilities

6.3.1.1.2 Areas related to the European Landscape Convention, ratified by Law 3827/2010 (A' 30)

The European Landscape Convention, also known as **the Florence Convention**, as ratified by the Greek State with Law 3827/2010 "Ratification of the European Landscape Convention" (Government Gazette 30/A/25.10.2010), aims to promote the protection, management, and planning of landscapes and to organize European cooperation on landscape issues.

According to the European Landscape Convention, each state must legally recognize landscapes as an essential component of the human environment, as an expression of the diversity of their common cultural and natural heritage, and as a foundation of their identity, and to establish and implement landscape policies aimed at protecting, managing, and planning landscapes.

Closest to the facilities of the proposed amendment, based on the Regional Spatial Framework of the Region of Eastern Macedonia and Thrace, is the **Zone of International Value "Nestos Zone: Nestos Delta**." However, it should be noted that all the facilities of the proposed amendment are located outside the boundaries of this Landscape Zone.

The following guidelines are provided for this special Zone of International Importance:

- Priority activation of planning tools for a unified approach to zones inside and outside the park, the designation of tourist development zones, and measures to restrict construction.
- Integrate environmental practices into agriculture.
- Maintain zones on the edges of habitats where there are shortcomings in terms of creating productive agricultural land and developing livestock farming.
- Development of greenhouses in specific zones and development of hedges between them to avoid the creation of extensive areas with greenhouses.
- Connection with other noteworthy landscapes through the proposed "Arc of Wetlands and Archaeological Sites."

6.3.1.1.3 Landscape features related to the Project

Landscape features of the marine study area include existing offshore installations, such as platforms for the extraction and processing of exported hydrocarbons.

6.3.1.1.4 Landscape Significance and Vulnerability Factors

Important factors to be taken into account regarding the installation of the Project under study are the dominant features of the landscape, variable factors (atmospheric conditions, distance, observer position, etc.), as well as the visual vulnerability and absorptive capacity of the landscape.

Visual vulnerability refers to the extent to which various human activities are visible within the landscape. Disturbances in higher parts of a landscape are more visible than those occurring in lower locations. Conversely, any disturbance is much less visible at low elevations, although the details of the intervention are more discernible because the viewing distance tends to be shorter. However, it is possible for

disturbances to be covered by vegetation and geomorphological formations (Hatzistathis and Ispikoudis 1995).

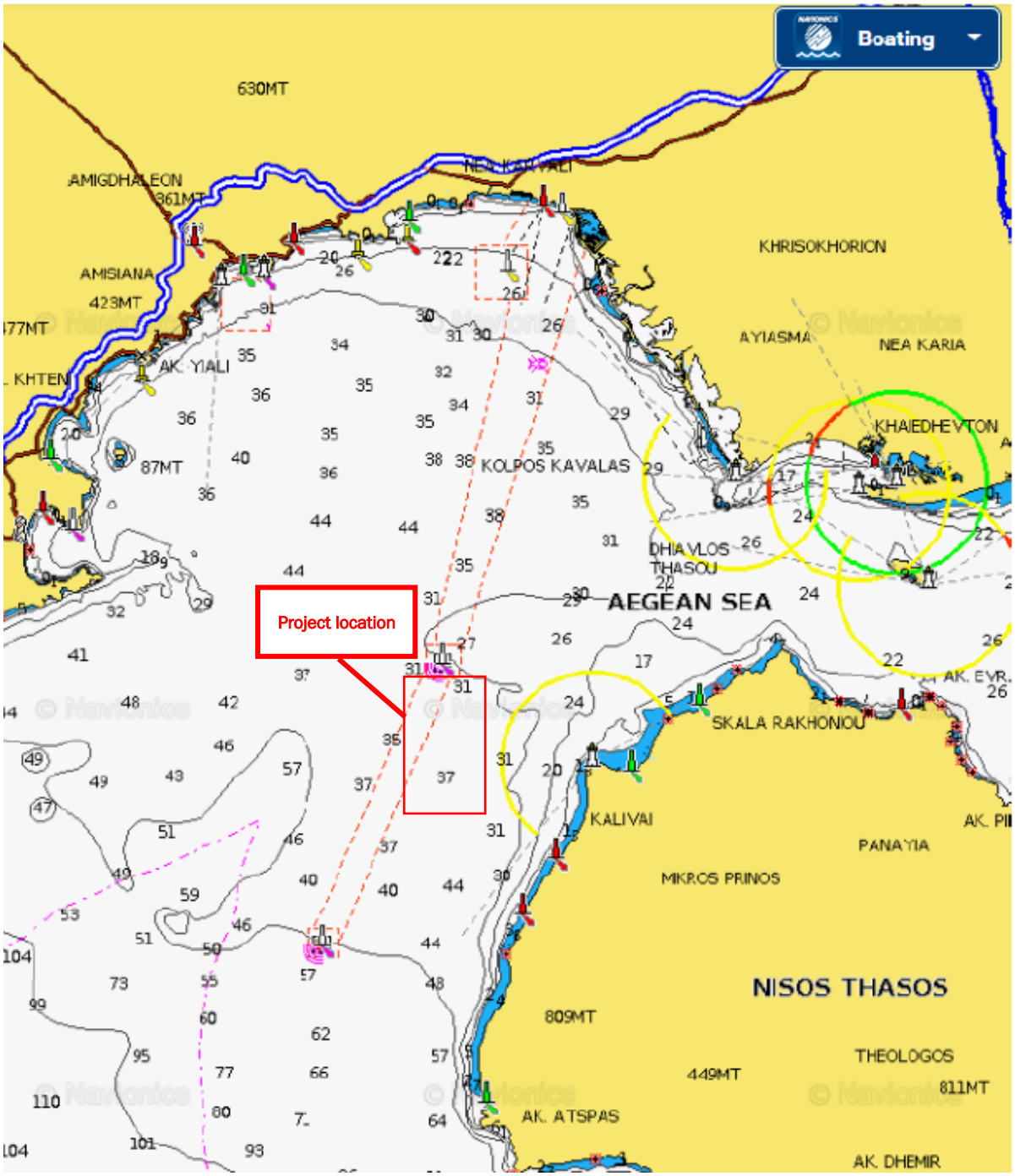
The visual absorption capacity of the landscape is the relative, natural capacity of a landscape to accept organized development or management activities and still maintain its visual character and the integrity of its view quality. The factors that influence this capacity of the land or landscape to absorb modifications are slope, vegetation, viewing distance, soil, landscape diversity, and human activities (Hatzistathis and Ispikoudis 1995).

In the case of the project under study, its distance from residential areas is sufficient to avoid negative effects due to visual disturbance and noise.

6.3.2 Morphological & Landscape Characteristics in the Marine Environment

6.3.2.1 Bathymetry in the Gulf of Kavala

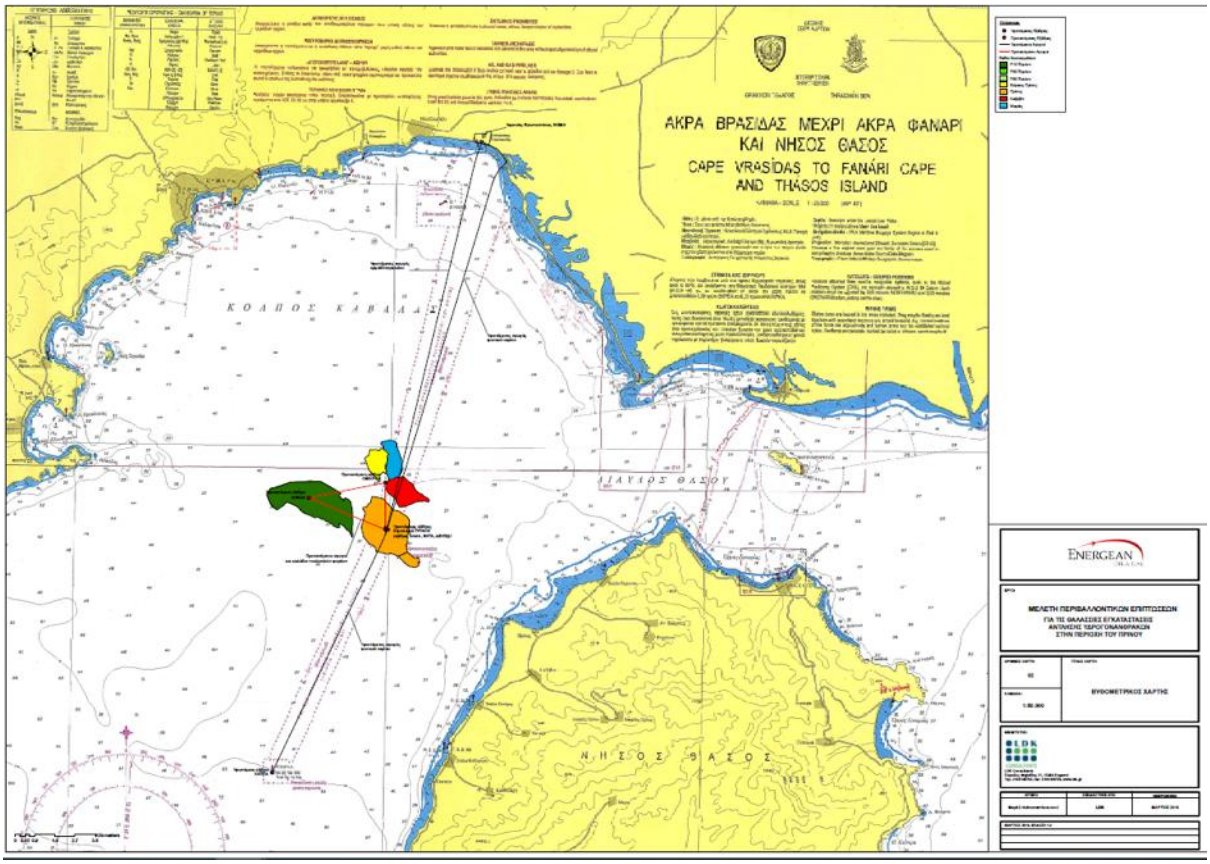
The average depth of the Gulf of Kavala is estimated at approximately 32 m, with the maximum depth found in the basin west of Thasos, at approximately 60 m. The Gulf communicates with the rest of the sea to the east through the Thasos Strait, 7.3 nautical miles wide, and to the southwest through the Thasos basin, 20 nautical miles wide (Sylaios et.al, 2005). The bathymetry of the Gulf of Kavala and the Project area is shown schematically in **the** following **Figure.**



(Source: Navionics, https://webapp.navionics.com, 10-6-2024)

Figure6 –25 : Bathymetric map of the Gulf of Kavala

According to the Bathymetric Map of the Army Geographical Service (AGS) (**Figure 6-26**), the depths in the wider area of the existing platforms range between 28-49 m (**Table 6-13**). The bathymetry of the area is constantly changing due to the sediment carried by small rivers and the main river formation, which is the Nestos and its estuary.



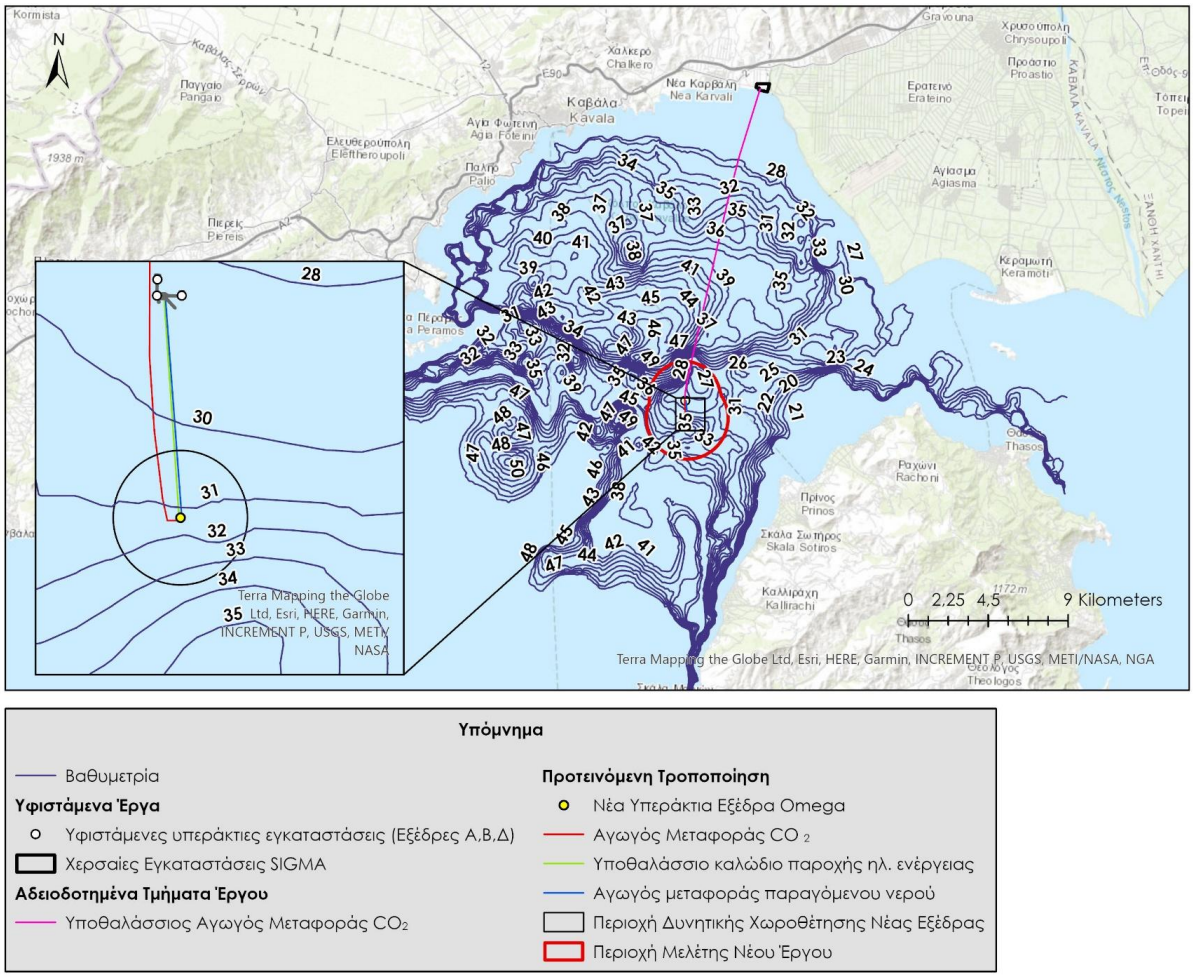
(Source: Bathymetric Map of the Gulf of Kavala, GYS, March 2016)

Figure6 –26 : Bathymetric map of the Gulf of Kavala

Table6 –13 : Bathymetry at existing and future platforms in the wider project area

Platform	Bathymetry (m)
Beta	28.60424
Alpha	28.60424
Delta	28.60424
Kappa	49.05974
Omicron*	32.55613
Lambda*	36.33371

** Future platforms, part of the licensed extension of the Prinos offshore facilities, are not part of the CO_2storage project under consideration.*



6 –27 : Bathymetric map within the area of the proposed amendment

6.4 GEOLOGICAL, SOIL, AND TECTONIC CHARACTERISTICS CHARACTERISTICS

This section records the geological characteristics of the terrestrial and marine environment of the wider study area, as well as the soil characteristics and tectonic data of the area.

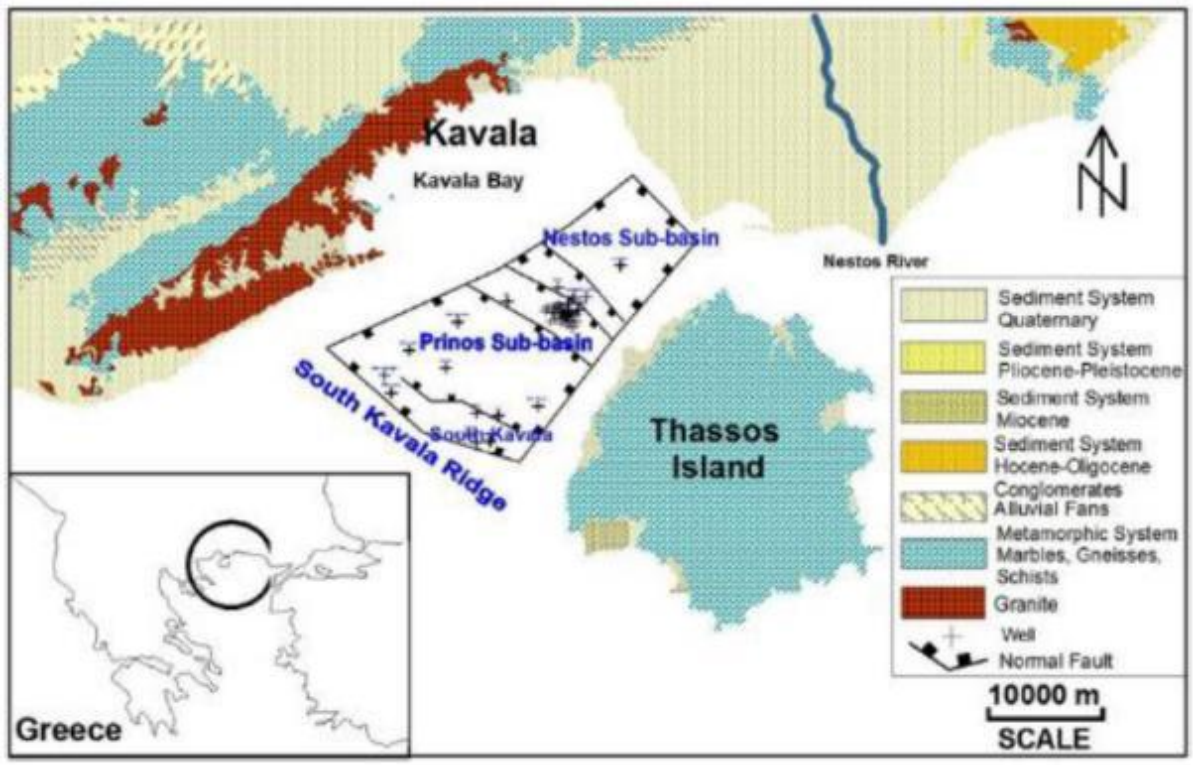
6.4.1 Geological Characteristics

6.4.1.1 Geological Characteristics of the Gulf of Kavala

In general, the Aegean Sea is characterized by a number of sedimentary basins from the Tertiary period, some of which developed due to volcanic activity. At the beginning of the Eocene, faults formed, causing the fragmentation of the region. Some parts were uplifted, while others sank. As a result, the sea penetrated the lower areas. In addition, the creation of Miocene molassic sediments in closed tectonic basins formed evaporites, under which hydrocarbon deposits are found inside Messinian sandstone formations. At the

same time, towards the end of the Oligocene and the beginning of the Miocene, the last Alpine folds were formed, resulting in the folding of the Eocene-Oligocene formations. This was followed by the breaking of old faults, the uplift and subsidence of fragments, the creation of seas and lakes, while a closed sea formed in the Thracian Sea, which created all the conditions for the trapping of hydrocarbons, as shown in **the** following **figure**.

The extension of the Middle Eocene-Late Oligocene period was associated with lithospheric thinning, which is probably related to changes in the geometry of the subducting plate, the dynamics of the mantle wedge, and the onset of plate folding along the Greek subduction zone.



(Source: Kiomourtzi et al., 2008)

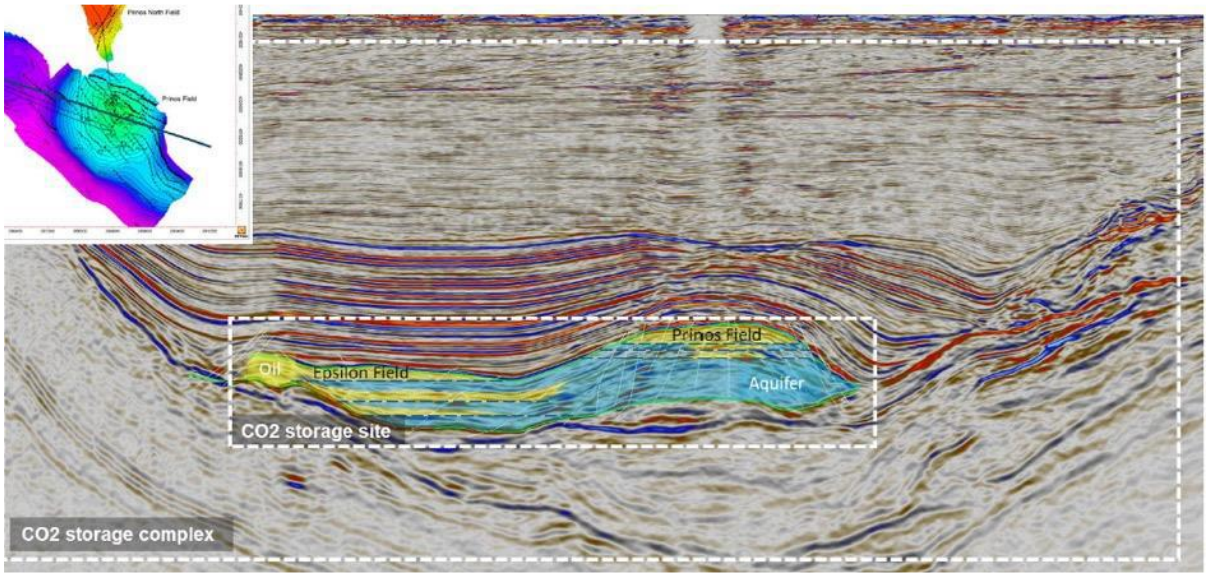
6 –28 Geological map of the Prinos-Kavala sedimentary basin in the North Aegean Sea, showing the location of oil and natural gas reservoirs

Grain size analysis of sediments in the Gulf of Kavala shows that most of them are covered by fine-grained sediments with silt-clay ratios between 85 and 95% (Lykousis 1984). Increased percentages of sand and silt, with high content of mica and silicon dioxide, were found in the south-eastern part and along the north-eastern and eastern coasts of the Gulf. The main source of fine-grained materials is considered to be the Nestos River. The distribution of these fine-grained materials is mainly due to the general cyclonic-anticyclonic movement of the waters (tides, air currents), the relatively low speeds of bottom currents, and the slope of the bottom. Finally, biogenic sand (pieces of echinoderms, mollusks) can be found in the central and southwestern parts of the bay.

6.4.1.2 Geological Characteristics in the Project Area

6.4.1.2.1 General Information

The area of the proposed project modification is located within the Prinos concession, with the potential CO_2storage site located within the Prinos and Epsilon structures, as shown in **the** following **Figure**.



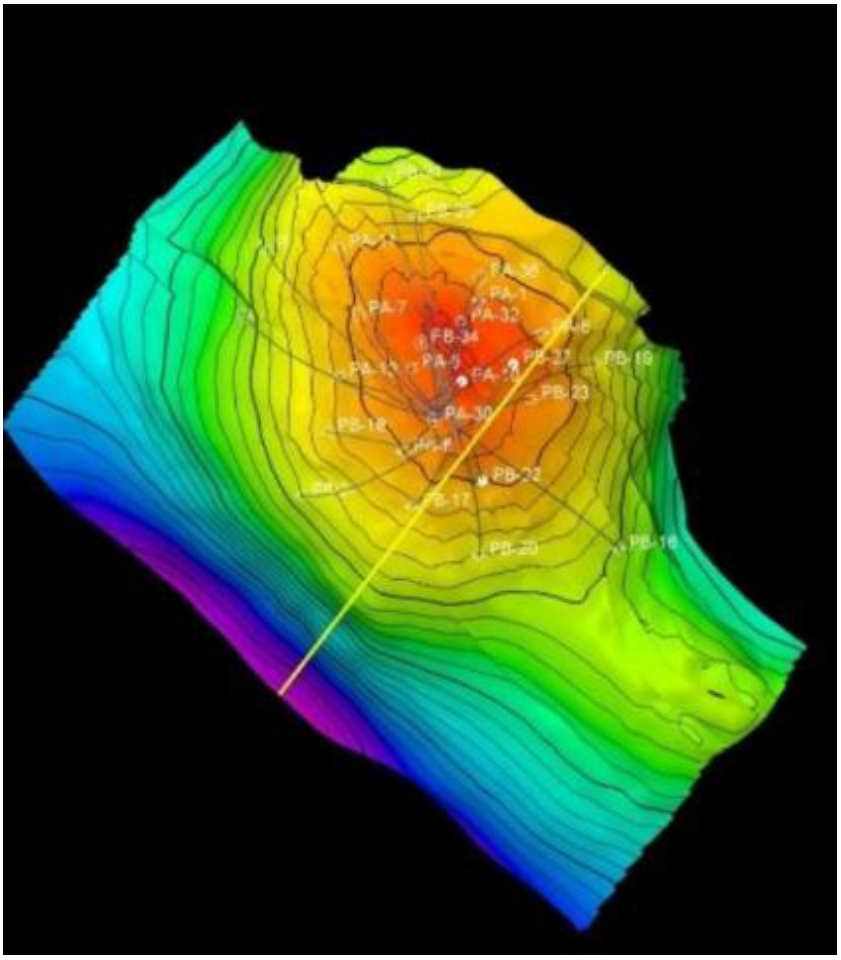
(Source: IENE, 14th Southeast Europe Energy Dialogue, Thessaloniki, May 2023)

Figure6 –29 Overall view of the Prinos, Epsilon fields and CO_2storage complex

The following **sections** describe the geological characteristics of both the Prinos and Epsilon fields and the CO_2storage complex (Prinos CO_2Storage Complex). As can be seen from the **figure** above**,** there are indications that the aquifer zone between the two fields is partially connected. The Prinos field has been producing oil since 1981. This field is facing water influx and depletion of its reservoir pressure, leading to a decline in oil production, while water injection to maintain pressure has been effective for several decades. In the Epsilon sector, production began in 2009 and continues today without water injection.

6.4.1.2.2 Prinos Field

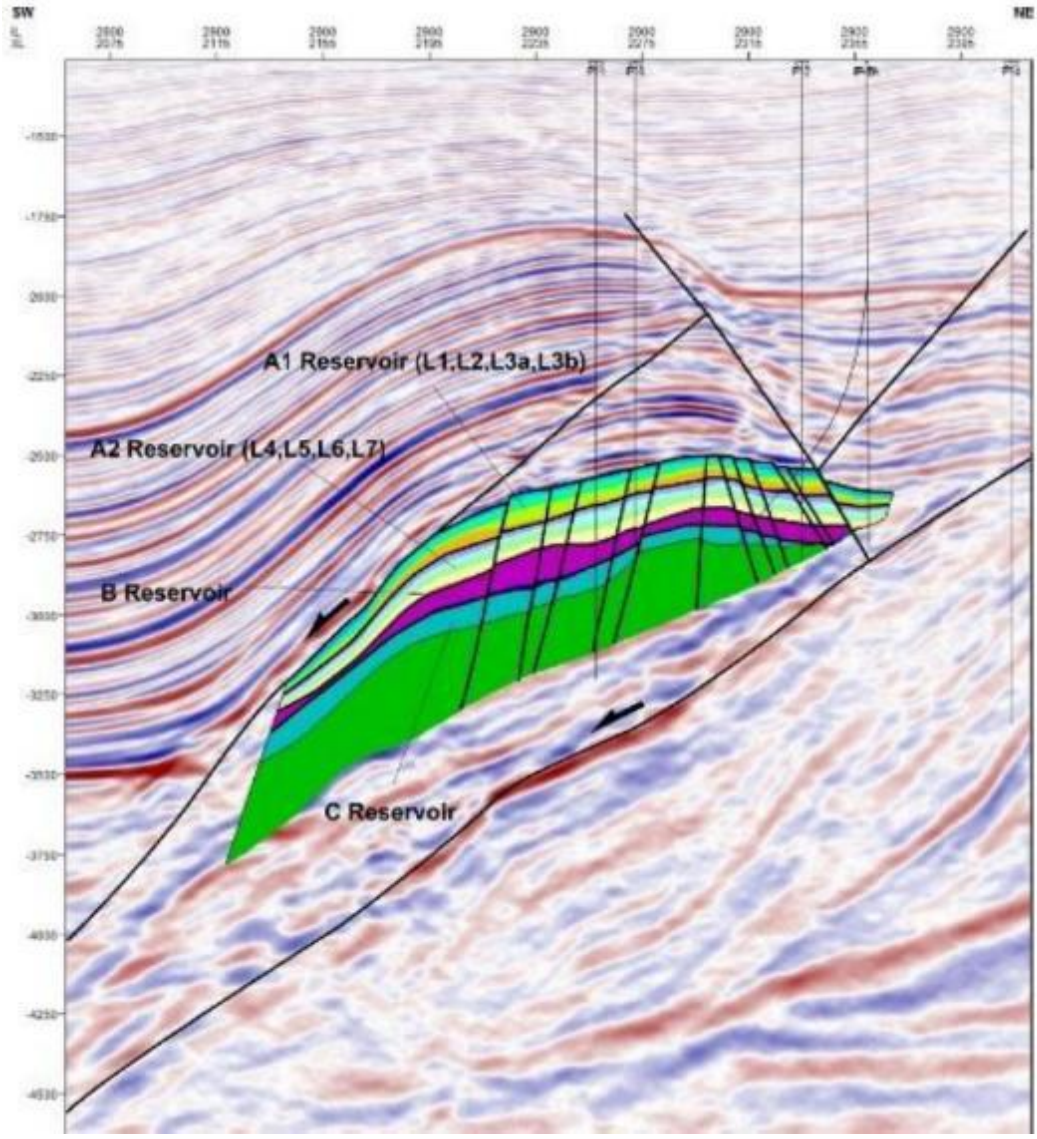
The proven productive reservoirs in the Prinos field are located at the top of the pre-evaporitic sequence and consist mainly of channel and distal fan turbidites formed during the rapid subsidence of the basin during the Miocene. They are usually found at depths of 2,490m - 2,790m TVDSS in the Prinos field area. Prinos is a relatively mature oil field covering an area of approximately 5.9 km² (2), located 8 km west of Thasos and 18 km south of the Gulf of Kavala, as shown in **the** following **figure.** The field was discovered in late 1973 by the Prinos-1 (P-1) well and developed between 1974 and 1981 with an initial 24 wells, 12 from each platform (Alpha and Beta). By 2022, a total of 65 wells had been drilled (including sidetrack wells), 12 of which are currently in production, 3 are injecting seawater, and the rest have been suspended or abandoned.



(Source: Technical Report for the CCS Exploration License Application, Energean, August 2022)

6 –30 Map of the upper structure of the A1 reservoir of the Prinos field

The Prinos field produced a subsaturated sour crude oil with a gravity of 27-29° API and a high sulfur and asphaltene content. The field was slightly overpressurized, with initial reservoir pressure ranging from 5,700-6,250 psia. The sandstones of the Prinos field can be subdivided into four (4) main reservoirs based on the presence of horizons dominated by shales that do not constitute reservoirs. Reservoir A1 can be further divided into four sub-reservoirs (L1, L2, L3a, L3b) and reservoir A2 into another four (L4, L5, L6 & L7), as shown in **the** following **Figure.** Reservoirs A, B, and C have three distinct OWC levels.



(Source: Technical Report for the CCS Exploration License Application, Energean, August 2022)

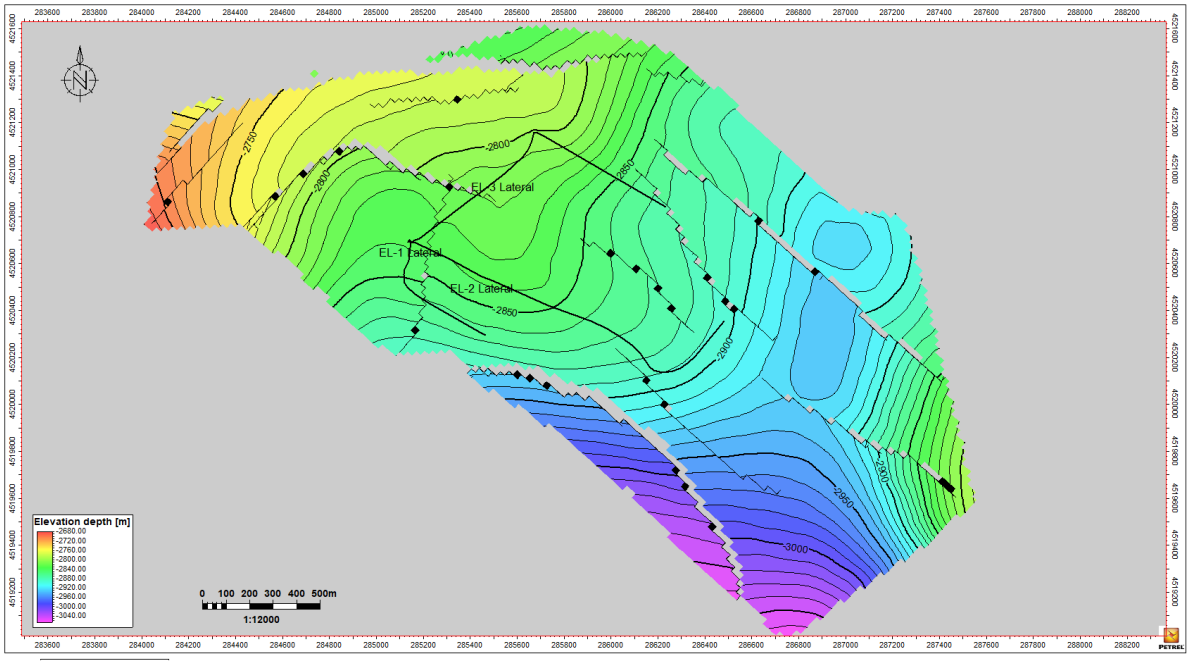
6 –31 Cross-section along the Prinos deposit

Petrographic interpretations have shown that reservoir A1 contains well-sorted and dominant medium-grained sandstones, often characterized by fine-grained laminations. Reservoir A2 contains alternating thin layers of sandstones with medium-grained sandstones and well-sorted sandstones. Reservoir B is characterized by unstructured sandstones with a very well-defined texture. The grain size in these sandstones varies from fine to granular, but is usually medium to coarse sand. Reservoir B is also characterized by dolomites and sandy clay horizons.

6.4.1.2.3 Epsilon Field

The Epsilon deposit (Figure 8-45) is located 4.5 km west-northwest of the Prinos deposit. It is an anticlinal structure with faults covering an area of approximately 4 km2 and separated from the Prinos deposit by a structural low, a saddle point, to the east.

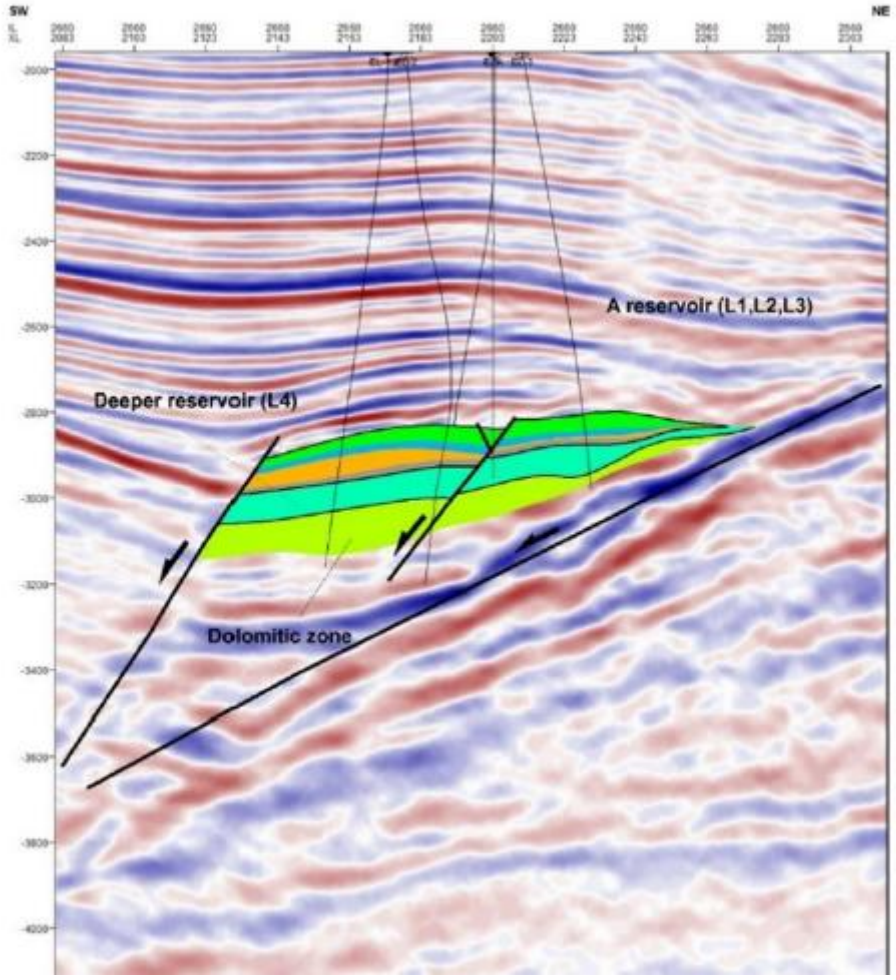
The Epsilon deposit was explored and discovered by the E-1 well in 2001 and confirmed by the E-1As sidetrack well in 2002. A productive two-foot ERD horizontal well, EA-H1, targeting the main compartment of the field, was drilled from the Alpha platform (Prinos complex).



(Source: Technical Report for the CCS Exploration License Application, Energean, August 2022)

6 –32 Map of the upper structure of reservoir A of the Epsilon field

The Epsilon reservoir is 300 m thick, Φ=9%, NTG=40-90%, with a permeability of 2-5 mD. The reservoir contains moderate light sour crude oil (36° API), with a dissolved gas content of 349 scf/bbl (62 m3/m3) and a high asphaltene content. The initial pressure in reservoir A was 6230 psi and the temperature was 140°. The sandstones of the Epsilon reservoir can be subdivided into three (3) main reservoirs: reservoir A (L1, L2 & L3), deeper reservoir (L4) and dolomitic zone, all clastic rocks (see **Figure** below). All reservoir units represent a series of accumulated/merged high to very high energy turbidite flows, separated by low to very low energy flows, dominated by mud- and sand-rich clasts.



(Source: Technical Report for the CCS Exploration License Application, Energean, August 2022)

6 –33 Seismic section along the Epsilon field, showing reservoir A (L1, L2 & L3), the deeper reservoir (L4) and the dolomitic zone

The heterolithic sand/mud lithologies show mm- to cm-scale intercalations/layers, which are well developed and slightly undulating to continuous parallel in form. The sand layers typically exhibit sharp to locally eroded bases and sharp tops, are predominantly very fine to fine-grained, and appear moderately well sorted. The muds separating the two reservoir units are dark gray in color, with organic components.

6.4.2 Characteristics of the Seabed

As part of the PPP for the offshore facilities of Prinos, sampling was carried out at 13 points in the Prinos Basin in November 2023 with the aim of determining the quality of the seabed in the study area, as shown in **the** following **figure.**

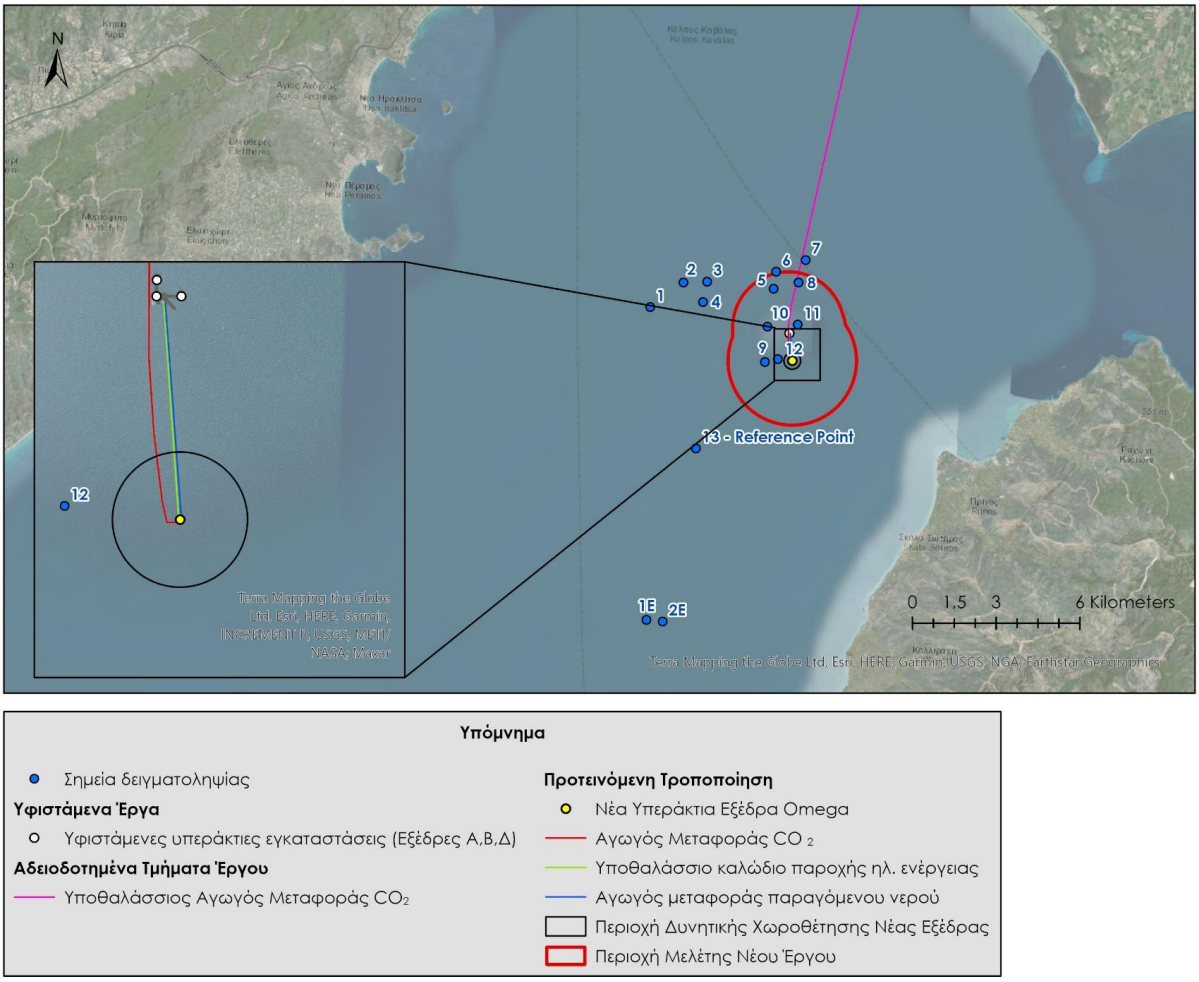


Figure6 –34 : Sampling points for water quality and seabed analysis (November 2023)

The table below shows the coordinates and depths of the sampling points.

Table6 –14 : Results of granulometric analysis (sampling in November 2023)

No	X (WGS 84)	Y (WGS 84)	X (EGSA87)	Y (EGSA87)	Bathymetry (m)
13(R)	24.458888	40.760623	538732.575012	4512285.72938	40.22371
1	24.437743	40.805658	536,922.831483	4517275.81976	36.943
2	24.451648	40.81388	538,091.019005	4,518,194.43695	38.10651
3	24.461644	40.814405	538,933.699241	4518257.08951	40.75853
4	24.460092	40.807827	538,806.66	4517526.18724	35.10134
5	24.48995	40.812742	541,322.010954	4518085.43087	38.23281
6	24.490744	40.818238	541,385.587972	4518695.89369	39.75599
7	24.503212	40.822313	542,434.39	4519154.23836	32.35225
8	24.500483	40.814949	542,208.981652	4518335.46583	27.71849
9	24.487037	40.789089	541,090.91	4515458.51588	31.52274

No	X (WGS 84)	Y (WGS 84)	X (EGSA87)	Y (EGSA87)	Bathymetry (m)
10	24.487807	40.80052	541,148.841615	4516727.75728	29.68481
11	24.500591	40.801407	542,226.66	4516832.24678	27.5491
12	24.492604	40.790124	541,560.001932	4515575.95355	31.19172
1	24.439994	40.704926	537,168.795443	4506094.93419	47.4362
2	24.447	40.704548	537,760.77	4506056.01116	47.03185

The results of the laboratory analyses of the marine sediment samples are summarized and interpreted below. The following **tables** present the results of the granulometric analysis of the sampling carried out in November 2023 at 13 monitoring stations in the Gulf of Kavala during the preparation of the EIA "Prinos Offshore Development Project" in 2015.

Table6 –15 : Results of grain size analysis (sampling in November 2023)

Size	Unit of measurement	9 R1	9 R2	11 R1	11 R2	12 R1	12 R2	1E R1	1E R2	2 R1	2E R2	REF R1	REF R2
>4 mm	%	1.9	1.7	0.9	0.1	0.3	1.8	0.2	2.4	2	0	1.2	0.3
4 mm	%	7.3	9.3	5.5	4.8	6.1	6.4	8.4	12.5	6.1	5.8	8	5.2
3 mm	%	4.1	5.1	4.1	4.0	4.6	5.6	9.2	9.9	9.4	7.4	4.6	6.1
2 mm	%	4.7	5.3	6.2	6.4	6.6	4.2	13.4	10	8.2	8.2	4.9	4.7
1 mm	%	10.9	15.5	23.7	18.9	16.8	15.2	23.5	25.5	21.9	19.7	13.2	13.6
0.5 mm	%	22.8	29.1	33.2	36.5	29.6	23.6	20.3	18.6	18.5	19.9	21.5	21.9
0.25 mm	%	28.2	21.3	17.6	18.7	21.7	23.6	12.4	11.8	20.8	19.6	27.4	25.6
<0.25 mm	%	20.1	12.7	8.8	10.6	14.3	19.6	11.2	9.3	13.1	19.4	19.2	22.6

The values refer to the percentage of retained material.

Table6 –16 : Results of analyses of general physicochemical parameters in sediment samples (sampling in November 2023)

Parameter	Method	Quality limits Staatscourant, The Netherlands, June 2000	Unit of measurement	Station 9 R1	Station 2E R2	Station 1E R1	Station 12 R1	REF station R2	Station 1E R2	Station 12 R2	Station 9 R2	REF Station R1	Station 11 R1	Station 11 R2	Station 2E R1
TOC	APHA 4500	0.1	% DW	6.40	2.90	4.40	3.10	2.80	9.50	6.80	5.70	4.80	6	4.30	5.10
TN (Total Nitrogen)	Kjeldahl	5	ug/g DW	137	107	110	99.5	95.1	155	192	149	184	152	122	130
Metals															
Arsenic (As)	PG/ICP	5	ug/g DW	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium (Cd)	PG/ICP	12	ug/g DW	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Manganese (Mn)	PG/ICP		ug/g DW	243	171	207	250	146	258	317	268	162	267	277	171
Lead (Pb)	PG/ICP	530	ug/g DW	20	17.7	49.8	18	11	20	23.2	6.5	17.5	41.9	35.9	16.8
Iron (Fe)	PG/ICP		ug/g DW	250	3060	4840	3050	2550	2620	2620	2900	3340	1920	3280	3060
Copper (Cu)	PG/ICP	73	ug/g DW	10.2	7.9	24	17	12.9	10.2	12.9	6.6	12	19.3	12	15.7
Chromium (Cr)	PG/ICP	38	ug/g DW	<0.3	<0.3	<0.2	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Zinc (Zn)	PG/ICP	620	ug/g DW	26.5	10.5	35.8	83.8	20.8	26.5	29.3	29.6	30.9	47.4	51.2	24.4
Cobalt (Ci)	PG/ICP	19	ug/g DW	<0.3	0.3	0	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.5
Molybdenum (Mo)	PG/ICP	200	ug/g DW	1.2	2	6	35.5	0.3	0.3	1.2	0.4	7.3	1	1.5	4.6
Nickel (Ni)	PG/ICP	4	ug/g DW	2.8	13.1	15.9	10.2	2.1	3.2	12.7	8.2	4.8	7.2	4.8	11.2
Polycyclic aromatic hydrocarbons (PAHs)															
Naphthalene	EPA 8270	0.1	mg/kg	ND	ND	ND	ND	ND	<0.05	ND	ND	ND	ND	ND	ND
Acenaphthylene	EPA 8270	0.010	mg/kg	ND	<0.02	ND	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	ND	ND	<0.02
Acenaphthene	EPA 8270	0.010	mg/kg	ND	<0.02	ND	ND	<0.02	ND	ND	ND	ND	ND	ND	<0.02
Fluorene	EPA 8270	3	mg/kg	ND	ND	ND	ND	<0.02	ND	ND	ND	ND	ND	<0.02	<0.02
Phenanthrene	EPA 8270	0.500	mg/kg	ND	<0.02	<0.02	ND	<0.02	<0.02	<0.02	ND	ND	<0.02	<0.02	ND
Anthracene	EPA 8270	0.100	mg/kg	ND	<0.02	ND	ND	0.046	ND	<0.02	ND	ND	<0.02	ND	ND

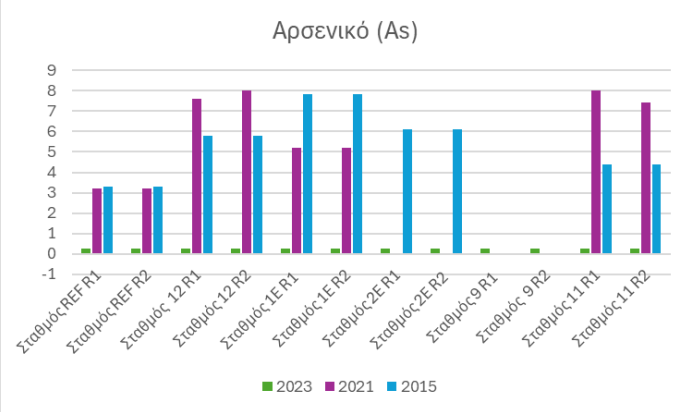
Fluoranthene	EPA 8270	0.010	mg/kg	ND	<0.02	<0.02	ND	<0.02	<0.02	<0.02	ND	ND	<0.02	ND	ND
Pyrene	EPA 8270	0.010	mg/kg	ND	<0.02	<0.02	ND	<0.02	<0.02	<0.02	<0.02	ND	ND	ND	ND
Benzo[a]anthracene	EPA 8270	0.400	mg/kg	ND	<0.02	<0.02	ND	<0.02	<0.02	<0.02	ND	ND	ND	ND	ND
Chrysene	EPA 8270	11	mg/kg	ND	<0.02	ND	ND	<0.02	ND	<0.02	ND	ND	<0.02	ND	ND
Benzo[b]fluoranthene	EPA 8270	0.200	mg/kg	0	0.053	<0.02	ND	<0.02	ND	<0.02	<0.02	ND	<0.02	<0.02	ND
Benzo[k]fluoranthene	EPA 8270	2	mg/kg	ND	ND	ND	ND	<0.02	ND	ND	ND	ND	<0.02	ND	ND
Benzo[a]pyrene	EPA 8270	3	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo[a,h]anthracene	EPA 8270	0.010	mg/kg	ND	<0.02	ND	ND	<0.02	ND	<0.02	ND	ND	ND	ND	ND
Benzo[g,h,i]perylene	EPA 8270	8	mg/kg	ND	<0.02	ND	ND	<0.02	ND	<0.02	ND	ND	ND	ND	ND
Ind Indeno(1,2,3-c,d) pyrene	EPA 8270	6	mg/kg	ND	<0.02	ND	ND	<0.02	ND	<0.02	<0.02	ND	ND	ND	<0.02

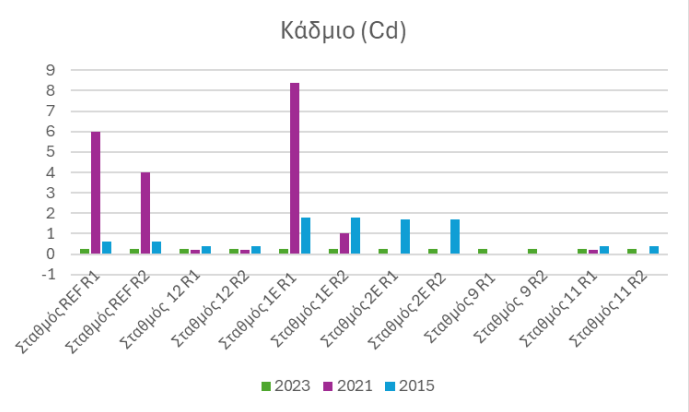
ND: Not Detected, Not quantified at the method's reporting limit.
* Non-accredited test according to ISO 17025, No. 154 ESYD.
R: replicate, repeat sample Maximum Permissible Concentration (MPC): Maximum permissible concentration

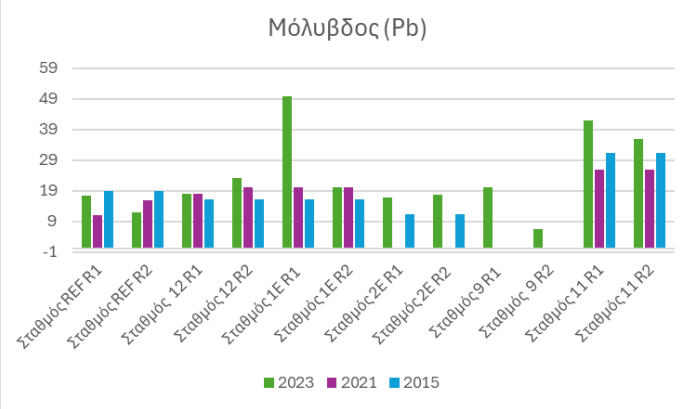
Examining the sampling stations as a whole and comparing the results of **the** above **tables** with the corresponding analyses carried out in October 2015 (EIA of the "Prinos Offshore Development" Project, 2015) and July 2021 ("Monitoring Program Report" - hereinafter MPR, 2020), it was found that there were no changes in the concentrations of Polycyclic Aromatic Hydrocarbons (PAHs). More specifically, in all the repeat samples from the aforementioned sampling stations, the detected values are lower than the laboratory detection limit (<0.020 mg/kg) and lower than the EU minimum limits for good environmental status of the marine environment.

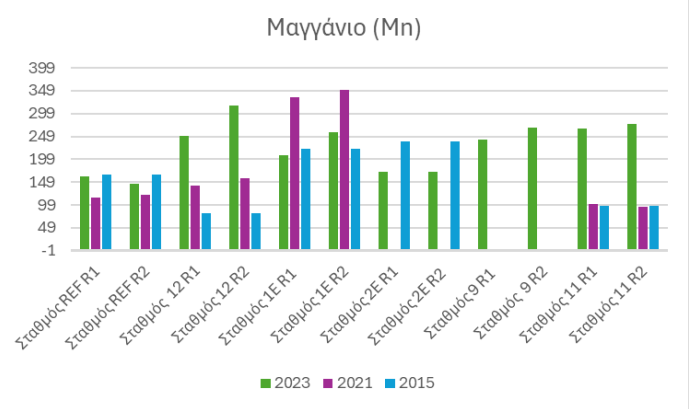
The study of the distribution of trace elements of metal concentration in sediments is important in the context of environmental pollution. Sediments show less variation over time and are therefore preferred as monitoring tools for assessing pollution. Heavy metals enter the coastal environment from various sources, whether natural or anthropogenic, such as the discharge of domestic sewage and industrial waste. Variations in metal concentrations may reflect the mixing of sediments from different sources and contamination from a variety of pollution sources.

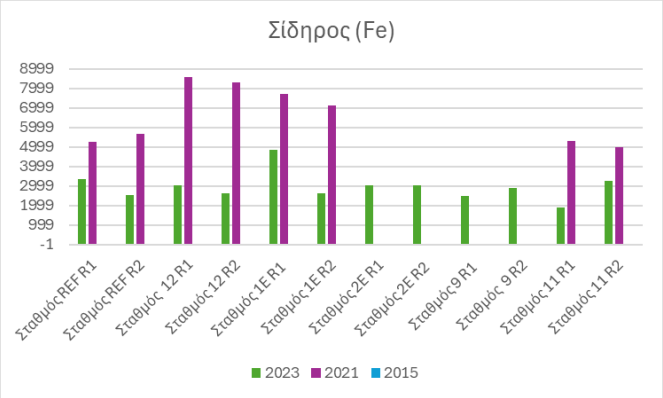
The following **figures** show a comparison of heavy metal concentrations in repeat samples of marine sediment collected in October 2015 (EIA of the "Offshore Development of Prinos", 2015), July and June 2021 (EIA 2020) and November 2023 (EIA 2023). It should be noted that the stations investigated in the context of this EIA 2023 are 9, 11, 12, 13-REF, 1E, and 2E.

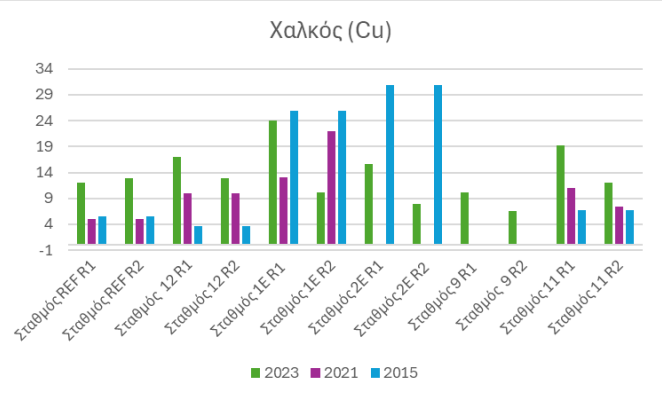


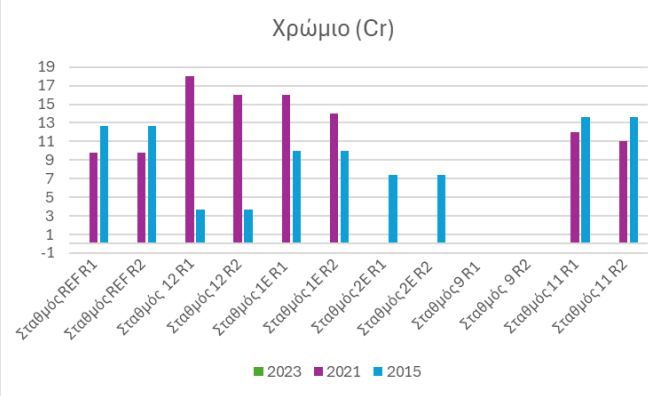


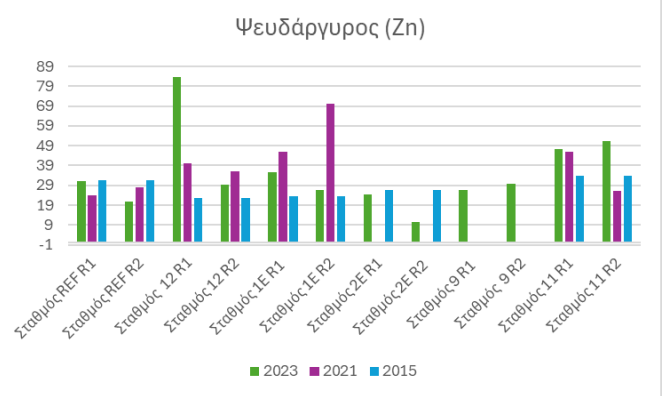


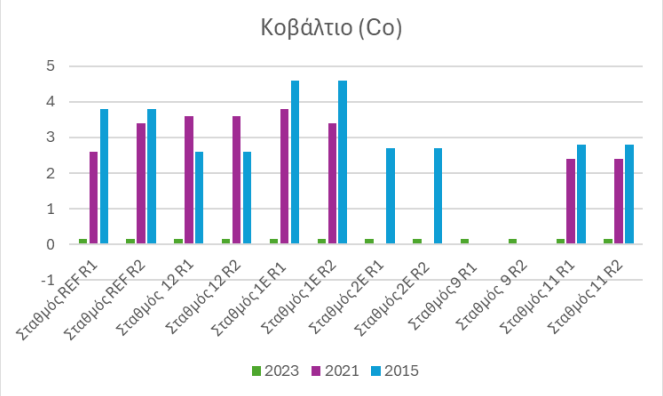


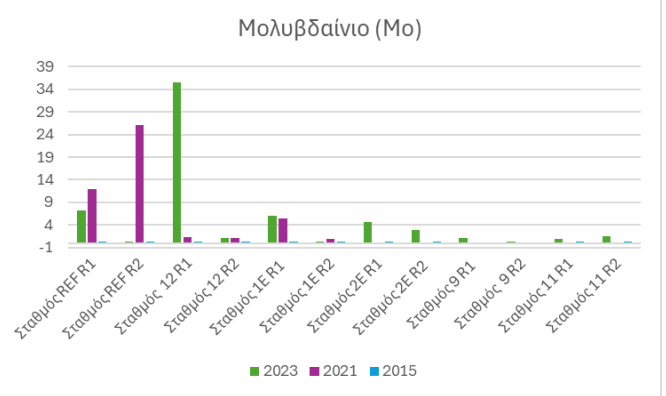

Σίδηρος (Fe)
8999
7999
6999
5999
4999
3999
2999
1999
999
-1
ΣταθμόςREF R1
ΣταθμόςREF R2
Σταθμός 12 R1
Σταθμός12 R2
Σταθμός1E R1
Σταθμός1E R2
Σταθμός2E R1
Σταθμός2E R2
Σταθμός9 R1
Σταθμός 9 R2
Σταθμός11 R1
Σταθμός11 R2
2023
2021
2015


Χαλκός (Cu)
34
29
24
19
14
9
4
-1
ΣταθμόςREF R1
ΣταθμόςREF R2
Σταθμός 12 R1
Σταθμός12 R2
Σταθμός1E R1
Σταθμός1E R2
Σταθμός2E R1
Σταθμός2E R2
Σταθμός9 R1
Σταθμός 9 R2
Σταθμός11 R1
Σταθμός11 R2
2023
2021
2015


Χρώμιο (Cr)
19
17
15
13
11
9
7
5
3
1
-1
ΣταθμόςREF R1
ΣταθμόςREF R2
Σταθμός 12 R1
Σταθμός12 R2
Σταθμός1E R1
Σταθμός1E R2
Σταθμός2E R1
Σταθμός2E R2
Σταθμός9 R1
Σταθμός 9 R2
Σταθμός11 R1
Σταθμός11 R2
2023
2021
2015


Ψευδάργυρος (Zn)
89
79
69
59
49
39
29
19
9
-1
ΣταθμόςREF R1
ΣταθμόςREF R2
Σταθμός 12 R1
Σταθμός12 R2
Σταθμός1E R1
Σταθμός1E R2
Σταθμός2E R1
Σταθμός2E R2
Σταθμός9 R1
Σταθμός 9 R2
Σταθμός11 R1
Σταθμός11 R2
2023
2021
2015


Κοβάλτιο (Co)
5
4
3
2
1
0
-1
ΣταθμόςREF R1
ΣταθμόςREF R2
Σταθμός 12 R1
Σταθμός12 R2
Σταθμός1E R1
Σταθμός1E R2
Σταθμός2E R1
Σταθμός2E R2
Σταθμός9 R1
Σταθμός 9 R2
Σταθμός11 R1
Σταθμός11 R2
2023
2021
2015


Μολυβδαίνιο (Mo)
39
34
29
24
19
14
9
4
-1
ΣταθμόςREF R1
ΣταθμόςREF R2
Σταθμός 12 R1
Σταθμός12 R2
Σταθμός1E R1
Σταθμός1E R2
Σταθμός2E R1
Σταθμός2E R2
Σταθμός9 R1
Σταθμός 9 R2
Σταθμός11 R1
Σταθμός11 R2
2023
2021
2015

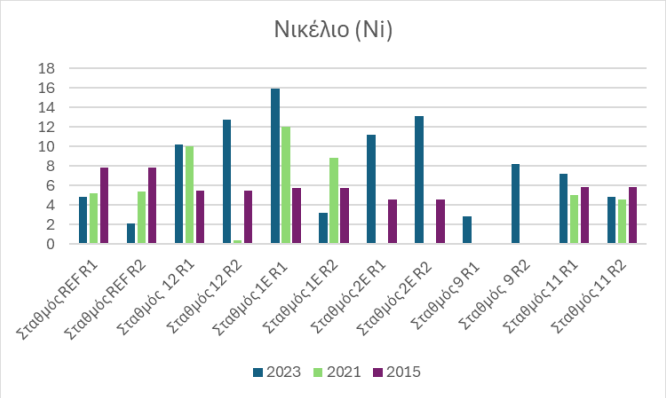
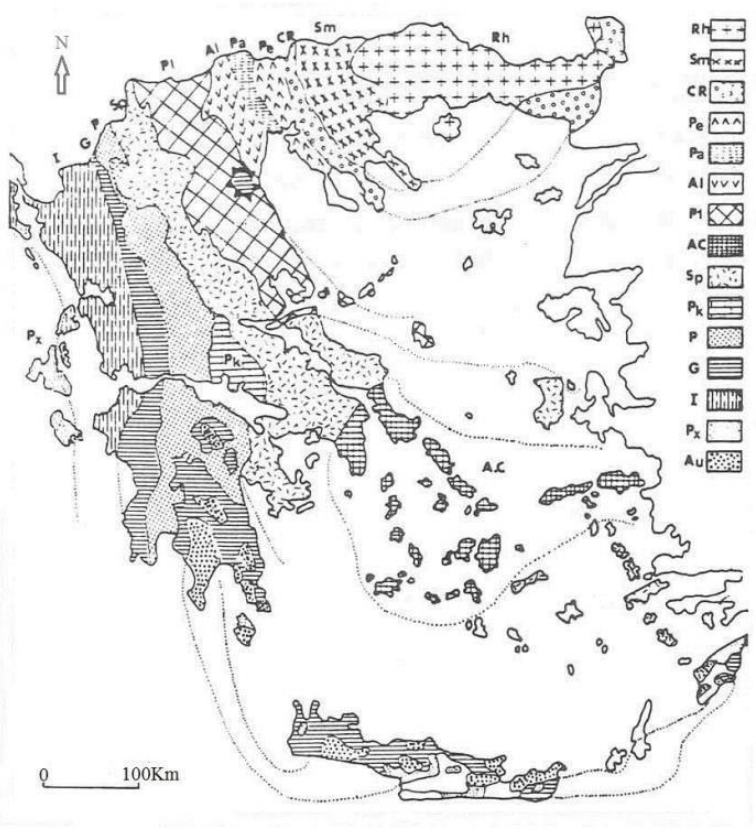


Figure6 –35 : Comparative diagrams of heavy metal concentrations during field surveys 10/2015, 06-07/2021, and 11/2023

6.4.3 Tectonic Characteristics

6.4.3.1 Tectonic

The tectonic picture of the area is particularly complex, and it is estimated that the tectonic structures present in the wider study area have played an important role in shaping the geological conditions and engineering geological characteristics of the formations. According to the **map** below**,** the study area belongs to the Rhodope Massif, which is mainly composed of metamorphic rocks of high to medium depth of metamorphism (gneisses & marbles) with intrusions of igneous rocks, as well as sedimentary rocks (alluvial sediments).



(Source: Aristotle University of Thessaloniki, Moundrakis)

Rh: mass of Rhodope, Sm: Serbo-Macedonian mass, CR: Perirhodope zone, (Pe: Paionia zone, Pa: Paiko zone, Al: Almopia zone) = Axios zone, Pl: Pelagonian zone, Ac: Attico-Cycladic zone, Sp: Sub-Pelagonian zone, Pk: Parnassus-Giona zone, P: Pindos zone, G: Gavrovo-Tripoli zone, I: Ionian zone, Px: Paxos zone, Au: Talea Mountains zone.

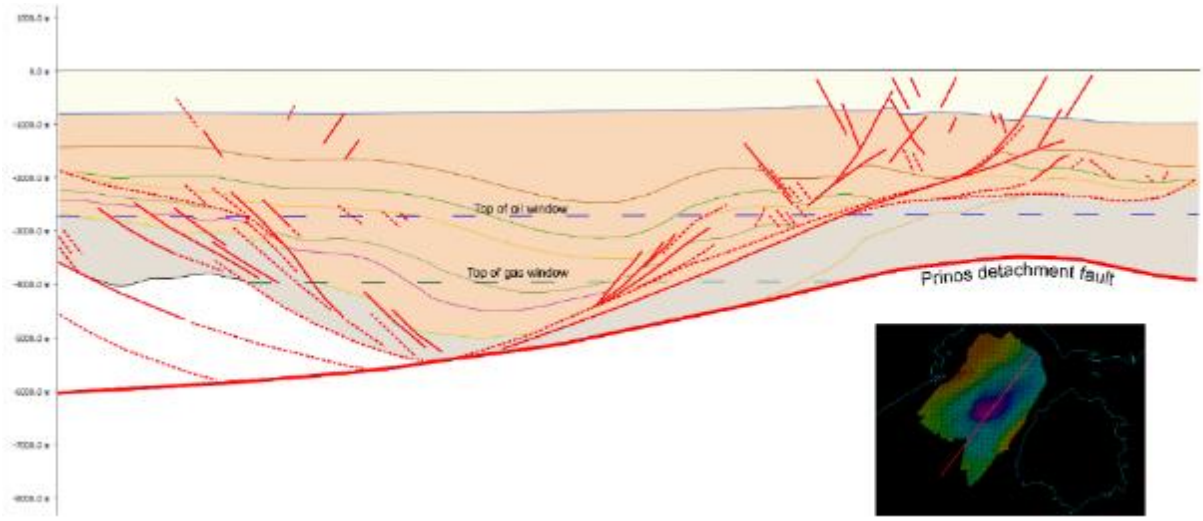
6 –36 : Geotectonic map of the Greek Zones

The Rhodope Massif is a complex unit. The sequence of nappes that comprise it were formed by the Alpine convergence of the African and Eurasian plates and is divided into two metamorphic complexes, the northern (Northern Rhodope Core Complex – NRCC) and the southern metamorphic complex (Southern Rhodope Core Complex – SRCC). The southern metamorphic complex consists of two tectonic units, the lower (Pangaean unit) and the upper, which is thrust onto the lower through the Nestos fault (Papanikolaou & Panagopoulos 1981, Dinter 1998).

The tectonic structure of **the Prinos Basin** is the result of subduction, southwest-northeast extension along low-angle faults during the uplift of the core complex during the Miocene - Pliocene and the right-lateral slip on northeast-trending faults caused by the extension of the North Anatolian Fault in the North Aegean during the Late Pliocene-Quaternary. Data from seismicity studies in Northern Greece (Burchfiel et al. 2006) show that (Late Pleistocene) Holocene deformation is characterized by N-S to NNE-SSW extension with only rare indications of right-lateral strike-slip faulting (Jackson & McKenzie 1988).

A cross section along the axis of the basin shows a northeast-dipping half-graben of kilometer scale forming an asymmetrical graben. The older sediments dip to the northeast and are bounded on the eastern side by

a series of low-angle, large-displacement faults and on the western side (ridge of South Kavala) by a zone of intermediate dip faults with smaller displacement. At shallower levels, high-angle faults locally disrupt the Pliocene-Quaternary sediments and, near the sides of the basin, bring them into contact with the metamorphic basement rocks.



(Source: Technical Report for the CCS Exploration License Application, Energean, August 2022)

6 –37 : Generalized cross-section along the Prinos Basin

The above **figure** shows a general cross-section along the Prinos basin and depicts the mapped seismic horizons and the resulting tectonostratigraphic correlations. The co-fracture unit (orange polygon) shows large-scale asymmetry with low-angle faults of large displacement to the northeast and intermediate-angle faults of smaller displacement to the southwest.

The faults in the Prinos basin are either flat or non-flat (listric), either with a large angle or a small angle, or a combination of these. Most of the faults in the Pliocene-Pleistocene section are high-angle and are connected to complex intersections with older low-angle faults. The most important tectonic feature of the Prinos Basin is the Prinos Detachment Fault (PDF), a zone of low-angle faults that separates the subsoil sediments from the metamorphic basement rocks. This structure is very clearly expressed in the seismic cube, which extends southwestward beneath the South Kavala Ridge. The surface of the Prinos Detachment Fault has a large-scale syn-tectonic shape, with a wavelength > 10 km and a width of up to 1.5 km, and the average direction of the main wave is B56°A. In cross section, it represents a surface with a sharp knife edge where all the faults of the overthrust basin are rooted.

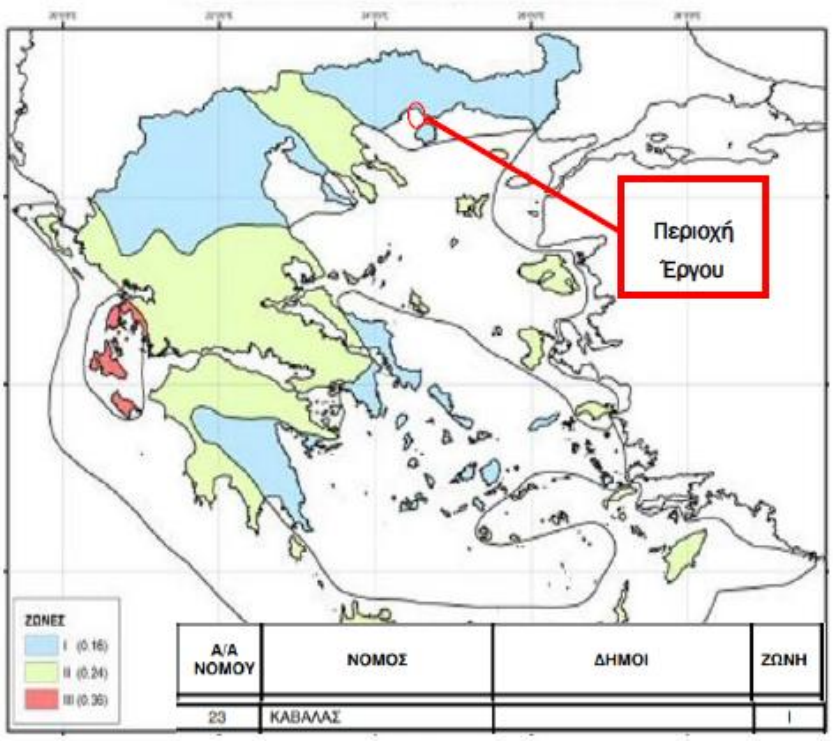
Apart from the faults, the Prinos basin is characterized by several syn-sedimentary folds. These folds are the result of overturning deformations that developed perpendicular to the direction of extension from the collapse of the hanging wall rocks above listric normal faults, or conical folds with axes parallel to the direction of extension, probably caused by compression perpendicular to the direction of extension. The latter is further supported by the fact that older syn-sedimentary folds develop steeper legs and greater width than younger ones.

Within the tectonic setting of the Prinos Basin, the Prinos and Epsilon fields are structural traps located on the hanging wall of a low-angle intra-sedimentary listric fault with a flat ramp geometry-wide, and were formed as submarine extension wedges due to unstable sliding.

The **Nestos sub-basin** is located in the northern part and the Prinos sub-basin, deeper than the former, in the southern part. The tectonic basin is structured by recycled anticlinal lines, formed by faults with a northwesterly and southwesterly dip, which are related to the trapping mechanism. These faults, which are still active today, were activated during sedimentation (syn-sedimentary faults) and led to the domed anticlines of Prinos, North Prinos, Epsilon, Ammodos, and South Kavala. The NE part of the Prinos basin was probably close from the moment of its formation, while the SW basement began to rise from the Messinian period, forming the southern ridge of Kavala. The basin gradually became isolated from the open sea and turned into a lagoon.

6.4.3.2 Seismic Hazard

With regard to the seismicity of the wider area, the land and offshore area of the project is classified in **seismic hazard zone I,** i.e. the lowest category (see map below), according to the "Amendment of the Provisions of the Greek Anti-Seismic Regulation EAK 2000 due to the Revision of the Seismic Hazard Map, Government Gazette 1154/B/12.08.2003."



(Source: Anti-Seismic Regulation, EAK 2000, Government Gazette 1154/12-8-2003)

Figure6 –38 : Seismic hazard map of Greece

According to the seismotectonic investigation of the Kavala-Prinos area by the Geodynamic Institute, National Observatory of Athens (NOA)[58] , there are five (5) active faults, which are summarized in the following **Table** and **Figure.**

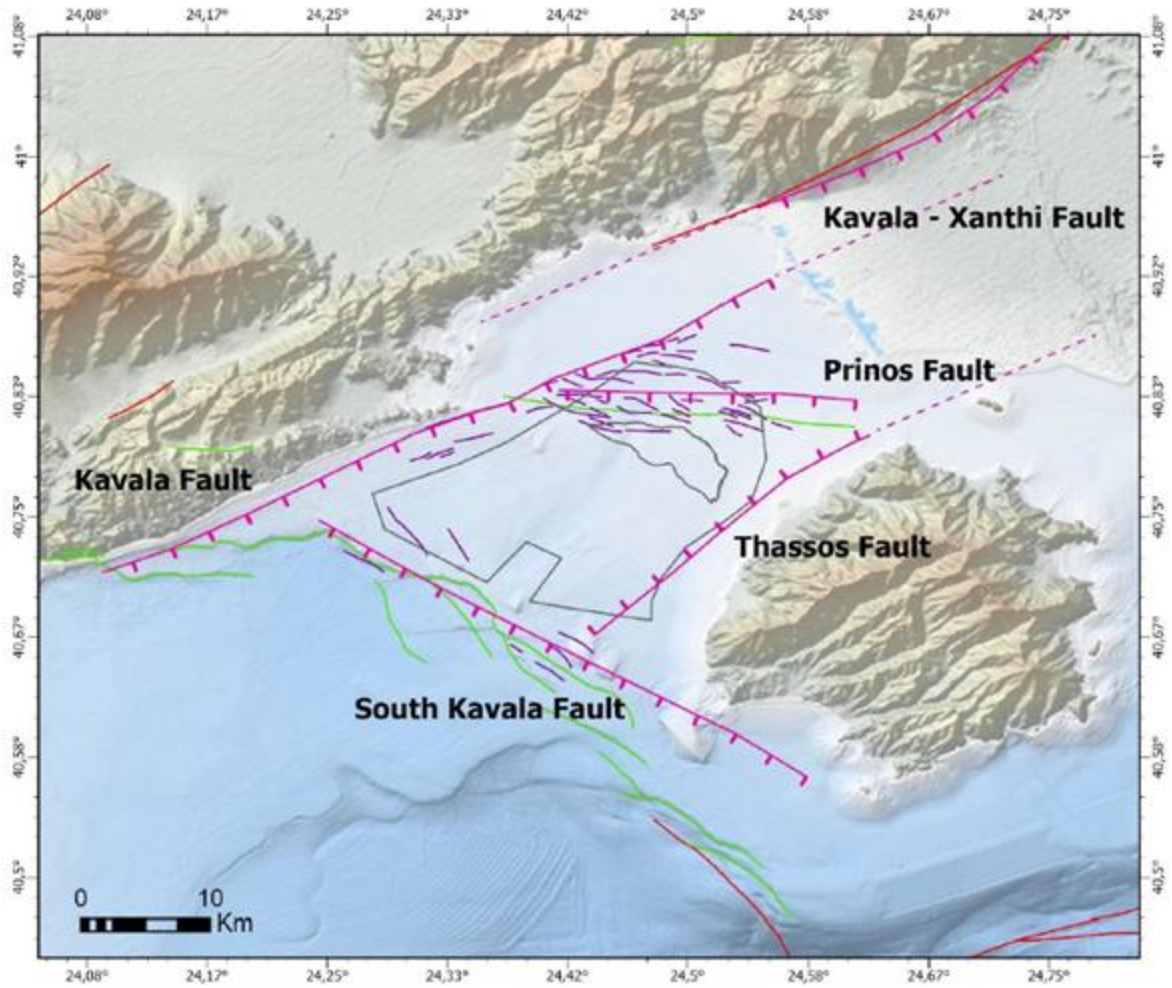
Table6 –17 : Active faults within the wider study area

No	Fault name	Address	Dip-Direction	Dip (°)	Kinematics
1	South Kavala	NW-SE	SSW	60	Normal
2	Mid - Prinos	A-D	S	80	Normal
3	Kavala	NW-SE	SE	45	Sliding
4	Thasos	NW-SE	NW	6	Normal
5	Kavala - Xanthi	NW-SE	SE	6	Sliding

(Source: Seismotectonic Investigation of Kavala Area, NOA – ENERGEAN SA, October 2023)

[58] Seismotectonic Investigation of Kavala Area – Geometry and Kinematics of Active Structural Elements Investigation based on Seismological, Geological and Geodetic Data (Deliverable D1: Technical Report-Database – Catalogue of Revised Seismic Events 2008-2023. Deliverable D5: Active Fault Map and report). NOA – ENERGEAN SA, October 2023.

The fault model in the immediate vicinity of the Project (see **Figure** below) includes the above five (5) main fault zones.



(Source: Seismotectonic Investigation of Kavala Area, NOA – Energean SA, October 2023)

6 –39 : Relief map and active faults in the Kavala-Prinos area[59]

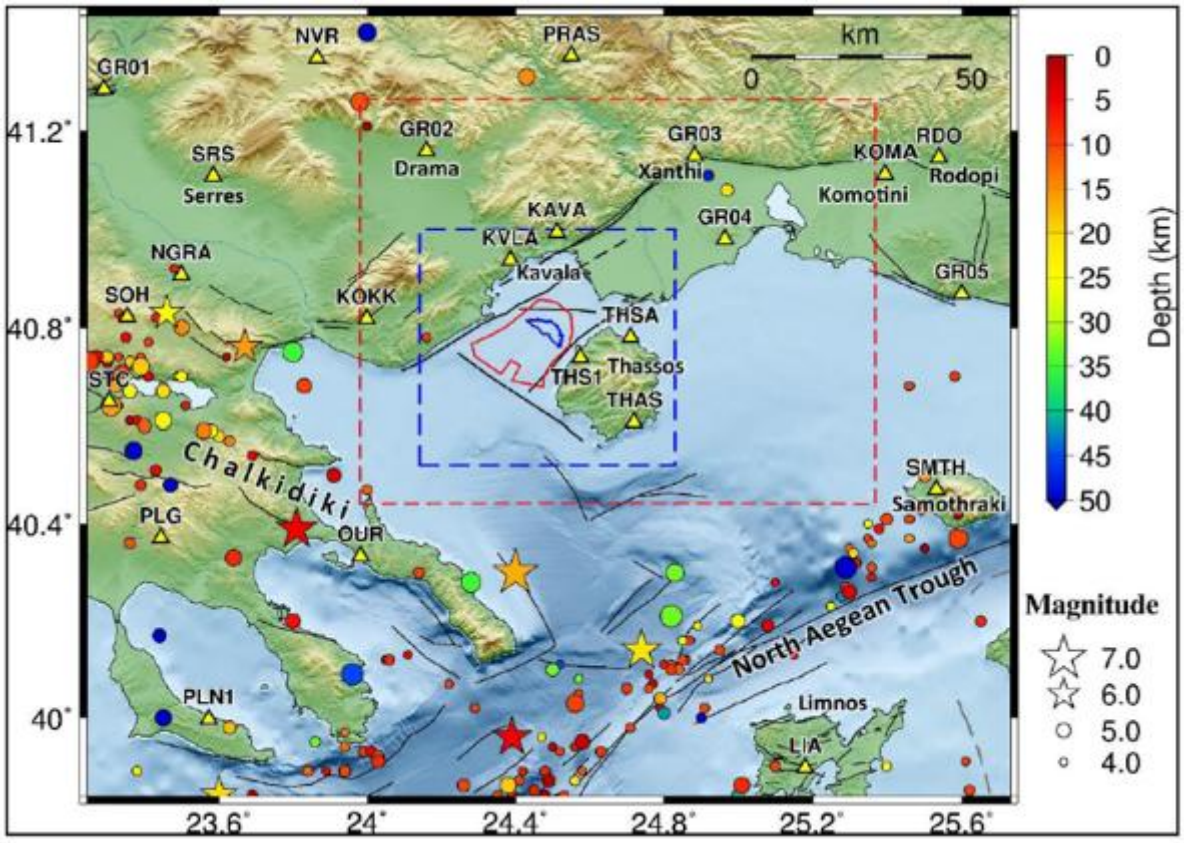
Based on the available data from the Geodynamic Institute of the National Observatory of Athens, the following table presents the most significant seismic events recorded in the wider area, within a radius of approximately 50km (or more) from the Project under study during the years 2016-2023. Based on the available data, the closest earthquake to the activity under study occurred on 08/12/2017 with an epicenter 28.3 m northwest of Serres and a magnitude of 3.8 on the Richter scale.

[59] Fault colors as follows: red-NOAFAULTS, green-IGME (YPO-THER project, Ioakeim et al. 2016), magenta & violet-ENERGEAN SA. The solid dark gray polygons indicate the storage complex and CO2 storage site.

Table6 –18 : Significant seismic events in the wider study area for the years 2016-2023

Time of occurrence	Epicenter	Latitude	Longitude	Depth (km)	Size
08/10/2016	11.2 km WNW of Kilkis	40.9518	22.7482	13	3.7
18/11/2016	11.5 km W of Kilkis	40.9907	22.7342	11	4.7
16/11/2016	10.9 km E of Kilkis	40.9737	22.7430	11	4
10/11/2016	9.6 km WNW of Kilkis	40.9630	22.7631	10	4.4
08/12/2017	28.3 km NW of Serres	41.2958	23.3582	10	3.8
07/04/2017	50.3 km SSW of Polygyros	39.9538	23.6568	12	4
25/06/2018	31.5 km ENE of Thessaloniki	40.7120	23.3049	9	3.7
25/06/2018	32.7 km ENE of Thessaloniki	40.7065	23.3222	11	4.1
21/04/2018	53.7 km SW of Karyes	39.9366	23.7703	13	3.9
21/04/2018	54.5 km SW of Karyes	39.9441	23.7496	13	4.7
16/01/2022	28.1 km N of Karyes	39.9979	24.2762	8	4.5
16/01/2022	31.0 km SSW of Karyes	39.9787	24.3355	8	4.3
16/01/2022	32.2 km SSW of Karyes	39.9693	24.3428	7	4
16/01/2022	32.8 km SSW of Karyes	39.9628	24.3354	8	5.4
07/02/2023	22.3 km SSW of Polygyros	40.1832	23.5161	8	4

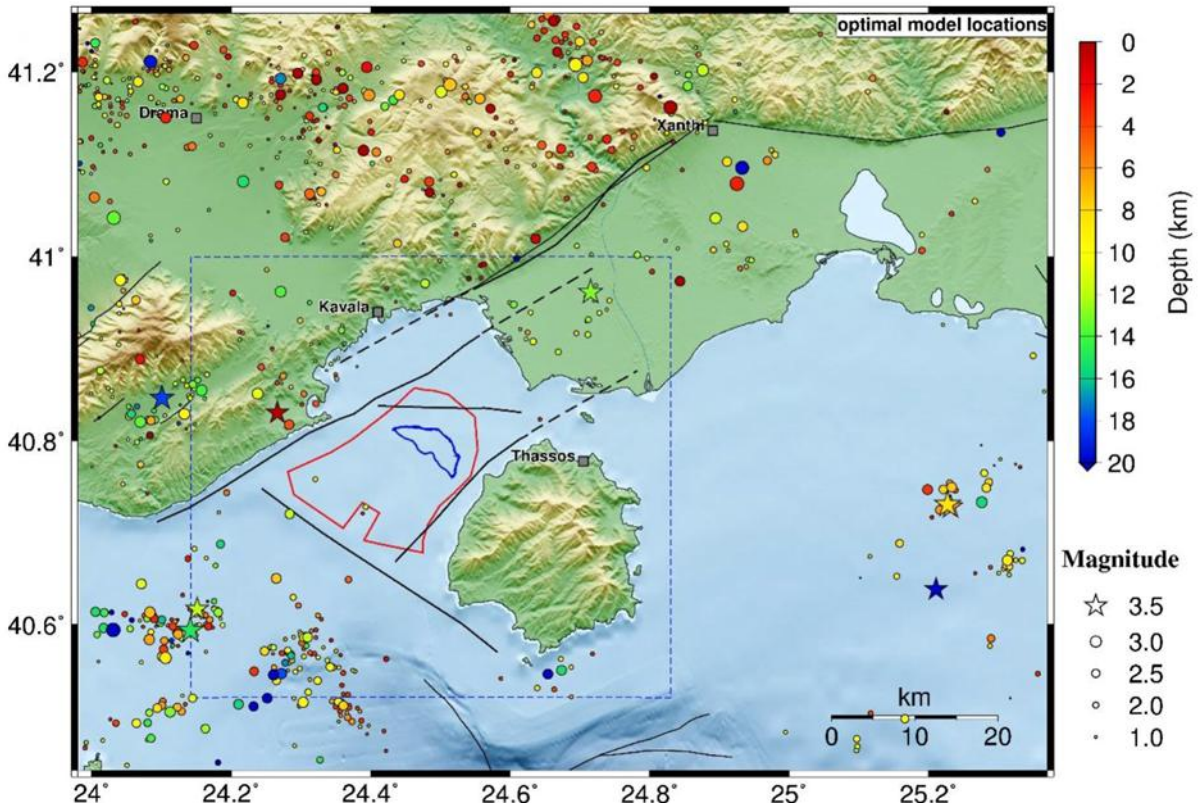
The following **figure** shows the seismicity of the study area for the **years 1900-2009**. It includes the offshore area of Prinos, Kavala, and the surrounding land areas (blue dotted rectangle), the seismological stations (yellow triangles), and the wider study area (red rectangle). The color of the epicenters corresponds to the focal depth. Events with M≥6.0 are depicted as stars. The fault lines (in black) are derived from the NOAfaults v5.0 database (Ganas et al., 2013; Ganas, 2023) and Energean SA's internal report. The solid red and blue polygons indicate the storage complex and the $CO_{(2)}$storage site,respectively.



(Source: List of seismic events 1900-2009, Makropoulos et.al 2012)

6 –40 : Seismicity in the wider study area for the years 1900–2009

The following **figure** shows the seismicity of the study area for the years **2008-2023**. The color of the epicenters corresponds to the focal depth. Events with M≥3.5 are shown as stars. The fault lines (in black) are taken from the NOAfaults v5.0 database (Ganas et al., 2013; Ganas, 2023) and from Energean SA's internal report. The solid red and blue polygons indicate the storage complex and the *CO(2)*storage area,respectively.



(Source: Seismotectonic Investigation of Kavala Area, NOA – Energean SA, October 2023)

6 –41 : Seismicity in the immediate study area for the years 2016–2023

As shown in the above **Figures**, seismicity in the immediate study area is very limited, with earthquakes mostly located at the boundaries of the wider Project area.

6.5 WATER ENVIRONMENT

6.5.1 Water Districts - Drainage Basins

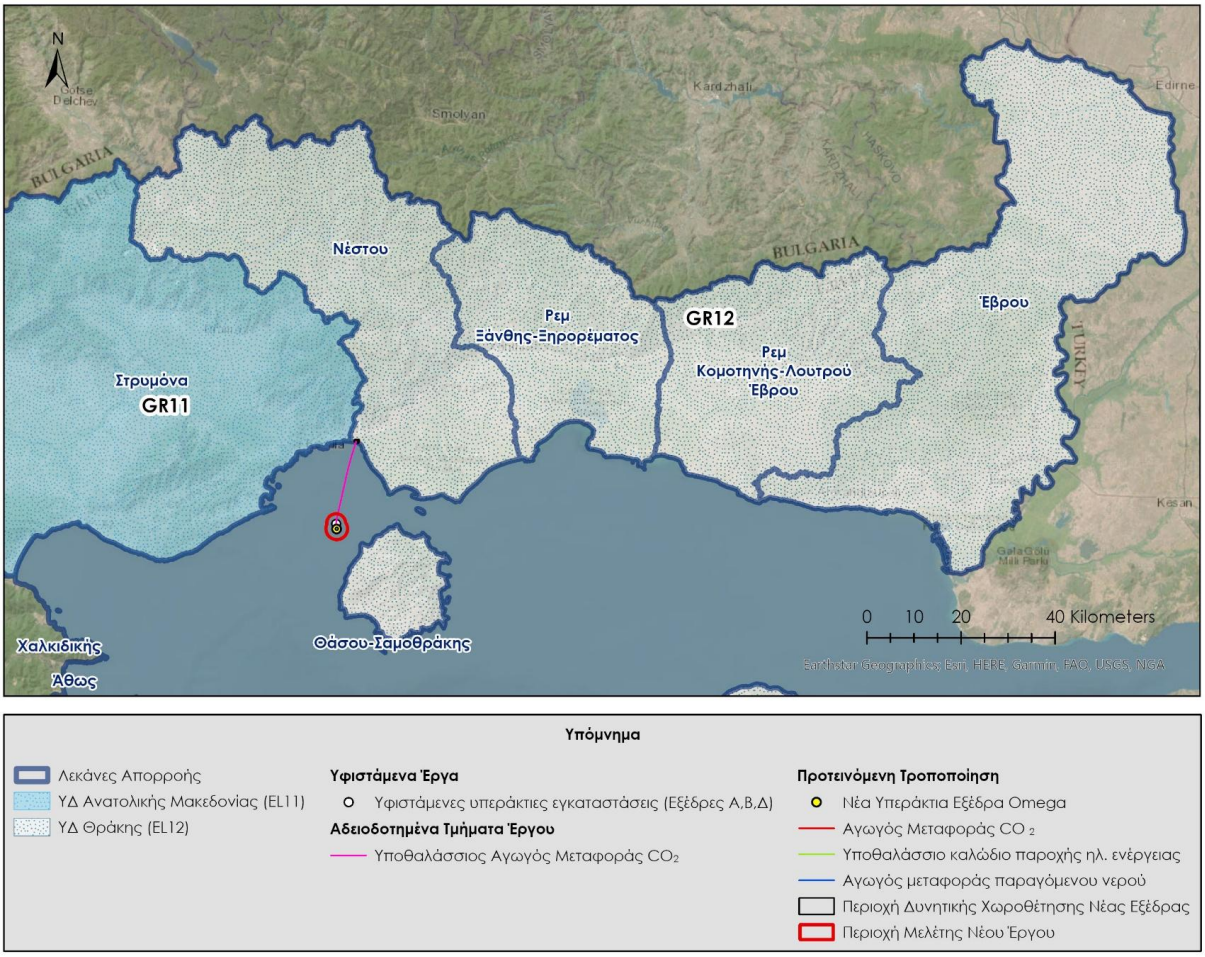
The study area of the licensed project falls within the Water Districts (WD) of Eastern Macedonia (EL11) and Thrace (EL12), for which River Basin Management Plans (RBMP) have been drawn up in accordance with the specifications of Directive 2000/60/EC, pursuant to Law 3199/2003 and Presidential Decree 51/2007, and have been approved by Decision 1005/12-09-2013 of the National Water Committee.

The2ndRevision of the River Basin Management Plan for the Eastern Macedonia Water District (EL 11) was approved and published in accordance with Government Gazette A 82/12.06.2024, while the 2nd Revision of the River Basin Management Plan for the Thrace Water District (EL 12) was approved and published in accordance with Government Gazette A 82/12.06.2024.e Revision of the Thrace Water District (EL 12) River Basin Management Plan was approved and published in accordance with Government Gazette A 81/12.06.2024.

The Eastern Macedonia Water District (EL11) extends geographically across Central and Eastern Macedonia. It borders the Thrace Water District (EL12) to the east and the Central Macedonia Water District (EL10). The total area of the district is 7,320 km(2) ·From an administrative point of view, this area includes, in whole or in part, the Regional Units of Serres, Thessaloniki, Kilkis, Kavala, and Drama. It includes one (1) unique river basin, the Strymon River Basin (EL1106), in accordance with Decision No. 706/2010 (Government Gazette 1383/B/2.9.2010) of the National Water Committee.

The Thrace Water District (EL12) extends north of the Greek-Bulgarian border and the watershed of the Nestos-Ochyros basins, east of the Greek-Turkish border - Turkey border line to the Gulf of Ainos, west of the watershed of the Nestos-Ochyros, Nestos-Strymonas, Nestos-Nea Karvali streams and the watershed of the coastal streams of Chrysoupoli to the Gulf of Kavala. The Thrace Water District includes five (5) river basins, those of Nestos (EL1207), Xanthi – Xeroremata (EL1208), the Komotini – Loutro Evrou (EL1209), Evros (EL1210) and Thasos – Samothraki (EL1242) river basins, in accordance with Decision No. 706/2010 (Government Gazette 1383/B/2.9.2010) of the National Water Committee.

The following **figure** shows the location, boundaries, and main drainage basins of the Water Districts of Eastern Macedonia (EL 11) and Eastern Macedonia and Thrace (EL 12).



(Source: 2η Revision of Drainage Basin Plans (SDLAP) for Eastern Macedonia (EL 11) and Thrace (EL 12), 2024)

Figure6 –42 : Location, boundaries, and main basins of the Water Districts of Eastern Macedonia (EL 11) and Thrace (EL 12)

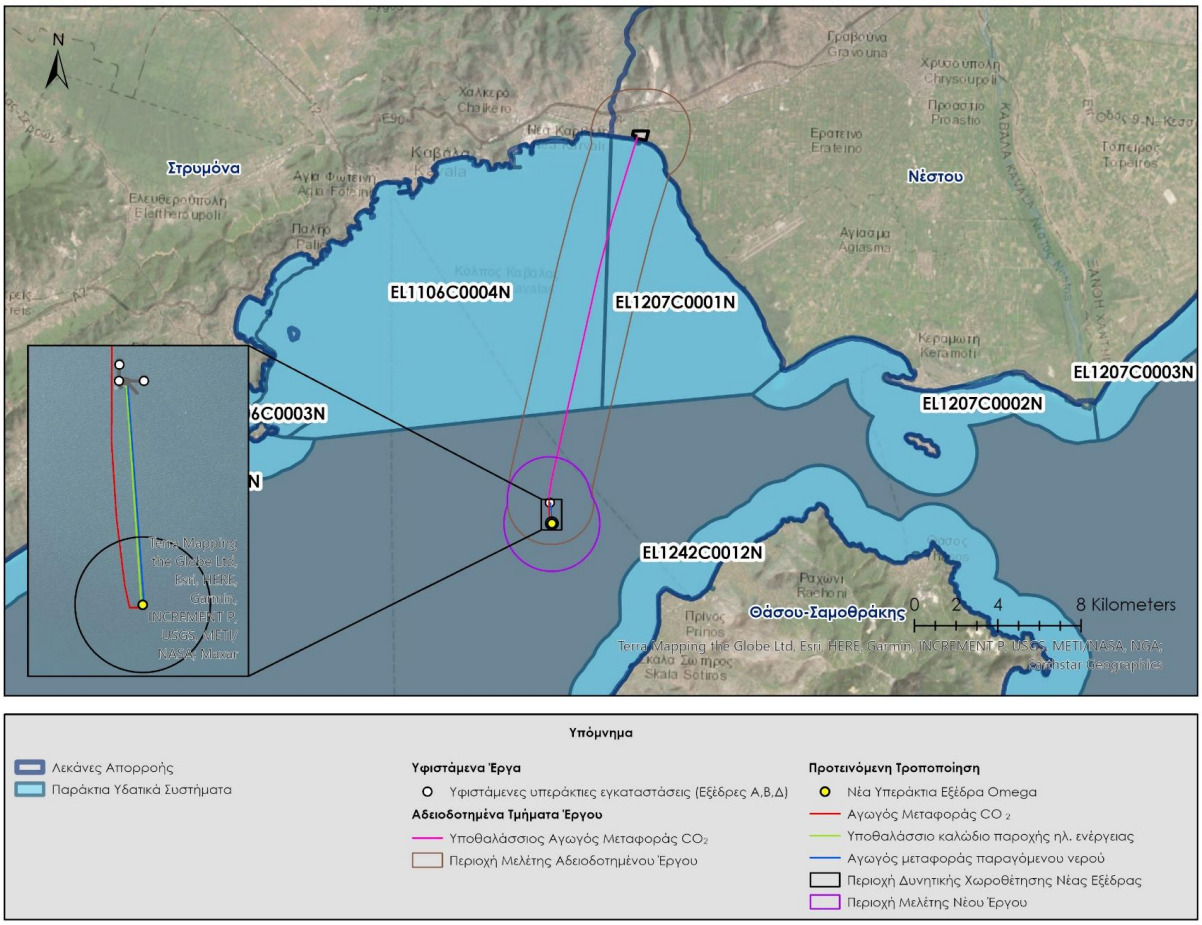
6.5.2 Coastal Water Systems

According to the 2nd Revision of the SDAPs of the Water Districts of Thrace and Eastern Macedonia (EGY, 2024), three (3) coastal water systems are recorded in the Nestos LAP, while four (4) are recorded in the Strymonas LAP. The following coastal water systems are located in the wider area of the Project: EL1106C0004N "Gulf of Kavala-Western" and EL1207C0001N "Gulf of Kavala-Eastern" and PYS EL242C0012N "Thasos Coast," the characteristics of which are summarized in **the** following **table.** The study area, and specifically part of the proposed route of the project pipeline, falls within two coastal water bodies of the Nestos and Strymonas river basins. Specifically, it is located within the coastal water body of the Western Gulf of Kavala (EL1106C0004N) and the coastal water body of the Eastern Gulf of Kavala (EL1207C0001N).

Table6 –19 : Coastal water bodies in the project area

Water body code	Water body name	LAP	Area (km²)	Distance from the nearest boundary of the Project study area
EL1106C0004N	Western Gulf of Kavala	LAP STRIMONA (EL1106)	183.16	~6km
EL1207C0001N	Eastern Gulf of Kavala	LAP NESTOS (EL1207)	69.55	~6km
EL12242C0012N	Thasos Coast	LAP THASOS - SAMOTHRAKI (EL1242)	**198.30**	**~4 km**

(Source: 2nd Revision of the River Basin Management Plans (RBMP) for Eastern Macedonia (EL11) and Thrace (EL12), 2024)



(Source: 2nd Revision of the River Basin Management Plans (RBMP) for Eastern Macedonia (EL11) and Thrace (EL12), 2024)

6 –43 : Coastal water systems located near the Project

6.5.3 Coastal Water Quality

According to the 2nd Revision of the SDAP for the Water Districts of Thrace and Eastern Macedonia, the quality of coastal water systems refers to their ecological and chemical status. The following **table** presents the coastal water bodies of the river basins located near the proposed amendment, as well as their ecological and chemical status, as described in the SDAPs.

Table6 –20 : Quality of coastal water systems near the proposed amendment

Water system category	WS code	WS Name	Drainage basin	Ecological status/potential	Chemical status	Overall status
Coastal water systems	EL1242C0012N	Thasos coast	THASOS - SAMOTHRAKI (EL1242)	High	Good	High
	EL1207C0001N	Eastern Gulf of Kavala	NESTOS (EL1207)	Moderate	Good	Moderate
	EL1106C0004N	Western Gulf of Kavala	STRYMONA (EL1106)	Moderate	Good	Moderate

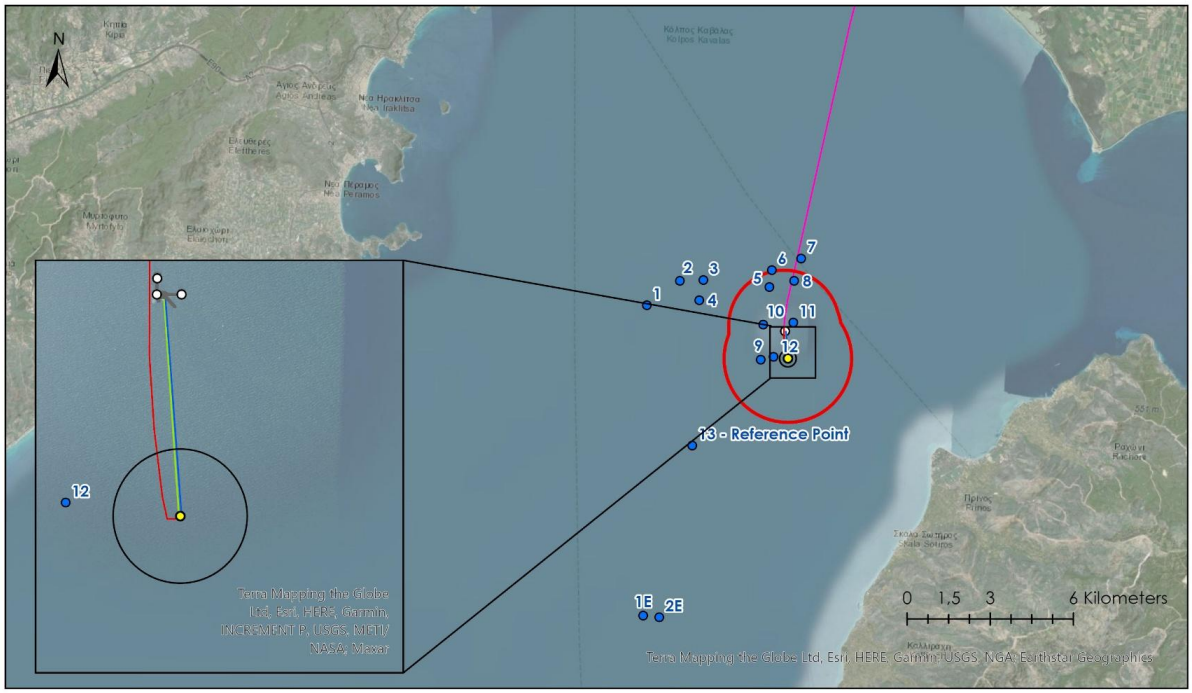
(Source: 2η Revision of the River Basin Management Plans (RBMP) for Eastern Macedonia (EL11) and Thrace (EL12), 2024)

With regard to **the quality of coastal water systems** in the wider area of the proposed amendment, an LDK study team took seawater samples at six (6) points in the Gulf of Kavala in November 2023. More specifically, these samples were taken and analyzed as part of the 2023 Annual Environmental Monitoring Report (EPM 2023), which concerns the implementation of the environmental control program for the Prinos Offshore Development, in accordance with the requirements of the Environmental Terms Approval Decision (ETAD) 8413/24.04.2018/YPEN.

The following **Table** and **Figure** show the total number of sampling stations investigated for seawater quality.

Table6 –21 : Coordinates of all seawater sampling stations in the Gulf of Kavala

Sampling stations acquisition (SD)	X EGSA 87	Y ETRS87	X WGS 84 (degrees)	Y WGS 84 (degrees)
9	541090.91	4515458.52	24.487037	40.789089
11	542,226.66	4516832.25	24.500591	40.801407
12	541,560.00	4515575.95	24.492604	40.790124
1	537,168.80	4506094.93	24.439994	40.704926
2	537,760.77	4506056.01	24.447000	40.704548
Reference Station	538,732.58	4512285.73	24.458888	40.760623



Υπόμνημα

- Σημεία δειγματοληψίας

Υφιστάμενα Έργα

- Υφιστάμενες υπεράκτιες εγκαταστάσεις (Εξέδρες Α,Β,Δ)

Αδειοδοτημένα Τμήματα Έργου

- Υποθαλάσσιος Αγωγός Μεταφοράς CO_2

Προτεινόμενη Τροποποίηση

- Νέα Υπεράκτια Εξέδρα Omega
- Αγωγός Μεταφοράς CO_2
- Υποθαλάσσιο καλώδιο παροχής ηλ. ενέργειας
- Αγωγός μεταφοράς παραγόμενου νερού
- Περιοχή Δυνητικής Χωροθέτησης Νέας Εξέδρας
- Περιοχή Μελέτης Νέου Έργου

6 –44 : Sampling points for water quality analysis (November 2023)

The results of the chemical analyses per sampling point are presented in detail for each point in the following tables.

Table6 –22 : Results of analyses of general physicochemical parameters in seawater samples taken at a depth of 10 m from the surface

Parameter	Method	Quality limits of Annex I of Joint Ministerial Decision No. 51354/2641/ E103/2010, Ministerial Decision No. 170766/2016 [60]	Unit of measurement	SD 9 SW R1	SD 9 SW R2	SD 11 SW R1	SD 11 SW R2	SD 12 SW R1	SD 12 SW R2	SD 1E SW R2	SD 1E SW R1	SD 2E SW R1	SD 2E SW R2	SD REF SW R1	SD REF SW R2
Depth			m	10		10					10	10		10	
pH				8.3		8.3					8.18	8.31		8.19	
Temperature			°C	19.7		20.8					20.5	19.4		21.8	
Laboratory measurements Nutrients															
Ammonia	APHA 4500-NH3 F		mg/l	0.13	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Sulfates	0.628 Ion Chromatography		mg/l	29	2900	28	28	3000	2900	3000	2900	2900	2900	2900	3100
Nitrous	Merck Spectr/t 114776		mg/l	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	0.02	0.02v	0.03	0.02	<0.02
Nitrates	Merck Spectr/t 114776		mg/l	12.2	13.8	9	9	11.5	10.4	8.7	10.6	12	8.2	12	12.9

60. Amendment of Joint Ministerial Decision No. 51354/2641/E103/2010 (B' 1909), in compliance with the provisions of Directive 2013/39/EU "amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy" of the European Parliament and of the Council of 12 August 2013 and other related provisions".

Parameter	Method	Quality limits of Annex I of Joint Ministerial Decision No. 51354/2641/ E103/2010, Ministerial Decision No. 170766/2016 [60]	Unit of measurement	SD 9 SW R1	SD 9 SW R2	SD 11 SW R1	SD 11 SW R2	SD 12 SW R1	SD 12 SW R2	SD 1E SW R2	SD 1E SW R1	SD 2E SW R1	SD 2E SW R2	SD REF SW R1	SD REF SW R2
Phosphates	Merck Spectr/t 114776		mg/l	<0.04	0.72	<0.04	<0.04	0.1	0.05	<0.04	<0.04	<0.04	<0.04	0.28	0.67
Laboratory measurements PAHs															
Benzo[a]pyrene	Lab. method based on EPA 525.3	0.020 μg/l	μg / l	ND	0.0052	ND	ND	ND	ND	ND	<0.003	ND	ND	ND	ND
Benzo[b]-fluoroanthene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	0.0065	ND	<0.005	ND	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo[K]-fluoro-nthene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	<0.005	ND	ND	ND	ND	<0.005	ND	ND	<0.005	<0.005	ND
Benzo-[g,h,i]perylene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	<0.005	ND	<0.005	ND	ND	<0.005	ND	ND	ND	ND	ND
Indeno(1,2,3-c,d)pyrene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	<0.005	ND	ND	ND	ND	<0.005	ND	ND	ND	ND	ND
Acena-phthene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acena-phthylene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	<0.01	ND	ND	ND	<0.01	<0.01	<0.01	<0.01	<0.01	ND	<0.01	<0.01
Anthracene	Lab. method based on EPA 525.3	0.020 μg/l	μg / l	ND	<0.01	ND	ND	<0.01	ND	ND	ND	<0.01	ND	ND	ND
Benzo[a]-anthracene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	<0.01	<0.01	<0.01	<0.01	ND	<0.01	ND	<0.01	ND	<0.01	<0.01	ND

Parameter	Method	Quality limits of Annex I of Joint Ministerial Decision No. 51354/2641/ E103/2010, Ministerial Decision No. 170766/2016 [60]	Unit of measurement	SD 9 SW R1	SD 9 SW R2	SD 11 SW R1	SD 11 SW R2	SD 12 SW R1	SD 12 SW R2	SD 1E SW R2	SD 1E SW R1	SD 2E SW R1	SD 2E SW R2	SD REF SW R1	SD REF SW R2
Chrysene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	<0.01	<0.01	ND	ND	<0.01	<0.01	ND	ND	ND	ND	ND
Dibenzo[a,h] anthracene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	ND	ND	ND	ND	ND	<0.005	ND	ND	ND	ND	ND
Fluoroanthene	Lab. method based on EPA 525.3	0.030 μg/l	μg / l	ND	0.018	<0.01	ND	ND	<0.01	ND	ND	ND	<0.01	<0.01	ND
Fluorene	Lab. method based on EPA 525.3	0.020 μg/l	μg / l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphtha-lene	Lab. method based on EPA 525.3	0.100 μg/l	μg / l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	Lab. method based on EPA 525.3	0.060 μg/l	μg / l	ND	0.016	<0.01	ND	ND	<0.01	ND	ND	ND	<0.01	<0.01	ND
Phenanthrene	Lab. method based on EPA 525.3	0.030 μg/l	μg / l	ND	<0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

*The quality limit refers to the Maximum Permissible Concentration as defined for the Netherlands through the Staatscourant report, The Netherlands, June 2000

** Non-accredited test according to ISO 17025, No. 154 ESYD.

*** The maximum legal limits are described and explained in terms of their proper use in Directives 98/83/EC 3-11-1998 and 2013/51/EURATOM 22-10-2013 amendments thereto and their corresponding adaptations in Greek legislation

Amendment of Joint Ministerial Decision No. 51354/2641/E103/2010 (B' 1909), in compliance with the provisions of Directive 2013/39/EU "amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy" of the European Parliament and of the Council of 12 August 2013 and other related provisions'.

R': REPLICATE (REPEAT SAMPLE)

ND: NOT DETECTED
SD: SAMPLING STATION

Table6 -23 : Results of analyses of general physicochemical parameters in seawater samples taken from the seabed

Parameter	Method	Quality limits of Annex I of Joint Ministerial Decision No. 51354/2641/E103/2010, Ministerial Decision No. 170766/2016[61]	Unit of measurement	SD 9 SW R1	SD 9 SW R2	SD 11 SW R1	SD 11 SW R2	SD 12 SW R1	SD 12 SW R2	SD 1E SW R2	SD 1E SW R1	SD 2E SW R1	SD 2E SW R2	SD REF SW R1	SD REF SW R2
Depth			m	25			20				35	35		25	
pH			pH units	8.23			8.29				8.14	8.22		8.18	
Temperature			°C	21			19.9				21.1	21.3		22.8	
Laboratory measurements Nutrients															
Ammonia	APHA 4500-NH3 F		mg/l	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.12	<0.025	<0.025	0.27	<0.025
Sulfates	0.628 Ion Chromatography		mg/l	30	3000	3000	290	3100	3000	3000	3000	3100	3100	3000	2900
Nitrous	Merck Spectr/t 114776		mg/l	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.02	0.02	0.03	<0.02	0.03	0.02
Nitrates	Merck Spectr/t 114776		mg/l	8.1	8.4	9.4	10.8	10.7	11	9.4	12.9	9.3	8.1	11.1	5.6
Phosphates	Merck Spectr/t 114776		mg/l	<0.04	<0.04	<0.04	<0.04	0.22	<0.04	<0.04	0	0.05	<0.04	<0.04	<0.04
Laboratory measurements PAHs															

[61], Amendment of Joint Ministerial Decision No. 51354/2641/E103/2010 (B' 1909), in compliance with the provisions of Directive 2013/39/EU "amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy" of the European Parliament and of the Council of 12 August 2013 and other related provisions".

Parameter	Method	Quality limits of Annex I of Joint Ministerial Decision No. 51354/2641/E103/2010, Ministerial Decision No. 170766/2016[61]	Unit of measurement	SD 9 SW R1	SD 9 SW R2	SD 11 SW R1	SD 11 SW R2	SD 12 SW R1	SD 12 SW R2	SD 1E SW R2	SD 1E SW R1	SD 2E SW R1	SD 2E SW R2	SD REF SW R1	SD REF SW R2
Benzo[a]pyrene	Lab. method based on EPA 525.3	0.020 μg/l	μg / l	ND	ND	<0.003	ND	ND	ND	ND	0.003	ND	0.005	ND	ND
Benzo[b]fluoranthene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	<0.005	<0.005	ND	<0.005	ND	ND	<0.005	<0.005	0.007	<0.005	<0.005
Benzo[K]fluoranthene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	ND	<0.005	ND	ND	ND	<0.005	<0.005	ND	<0.005	<0.005	<0.005
Benzo[g,h,i]perylene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	<0.005	ND	<0.005	ND	ND	ND	ND	<0.005	ND	<0.005	ND	ND
Indeno (1,2,3,-c,d) pyrene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	ND	<0.005	ND	ND	ND	ND	<0.005	ND	<0.005	ND	ND
Acenaphthene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	<0.01	ND	<0.01	ND	<0.01	<0.01	ND	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	Lab. method based on EPA 525.3	0.020 μg/l	μg / l	ND	ND	<0.01	ND	ND	ND	<0.01	ND	ND	<0.01	<0.01	ND
Benzo[a]-anthracene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	ND	<0.01	ND	ND	ND	<0.01	<0.01	ND	<0.01	<0.01	ND

Parameter	Method	Quality limits of Annex I of Joint Ministerial Decision No. 51354/2641/E103/2010, Ministerial Decision No. 170766/2016[61]	Unit of measurement	SD 9 SW R1	SD 9 SW R2	SD 11 SW R1	SD 11 SW R2	SD 12 SW R1	SD 12 SW R2	SD 1E SW R2	SD 1E SW R1	SD 2E SW R1	SD 2E SW R2	SD REF SW R1	SD REF SW R2
Chrysene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	ND	<0.01	ND	ND	ND	<0.01	<0.01	ND	<0.01	ND	ND
Dibenzo[a,h]-anthracene	Lab. method based on EPA 525.3	0.010 μg/l	μg / l	ND	ND	<0.005	ND	ND	ND	ND	ND	ND	<0.005	ND	ND
Fluoranthene	Lab. method based on EPA 525.3	0.030 μg/l	μg / l	ND	ND	<0.01	ND	ND	ND	<0.01	<0.01	ND	0.013	ND	ND
Fluorene	Lab. method based on EPA 525.3	0.020 μg/l	μg / l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	Lab. method based on EPA 525.3	0.100 μg/l	μg / l	ND	<0.1	ND	ND	ND	<0.1	ND	ND	ND	ND	ND	ND
Pyrene	Lab. method based on EPA 525.3	0.060 μg/l	μg / l	ND	ND	<0.01	ND	ND	ND	<0.01	<0.01	ND	0.011	ND	ND
Phenanthrene	Lab. method based on EPA 525.3	0.030 μg/l	μg / l	ND	ND	ND	ND	ND	ND	<0.01	ND	ND	ND	ND	ND

*The quality limit refers to the Maximum Permissible Concentration as defined for the Netherlands through the Staatscourant report, The Netherlands, June 2000

** Non-accredited test according to ISO 17025, No. 154 ESYD.

*** The maximum legal limits are described and explained in terms of their proper use in Directives 98/83/EC 3-11-1998 and 2013/51/EURATOM 22-10-2013 amendments thereto and their corresponding adaptations in Greek legislation

Amendment of Joint Ministerial Decision No. 51354/2641/E103/2010 (B' 1909), in compliance with the provisions of Directive 2013/39/EU "amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy" of the European Parliament and of the Council of 12 August 2013 and other related provisions'.

R': REPLICATE

ND: NOT DETECTED Not quantified at the method detection limit.

SD: SAMPLING STATION

The above chemical analysis results were evaluated and compared based on the quality standards referred to in Greek legislation, specifically Joint Ministerial Decision 51354/2641/E103/2010 (Government Gazette 1090/B/08.12.2010). Ministerial Decision No. Υ.Α. ΗΠ 51354/2641/E103/2010 (Government Gazette 1090/B/08.12.2010), as amended by Ministerial Decision No. 170766/22.01.2016 (Government Gazette 69/B/22.1.2016), sets out the **Environmental Quality Standards (EQS)** for the concentrations of certain priority pollutants and substances in surface waters, in accordance with the provisions of Directive 2008/105/ EC of the European Parliament and of the Council of 16 December 2008 *"on environmental quality standards in the field of water policy and amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC and 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council,"* as well as on the concentrations of specific pollutants in inland surface waters and other provisions.

With regard to the concentrations of PAHs, in all repeat samples of seawater, including samples from the Reference Station, these are below the detection limit (<0.005 mg/L) as well as lower than the EU and national thresholds for good environmental status of the marine environment (Annex I of Joint Ministerial Decision No. 51354/2641/E103/2010, Ministerial Decision No. 170766/2016). Similar concentrations were recorded in the 2021 sampling (within the framework of the 2020 EPP), where the concentrations of PAHs in the seawater samples were also below the detection limit. Therefore, **there is no evidence of pollution of the marine environment in the area under consideration from the operation of the existing Prinos complex project by PAHs.**

With regard to nutrient concentrations, it should be noted that there are currently no statutory limits in Greek legislation. The interpretation of the results of the laboratory analyses of nutrients was based on scientific articles presenting corresponding results of physicochemical analyses of seawater samples collected in the North Aegean (Zak et al. 2021, Pavlidou & Georgopoulos 2001, and Souvermezoglou et al. 2014). More specifically, according to Zak et al. (2021), the expected concentrations of sulfates (SO42-) in seawater range from 2,700 mg/L. Similar results were recorded in measurements taken from repeated seawater samples at all depths, with average values ranging from 2,900 mg/L to 3,008 mg/L.

The concentrations of ammonia ($_{NH3}$), phosphate (PO43-), nitrite ($NO^{(2)-}$) and nitrate ($NO^{(3)-}$) concentrations were similar in all repeat samples, including those from the Reference Station, as they are consistent with the concentrations recorded in samples taken over the last 30 years in Greece, and in particular in the North Aegean, according to Souvermezoglou et al. 2014.

In conclusion, as confirmed by the above data and those included in 2^{h} Revision of the SDAPs of the Thrace and Eastern Macedonia River Basin Districts, it is estimated that **the ecological status and chemical status of the surface waters examined are assessed as "good."**

6.5.4 Bathing waters

According to the **Bathing Water Identity Register** required by European Directive 2006/7/EC, the following is indicative information on bathing beaches located near the area. The bathing water profile provides information on the physical and geographical conditions of the coastal area, the hydrological characteristics of the bathing waters, and an assessment of the potential pollution risks in the area. The following **table**

presents the results of the bathing water assessment, as described in the Greek Bathing Water Identity Register of the National General Secretariat for Water.

Table6 –24 : Bathing water quality from 2019 to 2022 in the wider study area

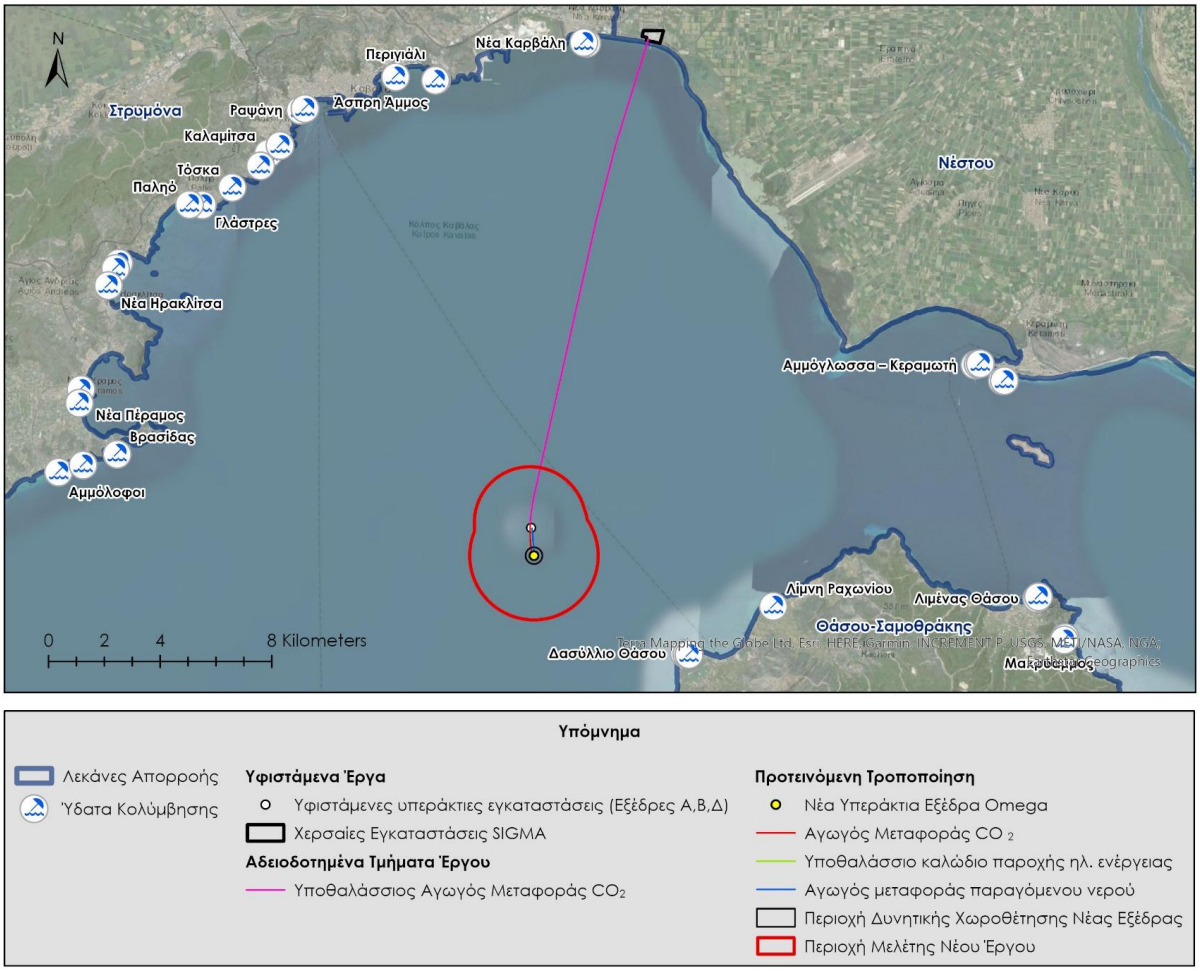
Monitoring Station Code	Monitoring Station Name	2019 Results	2020 results	2021 results	2022 Results
ELBW129011017	Lake Rachoniou	Good	Excellent	Excellent	Excellent
ELBW129011018	Thasos Dasyllio 1	Excellent	Excellent	Excellent	Excellent
ELBW129011025	Thasos Dasyllio 1	Excellent	Excellent	Excellent	Excellent
ELBW129011014	Limenaria	Excellent	Excellent	Excellent	Excellent
ELBW119012008	Nea Karvali	Excellent	Excellent	Excellent	Excellent
ELBW119012011	White Sand	Excellent	Excellent	Excellent	Excellent
ELBW119012009	Perigiali	Excellent	Excellent	Excellent	Excellent
ELBW119012013	Rapsani 2	Excellent	Excellent	Excellent	Adequate
ELBW119012005	Rapsani 1	Good	Excellent	Excellent	Adequate
ELBW119012006	Kalamitsa	Good	Excellent	Excellent	Excellent
ELBW119012007	Batis	Excellent	Excellent	Excellent	Excellent
ELBW119012010	Tosca	Excellent	Excellent	Excellent	Excellent
ELBW119012004	Old	Excellent	Excellent	Excellent	Excellent
ELBW119014013	Nea Heraklitsa	Excellent	Excellent	Excellent	Excellent
ELBW119014015	Nea Peramos	Excellent	Excellent	Excellent	Excellent
ELBW119014016	Sand dunes	Excellent	Excellent	Excellent	Excellent
ELBW119014018	Ocean View	Excellent	Excellent	Excellent	Excellent

(Source: Register of bathing water identities in Greece, https://bathingwaterprofiles.gr/map)

No bathing waters are located within the study area. The closest coastline to the potential location of the new Omega platform is the coastline named "Dasyllio Thasou" with code "ELBW129011025," approximately 6.5 km away. This beach received the Blue Flag award for 2023, meeting criteria that, in addition to bathing water quality and beach cleanliness, relate to beach organization, visitor safety, and nature protection.

Additional pressures relate to the mooring area for small private boats located approximately 80 m from the swimming area, the fishing channels of adjacent aquaculture and the mouth of the Aspropotamos stream, which is a continuous flow and potentially carries pollutant load from the wider area, which is characterised by agricultural activity.

The following **figure** shows the bathing waters located in the wider area of the proposed amendment.



(Source: Register of bathing water identities in Greece, https://bathingwaterprofiles.gr/map)

Figure6 –45 : Bathing waters near the Project

6.6 ATMOSPHERIC ENVIRONMENT - AIR QUALITY

Air pollution is defined as the presence in the atmosphere of any substances in concentrations or for durations that may cause adverse effects on health, living organisms, and ecosystems, and generally render the environment unsuitable for its desired uses. Under certain conditions, air pollution can reach levels that can create undesirable living conditions.

The Ministry of Environment and Energy (Air Quality Department) established the National Air Pollution Monitoring Network (EDPAR) in 2001. The Air Quality Department operates the network of stations in the Attica region and one station in Aliartos, Boeotia, for the needs of the Transboundary Pollution Transport Program. In the other regions, the stations are operated by the regional administrations. According to EDAPAR data and the Annual Air Quality Report (2022), the closest air pollution monitoring station to the study area and the only one in operation in the Region of Eastern Macedonia and Thrace is located in Kavala (WGS84 Projection System - Latitude: 40.93666 and Longitude: 24.412419, altitude 2 m). This station measures $SO_{(2)}$,$NO_{(x,)}$ CO, $O_{(3)}$,$PM_{(10)}$,$PM_{(2.5)}$,$C_{(6)}$ $H_{(6)}$.

The following table summarises the monthly averages of the pollutants measured at the Kavala-2 urban background station, as included in the Annual Air Quality Report (2022).

Table6 –25 : Measured pollutants at the Kavala-2 station (in μg/m3) for the year 2022

Pollutant	IAN	FEB	MAR	APR	MAY	JUL	JUL	AUG	SEP	OCT	NOV	DEC	Limit value
SO_2	3	3	5	5	4	2	3	3	7	8	7	8	125
NO	17	11	5	5	4	4	4	5	5	9	11	22	
NO_2	26	28	19	19	17	16	19	20	18	26	26	31	20
O_3	26	30			30	26					32	20	120
C_6 H_6			1.0	0.7	0	0.5	0.5	0.7	0.9	1.9	2.8	4.4	5

(Source: Annual report on air quality (Ministry of Environment and Energy, 2022)

Based on the above data and in comparison with the limit values, it is estimated that the concentrations of air pollutants in the wider area of the Project are low in relation to the established limits.

As part of the Annual Monitoring Report for the Prinos Offshore Development Project (2021), continuous monitoring of H_2 S and explosive mixtures were continuously monitored by the installed sensors throughout the year for the safety of the facility personnel. No exceedances of the concentrations of H_2 S and explosive mixtures were recorded.

Potential air quality impacts in the wider area of the proposed amendment could theoretically arise from various industrial facilities in the wider area, from the industrial and mining activities of Energean (onshore and offshore facilities), Greek Fertilizers and Chemicals ELFE S.A., activity at the port of Philippos B, as well as at the ports of Kavala and Keramoti, and road traffic (Egnatia Road, secondary connecting roads, and the urban road network of Kavala).

6.7 ENVIRONMENT

6.7.1 Airborne (atmospheric) noise

Noise pollution is defined as an unwanted sound or a sound that occurs at an inappropriate place and time. More specifically, noise is understood as a sound that is undesirable due to its effects on people and structures, which can cause fatigue or other malfunctions, as well as interfere with the perception and understanding of other sounds.

Noise is one of the most significant factors in the degradation of the environment and, consequently, of quality of life. The effects of noise on human health have been a key area of research and study for many years. Today, it has been sufficiently documented that the effects of noise on humans can be divided into physiological and psychological effects.

Noise can have negative effects on the following systems:

- **Humans**, ranging from simple annoyance to damage to health. The effect of emitted noise on the auditory system and, by extension, on the human environment is related to its effect on the human hearing system (temporary or permanent), its effect on the health of other human biological systems (e.g. nervous system) and the effect on human activities (e.g. performance and, more generally, attention to performing a task may increase or decrease depending on the noise level).
- The **man-made environment**, e.g. buildings, through the vibrations created by noise.
- **Pets and wild animals** and, more generally, various ecological systems, whose smooth functioning it disrupts (e.g., changing migration routes and driving animals away from their preferred feeding and breeding areas).

It should be noted that, according to the World Health Organization (WHO), on the one hand, "health" is not only considered to be the absence of disease but, more generally, physical and psychological well-being, and on the other hand, there is evidence of a biological mechanism whereby noise causes significant adverse effects on hearing in the form of temporary or permanent hearing loss.

The following three cases linking noise to health are now internationally recognized:

- Noise has an adverse effect on the human auditory system.
- Noise adversely affects mental and physical health, given its contribution to stress.
- Noise has a decisive impact on people who already suffer from an illness or abnormal physiology.

Certain segments of the population are more susceptible to higher noise levels, for example, people suffering from hypertension or mental health problems, etc. Finally, in addition to the above health effects, noise disturbance has an impact on an individual's performance and, by extension, corresponding adverse socio-economic effects.

Noise has an irregularly fluctuating sound pressure level. For this reason, indicators have been established that take this fact into account in order to describe noise disturbance.

It is natural that the criterion for whether noise is acceptable or not is related to people's reaction to noise or the effects of noise on human activities or health in general. Such criteria include annoyance, interference with conversation, disturbance of sleep, etc.

The current state of the acoustic environment in the wider area of the proposed amendment is moderate, given the industrial nature of the land part of the study area. The main sources of noise in the area are industrial noise from the facilities operating in the area (Energean Oil and Gas, Hellenic Fertilizers and Chemicals ELFE S.A., quarries), noise from activity at the commercial port of Filippos B, vehicle traffic on the road network in the area, including heavy vehicles, due to industrial activity, noise from maritime traffic and from typical urban activities in settlements in the area.

The operation of existing offshore facilities included in the study area is continuous and therefore there are no significant fluctuations in the level of noise produced. As part of the Annual Monitoring Report for the Prinos Offshore Development Project, noise measurements were taken at seven (7) points within the Gulf of Kavala in accordance with Directive 2002/49/EC of the European Parliament in September 2021. The index used to calculate the noise at the points where the measurements were taken is Lden, which is derived from the Lday, Levening, and Lday indices.

The index is calculated using the following equation:

$$Lden = 10\lg\frac{1}{24}(12 * 10^{\frac{Lday}{10}} + 4 * 10^{\frac{Levening+5}{10}} + 8 * 10^{\frac{Lnight+10}{10}})$$

Below is the **table** of measurements and calculations for the seven points in the area of the offshore facilities of Prinos, from September 6 to 10, 2021.

Figure6 –46 : Noise measurement locations, September 2021

Table6 –26 : Noise measurements

Location	Coordinate Y	Coordinate X	Lday	Levening	Lnight	Lden
1	40°48'20.37"N	24°26'15.87"E	40	42	41	47
3	40°48'51.86"N	24°27'41.92"N	41	44	42	49
10	40°48'1.87"N	24°29'16.11"N	47	44	42	50
11	40°48'5.06"N	24°30'2.13"E	45	46	41	49
12	40°47'24.45"N	24°29'33.38"N	44	40	42	48
1E	40°42'17.73"N	24°26'23.98"N	40	41	40	47
13	40°45'38.24"N	24°27'32.00"E	42	40	41	47

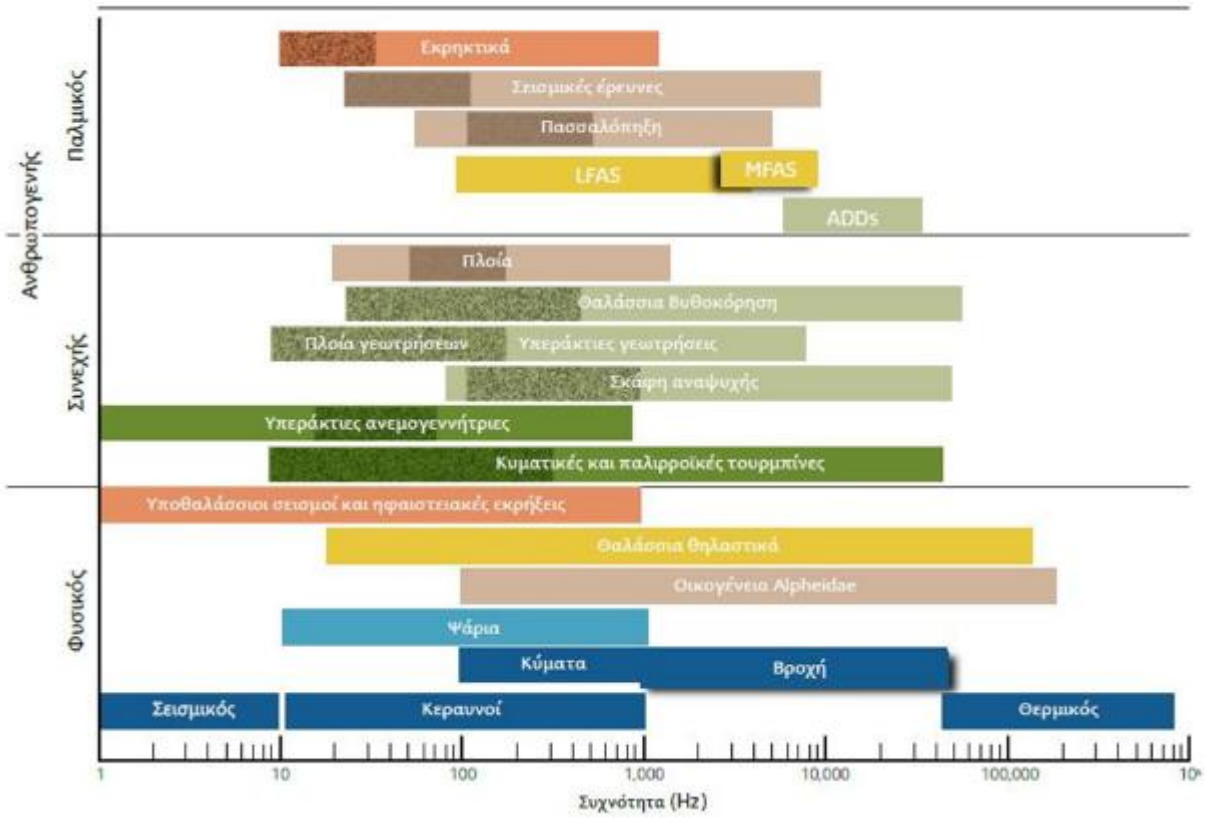
6.7.2 Subsea Noise

Anthropogenic underwater noise, which is officially classified as a source of marine environmental pollution, is recognized as a highly complex global issue that requires effective action (Prospathopoulos A., 2017). Anthropogenic underwater noise is divided into **pulsed** and **continuous/non-pulsed sound (environmental noise)** in the marine environment. Pulsed sounds are produced by offshore construction activities (e.g., cable and pipeline installation, offshore wind farms, oil rigs, port works, explosives, underwater excavations, etc.),

sonar (naval-military sonar, echo sounders - fishing sonar), seismic surveys (operation of sound devices to search for oil and natural gas deposits) and acoustic deterrent and harassment systems.

Continuous sounds are produced by the operation of offshore industrial facilities (e.g., oil rigs, dredging, drilling, wind turbines, etc.), maritime traffic (commercial shipping, fishing vessels, recreational boating and water sports, military vessels and coast guard activities, etc.) and offshore renewable energy infrastructure (tidal and wave energy, offshore wind farms, etc.).

The following **figure** shows the frequencies of anthropogenic (pulsed and continuous) and natural noise sources.



(Source: European Marine Board IVZW Future Science Brief 7 - Addressing underwater noise in Europe, 2021)

6 –47 : Frequencies of anthropogenic and natural noise sources

According to the above **figure**, frequencies ranging from 1 Hz to 500 Hz are classified as low, frequencies ranging from 500 Hz – 10 kHz are classified as medium, and frequencies ranging between 10 kHz – 200 kHz are classified as high (Tasker et al., 2010). Considering that the underwater noise in the offshore study area is mainly caused by ship traffic and existing offshore drilling, the frequency of noise sources is classified as **medium.**

6.8 BIOTOPE ENVIRONMENT

6.8.1 Marine Habitats

According to geospatial data estimating the distribution of seagrass beds (Panayiotidis et al. 2022, Topouzelis et al. 2018), the presence of marine phanerogam meadows is estimated in the wider study area of the proposed modification. Marine phanerogam communities include four species: *Posidonia oceanica, Cymodocea nodosa, Zostera noltei*, and *Halophila stipulacea.* Their distribution pattern along the coast varies depending on the species, with the endemic species *Posidonia oceanica* having the widest distribution. The total coverage of *Posidonia oceanica* meadows is approximately 2,500 km² (2) and 25-35% (~600 to 800 km² (2))of this area is included in the Natura 2000 network. The species *Cymodocea nodosa* is also widespread but on a smaller scale. The species *Zostera noltei* has a limited and local presence associated with the presence of fresh water, while the Lesser Antilles species *Halophila stipulacea* has also been recorded on the shores of the Mediterranean Sea.

According to fieldwork carried out in the wider area of the Project during the periods 06.11.2023 – 09.11.2023, 26.06.2021 – 27.06.2021 and 11.10.2015 – 19.10.2015, areas of soft substrate (mainly sandy) with vegetation of the marine fanwort *Cymodocae nodosa*, which is sporadically dense, and areas of soft substrate without vegetation have been recorded. In particular, areas with *Cymodocae nodosa* are found at depths of up to 1.5 m, followed by a zone of soft substrate without vegetation that extends to a depth of 3 m. From 3 m to 4 m depth, areas with *Cymodocae nodosa* vegetation are observed, while from 4 m to approximately 7 m, the soft substrate has no vegetation.

In SPA & SAC GR1150014, where the proposed amendment falls, and based on the granulometric analysis of sediments carried out in 2015, 2021, and 2024, the seabed is characterized as muddy/sandy.

In the context of the 2023 Annual Environmental Monitoring Report (EPM 2023), which relates to the implementation of the environmental control program for the Prinos Offshore Development in accordance with the requirements of the Environmental Terms Approval Decision (AEPO) 8413/24.04.2018/YPE, marine sediment samples were taken at six (6) stations within the wider study area. Based on the laboratory results of the granulometric analysis of the sediment samples (see Table below), a silty substrate is expected at these stations.

Table6 –27 : Results of grain size analysis

Size	Unit of measurement	9 R1	9 R2	11 R1	11 R2	12 R1	12 R2	1E R1	1E R2	2 R1	2E R2	REF R1	REF R2
>4 mm	%[62]	1.9	1.7	0.9	0.1	0.3	1.8	0.2	2.4	2.0	0	1.2	0.3
4 mm	%	7.3	9.3	5.5	4.8	6.1	6.4	8.4	12.5	6.1	5.8	8	5.2
3 mm	%	4.1	5.1	4.1	4.0	4.6	5.6	9.2	9.9	9.4	7.4	4.6	6.1
2 mm	%	4.7	5.3	6.2	6.4	6.6	4.2	13.4	10	8.2	8.2	4.9	4.7
1 mm	%	10.9	15.5	23.7	18.9	16.8	15.2	23.5	25.5	21.9	19.7	13.2	13.6
0.5 mm	%	22.8	29	33.2	36.5	29.6	23.6	20.3	18.6	18.5	19.9	21.5	21.9
0.25 mm	%	28.2	21.3	17.6	18.7	21.7	23.6	12.4	11.8	20.8	19.6	27.4	25.6
<0.25 mm	%	20.1	12.7	8.8	10.6	14.3	19.6	11.2	9.3	13.1	19.4	19.2	22.6

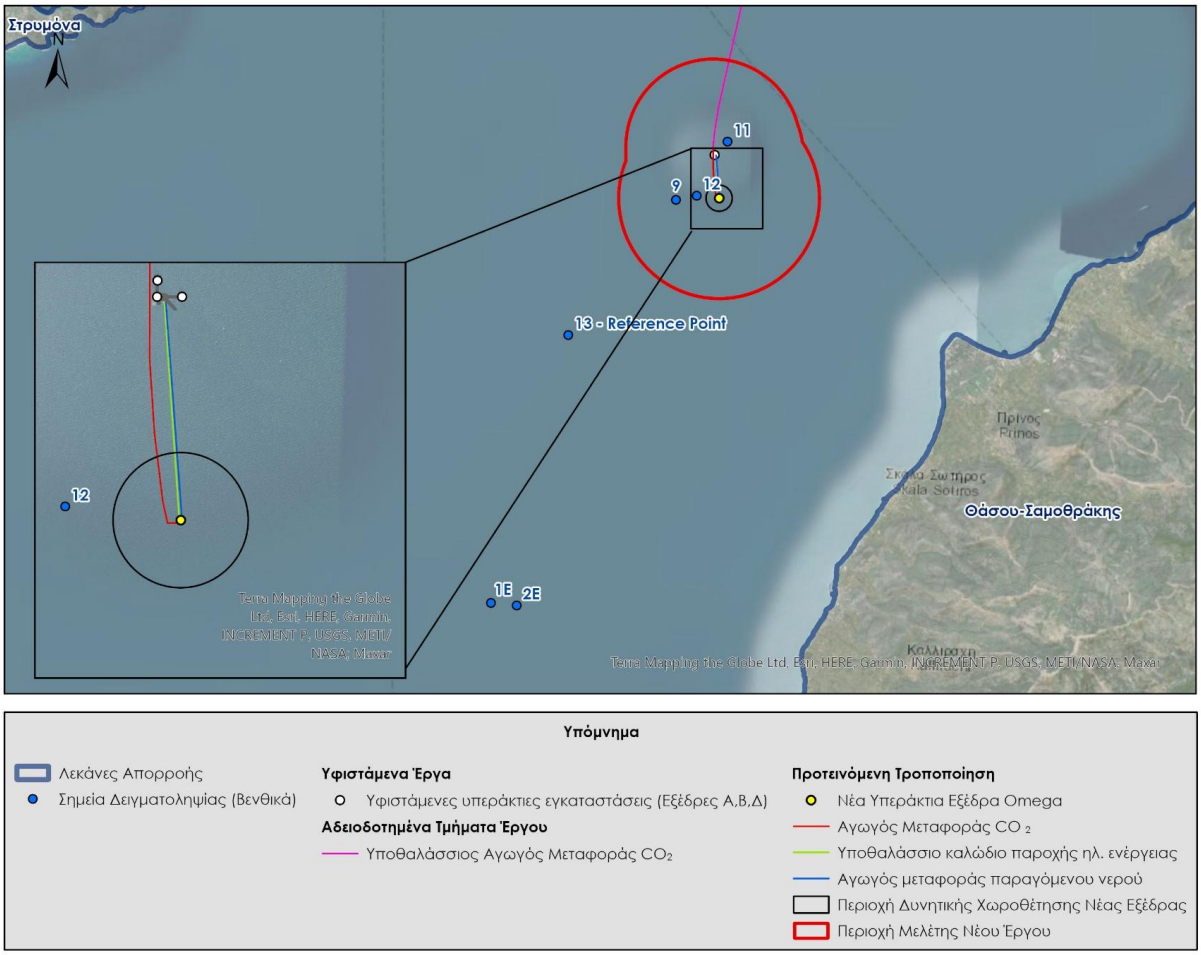
Source: Annual Environmental Monitoring Report 2023 (EPM 2023), which relates to the implementation of the environmental control program for the Prinos Offshore Development in accordance with the requirements of the Environmental Terms Approval Decision (ETAD) 8413/24.04.2018/YPEN)

6.8.2 Benthic communities

As part of the 2023 Annual Environmental Monitoring Report (EPM 2023), which relates to the implementation of the environmental monitoring program for the Prinos Offshore Development in accordance with the requirements of the Environmental Terms Approval Decision (ETAD) 8413/24.04.2018/YPEN, the LDK study team took samples in November 2023 at six (6) stations (9, 11, 12, 13-REF, 1E, and 2E) in the wider project area. A total of four (4) replicate samples were collected from each station and analyzed in an accredited laboratory to assess and evaluate the ecological status of the area.

Specifically, the quality data related to the benthos and proposed by OPTS 2008/56, i.e., the diversity H and richness S of benthic macroinvertebrate species, were used. For the quality parameter "ratio of opportunistic to tolerant species," the BENTIX index (Simboura & Zenetos, 2002) was used, as proposed by Simboura et al (2013). The statistical processing of the data was performed using the PRIMER 6.0 package. The following **Figure** and **Table** show the sampling stations.

[62] The values refer to the percentage of retained material.



6 –48 : Sampling points for benthic community analysis

6 –28 : Sampling points for analysis of benthic communities

Sampling stations (SS)	X EGSA 87	Y ETRS 87	X WGS 84 (degrees)	Y WGS 84 (degrees)
9	541090.91	4515458.52	24.487037	40.789089
11	542,226.66	4516832.25	24.500591	40.801407
12	541,560.00	4515575.95	24.492604	40.790124
1	537,168.80	4506094.93	24.439994	40.704926
2	537,760.77	4506056.01	24.447000	40.704548
13 - Reference Point	538,732.58	4512285.73	24.4588	40.760623

Based on laboratory analyses, 1,024 individuals belonging to 132 species or higher taxa were identified. Polychaetes represent 40% of species and 48% of individuals, while mollusks represent 46% of species and 24% of individuals. Significant abundance was found in arthropods (18%) and miscellaneous (5%). Echinoderms and siphonophores were less represented. Stations 9 and 11 had the greatest species richness and diversity, with station 9 also having the highest number of individuals.

The structure of the sample community showed similarities with previous studies in the Gulf of Kavala. Stations 9 and 12 showed the greatest similarity, while stations 1E and 2E were more heterogeneous, mainly due to the absence of specific species in the replicate samples. The SIMPER analysis identified three species that characterize station 2E. The PCA analysis of physicochemical data showed that most stations are similar, with exceptions in cobalt and molybdenum values in specific replicate samples.

The following **table** presents the values for the quality elements of species diversity, species richness, and BENTIX, as well as the characterization of the environmental status. The classification according to the WFD is also given. It can be seen that the ecological quality of the stations varies from "Good" to "Moderate," with the exception of station 9 on platform D, where the ecological quality is "High."

Table6 –29 : Values for the quality elements of species diversity, species richness, and BENTIX, and characterization of the environmental status. Classification according to the WFD is also provided.

Sampling Station	Platform	Species richness S	Classification according	Diversity H	Classification by H	BENTIX	Sort by BENTIX	EQR	Classification by OPY (2023)	Classification by OPY (2021)
1	K	1	GEnS	1.88	GEnS	3.87		0	Good	Good
2	K	12		2.37		4.02		0.7	Good	Fair
9	D	25		2.49	GEnS	3.02		0.5	Moderate	Good
11	D	23		2.96	GEnS	4.51		0	High	Good
12	D	17		2.66	GEnS	3.96		0.7	Good	Good

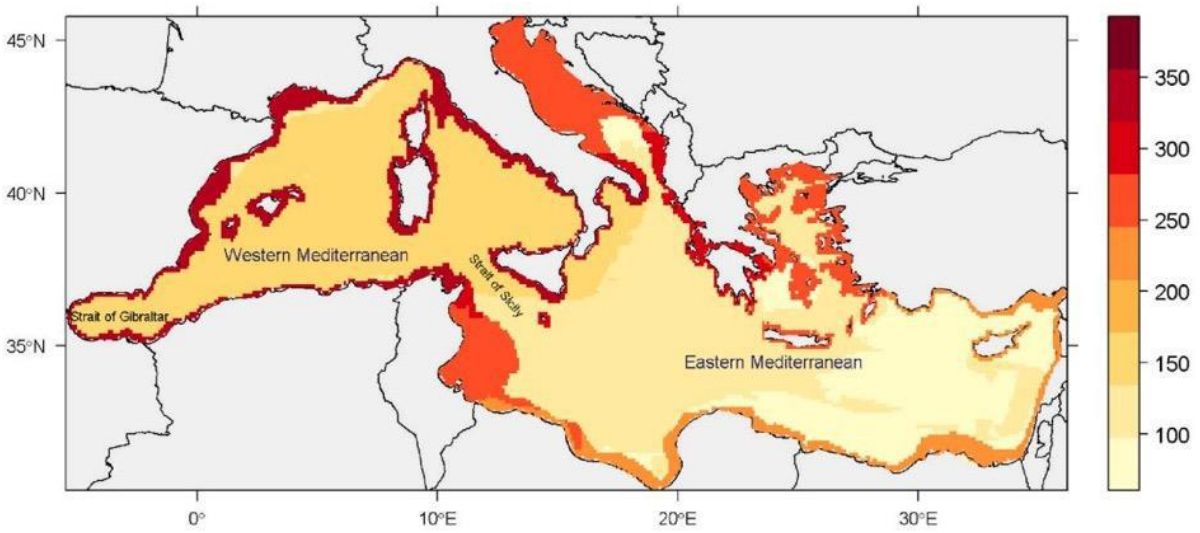
(Source: Annual Environmental Monitoring Report 2023 (EPM 2023), which relates to the implementation of the environmental monitoring program for the Prinos Offshore Development in accordance with the requirements of the Environmental Terms Approval Decision (ETAD) 8413/24.04.2018/YPEN)

The benthic communities are typical of the Mediterranean and do not show any significant impact from the activities in the area. In conclusion, it is estimated that the ecological status of the area is moderate to good on average.

6.8.3 Fish species

Although the Mediterranean Sea represents a small part of the world's oceans, it is home to an extremely rich and diverse biodiversity. Specifically, it includes approximately 17,000 species, representing 4–18% of global marine biodiversity, and includes species from temperate, cosmopolitan, subtropical, Atlantic, and Indo-Pacific regions. This richness is due to its diverse geological and climatic history, which has created conditions for the development of both temperate and subtropical species, making it a true biodiversity hotspot with approximately 20-30% endemic species.

The following **figure** shows the fish species richness index for the Mediterranean Sea, which has an average of 170 fish species per cell, ranging from 81 to 372 species per cell. The distribution of the index shows a longitudinal gradient with higher values in the western part of the basin and lower values in the southeastern part.



(Source: Carmezin et al. (2022). A mesoscale analysis of relations between fish species richness and environmental and anthropogenic pressures in the Mediterranean Sea)

6 –49 : Fish species richness index for the Mediterranean Sea

The Aegean Sea is divided into two distinct areas in terms of fish distribution: (a) the northern Aegean, roughly a rectangular basin, separated from the southern Aegean by the Cyclades archipelago and characterized by cold-water fauna, and (b) the southern Aegean, which is characterised by more thermophilic species, as well as migratory species from the Red Sea. Specifically, according to Simboura et al. (2019)[63] , Greek fish fauna is divided into (a) small pelagic fish, mainly sardines (Sardina pilchardus) and anchovies (Engraulis encrasicolus), which are mainly concentrated in the northern Aegean Sea, (b) large pelagic fish (swordfish and tuna) that migrate throughout the Mediterranean, and (c) benthopelagic or benthic fish that live in close connection with the seabed and are also more abundant in the northern Aegean Sea.

The following **table** presents the dominant fish species found in the Thracian Sea according to depth, as analyzed in the scientific article by Papaconstantinou et al. (2007).

6 –30 : Dominant fish species and protection status in the Thracian Sea based on abundance ranking for the various depth groups determined by dispersion analysis.

Types	Protection status - Bern Convention	Protection status Habitats Directive 2009/147/EC
Fish species at a depth of 16-28 m Average similarity: 67.8 SD: 4.9		
Arnoglossus laterna	Not included	Not included
Serranus hepatus	Not included	Not included
Diplodus annularis	Not included	Not included
Gobius niger	Not included	Not included

[63] Simboura, N., Maragou, P., Paximadis, G., Kapiris, K., Papadopoulos, V. P., Sakellariou, D., Pavlidou, A., Hatzianestis, I., Salomidi, M., Arvanitidis, C., & Panayotidis, P. (2019). Chapter 9 - Greece. In C. Sheppard (Ed.), World Seas: An Environmental Evaluation (2nd ed., Vol. I, pp. 123-145).

Types	Protection status - Bern Convention	Protection status Habitats Directive 2009/147/EC
Mullus barbatus	Not included	Not included
Trisopterus minutus capelanus	Not included	Not included
Spicara flexuosa	Not included	Not included
Trigla lucerna	Not included	Not included
Merlangius merlangus euxinus	Not included	Not included
Scorpaena notata	Not included	Not included
Merluccius merluccius	Not included	Not included
Gobius paganellus	Not included	Not included
Solea vulgaris	Not included	Not included
Cepola rubescens	Not included	Not included
Fish species at a depth of 30-90 m Average similarity: 73.8 SD: 7.1		
Serranus hepatus	Not included	Not included
Trisopterus minutus capelanus	Not included	Not included
Mullus barbatus	Not included	Not included
Arnoglossus laterna	Not included	Not included
Merluccius merluccius	Not included	Not included
Spicara flexuosa	Not included	Not included
Lepidotrigla cavillone	Not included	Not included
Cepola rubescens	Not included	Not included
Deltentosteus quadrimaculatus	Not included	Not included
Callionymus maculatus	Not included	Not included
Scyliorhinus canicula	Not included	Not included
Citharus linguatula	Not included	Not included
Lophius budegassa	Not included	Not included
Serranus cabrilla	Not included	Not included
Symphurus ligulatus	Not included	Not included
Gaidropsarus sp.	Not included	Not included
Raja clavata	Not included	Not included
Arnoglossus thori	Not included	Not included
Fish species at depths of 100-190 m Average similarity: 73.6 SD=4.4		
Trisopterus minutus capelanus	Not included	Not included
Merluccius merluccius	Not included	Not included
Argentina sphyraena	Not included	Not included
Lophius budegassa	Not included	Not included
Lepidorhombus boscii	Not included	Not included
Arnoglossus laterna	Not included	Not included
Scyliorhinus canicula	Not included	Not included
Lepidotrigla cavillone	Not included	Not included

Types	Protection status - Bern Convention	Protection status Habitats Directive 2009/147/EC
Callionymus maculatus	Not included	Not included
Cepola rubescens	Not included	Not included
Serranus hepatus	Not included	Not included
Capros aper	Not included	Not included
Phycis blennoides	Not included	Not included
Aspitrigla cuculus	Not included	Not included
Trigla lyra	Not included	Not included
Mullus barbatus	Not included	Not included
Fish species at a depth of 100-190 m Average similarity: 73.6 SD=4.4		
Hymenocephalus italicus	Not included	Not included
Gadiculus argenteus argenteus	Not included	Not included
Lepidorhombus boscii	Not included	Not included
Micromesistius poutassou	Not included	Not included
Coelorhynchus coelorhynchus	Not included	Not included
Phycis blennoides	Not included	Not included
Lophius budegassa	Not included	Not included
Argentina sphyraena	Not included	Not included
Merluccius merluccius	Not included	Not included
Galeus melastomus	Not included	Not included
Trigla lyra	Not included	Not included
Capros aper	Not included	Not included

(Source: Papaconstantinou, C., Machias, A., Somarakis, S., & Tsimenides, N. (2007). State of Hellenic Fisheries. Institute of Marine Biological Resources, Hellenic Centre for Marine Research)

According to the Standard Data Form for the Natura GR1150014 site, the protected fish species *Alosa fallax* is found in the study area. This species is listed in Annex II of Directive 92/43/EC. The SDD for GR1150010 also mentions the following fish species listed in Annex II of Directive 92/43/EC: *Alosa fallax, Aphanius fasciatus, Barbus strumicae, Cobitis taenia Complex*, and *Rhodeus amarus.* A more detailed analysis is provided in the Project's EIA.

6.8.4 Plangton

The Aegean Sea, and the eastern Mediterranean in general, is characterized by low concentrations of nutrients, production, and plankton biomass. The hydrographic structure of the water column in the North Aegean is influenced by the inflow of brackish water from the Black Sea through the Dardanelles, which

creates intense salinity stratification in the upper layers throughout the year (Psarra et al. 2022)[64] . In addition, the waters of the Black Sea, which are significantly colder in spring, form a 20 m thick surface layer in the North Aegean, which is colder than the underlying waters at the same time of year.

The northern Aegean, due to the influence of the Black Sea waters, is relatively more productive than the highly oligotrophic southern part. The main fish that feeds on zooplankton in the area is the anchovy (Engraulis encrasicolus). The main zooplankton groups include holoplankton (*Chaetognatha, Cladocera, Annelida, Copepoda, Thaliacea, Euphausiacea, Cnidaria, Mollusca, Pteropoda, Siphonophora)* and meroplankton (gastropod larvae, bivalve larvae). In the surface layer (0-50 m), *Copepoda, Cladocera*, and *Annelida* are more abundant in coastal areas, while *Chaetognatha* and *Thaliacea* are more abundant in pelagic areas. Below the surface layer, *Copepoda* constitute the largest part of the zooplankton, while *Chaetognatha* increase in abundance compared to the surface. The abundance of the main groups decreases sharply with depth, with the exception of mollusks, which show an increasing trend.

According to the available bibliographic information, picoplankton predominates in phytoplankton and contributes most to total chlorophyll a (Chla) production and total primary production in the North and South Aegean. Microplankton follows in terms of total Chla abundance and total primary production, and phycoplankton has the lowest contribution. It should be noted that no specific studies have been conducted in the project area and therefore no information is available for this specific location.

6.8.5 Marine Mammals

The North Aegean Sea is rich in nutrients, which flow in from rivers (Sylaios et al., 2005)[65] and from the Black Sea (Poulos et al., 1997)[66] . This area includes important marine and coastal protected areas that have been recognized at national, international, and European levels. These areas include Natura 2000 Network sites, Important Marine Mammal Areas (IMMAs), and Critical Cetacean Habitats (ACCOBAMS-CCHs).

The project study area falls within ACCOBAMS Zone 9 in the Northeast Mediterranean (Thracian Sea) and the Important Marine Mammal Area "Northern Coast and Islands of the Thracian Sea." It also falls within the protected area of the Natura 2000 Network, SPA & SAC GR1150014 "Marine Area of Kavala - Thasos", which covers an area of 75,686.03 ha and includes the Thasos sea channel and the Gulf of Kavala. This area is home to one of the largest fishing grounds in the country and is considered extremely important for populations of rare, endangered, and vulnerable cetaceans.

The cetaceans found in the area include dolphins, harbour porpoises (*Phocoena phocoena*) and the Mediterranean monk seal (*Monachus monachus*). The Mediterranean monk seal is a species listed in Annex

[64] Psarra, S., et al. (2022). Phytoplankton Dynamics in the Aegean Sea. In: The Aegean Sea Environment, Volume 129. Springer

[65] Sylaios, G., Theocharis, A., Tziavos, C., & Pitta, P. (2005). Nutrient fluxes and budget in the North Aegean Sea: a seasonal balance. Continental Shelf Research, 25(18), 2449-2466.

[66] Poulos, S. E., Drakopoulos, P. G., & Collins, M. B. (1997). Seasonal variability in sea surface oceanographic conditions in the Aegean Sea (eastern Mediterranean): an overview. Journal of Marine Systems, 13(1-4), 225-244.

II of Directive 92/43/EEC and uses the area mainly for feeding, as it does not include a terrestrial part for its reproduction (Notarbartolo di Sciara et al., 2016)[67] .

The area is also considered important for the common dolphin, with shallow and productive waters providing a critical habitat for the local population. Together with the marine area of Thrace, these areas are among the most important in the Mediterranean for the survival of the species.

The high productivity of the marine environment, due to the neighboring river deltas and the extensive plateau of the Thracian Sea, creates ideal habitats for coastal dolphins, such as the Bottlenose Dolphin (*Tursiops truncatus)* and the Common Dolphin (*Delphinus delphis)*. Local populations thrive in this area more than in the southern Aegean or Ionian Seas, making the area an important population reserve for the Eastern Mediterranean.

During the surveys conducted as part of the project's SEA, bottlenose dolphins, common dolphins, and porpoises were observed in the wider project area. A detailed description is provided in Section 1.1.B1.ii.4 of the project's SEA.

Marine mammals (whales, dolphins, porpoises, and pinnipeds) use sound for various purposes, such as communication, locating mates, searching for prey, avoiding predators and dangers, and for short- or long-range navigation. Depending on the intensity (sound pressure level) of the source, the period (frequency), and the distance between the source and the receiver, sound can affect marine organisms in various ways. The acoustic bandwidth of cetaceans can be divided into three functional groups, low, medium, and high, as described in **the table** below**.**

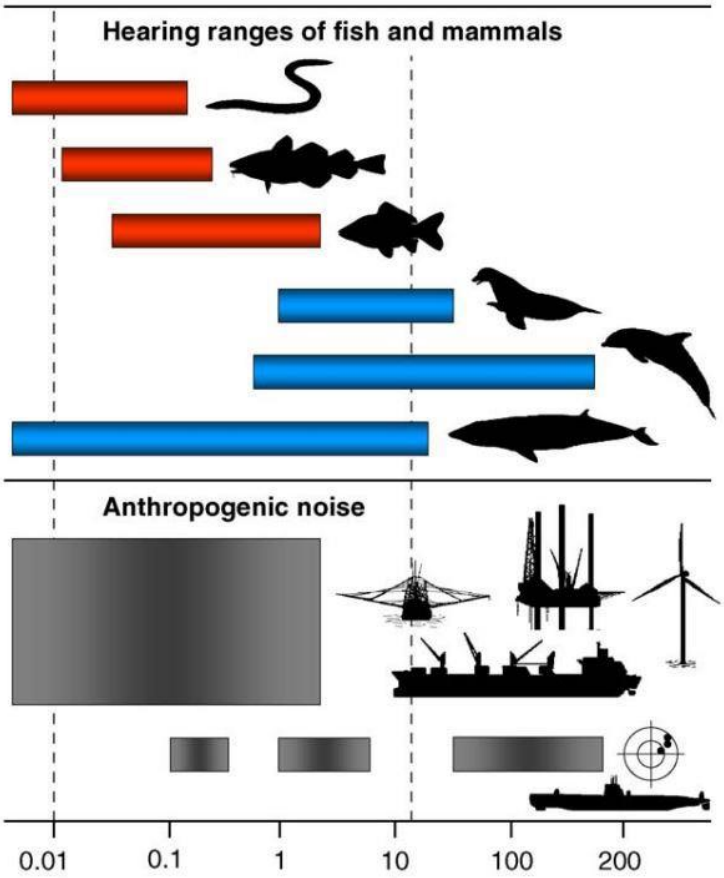
[67] Notarbartolo di Sciara, G., Adamantopoulou, S., & Androukaki, E. (2016). Monachus monachus. The IUCN Red List of Threatened Species 2016.

Table6 –31 : Dominant fish species and protection status in the Thracian Sea based on abundance ranking for the various depth groups determined by dispersion analysis

Functional Hearing Group	Estimated Audible Range Zone
Low-frequency cetaceans	7Hz to 36kHz
Mid-frequency cetaceans	150Hz to 160Hz
High-frequency whales	200Hz to 165kHz
Pterygopods in water	40Hz to 90kHz
Crustaceans in the air	42Hz to 52kHz

Source: NOAA Fisheries (2018). Revision to Technical Guidance for Assessing Effects of Anthropogenic Sound on Marine Mammal Hearing, https://www.noaa.gov/)

The following **figure** shows the hearing range of cetaceans and fish, according to Stabbekoorn et al. (2010).



(Source: Slabbekoorn, H., et al. (2010). A noisy spring: the impact of globally rising underwater sound levels on fish. Trends in Ecology & Evolution, 25(7), 419-427.)

6 –50 : Auditory range of cetaceans (Hz)

6.8.6 Sea Turtles

As part of the fieldwork on cetaceans and seabirds for the preparation of the Project's SEA, emphasis was also placed on recording the presence of sea turtles. For sea turtles, additional research was conducted on the coast 1 km on either side of the SIGMA land facilities, as well as on the coast up to Keramoti, where bird surveys were conducted to record dead animals and possible signs of nesting.. All available data on dead turtles that had washed up on the coast were also collected.

Sea turtles, especially loggerheads, are found washed up on the shore, most likely after death or after being trapped in fishing nets or struck by propellers. During fieldwork in the wider area, five dead loggerhead turtles were recorded, four on the shore and one floating in the sea, and one dead green turtle on the shore. There have been many recorded deaths, which indicates that the species congregates in the area to feed or that currents carry dead animals to the shore.

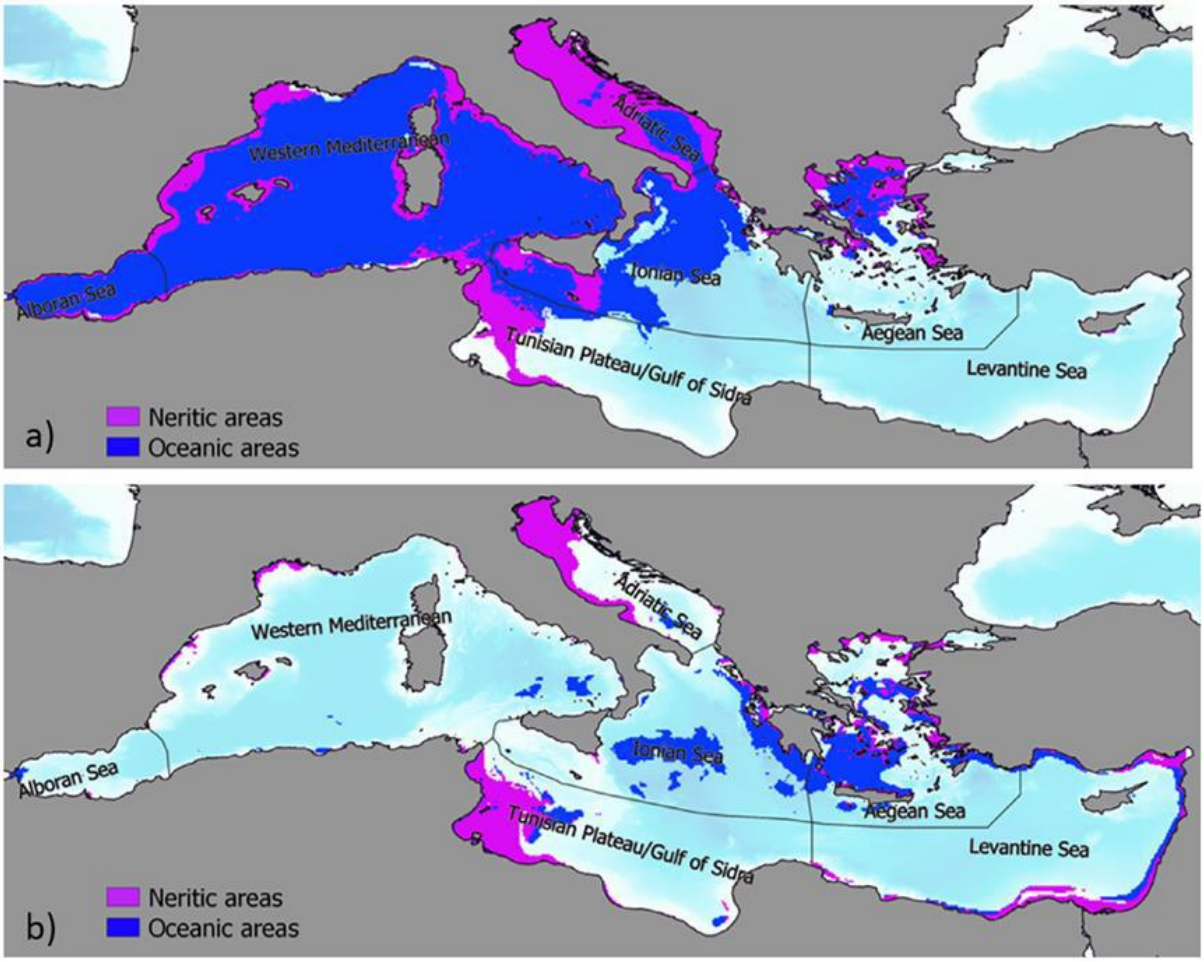
Specifically, based on data from the NGO Archelon, which has been working with sea turtles for the last 4 years (2020-2023), 81 sea turtle hatchings have been recorded within SPA GR1150014:

- 71 turtles of the species *Caretta caretta*
- 4 *Chelonia mydas* turtles
- 1 Dermochelys coriacea (leatherback turtle)
- 5 cases where it was not possible to identify the species, but they are classified in the *Chelonidae* family.

The presence of this species in the area has been known for some time. According to data from the port authority and the management body of the National Park of Eastern Macedonia and Thrace, as reported in the amphibian and reptile monitoring project for 2012-13, five loggerhead turtles and one Mydas turtle were spotted on the coast from Nea Karvali to Imerou beach in Komotini.

According to the "National Action Plan for the Loggerhead Sea Turtle (*Caretta caretta*) in Greece," the area is not included in the nesting zones, without however mentioning the different sporadic nesting sites which in Greek seas represent 445 nests/year, 15% of the total recorded nesting. Nevertheless, there is another trend for nesting on the coasts of the North Aegean islands.

The following **figure** shows the feeding zones of the loggerhead sea turtle. (a) refers to juveniles and (b) refers to adults, according to data from 1991 to 2020 (Chatzimeros et al 2021).



(Source: Chatzimeros et al 2021.)

6 –51 : Feeding zones of the loggerhead sea turtle

According to international literature (CBD Technical Series No. 99, 2022), sea turtles are sensitive to low-frequency sounds, mainly in the 100–1000 Hz range, with their maximum acoustic sensitivity occurring in the 100–400 Hz range. Hearing is an important sense for turtles, as it helps them locate biological signals, and hearing loss or damage may limit their ability to avoid natural and anthropogenic hazards, such as entanglement in fishing gear or collisions with ships – causes that are significant sources of mortality for sea turtles.

A more detailed description of the characteristics of sea turtles in the Project area is provided in the relevant EIA.

6.8.7 Avifauna

The project under consideration passes through the SPA & SAC GR1150014 "Kavala-Thasos Marine Area," which is included in the Project study area. The avifauna is also examined for the neighboring areas SPA GR1150001 "Nestos Delta and Keramotis Lagoons and Thasopoula Island" and SPA GR1150012 "Thasos (Mount Ypsario and coastal zone)" because (A) the population of the European shag (*Phalacrocorax aristotelis desmarestii)* within SPA GR1150014 and the protected area of this region is common with that

which breeds and congregates in SPA GR1150001 and SPA GR1150012, and (B) certain breeding, wintering, and migratory species of seabirds, aquatic birds, and shorebirds of SPA GR1150001 use the marine area of GR1150014 for feeding and movement, and (C) the SAC includes fauna that is also observed in the wider marine area, while its habitats may be of interest to the species of SPA GR1150014.

The marine area of the project is included in the Important Bird Area (IBA) with code GR250 and name "Gulf of Kavala and Thasos marine area," while the wider area also includes the GR012 area named "Nestos Delta and Coastal Lagoons."

As part of the SEA, the required number of fieldwork days for the relevant Natura 2000 areas was carried out between March and June and September – October 202, while recent recording data provided by the non-governmental organizations (NGOs) Hellenic Ornithological Society and Archelon were also used. Existing data were also provided by OFYPEKA.

With regard to birdlife, fieldwork covered the end of the wintering period, spring migration, the breeding season, and, for certain species, the post-breeding period (e.g. the Mediterranean gull), while autumn migration and the wintering period were covered by literature. Three methods were used to record bird fauna in the marine environment:

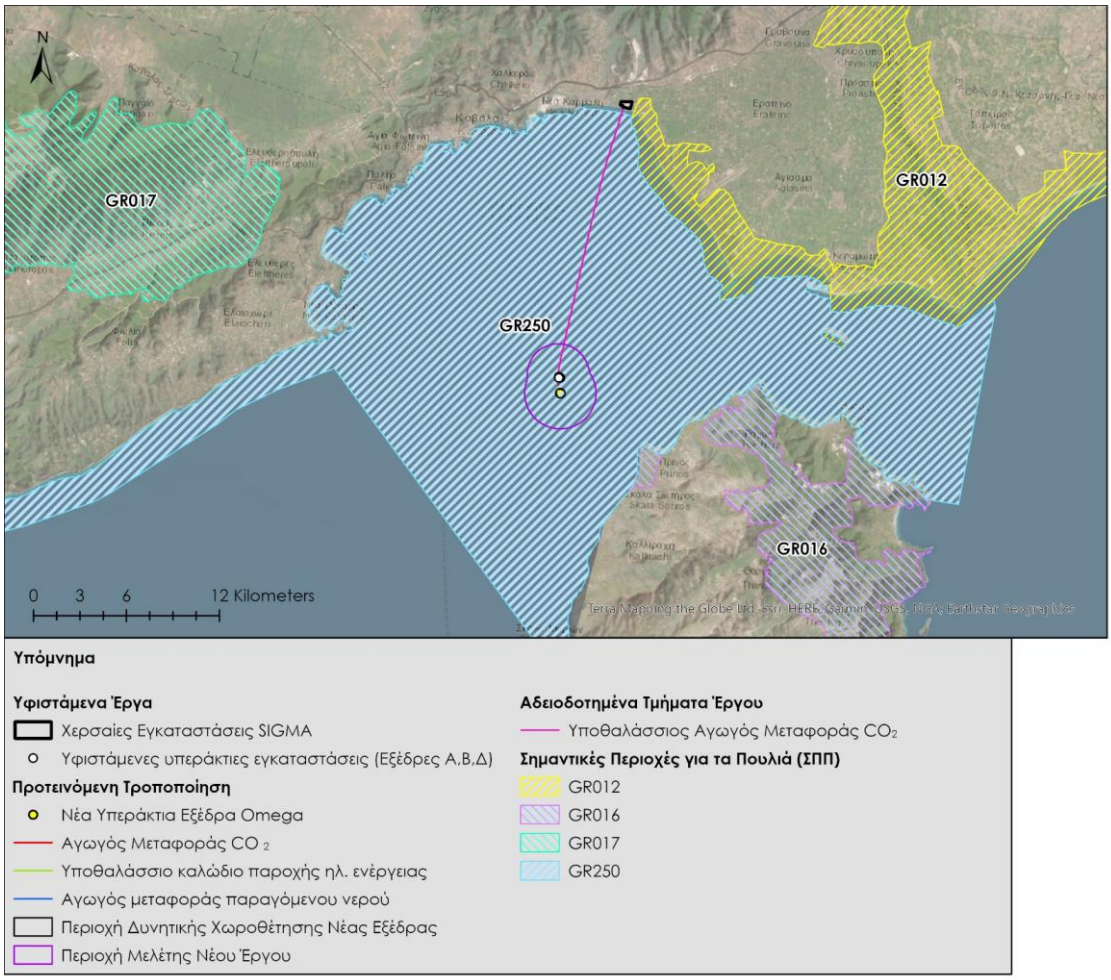
- Visual recordings from boats using the European Seabirds at Sea (ESAS) method
- Visual recordings from a boat along the coastline include the recording of birds and other fauna species in the coastal marine and terrestrial zone from a boat.
- Visual recordings from preselected viewing points on the coast include the recording of birds and other fauna species in the coastal marine and terrestrial zone from viewing points on the coast.

For the recording of birdlife in the terrestrial and wetland environment, **Direct Observation** (Look-and-See) method was applied to record birds from selected observation points chosen on the basis of existing knowledge of the area regarding species of interest and their habitats (e.g. Hatzicharalambous et al., 2004) in order to assess the distribution and abundance of bird species. The points were selected so as to cover the area under consideration as much as possible.

The SPA & SAC GR1150014 "Kavala-Thasos Marine Area" is located within the administrative boundaries of the Region of Eastern Macedonia and Thrace and covers an area of 75,686.03 ha. The area partially overlaps with the Important Bird Area GR250 "Gulf of Kavala and Thasos Marine Area." The area overlaps marginally with the Ramsar site "Nestos Delta and adjacent lagoons" (area code: 56), mainly east of the Nestos estuary.

SPA GR1150001 "Nestos Delta and Keramotis and Thasopoula Lagoons" is located within the administrative boundaries of the Region of Eastern Macedonia and Thrace, the Regional Units of Xanthi and Kavala, and covers an area of 23,028.11 ha. The largest part of the area overlaps with the Natura 2000 network area GR1150010 "Nestos Delta and Keramotis Lagoons - Wider Area and Coastal Zone. The area is located within the boundaries of the National Park of Eastern Macedonia and Thrace as it existed until 2012, which no longer legally exists, as well as the Important Bird Area GR012 "Nestos Delta and coastal lagoons," while partially overlapping with Wildlife Refuge K769 "Kozas Orman Nestos Municipality of Topiros." The area is included within the Ramsar site Nestos Delta and adjacent lagoons (area code: 56). The area is managed by the Nestos-Vistonida and Rodopi National Parks Management Unit, OFYPEKA.

The international importance of the area is further enhanced by its inclusion in the network of Important Bird Areas (IBAs) as defined by Birdlife International. As shown in the **figure** below, the marine area of the project is included in the Important Bird Area (IBA) with code GR250 and name "Gulf of Kavala and Thasos marine area," while the area GR012, named "Nestos Delta and Coastal Lagoons," is also located near the study area. The area with code GR016, named "Thasos Island and Xironisi," is also located in the wider area.



(Source: Hellenic Ornithological Society, EOS)

Figure6 –52 : Important Bird Areas (IBAs)

6.9 ENVIRONMENTAL PROTECTED AND SENSITIVE AREAS

The **National System of Protected Areas** consists of all areas falling under one or more of the categories listed in Article 19 of Law 1650/1986 (Government Gazette 160 A`), with the aim of effectively protecting their biodiversity and other ecological values.

According to Article 19 of Law 1650/1986 (as amended by Article 46 of Law 4685/2020):

1 **Biodiversity protection areas** are defined as terrestrial, aquatic, marine, or mixed areas, natural or semi-natural areas with a recorded presence of natural habitat types and species of international, Union importance and/or Greek interest that need protection and conservation. The areas included in the National List of Areas of the European Ecological Network Natura 2000 are designated as biodiversity protection areas and are divided into **Special Areas of Conservation (SACs), Special Protection Areas (SPAs)** and **proposed Sites** of **Community Importance (pSCIs),** according to their specific classification in Annex I and Tables 1 and 2 attached thereto of the joint decision of the Ministers of Environment and Energy and Rural Development and Food No. 50743/2017 (B' 4432).

2 Regardless of their inclusion in the Natura 2000 network, protected areas may be designated as follows:

- **National Parks**. National Parks, whether terrestrial, marine, or mixed, are defined as large natural or semi-natural areas in which large-scale ecological functions take place with characteristic species and types of natural habitats of Union importance and/or Greek interest, which need protection and conservation. National Parks may be named on the basis of their physical and geographical characteristics and/or their historical, spatial and/or administrative identity. National Parks may include two or more Natura 2000 sites and/or Biodiversity Protection Areas, especially when these are characterised by a wide range of ecosystem functions with common spatial, physical-geographical and/or abiotic characteristics.
- **Wildlife Refuges (WR)**. Wildlife Refuges (WR) are areas (terrestrial, wetland, marine, or mixed) that are assessed as suitable for the development of wild fauna and flora populations or as habitats for reproduction, feeding, and wintering of wild fauna species, or as areas for fish reproduction and fry concentration. They may be named based on their spatial and/or administrative identity. Ecological corridors between protected areas may also be designated as Wildlife Refuges.
- **Protected Landscapes and Protected Natural Formations**. Protected landscapes and protected natural formations are designated as functional parts of nature or individual creations of nature (areas or points of interest) that have special ecological, geological or geomorphological value or contribute to the conservation of natural processes and the protection of natural resources, such as trees, clusters of trees and shrubs, marine protective vegetation, riparian and coastal vegetation, natural fences, waterfalls, springs, gorges, dunes, reefs, caves, rocks, petrified forests, trees or parts thereof, paleontological finds, coral geomorphological formations, and geosites. Protected natural formations of monumental character are specifically designated as preserved natural monuments. Individual areas within National Parks, Biodiversity Protection Areas and/or Wildlife Refuges may be designated as Protected Natural Formations and included in the graduated protection zones of these areas.

In the areas referred to in paragraphs 1 and 2 above, one or more of the following protection and management zones are defined by presidential decree:

- **Absolute Nature Protection Zone:** Areas with extremely sensitive types of natural habitats and/or habitats of extremely sensitive species, whose presence and representativeness is considered to be very high or whose status requires extremely strict protection.
- **Nature Protection Zone:** Nature protection zones are defined as areas with natural habitat types and/or habitats of species whose presence and representativeness is considered high or whose status requires strict protection. In these zones, the natural environment is protected from activities or interventions that could significantly alter its natural condition, composition, or development for the worse.
- **Habitat and Species Conservation Zone:** Habitat and species conservation zones are defined as areas subject to appropriate management to ensure a satisfactory degree of conservation of the protected objects (natural habitat types and species of Union importance and/or national interest) that they host.
- **Natural Resource Sustainable Management Zone:** Natural resource sustainable management zones are defined as areas of protected areas in which it is possible for the protected object to coexist with relevant cultural values and/or human activities that promote sustainable natural resource management and/or sustainable development, i.e., those that serve environmental protection, economic development, social cohesion, and climate change mitigation. Human activities within this zone, when they may lead to a deterioration in the conservation status of the protected object in the protected area and, in particular, in the conservation status of the protected object at national level, are subject to appropriate regulations based on the relevant provisions of the act designating the protected area and the relevant Management Plan.

Article 27 of Law 4685/2020 established the **Natural Environment and Climate Change Agency - OFYPKA -** as a legal entity under private law supervised by the Ministry of Environment and Energy and within it 24 Protected Area Management Units. With the integration into the Natural Environment and Climate Change Agency of the Nestos-Vistonida-Ismarida and Thasos Management Agency and the Rodopi Mountain Range Management Agency, the Nestos-Vistonida and Rodopi National Parks Management Unit operates from its headquarters in Porto Lagos, Xanthi, and its branch in Mesochori, Paranesti. The Management Unit is subordinate to the Protected Areas Management Directorate (Sector A) of the General Directorate of OFYPE (Management Unit 2).

6.9.1 Areas of the National System of Protected Areas

6.9.1.1 Natura 2000 Network

6.9.1.1.1 General Information

At European level, the Natura 2000 network is a European Ecological Network of areas that host natural habitat types and habitats of species considered to be of high ecological importance. Directive 92/43/EEC

(also known as the Habitats Directive) was adopted in 1992 in response to the Bern Convention to promote the protection of biodiversity, taking into account economic, social, cultural, and regional criteria. Directive 92/43/EEC is the cornerstone of European nature conservation policy and is based on two main pillars:

1 The Natura 2000 network of protected areas.

2 A system for the protection of species of fauna and flora of Community interest.

The Directive provides for the creation of a Europe-wide network of protected areas called Natura 2000. Two types of areas are included in this network:

1 Areas designated as Sites of Community Importance (SCI) because they contain important habitat types listed in Annex I and/or are home to important species listed in Annex II of Directive 92/43/EEC.

2 Areas classified as Special Protection Areas (SPAs) which host bird species listed in Annex I to Directive 2009/147/EC (which codified and replaced Directive 79/409/EC) and/or other important migratory bird species.

Based on the provisions of the Directive, the inclusion of SCIs in the Natura 2000 network takes place in three stages:

1 Each Member State proposes a list of sites, indicating which types of natural habitats listed in Annex I and which local species listed in Annex II are found in each site. The criteria followed in this process are set out in Annex III to the Directive. The sites proposed by the Member States are designated as "Proposed Sites of Community Importance" (pSCI).

2 After evaluation by the European Commission, based on the criteria in Annex III, the list of sites proposed for inclusion is finalized and the sites are designated as Sites of Community Importance (SCI). In accordance with paragraph 4 of Article 4 of the Directive, from this stage onwards, the provisions of Article 6 apply.

3 After the national list of SCIs has been accepted, Member States shall, within a period of six years, designate these sites as "Special Areas of Conservation" (SACs), thereby completing the integration of these areas into the Natura 2000 network. In this context, Member States are required to take specific measures to conserve and restore the habitats and species of each area to a favorable conservation status.

Once designated by the Member States, SPA areas are automatically included in the Natura 2000 network without having to go through the above stages.

The Directive aims to protect approximately 200 habitat types and 1,000 species listed in its Annexes and considered to be of European interest, based on the criteria of the Directive. Specifically:

- **Annex I** includes protected habitat types.

- **Annex II** includes approximately 900 species, whose habitats have been designated as Special Areas of Conservation (SACs) and are included in the Natura 2000 network. These areas should be managed in accordance with the ecological requirements of the species.
- **Annex IV** lists more than 400 species that should be subject to strict protection throughout their natural range within the EU, both inside and outside the Natura 2000 network.
- **Annex V** includes more than 90 species for which Member States should ensure that exploitation and removal from the wild do not adversely affect their favorable conservation status.

The Habitats Directive was transposed into national law through Joint Ministerial Decision 33318/3028/1998 laying down measures and procedures for the conservation of natural habitats and wild fauna and flora, as amended by Joint Ministerial Decision Η.Π. 14849/853/Ε103/4-4-2008 and is currently in force. In addition, Law 3937/2011 on the conservation of biodiversity established the National System of Protected Areas (including Natura 2000 sites), as amended by Joint Ministerial Decision 50743/2017 (revision of the national list of Natura 2000 sites), as well as general guidelines and regulations for their conservation.

The Project under consideration passes through the Special Protection Area (SPA) and Site of Community Importance (SCI) of the Natura 2000 network GR1150014 "Kavala-Thasos Marine Area," and the wider area includes SPA GR1150001, Special Conservation Area (SCA) GR1150010, and SPA GR1150012. The GR1150014 area was included in the National List of Areas of the European Ecological Network Natura 2000 as an SPA and SCI according to its most recent revision (Joint Ministerial Decision 50743/11.12.2017).

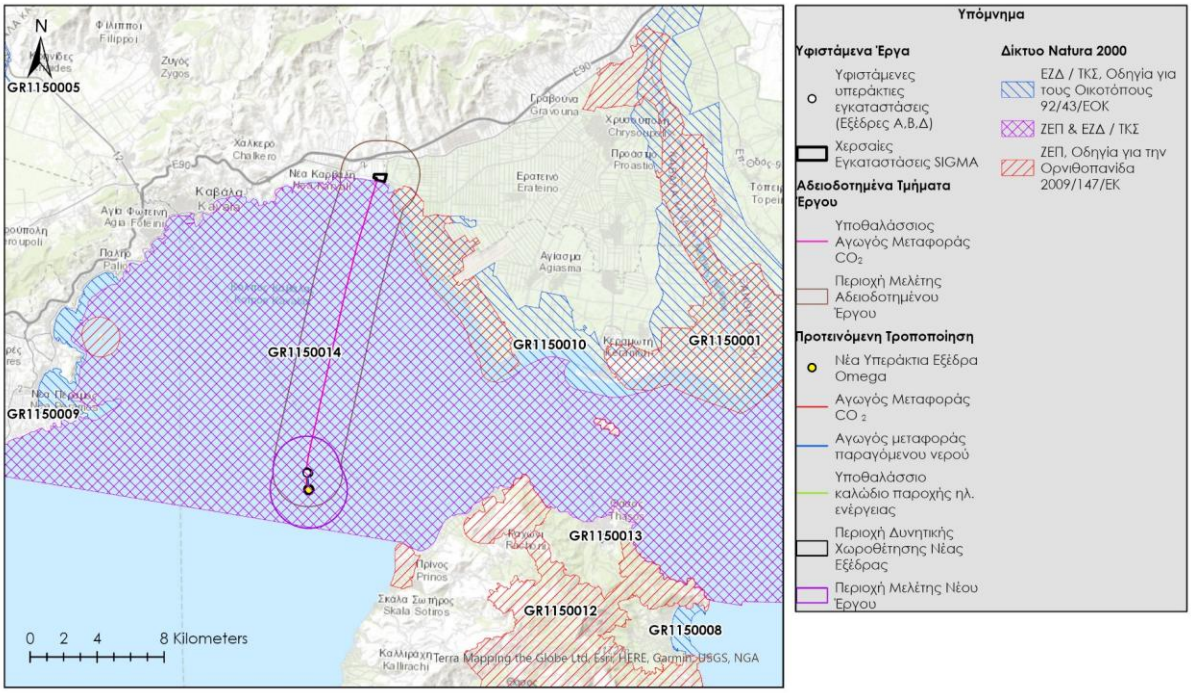


Figure6 –53 : SPA & SAC GR1150014, SPA GR1150001, SAC GR1150010 and SPA GR1150012

6.9.1.1.2 SCI & SPA GR1150014 "Marine Area of Kavala-Thasos"

One (1) species of fish and two (2) species of marine mammals are found (see **Table** below). There is insufficient data on their conservation status.

Table6 –32 : Species in SCI & SPA GR1150014 referred to in Article 4 of Directive 2009/147/EC and listed in Annex II to Directive 92/43/EEC and site assessment for them

Species			Population in the area (Natura site)						Site assessment (Natura site)			
Species group	Code	Scientific name	Type	Size		Unit	Category, population data	Data quality	A/B/C/D	A/B/C		
				Min	Max				Pop.	Con.	Iso.	Glo.
F	1103	*Alosa fallax*	r	0	0		P	DD	D			
M	1351	*Phocoena Phocoena*	p				P	DD	D			
M	1349	*Tursiops truncatus*	p				P	DD	D			

Legend

Species group**: A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = **Reptiles

***Species**: Latin species name*

***Type**: p = permanent, r = reproduction, c = concentration, w = wintering*

***Size:** i= individuals, p= pairs*

***Data abundance category**: C = common, R = rare, V = very rare, P = present or population size in individuals (i) or pairs (p).*

***Data quality**: G= Good, M= Moderate, P= Poor, DD= Data deficient*

***Pop.: Population**: Relative size and density of the species in the area in relation to the total population within national boundaries. A: 100% ≥ p ≥ 15%, B: 15% ≥ p ≥ 2%, C: 2% ≥ p ≥ 0, D: insignificant population. Data from SDF*

***Con.: Conservation**: degree of conservation of habitat features important for the species and potential for restoration. A: excellent conservation, B: good conservation, C: moderate or limited conservation. Data from SDF*

(Source: Standard Data Form GR1150014 "Marine Area of Kavala-Thasos")

Two bird species listed in Annex I of Joint Ministerial Decision 37338/1807/E.103 are present (see table below). There is insufficient data on the degree of conservation of the habitat characteristics that are important for the species and the possibilities for restoration (conservation).

Table6 -33 : Bird species listed in Annex I of Joint Ministerial Decision 37338/1807/E.103 in the GR1150014 SAC & SPA area

Species			Population in the area (Natura site)						Area assessment (Natura site)			
Species group	Code	Scientific name	Type	Size		Unit	Category, population data	Data quality	A/B/C/D	A/B/C		
				Min	Max				Pop.	Con.	Iso.	Glo.
B	A392	*Phalacrocorax aristotelis desmarestii*	r	168	182	p	P	G				
B	A392	*Phalacrocorax aristotelis desmarestii*	c	580	1000	i	P	G				
B	A464	*Puffinus yelkouan*	c	500	2000	i	P	G				

Legend

***Species group**: B= Birds*

***Species**: Latin name of species*

***Type**: p = permanent, r = breeding, c = concentration, w = wintering*

***Size:** i= individuals, p= pairs*

***Data abundance category**: C = common, R = rare, V = very rare, P = present or population size in individuals (i) or pairs (p).*

***Data quality**: G= Good, M= Moderate, P= Poor, DD= Data deficient*

***Pop.: Population**: Relative size and density of the species in the area in relation to the total population within national boundaries. A: 100%>=p> 15%, B: 15%>=p>2%, C: 2%>=p>0, D: insignificant population. Data from SDF*

***Con.: Conservation**: degree of conservation of habitat features important to the species and potential for restoration. A: excellent conservation, B: good conservation, C: moderate or limited conservation. Data from SDF*

***Iso.: Isolation**: Degree of isolation of the population present in the area in relation to the natural range of the species. A: Isolated (almost) population, B: Non-isolated population, but located on the edge of the distribution area, C: Non-isolated population, within the wider distribution area.*

***Glo.: Global**: Overall assessment of the site's value for the conservation of the species. A: Excellent, B: Good, C: Adequate.*

(Source: Standard Data Form GR1150014 "Marine Area of Kavala-Thasos")

6.9.1.1.3 SAC GR1150010 "Nestos Delta and Keramoti Lagoons - Wider Area"

There are 22 habitat types (HT) listed in Annex I of Directive 92/43/EC, of which: three (3) are priority habitats (1150, 3170, and 91E0), 9 are habitats with conservation status A, 10 with conservation status B, 2 with conservation status C, while for 1170 there is insufficient data (see **table** below).

Table6 –34 : Habitat types of Annex I of Directive 92/43/EC in SAC GR1150010

Code	Description TO	PF	Area (ha)	Data quality (data quality)	Representativeness (representativeness)	Relative surface (relative surface)	Degree of conservation	Overall assessment (global)
					A / B / C / D	A / B / C	A / B / C	A / B / C
1110	Sandbanks permanently covered by shallow seawater	0	2918.51	P	A	C	B	B
1130	River mouths	0	17.8589	G	B	A	B	B
1140	Muddy and sandy flat areas exposed during low tide	0	0	G	C	-	A	A
1150	Coastal lagoons	1	849,685	G	A	B	B	B
1170	Yfalo	0	0	G	D	-	-	-
1210	Annual vegetation between high tide and low tide marks	0	34.0677	G	A	B	C	B
1310	Primary vegetation with Salicornia and other annual species of muddy and sandy areas	0	23.0126	G	B	C	A	B
1410	Mediterranean pastures (*Juncetalia maritimi*)	0	1632.68	G	B	A	B	B
1420	Mediterranean and thermo-Atlantic halophytic shrubs (*Sarcocornetea Fruticosi*)	0	424,974	G	A	B	A	A
2110	Substandard moving dunes	0	85.4206	G	B	B	A	B
2120	Shifting dunes of the coastline with *Ammophila* arenaria ("white dunes")	0	107,283	G	A	B	A	B
2190	Wet cavities between the thorns	0	13,578	G	A	B	B	B
2220	Dunes with *Euphorbia terracina*	0	80.1886	G	B	A	A	A

Code	Description TO	PF	Area (ha)	Data quality (data quality)	Representativeness (representativeness)	Relative surface (relative surface)	Degree of conservation	Overall assessment (global)
					A / B / C / D	A / B / C	A / B / C	A / B / C
3150	Eutrophic natural lakes with *Magnopotamion* or *Hydrocharition* vegetation	0	11.2101	G	A	C	B	B
3170	Mediterranean seasonal ponds	1	0.05	G	B	C	C	C
3280	Mediterranean rivers with permanent flow of *Paspalo-Agrostidion* and dense vegetation in the form of a curtain of *Salix* and *Populus alba* on their banks	0	422.582	G	A	A	B	A
62A0	Dry grasslands of the eastern Mediterranean (*Scorzoneratalia villosae*)	0	332.525	G	C	C	B	C
6420	Wet Mediterranean grasslands with tall grasses from *Molinio-Holoschoenion*	0	1127.64	G	B	A	B	B
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	1	513,846	G	B	A	A	A
91F0	Mixed forests with *Quercus robur, Ulmus laevis, Ulmus minor, Fraxinus excelsior, or Fraxinus angustifolia* (*Ulmenion minoris*) along large rivers	0	157,452	G	A	A	B	A
92A0	Forests – galleries with *Salix alba* and *Populus alba*	0	623.623	G	A	B	A	A

Code	Description TO	PF	Area (ha)	Data quality (data quality)	Representativeness (representativeness)	Relative surface (relative surface)	Degree of conservation	Overall assessment (global)
					A / B / C / D	A / B / C	A / B / C	A / B / C
92D0	Southern riparian forests - galleries and thickets (*Nerio-Tamaricetea and Securinegion tinctoriae*)	0	672,515	G	A	B	A	A

Legend

Habitat code: *Four-digit habitat code*

Habitat type ***description****: Habitat type name*

PF: *Priority habitat (Value 0 or 1: Priority habitat)*

Area (ha)*: TO area in hectares*

Data quality: *G= Good, M= Moderate, P= Poor, DD= Data deficient*

Representativeness*: provides a measure of how "typical" a habitat type is. A (excellent), B (good), C (sufficient), D (insignificant presence).*

(Source: Standard Data Form GR1150010 "Nestos Delta and Keramoti Lagoons - Wider Area")

Five (5) species of fish, two (2) species of invertebrates, six (6) species of reptiles, three (3) species of mammals, and two (2) species of amphibians are present (see **Table** below). The conservation status is B for six (6) of these species, C for seven (7) species, and there is insufficient data for five (5) species.

Table6 –35 : Species in SAC GR1150010 referred to in Article 4 of Directive 2009/147/EC and listed in Annex II to Directive 92/43/EEC and site assessment for them

Species			Population in the area (Natura site)						Site assessment (Natura site)			
Species group	Code	Scientific name	Type	Size		Unit	Category, population data	Data quality	A/B/C/D	A/B/C		
				Min	Max				Pop.	Con.	Iso.	Glo.
F	1103	*Alosa fallax*	r	0	0		P	DD	C	C	C	C
F	1152	*Aphanius fasciatus*	p	0	0		C	-	B	B	C	B
F	5263	*Barbus strumicae*	p	0	0		C	DD	-	B	C	B
F	6963	*Cobitis taenia Complex*	p	0	0		C	DD	-	B	C	B

Species			Population in the area (Natura site)						Site assessment (Natura site)			
F	5339	*Rhodeus amarus*	p	0	0		C	DD	-	B	C	B
I	1043	*Lindenia tetraphylla*	p	0	0		P	-	C	B	C	B
I	1037	*Ophiogompus Cecilia*	p	0	0		P	-	B	B	C	C
R	1279	*Elaphe quatuorlineata*	p	0	0		P	-	A	C	A	A
R	1220	*Emys ombicularis*	p	0	0		C	-	B	C	C	C
R	2373	*Mauremys rivulata*	p	0	0		C	-	B	C	C	C
R	1219	*Testudo graeca*	p	0	0		R	-	C	C	C	C
R	1217	*Testudo hermanni*	p	0	0		P	-	B	C	C	C
R	6095	*Zamenis situla*	p	0	0		P	-	D	-	-	-
M	1355	*Lutra lutra*	p	0	0		-	-	B	C	A	B
M	1351	*Phocoena Phocoena*	p	0	0		P	DD	D	-	-	-
M	1349	*Tursiops truncates*	p	0	0		P	DD	D	-	-	-
A	1193	*Bombina variegata*	p	0	0		C	-	D	-	-	-
A	1171	*Triturus karelinii*	p	0	0		V	-	D	-	-	-

Legend

Species group**: A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = **Reptiles

***Species**: Latin species name*

***Type**: p = permanent, r = reproduction, c = concentration, w = wintering*

***Size:** i= individuals, p= pairs*

***Data abundance category**: C = common, R = rare, V = very rare, P = present or population size in individuals (i) or pairs (p).*

***Data quality**: G= Good, M= Moderate, P= Poor, DD= Data deficient*

***Pop.: Population**: Relative size and density of the species in the area in relation to the total population within national boundaries. A: 100% ≥ p ≥ 15%, B: 15% ≥ p ≥ 2%, C: 2% ≥ p ≥ 0, D: insignificant population. Data from SDF*

***Con.: Conservation**: degree of conservation of habitat features important for the species and potential for restoration. A: excellent conservation, B: good conservation, C: moderate or limited conservation. Data from SDF*

(Source: Standard Data Form GR1150010 "Nestos Delta and Keramotis Lagoons – Wider Area")

6.9.1.1.4 SPA GR1150001 "Nestos Delta and Keramotis Lagoons and Thasopoula Island"

There are 206 bird species listed in Annex I of Joint Ministerial Decision 37338/1807/E.103 with good conservation (B) of the habitat characteristics that are important for the species (conservation), except for 15 species for which there is insufficient data (see **table** below).

Table6 –36 : Bird species listed in Annex I of Joint Ministerial Decision 37338/1807/E.103 in SPA GR1150001

Species			Population in the area (Natura site)						Area assessment (Natura site)			
Species group	Code	Scientific name	Type	Size		Unit	Category, population data	Data quality	A/B/C/D	A/B/C		
				Min	Max				Pop.	Con.	Iso.	Glo.
B	A293	Acrocephalus melanopogon	c				P		C	B	C	B
B	A296	Acrocephalus palustris	c				P		C	B	C	B
B	A295	Acrocephalus schoenobaenus	r				P		C	B	C	B
B	A297	Acrocephalus scirpaceus	r				P		C	B	C	B
B	A168	Actitis hypoleucos	c				P		C	B	C	B
B	A247	Alauda arvensis	r				P		C	B	C	B
B	A247	Alauda arvensis	w				P		C	B	C	B
B	A229	Kingfisher	r	2	2	p	P		C	B	C	B
B	A229	Alcedo atthis	w	3	7	i	P		C	B	C	B
B	A054	Anas acuta	w	1	380	i	P		C	B	C	B
B	A857	Spatula clypeata	w	140	430	i	P		C	B	C	B
B	A052	Anas crecca	w	1	440	i	P		C	B	C	B
B	A855	Mareca penelope	w	842	1662	i	P		C	B	C	B
B	A053	Anas platyrhynchos	r	1	29	p	P		C	B	C	B
B	A053	Anas platyrhynchos	w	20	930	i	P		C	B	C	B
B	A856	Spatula querquedula	c	50	10	i	P		C	B	C	B
B	A856	Spatula querquedula	r	2	11	p						
B	A889	Mareca strepera	r	3	3	p	P		C	B	C	B
B	A889	Mareca strepera	w	19	69	i	P		C	B	C	B
B	A394	Anser albifrons albifrons	w	36	329	i		G	B	B	C	B
B	A043	Anser anser	w	1	63	i		G	C	B	B	B

Species			Population in the area (Natura site)						Area assessment (Natura site)			
B	A042	Anser erythropus	w	0	1	i		G	A	B	B	B
B	A255	Anthus campestris	r				P		C	B	C	B
B	A258	Anthus cervinus	c				P		C	B	C	B
B	A257	Anthus pratensis	c				P		C	B	C	B
B	A259	Anthus spinoletta	w				P		C	B	C	B
B	A256	Anthus trivialis	w				P		C	B	C	B
B	A228	Tachymarptis melba	c				P		C	B	C	B
B	A226	Apus apus	r				P		C	B	C	B
B	A227	Apus pallidus	r				P		C	B	C	B
B	A091	Aquila chrysaetos	r	2	2	p	P		C	B	C	B
B	A859	Clanga clanga	w	1	13	i		G	C	B	B	B
B	A404	Aquila heliaca	c	2		i		G	A	B	B	B
B	A858	Clanga pomarina	r	3	4	p		G	B	B	B	B
B	A028	Ardea cinerea	r	70	110	p		G				
B	A028	Ardea cinerea	w	64	192	i						
B	A029	Purple Heron	r	3	8	p		G	A	B	C	B
B	A222	Asio flammeus	r	1	1	p						
B	A222	Asio flammeus	w				P		C	B	C	B
B	A221	Asio otus	r	1	2	p						
B	A059	Aythya ferina	w	9	90	i	P		C	B	C	B
B	A061	Aythya fuligula	w	1	40	i	P		C	B	C	B
B	A060	Aythya nyroca	r	5	5	p						
B	A021	Botaurus stellaris	r	1	1	p		G	B	B	B	B
B	A215	Bubo bubo	p				R		B	B	C	B
B	A215	Bubo bubo	r	1	1	p						
B	A133	Burhinus oedicnemus	r	2	7	p		G	C	B	C	B
B	A087	Buteo buteo	r	8	8	p	P		C	B	C	B
B	A087	Buteo buteo	w	30	90	i		G	C	B	C	B
B	A403	Buteo rufinus	c				P		C	B	B	B
B	A403	Buteo rufinus	r	1	1	p	P		C	B	B	B
B	A243	Calandrella brachydactyla	r				P		C	B	C	B
B	A149	Calidris alpina	c				P		C	B	C	B

Species			Population in the area (Natura site)						Area assessment (Natura site)			
B	A149	Calidris alpina	w	1	390	i	P		C	B	C	B
B	A147	Calidris ferruginea	c				P		C	B	C	B
B	A145	Calidris minuta	w	1	450	i	P		C	B	C	B
B	A146	Calidris temminckii	c				P		C	B	C	B
B	A224	Caprimulgus europaeus	r				P		C	B	C	B
B	A138	Charadrius alexandrinus	r	1	7	p		G	C	B	C	B
B	A138	Charadrius alexandrinus	w	1	21	i						
B	A137	Common ringed plover	c				P		C	B	B	B
B	A734	Chlidonias hybrida	w	300	300	i		G	C	B	C	B
B	A198	White-winged tern	c	600	600	i		G	C	B	C	B
B	A197	Black tern	c	300	300	i		G	C	B	C	B
B	A030	Ciconia nigra	r	3	3	p		G	B	B	B	B
B	A080	Circaetus gallicus	r	4	4	p	P		C	B	C	B
B	A081	Circus aeruginosus	r	10	10	p		G	A	B	C	B
B	A081	Circus aeruginosus	w	22	58	i		G	A	B	C	B
B	A082	Circus cyaneus	w	1	6	i		G	B	B	C	B
B	A084	Circus pygargus	c				P		C	B	C	B
B	A231	Coracias garrulus	r	2	9	p	P		C	B	C	B
B	A113	Coturnix coturnix	c				P		C	B	C	B
B	A113	Coturnix coturnix	r				P		C	B	C	B
B	A212	Cuculus canorus	r				P		C	B	C	B
B	A036	Cygnus olor	r	1	20	p						
B	A036	Cygnus olor	w	37	266	i		G	C	B	C	B
B	A738	Delichon urbicum (urbica)	r				P		C	B	C	B
B	A868	Leiopicus medius	p				P		C	B	C	B
B	A429	Dendrocopos syriacus	r	20	20	p	P		C	B	B	B

Species			Population in the area (Natura site)						Area assessment (Natura site)			
B	A236	Dryocopus martius	p				P		C	B	B	B
B	A236	Dryocopus martius	r	1	25	p						
B	A773	Ardea alba	w	10	60	i		G	A	B	B	B
B	A026	Little Egret	c	200	200	i		G	A	B	C	B
B	A026	Egretta garzetta	r	90	190	p		G	B	B	C	B
B	A026	Little Egret	w	22	40	i		G	B	B	C	B
B	A447	Emberiza caesia	c				P		C	B	C	B
B	A382	Emberiza melanocephala	r				P		C	B	C	B
B	A269	Erithacus rubecula	w				P		C	B	C	B
B	A101	Falco biarmicus	w	1	2	i		G	B	B	C	B
B	A098	Falco columbarius	w	4	4	i		G	C	B	C	B
B	A100	Falco eleonorae	c			i		G	C	B	B	B
B	A103	Falco peregrinus	w	1	2	i	P		C	B	C	B
B	A099	Falco subbuteo	r	5	5	p	P	G	C	B	C	B
B	A097	Falco vespertinus	c	20	30	i		G	C	B	C	B
B	A321	Ficedula albicollis	c				P		C	B	C	B
B	A322	Ficedula hypoleuca	c				P		C	B	C	B
B	A442	Ficedula semitorquata	c				P		C	B	C	B
B	A657	Fringilla coelebs all others	r				P		C	B	C	B
B	A125	Fulica atra	r				P		C	B	C	B
B	A125	Fulica atra	w	3950	12660	i	P		C	B	C	B
B	A153	Gallinago gallinago	w	1	30	i		G	C	B	C	B
B	A002	Gavia arctica	w	2	9	i		G	B	B	B	B
B	A001	Gavia stellata	w	2	2	i		G				
B	A135	Glareola pratincola	r	2	19	p		G	C	B	C	B
B	A078	Gyps fulvus	c			i		G	B	B	C	B

Species			Population in the area (Natura site)						Area assessment (Natura site)			
B	A130	Haematopus ostralegus	r	2	21	p	P		C	B	C	B
B	A130	Haematopus ostralegus	w	2	2	i						
B	A075	Haliaeetus albicilla	c	1	5	i		G	A	B	B	B
B	A075	Haliaeetus albicilla	r	1	1	p		G	A	B	B	B
B	A707	Hieraaetus fasciatus (Aquila fasciata)	c					G	C	B	B	B
B	A092	Hieraaetus pennatus (Aquila pennata)	c					G	C	B	C	B
B	A131	Black-winged stilt	r	25	25	p	P		C	B	C	B
B	A299	Hippolais icterina	c				P		C	B	C	B
B	A479	Cecropis daurica	r				P		C	B	C	B
B	A251	Hirundo rustica	r				P		C	B	C	B
B	A022	Ixobrychus minutus	r	1	7	p	P		C	B	C	B
B	A233	Jynx torquilla	c				P		C	B	C	B
B	A338	Lanius collurio	r				P		C	B	C	B
B	A339	Lanius minor	r				P		C	B	C	B
B	A341	Lanius senator	r				P		C	B	C	B
B	A179	Larus ridibundus	w			i		G	C	B	C	B
B	A181	Larus audouinii	c				R		B	B	B	B
B	A180	Larus genei	w	13	60	i		G	A	B	C	B
B	A176	Larus melanocephalus	c					G	A	B	C	B
B	A176	Larus melanocephalus	r	160	160	p		G	A	B	C	B
B	A862	Hydrocoloeus minutus	c				P		C	B	C	B
B	A292	Locustella luscinioides	r				P		C	B	C	B
B	A246	Lullula arborea	w				P		C	B	C	B
B	A271	Luscinia megarhynchos	r				P		C	B	C	B

Species			Population in the area (Natura site)						Area assessment (Natura site)			
B	A242	Melanocoryph a calandra	r				P		C	B	C	B
B	A069	Mergus serrator	w	1	1	i		G	C	B	C	B
B	A230	Merops apiaster	r				P		C	B	C	B
B	A073	Milvus migrans	r	1	1	p	P		B	B	C	B
B	A073	Milvus migrans	w	1	8	i	P		B	B	C	B
B	A074	Milvus milvus	c					G	A	B	B	B
B	A262	Motacilla alba	r				P		C	B	C	B
B	A261	Grey Wagtail	w				P		C	B	C	B
B	A260	Motacilla flava	r				P		C	B	C	B
B	A319	Muscicapa striata	c				P		C	B	C	B
B	A319	Muscicapa striata	r				P		C	B	C	B
B	A077	Neophron percnopterus	c			i		G	B	B	C	B
B	A159	Numenius tenuirostris	c				P		A	B	B	B
B	A023	Nycticorax nycticorax	c	20	50	i		G	C	B	C	B
B	A278	Oenanthe hispanica	r				P		C	B	C	B
B	A277	Oenanthe oenanthe	r				P		C	B	C	B
B	A337	Oriolus oriolus	r				P		C	B	C	B
B	A214	Otus scops	p				P		C	B	C	B
B	A214	Otus scops	r	1	4	p						
B	A094	Pandion haliaetus	c					G	B	B	C	B
B	A355	Passer hispaniolensis	r				P		C	B	C	B
B	A020	Pelecanus crispus	c	150	200	i		G	C	B	B	B
B	A020	Pelecanus crispus	w	100	350	i		G	C	B	B	B
B	A019	Pelecanus onocrotalus	c	100	150	i		G	A	B	B	B
B	A072	Pernis apivorus	r	4	4	p	P	G	C	B	C	B

Species			Population in the area (Natura site)						Area assessment (Natura site)			
B	A392	Phalacrocorax aristotelis desmarestii	r	6	6	p		G	A	B	C	B
B	A392	Phalacrocorax aristotelis desmarestii	w	20	40	i	P	G	C	B	B	B
B	A391	Phalacrocorax carbo sinensis	w	60	2500	i		G	B	B	C	B
B	A875	Microcarbo pygmaeus	w	50	170	i		G	A	B	B	B
B	A170	Phalaropus lobatus	c				P		B	B	B	B
B	A663	Phoenicopterus roseus	w	380	1310	i		G	B	B	C	B
B	A273	Phoenicurus ochruros	w				P		C	B	C	B
B	A274	Phoenicurus phoenicurus	c				P		C	B	C	B
B	A572	Phylloscopus collybita s. str.	w				P		C	B	C	B
B	A314	Phylloscopus sibilatrix	c				P		C	B	C	B
B	A316	Phylloscopus trochilus	c				P		C	B	C	B
B	A234	Picus canus	p				P		C	B	B	B
B	A234	Picus canus	r	2	17	p						
B	A034	Platalea leucorodia	w	10	16	i	P		C	B	C	B
B	A032	Plegadis falcinellus	c	100	200	i		G	B	B	C	B
B	A140	Pluvialis apricaria	w	110	120	i	P		C	B	C	B
B	A141	Pluvialis squatarola	w	1	60	i	P		C	B	C	B
B	A005	Podiceps cristatus	r	1	2	p	P		C	B	B	B
B	A005	Podiceps cristatus	w	50	300	i	P		C	B	B	B
B	A008	Podiceps nigricollis	w	20	70	i		G	C	B	C	B
B	A892	Zapornia parva	c				P		C	B	B	B
B	A893	Zapornia pusilla	c				P		C	B	B	B
B	A464	Puffinus yelkouan	w	700	1000	i		G	C	B	B	B
B	A132	Recurvirostra avosetta	w	40	160	i	P		C	B	C	B

Species			Population in the area (Natura site)						Area assessment (Natura site)			
B	A249	Riparia riparia	r				P		C	B	C	B
B	A275	Saxicola rubetra	c				P		C	B	C	B
B	A189	Gelochelidon nilotica	r	1	1	p		G	C	B	C	B
B	A894	Hydroprogne caspia	w	2	2	i		G	C	B	C	B
B	A863	Thalasseus sandvicensis	w	1	10	i		G	C	B	C	B
B	A193	Sterna hirundo	r	5	21	p		G	B	B	C	B
B	A210	Streptopelia turtur	r				P		C	B	C	B
B	A351	Sturnus vulgaris	r				P		C	B	C	B
B	A351	Sturnus vulgaris	w				P		C	B	C	B
B	A310	Sylvia borin	c				P		C	B	C	B
B	A304	Sylvia cantillans	r				P		C	B	C	B
B	A309	Sylvia communis	r				P		C	B	C	B
B	A574	Sylvia curruca	c				P		C	B	C	B
B	A397	Tadorna ferruginea	w	72	72	i		G	A	B	B	B
B	A048	Tadorna tadorna	r	1	20	p	P		C	B	C	B
B	A048	Tadorna tadorna	w	21	156	i	P		C	B	C	B
B	A166	Tringa glareola	c	30	50	i	P		C	B	C	B
B	A164	Tringa nebularia	w	1	1	i		G	C	B	C	B
B	A165	Tringa ochropus	w	1	1	i	P		C	B	C	B
B	A163	Tringa stagnatilis	c				P		C	B	C	B
B	A162	Tringa totanus	r	1	6	p	P		C	B	C	B
B	A162	Tringa totanus	w	30	70	i	P		C	B	C	B
B	A285	Turdus philomelos	c				P		C	B	C	B
B	A232	Upupa epops	r				P		C	B	C	B
B	A728	Vanellus (Hoplopterus) spinosus	r	2	21	p						
B	A142	Vanellus vanellus	r	1	1	p						
B	A142	Vanellus vanellus	w	170	440	i	P	G	C	B	C	B
B	A167	Xenus cinereus	c				R		B	B	B	B

Species	Population in the area (Natura site)	Area assessment (Natura site)
Legend		
***Species group**: B= Birds*		
***Species**: Latin name of species*		
***Type**: p = permanent, r = breeding, c = concentration, w = wintering*		
***Size:** i= individuals, p= pairs*		
***Data abundance category**: C = common, R = rare, V = very rare, P = present or population size in individuals (i) or pairs (p).*		
***Data quality**: G= Good, M= Moderate, P= Poor, DD= Data deficient*		
***Pop.: Population**: Relative size and density of the species in the area in relation to the total population within national boundaries. A: 100% ≥ p ≥ 15%, B: 15% ≥ p ≥ 2%, C: 2% ≥ p ≥ 0, D: insignificant population. Data from SDF*		
***Con.: Conservation**: degree of conservation of habitat features important for the species and potential for restoration. A: excellent conservation, B: good conservation, C: moderate or limited conservation. Data from SDF*		
***Iso.: Isolation**: Degree of isolation of the population present in the area in relation to the natural range of the species. A: Isolated (almost) population, B: Non-isolated population, but located on the edge of the distribution area, C: Non-isolated population, within the wider distribution area.*		
***Glo.: Global**: Overall assessment of the site's value for the conservation of the species. A: Excellent, B: Good, C: Adequate.*		

(Source: Standard Data Form GR1150001 "Nestos Delta and Keramotis Lagoons and Thasopoula Island")

6.9.1.1.5 SPA GR1150012 "Thasos (Mount Ypsario and coastal zone)"

There are 48 bird species listed in Annex I of Joint Ministerial Decision 37338/1807/E.103 (see **table** below). In terms of the degree of conservation of habitat characteristics that are important for the species and restoration possibilities (conservation), 6 species show excellent conservation (A), 28 species show good conservation (B), 2 species (*Alauda arvensis, Chlidonias leucopterus)* show moderate or limited conservation, and for 12 species there is insufficient data.

Table6 –37 : Pollutants measured at the Kavala-2 station (in μg/m3) for the year 2022 Bird species listed in Annex I of Joint Ministerial Decision 37338/1807/E.103 in SPA GR1150012

Species			Population in the area (Natura site)						Area assessment (Natura site)			
Species group	Code	Scientific name	Type	Size		Unit	Category, population data	Data quality	A/B/C/D	A/B/C		
				Min	Max				Pop.	Con.	Iso.	Glo.
B	A402	*Accipiter brevipes*	r	4	4	p	-	G	C	A	C	B
B	A247	*Alauda arvensis*	c	0	0	-	C	DD	C	C	C	C
B	A229	*Alcedo atthis*	w	5	5	p	-	G	C	B	C	B
B	A229	*Alcedo atthis*	p	5	10	p	-	G	C	B	C	B
B	A226	*Apus Apus*	r	0	0	-	C	DD	C	B	C	C
B	A028	*Ardea cinerea*	w	0	0	-	P	DD	D	-	-	-
B	A215	*Bubo bubo*	p	2	4	p	-	G	C	A	C	B
B	A087	*Buteo buteo*	w	5	0	p	-	M	-	A	-	-
B	A087	*Buteo buteo*	p	5	0	p	-	M	C	A	C	B
B	A224	*Caprimulgus europaeus*	r	0	0	-	C	DD	C	-	C	B
B	A198	*White-winged tern*	c	0	0	-	P	DD	D	C	-	-
B	A080	*Circaetus gallicus*	r	2	4	p	-	G	C	A	C	B
B	A738	*Delichon urbicum*	r	0	0	-	C	DD	C	B	C	B
B	A026	*Egratta garzetta*	c	0	0	-	-	DD	D	B	-	
B	A447	*Emberiza caesia*	r	0	0	-	C	DD	C	B	C	B
B	A447	*Emberiza caesia*	c	0	0	-	P	DD	C	B	C	B
B	A379	*Emberiza hortulana*	r	0	0	-	P	DD	C	B	C	B
B	A379	*Emberiza hortulana*	c	0	0	-	P	DD	C	B	C	B
B	A100	*Falco eleonorae*	c	30	60	i	-	G	C	B	C	B

Species			Population in the area (Natura site)						Area assessment (Natura site)			
B	A103	*Falco peregrinus*	p	5	6	p	-	G	B	B	C	B
B	A321	*Ficedula albicollis*	c	0	0	-	P	DD	C	-	C	C
B	A320	*Ficedula parya*	c	0	0	-	P	DD	C	-	C	C
B	A131	*Himantopus Himantopus*	c	0	0	-	P	DD	D	B	-	-
B	A439	*Hippolais olivetorum*	c	0	0	-	P	DD	C	B	C	C
B	A439	*Hippolais olivetorum*	r	0	0	-	R	DD	D	B	-	-
B	A251	*Hirundo rustica*	r	0	0	-	C	DD	C	B	C	B
B	A023	*Nycticorax nycticorax*	c	0	0	-	P	DD	D	-	-	-
B	A337	*Oriolus oriolus*	r	2	0	i	-	M	C	B	C	B
B	A337	*Oriolus oriolus*	c	0	0	-	C	DD	C	B	C	B
B	A072	*Pernis apivorus*	r	3	0	p	-	M	C	A	C	B
B	A392	*Phalacrocorax aristotelis desmarestii*	r	150	0	P	-	M	B	B	C	A
B	A663	*Phoenicopterus roseus*	c	0	0	-	P	DD	-	-	-	-
B	A249	*Riparia riparia*	c	0	0	-	C	DD	C	-	C	C
B	A193	*Sterna hirundo*	c	0	0	-	C	DD	C	-	C	C
B	A885	*Sternula albifrons*	c	0	0	-	C	DD	C	-	C	C
B	A210	*Streptopelia turtur*	r	0	0	-	C	DD	C	B	C	B
B	A440	*Sylvia ruppeli*	r	0	0	-	C	DD	C	B	C	C
B	A228	*Tachymarptis melba*	r	0	0	p	-	M	B	B	C	A

Legend

***Species group**: B= Birds*

***Species**: Latin name of species*

***Type**: p = permanent, r = breeding, c = concentration, w = wintering*

***Size:** i= individuals, p= pairs*

***Data abundance category**: C = common, R = rare, V = very rare, P = present or population size in individuals (i) or pairs (p).*

***Data quality**: G= Good, M= Moderate, P= Poor, DD= Data deficient*

***Pop.: Population**: Relative size and density of the species in the area in relation to the total population within national boundaries. A: 100% ≥ p ≥ 15%, B: 15% ≥ p ≥ 2%, C: 2% ≥ p ≥ 0, D: insignificant population. Data from SDF*

***Con.: Conservation**: degree of conservation of habitat characteristics that are important for the species and potential for restoration. A: excellent conservation, B: good conservation, C: moderate or limited conservation. Data from SDF*

***Iso.: Isolation**: Degree of isolation of the population present in the area in relation to the natural range of the species. A: Isolated (almost) population, B: Non-isolated population, but located on the edge of the distribution area, C: Non-isolated population, within the wider distribution area.*

***Glo.: Global**: Overall assessment of the site's value for the conservation of the species. A: Excellent, B: Good, C: Adequate.*

(Source: Standard Data Form GR1150012 "Thasos (Mount Ypsario and coastal zone)")

6.9.1.1.6 Special Environmental Study 01B

The following **figure** is an excerpt from Map 8 of EPM01B "*Delimitation of protected objects – Protection zones*" and illustrates the proposals made by EPM01B regarding the delimitation of protection zones that divide the protected areas internally.

The protection zones are classified, based on the provisions of Law 4685/2020, as "Areas of absolute nature protection," "Nature Protection Areas," "Habitat and Species Conservation Areas," and "Sustainable Natural Resource Management Areas."

It should be noted that EMP 01B has currently been approved, but a Presidential Decree has not yet been issued. According to the **diagram** below**,** the project under consideration falls within zone ZBDPH-05, which is a Sustainable Natural Resource Management Zone. The specific land uses for zone ZBDP-05 according to EPM 01B are presented in **the** following **Table.**

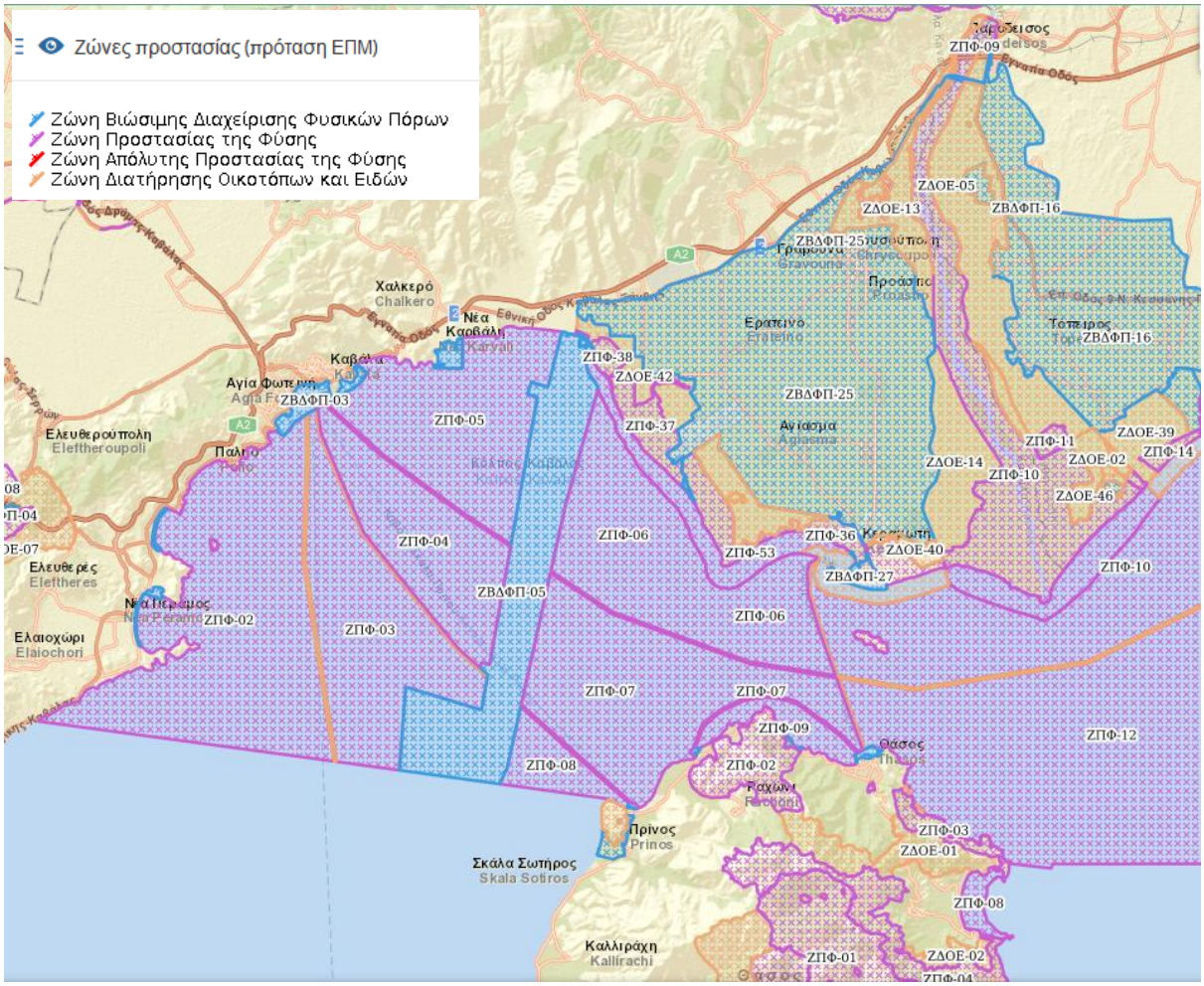


Figure6 –54 : Approved EMP 01B in terms of protection zones (EMP 01B proposal) within the protected areas of the Natura 2000 network

Table6 –38 : Special land uses for the proposed zone ZBDFP-05

SPECIAL LAND USES FOR THE ZBDFP BASED ON PD 59/2018 AS APPLICABLE	ZBDFP-05
(1) RESIDENTIAL	
(2) SOCIAL WELFARE	
(3) EDUCATION	
(4.1) SMALL SPORTS FACILITIES	
(4.2) LARGE SPORTS FACILITIES WITHIN THE PLAN OR WITHIN THE SETTLEMENT)	
(4.3) SPECIAL SPORTS FACILITIES	
(5) PLACES OF WORSHIP	
(6) CULTURAL FACILITIES	
(7) ADMINISTRATION	
(8.1) (HEALTH CARE) PRIMARY HEALTH SERVICES WITHOUT HOSPITALISATION	
(8.2) (HEALTH CARE) SECONDARY AND TERTIARY HEALTH SERVICES INCLUDING HOSPITALISATION	
(8.3) (CARE) OUTPATIENT MENTAL HEALTH UNITS.	
(8.4) (HEALTH CARE) ADDICTION PREVENTION AND TREATMENT UNITS. ADDICTIONS.	
(9) PUBLIC GATHERING PLACES / CONFERENCE CENTERS (ONLY FOR AREAS WITHIN THE PLAN OR WITHIN THE SETTLEMENT)	
(10.1) COMMERCIAL STORES.	
(10.2) PERSONAL SERVICES ESTABLISHMENTS.	
(10.3) FOOD SUPERMARKETS	
(10.4) DEPARTMENT STORES	
(10.5) SHOPPING CENTERS (ONLY FOR AREAS WITHIN THE PLANNED OR WITHIN SETTLEMENTS)	
(10.6) COMMERCIAL EXHIBITION FACILITIES EXHIBITION CENTERS (ONLY FOR AREAS WITHIN THE PLAN OR WITHIN SETTLEMENTS)	
(11) OFFICES/RESEARCH CENTERS/BUSINESS INCUBATORS	Special permit for scientific research
(12) CATERING	
(13) REFRESHMENT ROOMS	
(14) RECREATION - ENTERTAINMENT CENTERS	
(15) TOURIST ACCOMMODATION, SPECIAL TOURIST INFRASTRUCTURE FACILITIES AND OTHER TOURIST BUSINESSES (Law 4276/2014)	
(16) PARKING (STADIUM BUILDING)	
(17) FUEL AND ENERGY SUPPLY STATIONS	
(18) CAR WASHES, LUBRICATION STATIONS	
(19) REPAIR SHOPS	
(20) WAREHOUSES (LOW, MEDIUM, HIGH TRAFFIC)	
(21) SUPPLY FACILITIES	

SPECIAL LAND USES FOR THE ZBDFP BASED ON PD 59/2018 AS APPLICABLE	ZBDFP-05
(21.A) DATA AND TECHNOLOGICAL SUPPORT CENTERS AND OTHER RELATED ACTIVITIES (DATA CENTRES)	
(22) PROFESSIONAL LABORATORIES	
(23) CRAFT AND INDUSTRIAL FACILITIES (LOW AND MEDIUM NOISE - CATEGORIES A2 AND B OF LAW 4635/2019) *	
(24) AGRICULTURAL FARMS, FACILITIES, AND ACTIVITIES	
(24.1) AGRICULTURAL, FORESTRY, LIVESTOCK, FISHERIES AND OTHER AGRICULTURAL EXPLOITATIONS AND ACTIVITIES	Fishing farms and activities are governed by the conditions and restrictions set out in special use 24.9
(24.2) AGRICULTURAL STORAGE FACILITIES, GREENHOUSES AND OTHER AGRICULTURAL FACILITIES AGRICULTURAL SECTOR (ARTICLE 2 OF THE PRESIDENTIAL DECREE OF 31.5.1985, D' 270).	
(24.3) LIVESTOCK AND POULTRY FARMING FACILITIES - PUMPING STATIONS	
(24.4) AQUACULTURE (LAND, SEA, LAKE AND RIVER FACILITIES)	
(24.5) MULTIFUNCTIONAL AGRICULTURAL ESTATE (ARTICLE 52 OF LAW 4235/2014, A' 32)	
(24.6) LIVESTOCK PARKS (ARTICLE 43 OF LAW 4235/2014)	
(24.7) SALT MARSHES	
(24.8) GRAZING	
(24.9) FISHERIES (AMATEUR AND PROFESSIONAL)	Additional restrictions may be imposed by OFYPEKA, maintenance and modernization of existing fishing shelters
(24.10) COLLECTION OF PLANTS, HERBS, INVERTEBRATES AND FUNGI (MUSHROOMS) AND BENTHIC ORGANISMS FROM THE SUBSTRATE OF THE COASTAL ZONE	To meet the individual needs of the inhabitants of the zone and for limited commercial use, following the preparation and approval by OFYPKA of a relevant list of species permitted for collection
(24.11) HUNTING	
(24.12) EQUESTRIAN CENTERS	
(24.13) AGRICULTURAL DEVELOPMENT LAND IMPROVEMENT WORKS	
(25) MINING ACTIVITIES (MINES, QUARRIES, METALLES, SAND EXTRACTION, HYDROCARBON EXPLORATION, RESEARCH AND EXPLOITATION ZONES HYDROCARBONS).	Operation of legally existing hydrocarbon exploration, research and exploitation facilities, improvement and modernisation, and new
(26) MASS TRANSPORT FACILITIES, WITH SPECIALISATION BY SUBCATEGORIES ACCORDING TO ZONE	
(26.1) AIRPORTS (ONLY FOR AREAS WITHIN THE PLAN OR WITHIN SETTLEMENT)	
(26.2) HELIPORTS	
(26.3) WATERWAYS	

SPECIAL LAND USES FOR THE ZBDFP BASED ON PD 59/2018 AS APPLICABLE	ZBDFP-05
(26.4) RAILWAY STATIONS	
(26.5) COMMERCIAL RAILWAY STATIONS	
(26.6) SPECIAL RAILWAY FACILITIES	
(26.7) URBAN AND INTERCITY BUS, TROLLEYBUS, AND TRAM STATIONS	
(26.8) PARKING AREAS FOR TOURIST BUSES (COACHES), TRUCKS AND MOTORHOMES	
(26.9) S.E.A. (MOTORWAY SERVICE STATIONS)	
(26.10) PUBLIC TRANSPORT TRANSFER STATIONS	
(26.11) PORT AREAS FOR PASSENGER, COMMERCIAL, FISHING, INDUSTRIAL AND TOURIST ACTIVITIES, MARINAS	
(26.12) LINEAR TRANSPORT INFRASTRUCTURE	
(26.12.1) ROADS (MOTOR VEHICLE TRAFFIC) (POSSIBILITY OF SPECIALISATION BASED ON RELEVANT LEGISLATION)	
(26.12.2) LOW-TRAFFIC ROADS	
(26.12.3) SIDEWALKS	
(26.12.4) BICYCLE PATHS	
(26.12.5) SQUARES	
(26.12.6) FOOTPATHS	
(26.12.7) MARITIME TRAFFIC CORRIDORS	Additional traffic restrictions may be imposed by OFYPE
(27) VEHICLE TECHNICAL INSPECTION CENTERS (KTEO, IKTEO)	
(28) VEHICLE TRANSFER STATIONS	
(29) PACKAGING AND MATERIAL RECYCLING FACILITIES	
(30) RECYCLING CORNERS AND GREEN POINTS (SMALL) (JOINT MINISTERIAL DECISION 18485/26.4.2017, B' 1412).	
(31) PROCESSING, STORAGE AND DISPOSAL AREA FOR SOLID WASTE / AREA FOR THE PROCESSING AND DISPOSAL OF SOLID TOXIC WASTE (ONLY FOR AREAS WITHIN THE PLAN OR WITHIN SETTLEMENT)	
(32) SEWAGE TREATMENT AND DISPOSAL AREA (BIOLOGICAL TREATMENT)	
(33) FACILITIES FOR THE PRODUCTION, STORAGE AND TRANSPORT OF ELECTRICITY AND NATURAL GAS, WATER SUPPLY, TELECOMMUNICATIONS AND RELATED FACILITIES	
(34) RENEWABLE ENERGY SOURCE FACILITIES.	
(35) TELECOMMUNICATIONS, RADIO AND TELEVISION STATIONS.	
(36) MILITARY FACILITIES	
(36.A) WILDLIFE CARE CENTERS (KEPEAP) (ONLY AS FAR AS OFFICES AND FIRST AID)	
(37) END-OF-LIFE VEHICLE FACILITIES (ELVF) (ONLY FOR AREAS WITHIN THE PLAN OR WITHIN SETTLEMENTS)	
(38) CEMETERIES	
(39) CREMATORIUM AND BONE DEPOSIT CENTERS	

SPECIAL LAND USES FOR THE ZBDFP BASED ON PD 59/2018 AS APPLICABLE	ZBDFP-05
(40) CORRECTIONAL FACILITIES PRISONS DETENTION CENTERS	
(41) TEMPORARY RECEPTION AND ACCOMMODATION FACILITIES FOR MIGRANTS/REFUGEES AND VULNERABLE GROUPS	
(42) RACETRACK (ONLY FOR AREAS WITHIN THE PLAN OR WITHIN SETTLEMENT)	
(44) CASINO (ONLY FOR AREAS WITHIN THE PLAN OR WITHIN SETTLEMENT)	
(45) VENUES FOR TECHNICAL ENTERTAINMENT AND GAMBLING (ONLY FOR AREAS WITHIN THE PLAN OR WITHIN THE SETTLEMENT)	
(46) URBAN AGRICULTURE VEGETABLE GARDENS	
(47) CHILDREN'S CAMPS AND HOLIDAY RESORTS	
(48) CONSTRUCTIONS IN PUBLIC COMMON AREAS IN ACCORDANCE WITH ARTICLE 20 OF THE NOK	
(48.1) CONSTRUCTIONS FOR:	
(48.1) A) LANDSCAPING, SUCH AS STAIRS, WALLS, PATHWAYS, SLOPED SURFACES, MECHANICAL MEANS OF COVERING OF HEIGHT DIFFERENCES, AS WELL AS STRUCTURES FOR THE SERVICE OF PERSONS WITH DISABILITIES AND/OR OBSTACLES PERSONS	
(48.1) B) STRUCTURES FOR THEIR LANDSCAPING AND AESTHETICS UPGRADING, EQUIPMENT AND SAFETY, AND IN GENERAL STRUCTURES FOR SERVING THE PURPOSE OF THE AREAS (48.1)	
(48.1) C) TEMPORARY AND PROVISIONAL STRUCTURES	
(48.1) D) THE OPERATION AND MAINTENANCE OF MASS TRANSPORTATION TRANSPORTATION.	
(48.2) FACILITIES:	
(48.2) A) THE CONSTRUCTION OF INFRASTRUCTURE NETWORKS AND PUBLIC UTILITY FACILITIES AND UNDERGROUND) AND UNDERGROUND)	
(48.2) B) THE INSTALLATION OF ATMOSPHERIC MEASURING STATIONS POLLUTION, NOISE AND METEOROLOGICAL PARAMETERS WITH THE NECESSARY EQUIPMENT	
(48.2) C) ABOVE-GROUND AND UNDERGROUND DISTRIBUTION OR MEASUREMENT STATIONS AND REGULATION OF NATURAL GAS	
(48.2) D) INSTALLATION OF NATURAL BOILERS OR UNITS HIGH-EFFICIENCY COGENERATION UNITS FOR ELECTRICITY AND HEAT EFFICIENCY FOR DISTRICT HEATING	
(48.2) E) INSTALLATION OF ELECTRIC VEHICLE CHARGING STATIONS VEHICLES	
(48.2) F) THE INSTALLATION OF WATER DESALINATION UNITS AND OTHER WATER TREATMENT SYSTEMS FOR THE SUPPLY OF WATER TO MUNICIPAL NETWORKS, TOGETHER WITH THE ACCOMPANYING WORKS (49) INFORMATION KIOSKS/ENVIRONMENTAL INTERPRETATION WORKS	
(49) INFORMATION KIOSKS/ENVIRONMENTAL INTERPRETATION PROJECTS (SIGNS, EXIT SIGNS, KIOSKS, SHELTERS, ETC.)	Environmental interpretation projects
(50) PROJECTS FOR THE PREVENTION OR TREATMENT OF SALINITY OF (51) WORKS FOR PROTECTION AGAINST EROSION, LANDSLIDES AND SUPPORT	

SPECIAL LAND USES FOR THE ZBDFP BASED ON PD 59/2018 AS APPLICABLE	ZBDFP-05
(51) PROJECTS FOR PROTECTION AGAINST EROSION, LANDSLIDES AND SUPPORT (52)	
(52) MARINE RECREATION (SWIMMING, SAILING, DIVING, UNDERWATER PHOTOGRAPHY, ETC.)	
(53) WORKS RELATING TO THE RESTORATION AND IMPROVEMENT OF WATER RESERVES	
(54) FLOATING INFRASTRUCTURE AND MARINE RECREATION FACILITIES	
(55) LIGHTHOUSES.	
Legend: *Color code:* *Red: Not selected based on the EMP* *Orange: Selected based on the EPM with conditions/specifications* *Green: Selected based on the EPM* *Light blue: Not applicable in the zone*	

(Source: EPM 01B)

6.9.1.2 National Park of Eastern Macedonia and Thrace

The National Park of Eastern Macedonia and Thrace, as defined in 2008 by Joint Ministerial Decision (JMD) 44549/2008 (Government Gazette 497/A/17-10-2008), includes the protected areas of the Nestos Delta wetland, Lakes Vistonida and Ismarida and the surrounding areas, with a total land and water area of 930,000 acres.

The institutional management of the National Park of Eastern Macedonia and Thrace is the Nestos Delta Vistonida-Ismarida Management Agency, which is a private, non-profit legal entity established in April 2003 by the Ministry of Environment and Energy. The management of the National Park must be compatible with the requirements of the relevant Management Plan.

The wetland complex of the National Park is one of the most important in Greece due to its large size and high biological, aesthetic, scientific, educational, and geomorphological value. The purpose of the National Park is to effectively protect the habitats and rare species of flora and fauna that live and reproduce in the area. More than 326 species of birds have been observed in the National Park during the breeding season, wintering, or simply passing through the area. In addition, there is a wide variety of fish, amphibians, and reptiles. The wetland is also an important habitat for otters, wolves, roe deer, and many other mammals.

The main habitats are as follows:

- **Sandy areas**: apart from birds, which prefer sandy barren areas, only plants that are adapted to harsh conditions, such as sea daffodils, live here.
- **Salt marshes and salt flats**: These areas are periodically flooded with brackish or salt water. Here we can find salt-tolerant plants, as well as animals that are adapted to this harsh environment.
- **Reed beds**: These are important feeding grounds for storks, birds of prey, and many other bird species.
- **Reed beds**: Reed beds are ideal nesting sites for a significant number of birds and a wide variety of species.

- **Mastic shrub thickets, riparian forests**: Protected areas in forests provide ideal conditions for many birds of prey to breed and find sufficient food.

Within the National Park, the specific Protected Zones and their boundaries follow the natural characteristics or artificial features of the area. Only specific uses and activities, as defined in Joint Ministerial Decision 44549/2008, are permitted in these Protected Zones. During the Environmental Licensing Procedure for new or existing projects located within the National Park, consultation with the Nestos-Vistonida-Ismarida Delta Management Agency is required.

The following table presents the Protected Areas in descending order of ecological importance in terms of their uses and activities within their boundaries.

Table6 –39 : Zones of the National Park of Eastern Macedonia and Thrace

Zone	Uses/Activities
Zone A	Nature Protection Area
Zone B	Protected Landscapes
Zone C	Eco-development Area
Zone D	Regional National Park Zone

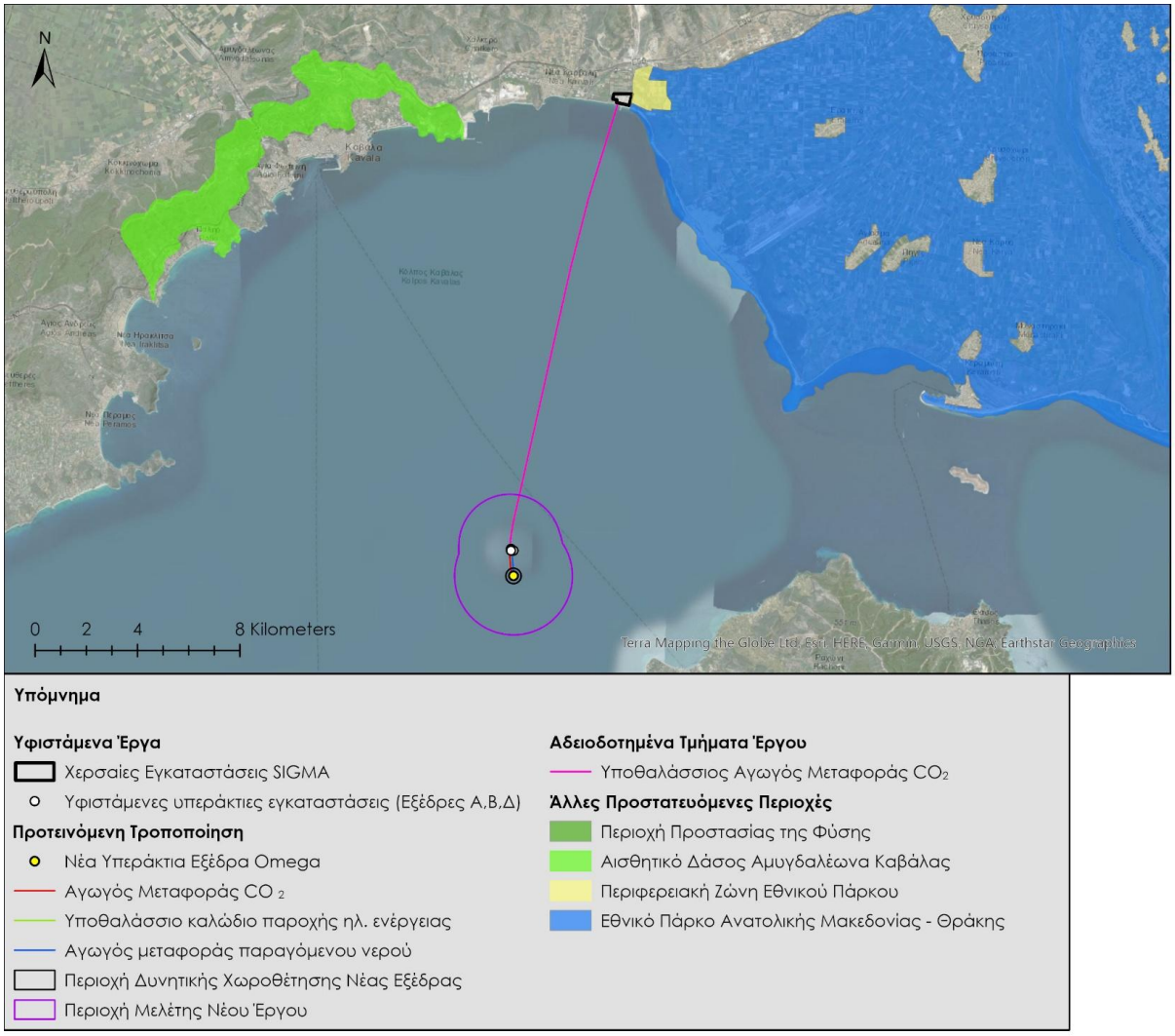


Figure6 –55 : National Park of Eastern Macedonia and Thrace

As shown in the above **Figure**, no part of the National Park of Eastern Macedonia and Thrace falls within the Project study area.

6.9.1.3 Wildlife Refuges

The establishment of the first permanent Game Reserves within the administrative boundaries of the Thasos Forestry Office resulted in a permanent ban on hunting and was implemented through Ministerial Decision 38098/1976 (Government Gazette 744/B/4.6.1976). The Game Reserves were subsequently renamed Wildlife Reserves (KAZ), as they are known today, an amendment implemented by Article 57 of Law 2637/1998 (Government Gazette 200/A/08.27.1998).

The current Law 3937/2011 (Government Gazette 60/A/31.03.2011) defines KAZ (Wildlife Refuges) in paragraph 4.3 of Article 5 as *"... natural areas (terrestrial, wetland, or marine) that are of particular importance as significant sites for the development of wild flora or as habitats for reproduction, feeding, wintering of wild fauna species, or as areas for fish reproduction and fry concentration, or, finally, as important marine habitats..."*. In addition, it provides that ecological corridors between other categories of protected areas may also be designated as SACs.

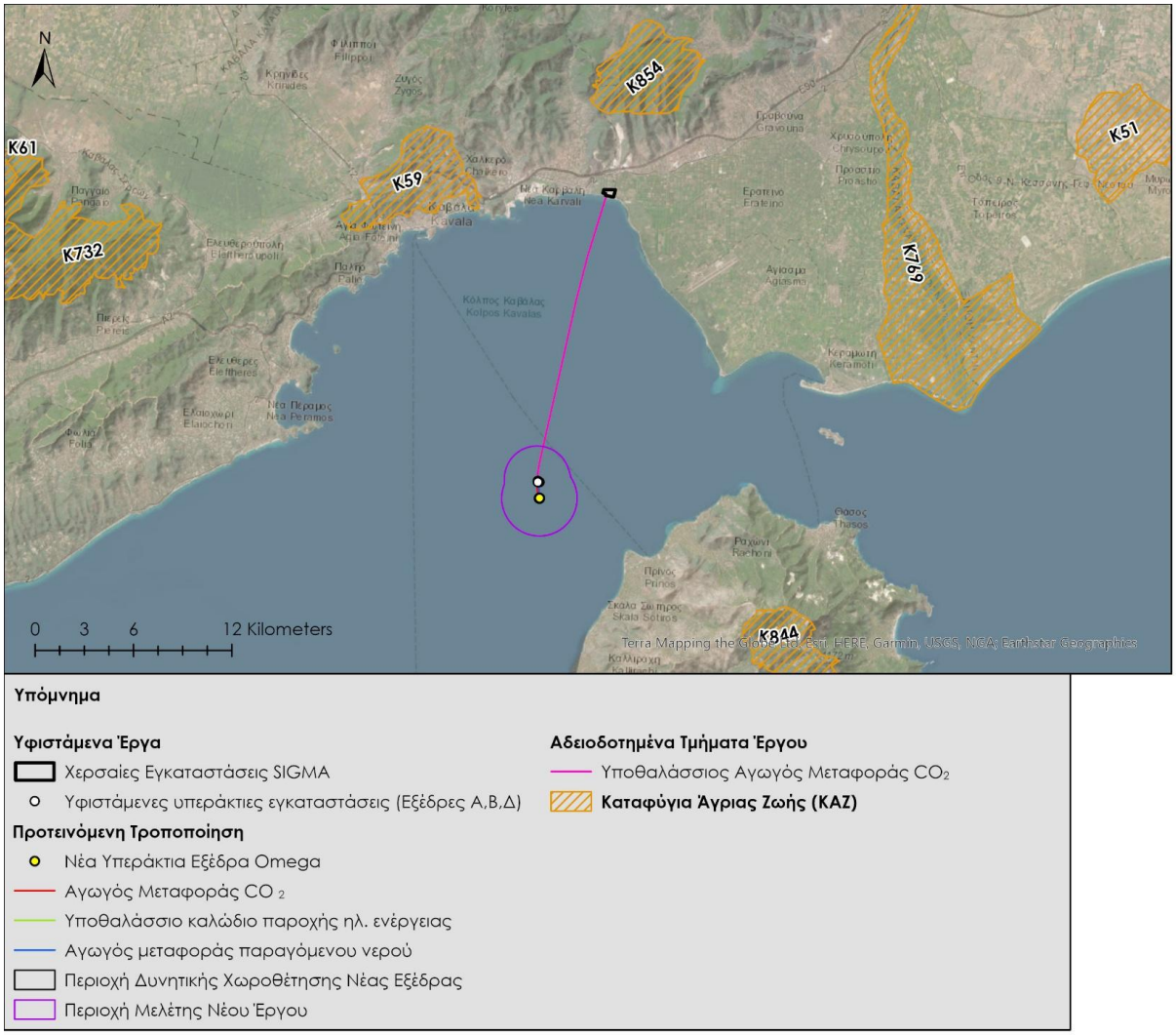
In permanent refuge areas, it is prohibited to hunt any game or wild fauna, or to capture any wild fauna for non-research purposes.

The project study area does not include any designated SACs (paragraph 3 of Article 6 of Law 3937/2011). The SACs that exist within the wider project area are shown in **the figure** below.

The following **table** summarises the nearest SACs in the study area and their distance from the Project's land facilities.

Table6 –40 : Summary description of Wildlife Refuges (WRL) and their distances from the Project's land facilities

No	Wildlife Refuge	Code	Government Gazette	Distance from land facilities (km)
1	Kallirachi-Maries	K104	744/B/1976	1
2	Limania, Theologou, Potamia, Prinos, Maries, Thasos Island	K844	672/B/01-06-2001 Amendment	14.5
3	Agios Timotheos - Koupia	K59	733/B/1976	18
4	Kotsa Orman Nestos	K769	908/B/2001	22.8



6 –56 : Wildlife Refuges within the wider Project area

6.9.2 Other Natural – Ecologically Sensitive Areas

6.9.2.1 Ramsar Wetlands

The Convention on Wetlands of International Importance, especially as waterfowl habitat, also known as the "Ramsar Convention" – named after the Persian city where it was signed in 1971 – provides for the protection of wetland ecosystems.

According to Article 1 of the Convention, wetlands are: *"...natural or artificial areas consisting of marshes with herbaceous vegetation, non-exclusively rain-fed marshes with peaty substrate, peaty areas or water. These areas are permanently or temporarily flooded with water that is stagnant or flowing, fresh, brackish, or salty, and also include those covered by seawater whose depth at low tide does not exceed six meters. Wetlands may also include riparian or coastal zones adjacent to wetlands or islands or marine water bodies that are deeper than six meters at low tide...*

Each state party to the Convention must designate at least one wetland of international importance, while according to the most recent survey, the 158 states that have ratified the Convention have designated 1,828 wetlands of international importance.

The Convention was ratified by Greece with Legislative Decree 191/1974 (Government Gazette 350/A/11.20.1974), which was subsequently amended by Law 1751/1988 (Government Gazette 26/A/02.09.1988) and Law 1950/1991 (Government Gazette 84/A/05.31.1991) "On the Ratification of the Amendments to the Ramsar Convention." There are 10 Greek wetlands that have been designated since August 21, 1975 as wetlands of international importance (Ramsar wetlands), covering an area of 1,635,010 square meters. It should be noted that Greece, by signing and ratifying the Ramsar Convention, has undertaken to conserve and properly use all of the country's wetlands through local, regional, and international activities and cooperation.

The Montreux Record is an extract from the Ramsar List of Wetlands, which was established during the 4th Conference of the Contracting Parties, held from June 27 to July 4, 1990 (Recommendation 4.8, Ramsar Convention). The purpose of the list was to record all Ramsar wetlands that are at risk of changing their ecological character, thereby obliging the contracting parties to take drastic measures to prevent or reverse these changes.

When the Montreux list was first created, all 10 Greek wetlands were included, but in 1999, three were removed: Lake Mikri Prespa, Lake Kerkini, and the Evros Delta. Today, seven of the ten Greek wetlands are included in the Montreux List.

In the area of the land facilities of the already licensed project, within the boundaries of the Municipality of Nestos, there is one (1) Ramsar Wetland, which is also included in the Montreux List.

This wetland (see **figure** below), called "*Nestos Delta and adjacent lag*oons," with a total area of 21,930 ha, joined the Ramsar Convention in 1975.

(Source: WWF Ecoscope, http://www.oikoskopio.gr/map/, 10-6-2024)

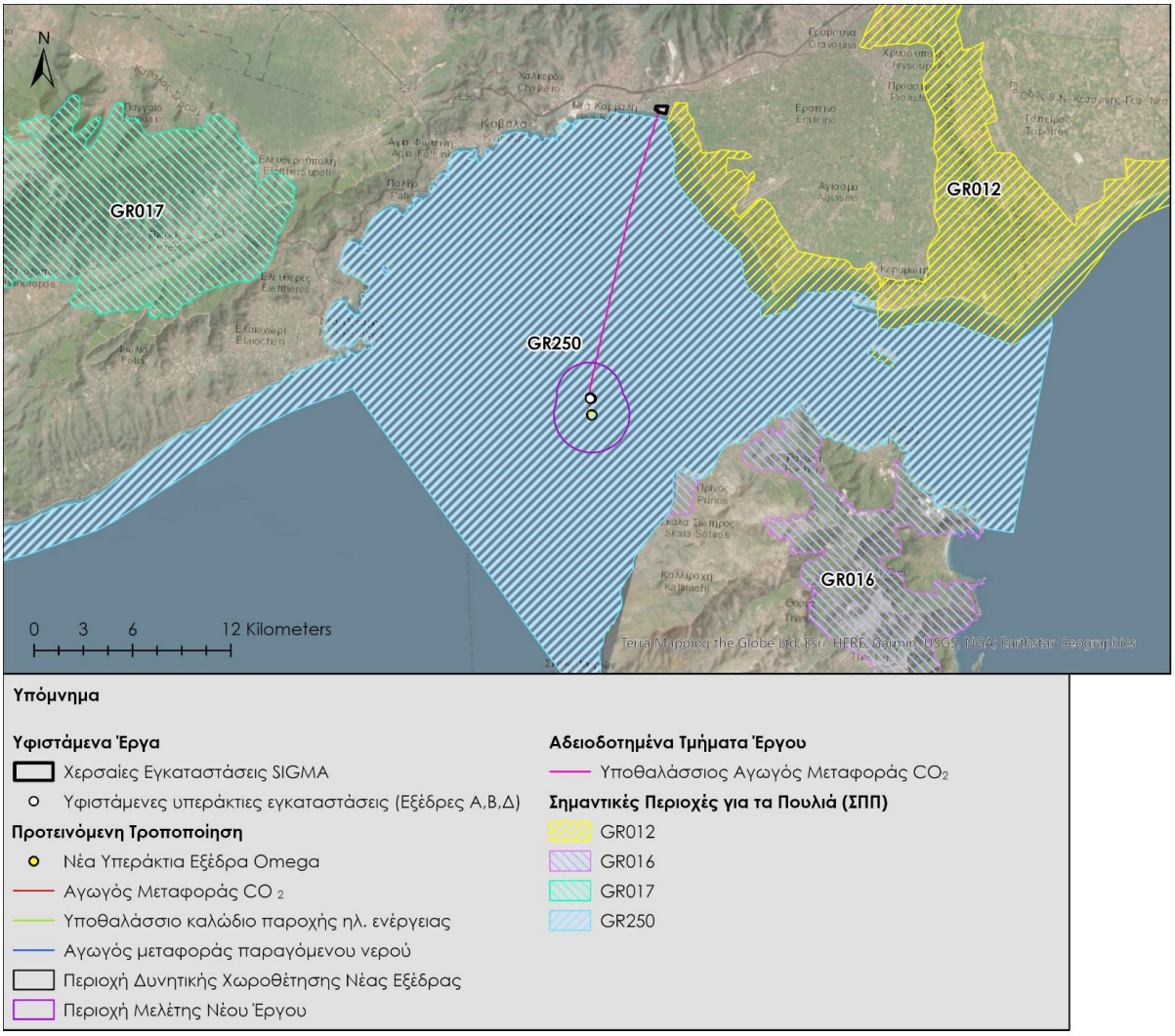
Figure6 –57 : Ramsar site "Nestos Delta and adjacent lagoons"

6.9.3 Other Protected Areas

6.9.3.1 Important Bird Areas (IBAs)

Important Bird Areas (IBAs) have been designated and delineated by Birdlife International. Birdlife International's overall objective is to update IBA data from partners every four years. The specific objective of Birdlife International is to record bird species (for IBA areas) in special field protocols and includes reporting threats that may affect birds or the habitat, conservation actions taking place in the area, and bird species observed.

As shown in the **figure** below, the marine area of the project is included in the Important Bird Area (IBA) with code GR250 and name "Gulf of Kavala and Thasos marine area," while the study area also includes the GR012 area named "Nestos Delta and Coastal Lagoons." The wider area also includes the area with code GR016 and name "Thasos Island and Xironisi."



(Source: Hellenic Ornithological Society, EOS)

Figure6 –58 : Important Bird Areas (IBAs)

Gulf of Kavala and Thasos marine area – GR250

According to the report "Important Areas for Seabirds in Greece", LIFE07 NAT/GR/000285 - Hellenic Ornithological Society (EOT/BirdLife Greece, 2012), the species that meet the criteria for IBA250 GR250 "Gulf of Kavala and Thasos marine area" include *Phalacrocorax aristotelis* and *Puffinus yelkouan.* This marine SPA includes the entire Gulf of Kavala, the Straits of Thasos, the coastal waters along the southern island of Thasos and along the mainland to Drakopetra in the west.

This SPA has been designated because of its importance for the European Shag (*Phalacrocorax aristotelis desmarestii*) and the *Yelkouan* Shearwater (*Puffinus yelkouan*). More specifically, the area includes the feeding and maintenance areas of the largest breeding population of Shags in Greece, which breeds within the SPA GR1150001 of the Natura network "Nestos Delta and Keramotis Lagoons and Thasopoula Island" and the SPA of the Natura network GR1150012 "Thasos (Mount Ypsario and coastal zone)" and comprises 10% of the national breeding population of the species.

Thasos Island and Xironisi – GR016

The area includes Mount Ypsari with steep rocky slopes, extensive meadows, maquis scrub, forests of Calabrian pine (*Pinus brutia*) and black pine (*Pinus nigra*), and deciduous broadleaf trees. The area also includes the islets around Thasos and the verdant islet of Xironisi, located southwest of Kavala and characterized by vertical rocky coasts. To the northwest of the island, in Ormos Prinos, there is a coastal wetland with reeds (*Phragmites spp.*), while in the area of the settlement of Maries there is another wetland with stagnant fresh water. The coastal and surrounding marine zone is of great importance to seabirds, both as a breeding ground and as a feeding ground.

Since 1985, fires have burned about 60% of the island, but the area still has a high percentage of forest cover. Extensive olive groves, large marble quarries, and intensive livestock farming (mainly sheep and goats) are the main land uses, while tourism has also been developing in recent years.

Marble quarrying has destroyed part of the area and continues to expand, while the disturbance caused by this activity affects a large part of it. Intensive fishing with trawlers (reduction in catches, disturbance during reproduction) and trapping (in nets and longlines) threaten the species *Puffinus yelkouan* and *Phalacrocorax aristotelis.* Other threats include poaching, overgrazing, forest fires, and uncontrolled landfills, which lead to an increase in the population of *Larus michahellis,* which in turn prey on seabird chicks and eggs. Residential development is seriously affecting the coastal wetland in Prinos, while tourism development and recreational activities are affecting the coastal areas of the region and the islet of Panagia. In recent years, seabird colonies have been disturbed by amateur fishermen, which has had a negative impact on the reproductive process.

Nestos Delta and Coastal Lagoons – GR012

This wetland is of great importance for aquatic birdlife. It consists of a complex of wetlands, the most important part of which is the southern section of the Nestos River, 29 km long, with its estuary and riparian forest. West of the estuary, there are six lagoons (Vassovas, Eratinou, Agiasmos, Kokkala-Pigon, Keramoti, Monastiraki), extensive sandy coasts, salt marshes, and freshwater marshes. The eastern side is dominated by salt marshes and extensive freshwater marshes (permanent or seasonal). The area also includes the lakes of Chrysoupoli, which are 18 small freshwater lakes (remnants of old beds of the Nestos River), as well as the island of Thasopoula. The Kotza Orman forest, covering an area of approximately 450 hectares, is one of the largest water-rich forests in Greece. The main human activities in the area include agriculture, livestock farming, fishing, and tourism.

6.9.3.2 Critical Habitats for Cetaceans according to the ACCOBAMS International Convention

The Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea, and Contiguous Atlantic Area (ACCOBAMS) aims to conserve cetaceans at the regional level. Under this intergovernmental Agreement, countries commit to protecting all cetacean species and their habitats in the Agreement's area of application. In this context, the members and the Scientific Committee of ACCOBAMS have identified Cetacean Critical Habitats (CCHs), which are areas critical for the survival and conservation of a healthy cetacean population. They include marine habitats important for feeding, reproduction, and rearing of calves, as well as areas important for migration.

A total of 8 Critical Habitats for Cetaceans have been identified in Greek marine waters (see **Figure** below):

- Kalamos
- Eastern Ionian Sea and Gulf of Corinth
- Argosaronic Gulf and southern Euboean Gulf
- Northern Sporades marine area
- Northern Aegean Sea
- Maritime area of the Dodecanese
- Amvrakikos Gulf
- Southwestern Crete and the Hellenic Trench

ACCOBAMS resulted from consultations between the four conventions:

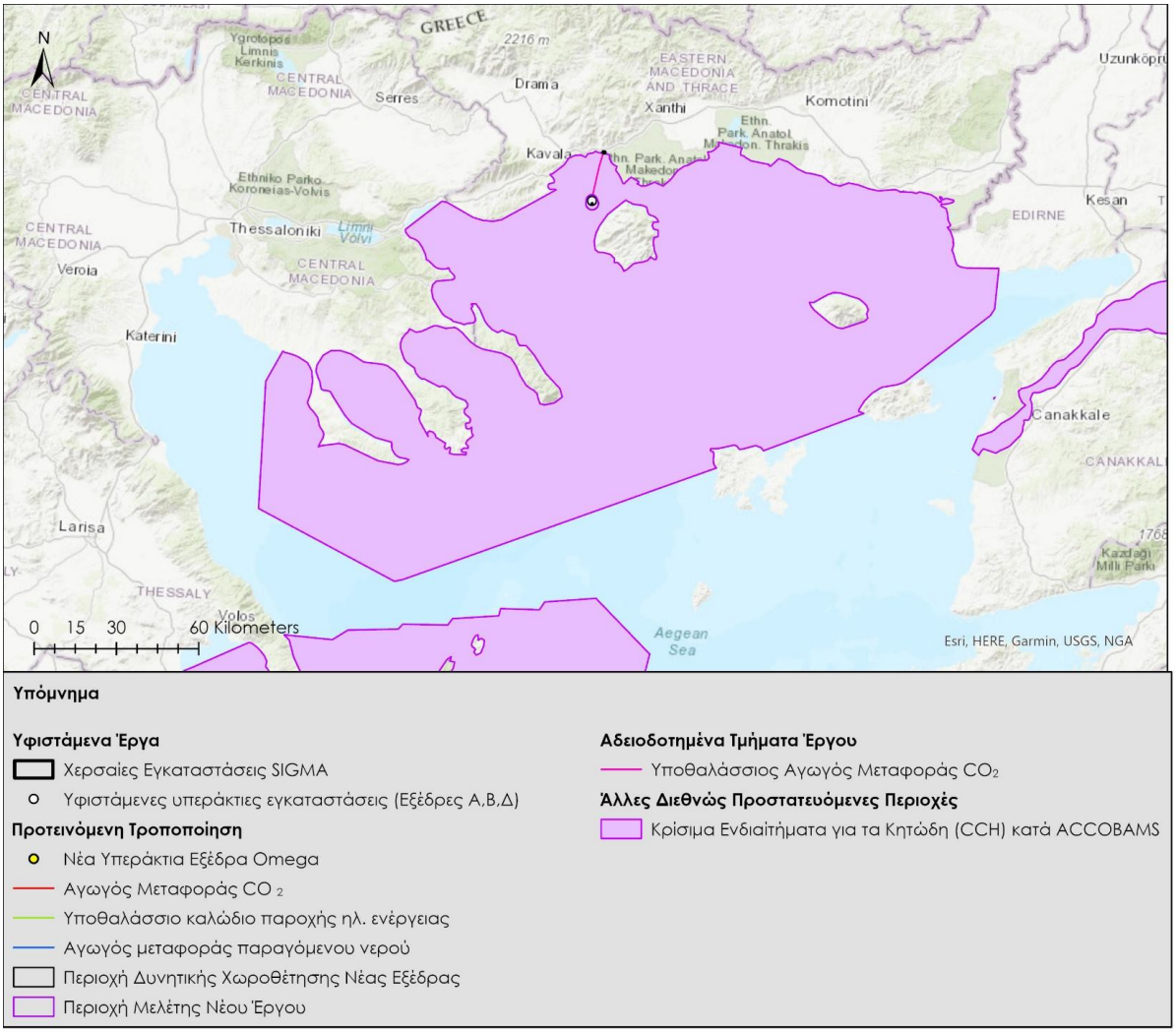
- the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean,
- the Bonn Convention on the Conservation of Migratory Species of Wild Animals,
- the Bern Convention on the Conservation of European Wildlife and Natural Habitats,

Due to the migratory characteristics of these species, the agreement was drawn up under the auspices of the Bonn Convention (UNEP/CMS).

The area covered by the agreement consists of all the marine waters of the Black Sea, the Mediterranean Sea, and the adjacent Atlantic area west of the Strait of Gibraltar. The area includes the Pelagos Sanctuary, which is dedicated to marine mammals in the northwestern Mediterranean and was established by France, Italy, and Monaco. ACCOBAMS is the first agreement that commits countries in these regions to cooperate on cetacean conservation. An innovative approach of this agreement is the inclusion of non-coastal countries whose maritime activities may endanger the conservation of cetaceans.

In 2010, the parties to ACCOBAMS adopted a resolution to extend the geographical scope of the agreement area to the exclusive economic zones of Spain and Portugal. In 2022, the agreement has 24 parties: Albania, Algeria, Bulgaria, Croatia, Cyprus, Egypt, France, Georgia, Greece, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Portugal, Romania, Slovenia, Spain, Syria, Tunisia, Turkey, and Ukraine.

Overall, the study area falls within the boundaries of Accobams Zone 9 in the Northeast Mediterranean (Thracian Sea), as shown in **the** following **figure**.



(Source: Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area, https://accobams.org/)

Figure6 –59 : Critical Habitats for Cetaceans in the Northeast Mediterranean according to the ACCOBAMS Agreement

The species characteristic of the Northern Aegean study area found in Accobams Zone 9 are marine mammals. The dolphins that appear include *Tursiops truncatus* (bottlenose dolphin), *Delphinus delphis (*common dolphin), and *Stenella coeruleoalba (*striped dolphin). *Monachus monachus (*Mediterranean monk seal) is also present, and various species of whales such as *Balaenoptera physalus* (fin whale). The presence of these species highlights the ecological value of the area and the need for ongoing protection and conservation efforts under international agreements such as ACCOBAMS.

6.9.3.3 Important Marine Mammal Areas (IMMAs)

Important Marine Mammal Areas (IMMAs) are defined as distinct habitat areas important for marine mammal species that can be delineated and managed for protection and conservation. IMMAs consist of areas that are important at the local level for protection and/or monitoring. The term "important" in the context of IMMA classification refers to any perceived value associated with marine mammals within the

IMMA that is relevant to improving the conservation status of these species or populations. IMMAs are identified by experts through a methodical process that is independent of any political and socio-economic conditions and is intended to contribute to existing national and international marine mammal conservation tools, in relation to marine protected areas, including Ecologically or Biologically Significant Areas (EBSAs) and Key Biodiversity Areas (KBAs).

(Source: Important Marine Mammal Areas, https://www.marinemammalhabitat.org/immas/)

Figure6 –60 : Important Marine Mammal Areas (IMMAs) located in the study area of the northern coast of the Thracian Sea islands

As shown in **the figure** above, the study area falls within the Important Area for Marine Mammals called "Northern Coast and Islands of the Thracian Sea" with a total area of 5441 km^2.

Four species of marine mammals have been identified in the marine area of the northern coast and islands of the Thracian Sea:

- Monachus Monachus (Mediterranean monk seal)
- Tursiops *truncatus* (bottlenose dolphin)
- Delphinus *delphis* (common dolphin)
- Stenella coeruleoalba (striped dolphin)

The presence of these species highlights the ecological value of the area and the need for ongoing protection and conservation efforts under international agreements such as IMMAs (Northern Coast and Islands of the Thracian Sea Important Marine Mammal Area - IMMA, 2014).

6.9.3.4 Ecologically or Biologically Significant Areas (EBSAs)

Ecologically or Biologically Significant Areas (EBSAs) are pelagic areas important for their ecological and biological characteristics, such as providing food, critical habitats, and breeding grounds. These areas were identified in 2008 through a process under the auspices of the United Nations Convention on Biological Diversity, applying specific scientific criteria. The area is particularly productive due to the inflow of water from transfrontier rivers, uplifts, and the inflow of nutrient-rich water from the Black Sea. The area includes some of the most important fishing grounds in the Aegean Sea. The area is home to rare species of cetaceans and corals, as well as one of the largest marine parks in the Mediterranean, which supports a significant population of Mediterranean monk seals.

The North Aegean Sea area (see figure below) has been recognized as one of the three Ecologically or Biologically Significant Areas in Greece, and is included in the MID 17 EBSAs zone according to geospatial data.

(Source: Important Marine Mammal Areas, https://www.marinemammalhabitat.org/immas/)

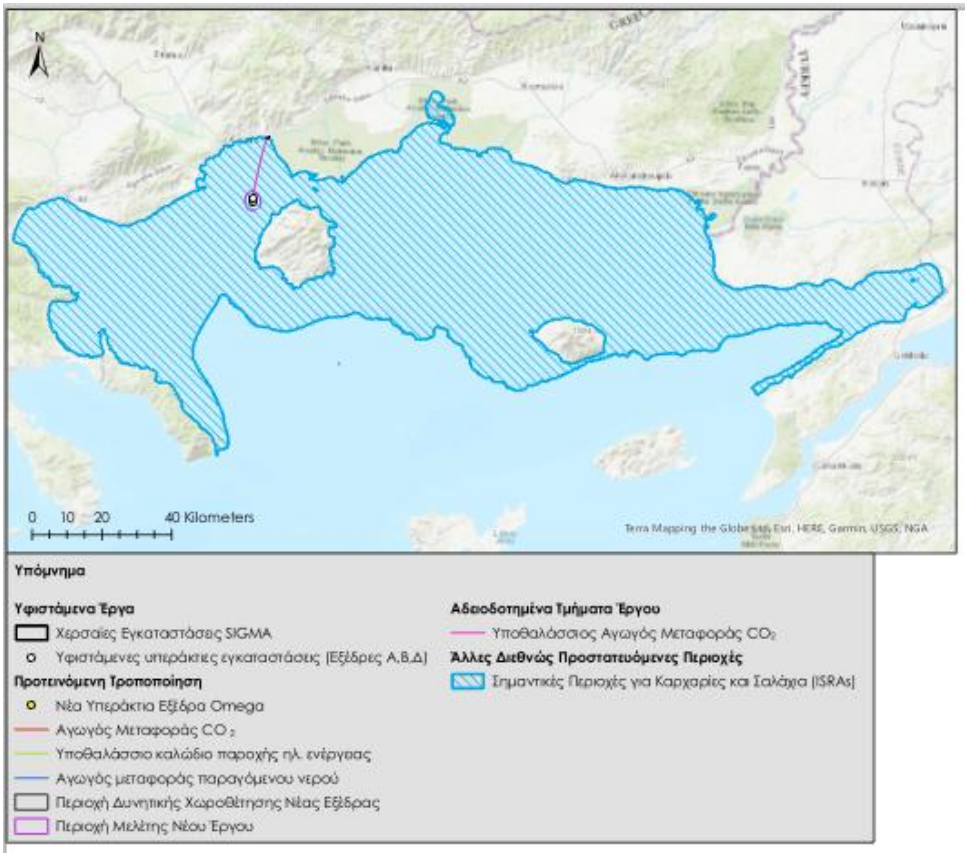
6 –61 : Ecologically or Biologically Significant Areas (EBSAs) located in the Northern Aegean study area

6.9.3.5 Important Shark and Ray Areas (ISRAs)

In May 2023, the first meeting between experts from around the world was held with the aim of defining critical habitats for sharks, rays, and chimeras throughout the Mediterranean and Black Seas (ISRAs). ISRAs are defined by the IUCN Shark Specialist Group (SSC Shark Specialist Group) as "distinct, three-dimensional segments of habitats and habitats that are important for one or more shark species and can be managed for their conservation." Although they are not protected areas, their designation will allow policymakers to take into account the use of habitats by sharks, rays, and skates when developing and implementing management measures. In addition to the total of 85 candidate ISRAs identified, 17 areas were designated as Areas of Interest (AoI) because the scientific evidence is insufficient, but these areas are likely to be important for many species. The best available scientific information is used to delineate ISRAs in order to identify areas that are most critical for the long-term survival of sharks, rays, and skates globally. The areas include places where they mate, reproduce, feed, rest, congregate, or make stopovers during migration. The

workshop also encouraged further collaboration among experts in the region to develop research projects and build knowledge about critical habitats and habitats in these areas.

The Thracian Sea continental shelf is located in the northernmost part of the Aegean Sea. It is characterised by a diverse coastline and continental shelf morphology that includes several bays and two islands (Thasos and Samothraki). It has an extensive continental shelf, which is mainly covered by seagrass beds and sandy-muddy substrates. The nutrient-rich rivers and waters of the Black Sea support the high biological productivity of the area. The area coincides with an ecologically or biologically significant marine area, 12 key biodiversity areas, 10 Natura 2000 sites, five Ramsar sites, and two national parks. Within this area there are endangered species (e.g. *Aetomylaeus bovinus)*, species with limited distribution (*Raja radula)*, breeding areas (e.g. *Scyliorhinus canicula)* and undefined concentrations (*Dasyatis pastinaca).*



(Source: https://isea.com.gr/delineation-of-isras)

Figure6 –62 : Important Shark and Ray Areas (ISRAs) in the study area

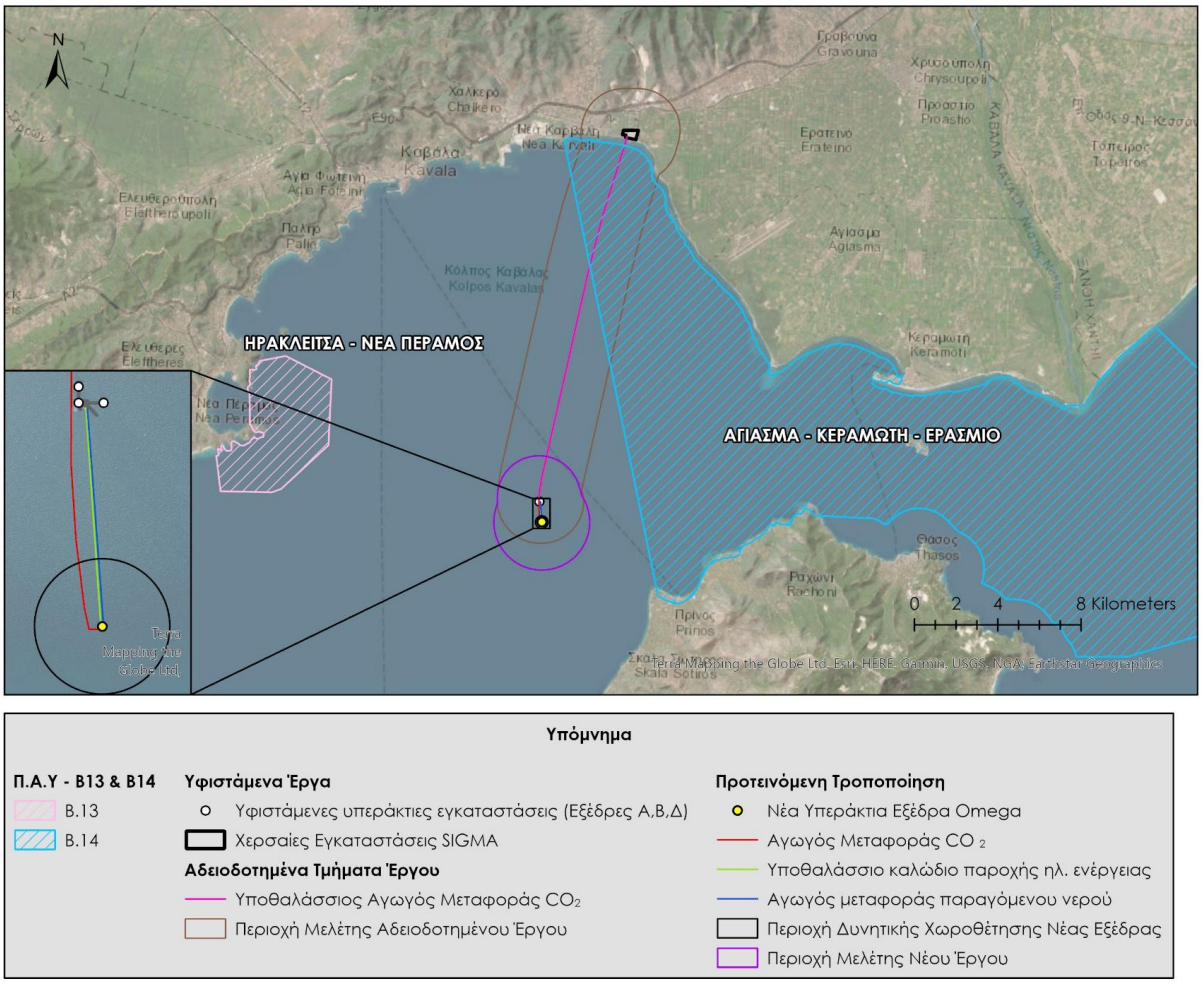
6.10 ANTHROPOGENIC ENVIRONMENT

6.10.1 Areas of the National System of Protected Areas

Directive 2014/89/EU on Maritime Spatial Planning (hereinafter MSP) was transposed into Greek law through Law 4546/2018 (Government Gazette 101/A/2018), as amended by Law 4759/2020, and is currently in force. According to Article 3 of Law 4546/2018, as amended by Article 19 of Law 4759/2020, MSP is the process by which the competent authority analyzes and organizes human activities in marine areas to achieve a synthesis of ecological, environmental, economic, social, and cultural parameters with the aim of promoting the sustainable development of maritime economies and maritime areas and the sustainable use of marine resources. The main competent authority for the preparation, implementation, and evaluation of the MSP is the Ministry of Environment and Energy (Article 14(1) of Law 4546/2018). The implementation tasks are delegated hierarchically to the General Secretariat for Spatial Planning and Urban Environment – General Directorate for Spatial Planning – Directorate for Spatial Planning.

Given the establishment of the MSP for the marine area, but also the absence of approved corresponding THPs, the compatibility of the proposed project with the existing maritime spatial planning will be examined on the basis of the MSP itself and the corresponding **Special and Regional Spatial Planning Frameworks** in force, which concern specific economic sectors (renewable energy sources, industry, aquaculture, etc.) and include spatial planning guidelines for the development of each sector in land, coastal, and marine areas (to a lesser extent).

At the national level, no marine uses have been institutionalized, with the exception of the **Special Framework for Spatial Planning and Sustainable Development (EPCHSAA) for Aquaculture**, which was established in November 2011 (Government Gazette 2505/B/2011). According to the Draft Special Framework for Spatial Planning of Aquaculture Activities (Government Gazette 2505 B/04.11.2011), the interventions of the proposed amendment do not fall within P.A.Y. B14 "Agiasma-Keramoti-Erasmio" (fish farming, shellfish farming, other aquatic organisms), while they are 4.5 km away from area B14 "Agiasma-Keramoti-Erasmio" and 11.5 km from area B13 "Iraklitsa-Nea Peramos," as shown in **the** following **figure.** These P.A.Y.s are classified as B, i.e., areas for the development of aquaculture with potential for further development.



(Source: Government Gazette 2505 B/04.11.2011, own processing)

6 –63 : Aquaculture Development Areas (ADA)

According to the Detailed Documentation Text of the Update of the MBP of the 2nd Revision of the SDLAP[68] , **in the Thrace Water District** (EL12) there are currently a total of twenty-nine (29) aquaculture units in operation, 24 of which are registered in the Register of Aquaculture Product Production Companies with Veterinary Code Numbers for Fish . Of the 29 units, nine (9) are fish farms (6 freshwater and 3 marine) and twenty (20) are coastal mussel farms. All marine aquaculture farms are located within Aquaculture Development Areas (ADA) B.14 and D.2 of Joint Ministerial Decision 31722/4.11.2011.

In addition, there are twenty-five (25) potentially exploitable lagoons within the boundaries of the Thrace Water District (EL12). Of these, eighteen (18) lagoons and two (2) lakes, Ismarida and Vistonida, are currently being exploited. The exploited lakes and lagoons cover a total area of approximately 77,200 stremmas. The

[68] *It should be noted that the Detailed Documentation Text of the "Update of the Register of Protected Areas" of the 2nd Revision of the SDAP for the Thrace River Basin District (EL12) has not yet been posted. However, it is available in the relevant texts that have been put up for consultation on the official website of the Ministry of Environment and Energy (https://wfdver.ypeka.gr/el/project/consultation-el12-45-2revision-protected-areas-gr/).*

most important of these is Lake Vistonida, covering an area of 45,000 acres. At the same time, the lagoons of Agiasmos, Eratino, and Vassova in the wider Keramoti area, as well as the lagoons of Rodopi (Porto Lagos, Lagos, Ismarida, etc.).

Under the 1st Management Plan,seven (7)coastal water systems related to the SACs in Table 1 of the Annex to Joint Ministerial Decision 31722/4.11.2006 were included in the MPA as protected areas under Directive 2006/113/EC. seven (7) coastal water systems related to the SACs listed in Table 1 of the Annex to Joint Ministerial Decision 31722/4.11.2011: EL1207C0001N Eastern Gulf of Kavala, EL1207C0002N Northern Coasts of Thasos Channel, EL1207C0003N Avdira Beach, EL1208C0004N Vistonikos Gulf, EL1208C0005N Western Coast of the Thracian Sea, EL1210C0006N Eastern Coast of the Thracian Sea, and EL1242C0012N Coast of Thasos.

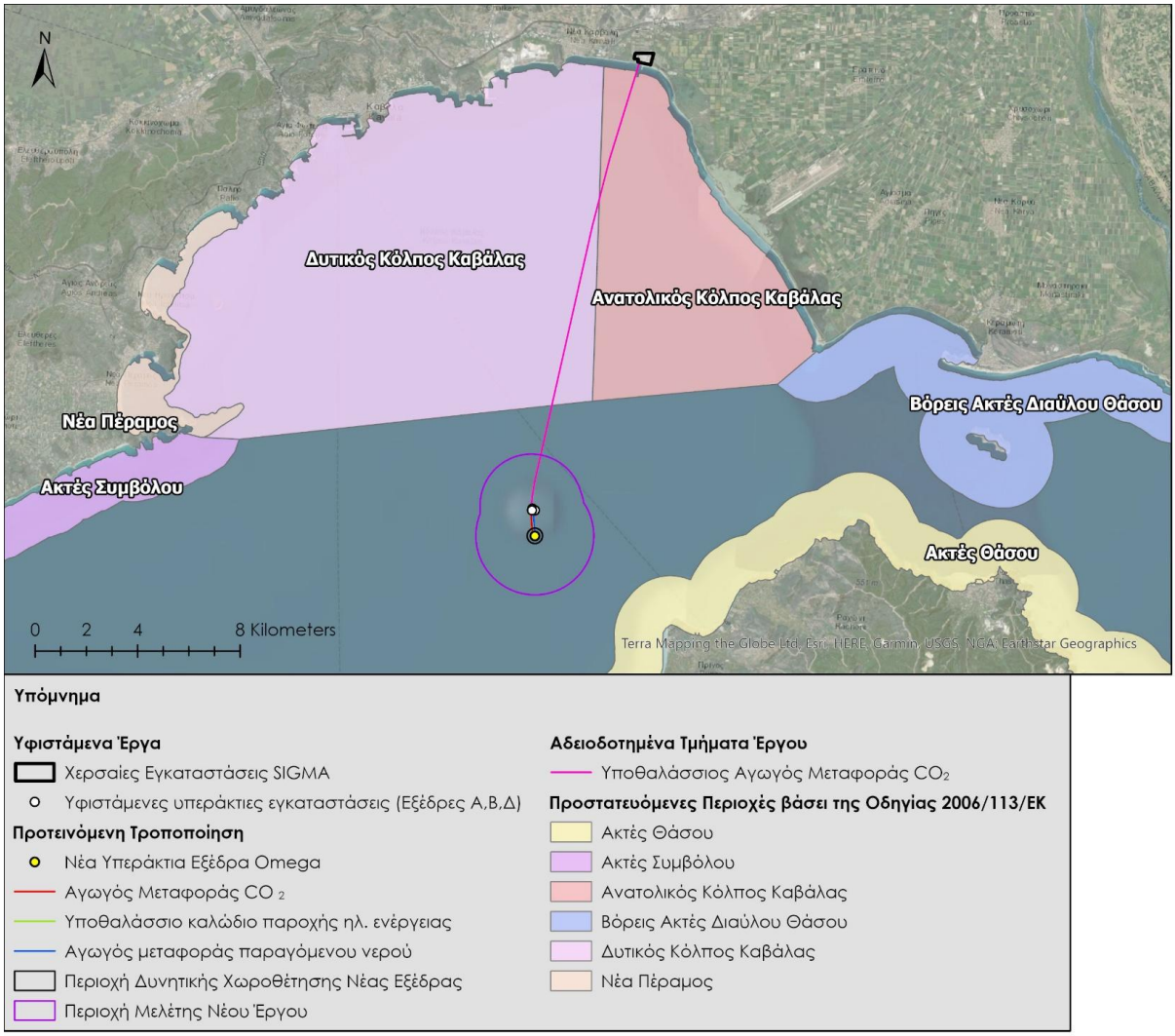
In the Region of Thrace, pursuant to Regulations 178/2002, 852/2004, 853/2004, 854/2004, 882/2004 and PD 79/2007 (Government Gazette 95/A/2007), as amended by Law 4472/2017 (Government Gazette 74/A/2017), there are six (6) Areas - Zones for the production and fishing of live bivalve molluscs. More specifically, based on Regional Governor Decision AP22510/19-12-2016, two areas for the fishing of live bivalve molluscs were designated in the Evros Regional Unit, K2 and K3, which are related to coastal areas EL1210C0006N and EL1210C0009N, respectively. In the Regional Unit of Rodopi, Regional Governor Decision AP 4508/26-4-2017 designated a Production and Fishing Zone for Live Bivalve Molluscs, which is related to the coastal YS EL1208C0004N.

In the Regional Unit of Kavala, the following areas were also designated by decision of the Regional Governor: Agiasma Production Area (Ref. No. 04/339/17.01.2017), Vasova Production Area (Ref. No. 04/340/17.01.2017) and the Keramotis Bay Production Area (Ref. No. 04/338/17.01.2017), which are related to coastal water bodies EL1207C0001N and EL1207C0002N. Taking the above into account, the coastal EL1210C0009N, which is related to the K3 Living Bivalve Mollusk Fishing Zone, is also included in the MPA of protected areas. According to Decision No. 22557/19.12.2016, shellfish originating from K3 may be made available for human consumption only after processing in purification centers. The species harvested is mussels (Mytilus galloprovincialis) from natural stocks (wild species).

Thus, according to the 2nd Revision of the MPP, one more coastal water body is included with code PP EL1210C0009NSH and name "Coasts of Evros".

According to the 2nd Revision of the SDAP (EL11), in **the Eastern Macedonia Water District (EL11)**, there are a total of sixteen (16) aquaculture units, of which three (3) are fish farms, seven (7) are mussel farms, and six (6) are spirulina farms. In addition, within the coastal water system "Strymonikos Gulf" (EL1106C0001N), there is one (1) fish farm for Mediterranean marine fish and five (5) mussel farms. This includes the four (4) coastal water systems of the Eastern Macedonia Water District (EL11). The area of potential location of the new Omega platform does not fall within any protected area under Directive 2006/113/EC.

The potential location of the new Omega platform does not fall within any protected area under Directive 2006/113/EC. The following figure shows these areas located in the wider project area.



(Source: 2η Revision of SDAP, own processing)

Figure6 –64 : Protected areas under Directive 2006/113/EC in the project area

Table6 –41 : Protected areas under Directive 2006/113/EC

No	Area code	Area name	Connection to WS	Distance from the proposed amendment (km)
1	EL1106C0002NSH	Symbol Coast	EL1106C0002N	12.5
2	EL1106C0003NSH	Nea Peramos	EL1106C0003N	13
3	EL1106C0004NSH	Western Gulf of Kavala	EL1106C0004N	5.5km
4	EL1207C0001NSH	Eastern Gulf of Kavala	EL1207C0001N	6.5km
5	EL1207C0002NSH	Northern Coast of Thasos Channel	EL1207C0002N	11.5
6	EL1242C0012NSH	Coasts of Thasos	EL1242C0012N	4

6.10.2 Rest of natiral and ecological sensitive areas

The area is located in the Prefecture of Kavala and consists of the Regional Units (RU) of Kavala and Thasos, which resulted from the division of the Prefecture of Kavala into mainland and island parts, respectively.

The **Regional Unit of Kavala** consists of 3 municipalities and 11 municipal units (MU):

- Municipality of Paggaio
  - Municipal Unit of Eleftheroupoli
  - Municipal Unit of Eleftheron
  - Municipal Unit of Orfanou
  - Municipal Unit of Pangaio
  - Municipal Unit of Pieria
- Municipality of Kavala
  - Municipality of Kavala
  - Municipal Unit of Philippi
- Municipality of Nestos
  - Municipal Unit of Keramotis
  - Municipal Unit of Oreinou
  - Municipal Unit of Chrysoupoli

The **Regional Unit of Thasos** consists of one municipality and one municipal unit according to the current administrative structure and division of the region established in 2011, in accordance with the relevant provisions of the Kallikratis program.

The municipalities of Kavala and Thasos have a coastline and the main settlements are coastal or close to the sea.

The most populous municipality in the prefecture is Kavala. The main characteristics of **the Municipality of Kavala** are as follows:

- It is a classic example of a municipality with a large urban center and its surrounding areas.
- Most of its area is coastal, but it also has a significant mountainous part.
- It consists of a radial settlement network with one center and six satellite settlements.
- The city of Kavala is the administrative center that serves all the residents of the Prefecture of Kavala.
- It is a center of academic education and research.
- It has a full range of services and urban and social infrastructure.

Kavala is the capital of the Kavala Prefecture. It is an important port and commercial center in northern Greece. It is also the seat of the Holy Metropolis of Philippi, Neapolis, and Thasos and concentrates a significant part of the cultural resources of the prefecture.

6.10.3 Cultural Heritage

The Ephorate of Antiquities of Kavala, based in Kavala and with territorial jurisdiction over the regional units of Kavala and Thasos, is responsible for matters relating to the implementation of archaeological legislation and the protection of immovable and movable antiquities from ancient times up to 1830.

The Service of Modern Monuments and Technical Works of Eastern Macedonia and Thrace is a Regional Service of the Ministry of Culture and Sports, at the Directorate level, based in Xanthi and with jurisdiction over the regional units of Evros, Rodopi, Xanthi, Drama, Kavala, and Thasos. The Service's mission is to protect, restore, and promote modern monuments (post-1830).

The Ephorate of Underwater Antiquities is a Special Regional Service of the Ministry of Culture (YPPO, formerly YPPOA) with jurisdiction throughout Greece. It was established in 1976 (Government Gazette 207/A/10-8-1976) and its mission is to protect underwater antiquities, which consist of ancient shipwrecks, settlements, or ancient port facilities located in the sea, lakes, and rivers. Since 2003, shipwrecks and aircraft wrecks over 50 years old from the date of their sinking, including the movable elements they contain, have been declared monuments because they are of historical, technological, scientific, and cultural interest, the Ephorate of Underwater Antiquities also protects them. (Government Gazette 1701/B/19-11-2003).

6.11 Socio-economic Environment

6.11.1 Demographic Data

The interventions of the proposed amendment are located in the Gulf of Kavala, between the mainland and the island of Thasos, and belong to the territory of the Administrative Region of Eastern Macedonia and Thrace, in the Prefecture of Kavala. The Regional Units (RU) correspond geographically to the respective prefectures, except for the Regional Units of Kavala and Thasos, which resulted from the division of the Prefecture of Kavala into mainland and island parts, respectively. The Prefecture of Kavala and the Municipalities of the Regional Units of Kavala and Thasos are Kavala, Paggaio, Nestos, and Thasos. The Municipalities of the Regional Units of Kavala and Thasos have a coastline, and the main settlements are coastal or close to the sea.

According to the Hellenic Statistical Authority, the Region of Eastern Macedonia and Thrace has a permanent population of 562,201 inhabitants, making it the 6th most populous region in the country. The permanent population decreased by 7.6% between 2011 and 2021. This decrease is greater than the national average (-3.1%) and the second largest at the regional level after the Region of Western Macedonia (-10.3%). The population development per region during the period 2011-2021 is presented in **the** following **table.**

Table6 –42 : Evolution of permanent population by Region

Territorial Unit	2011	2021	Change 2011/2021
TOTAL	10,816,286	10,482,487	-3.1
REGION OF EASTERN MACEDONIA AND THRACE	608,182	562,201	-7.6
CENTRAL MACEDONIA REGION	1,882,108	1,795,669	-4.6
REGION OF WESTERN MACEDONIA	283,689	254,595	-10.3
REGION OF EPIRUS	336,856	319,991	-5.0
REGION OF THESSALIA	732,762	688,255	-6.1
REGION OF CENTRAL GREECE	547,390	508,254	-7.1
REGION OF THE IONIAN ISLANDS	207,855	204,532	-1.6
REGION OF WESTERN GREECE	679,796	648,220	-4.6
REGION OF PELOPONNESE	577,903	539,535	-6.6
REGION OF ATTICA	3,828,434	3,814,064	-0.4
NORTH AEGEAN REGION	199,231	194,943	-2.2
SOUTH AEGEAN REGION	309,015	327,820	6.1
REGION OF CRETE	623,065	624,408	0.2

(Source: ELSTAT (population censuses))

At the regional level, the largest decrease was observed in the region of Kavala compared to the region of Thasos (-7% and -4.8% respectively), and at the municipal level, the largest decrease was observed in the municipality of Nestos (-9%), as shown in **the table** below.

Table6 –43 : Evolution of the permanent population in the Prefecture of Kavala by regional unit and municipality

Territorial Unit	2011	2021	Change 2011/2021
PE KAVALA	124,897	116,195	-7
MUNICIPALITY OF KAVALA	70,501	66,376	-5.9
MUNICIPALITY OF NESTOS	22,331	20,311	-9.0
MUNICIPALITY OF PAGGAIO	32,085	29,508	-8.0
THASOS	13,770	13,104	-4.8%
MUNICIPALITY OF THASOS	13,770	13,104	-4.8

(Source: ELSTAT (population censuses))

In terms of gender distribution in the Region of Eastern Macedonia and Thrace, women number 286,397 and constitute 50.7% of the population, while men number 275,804 and constitute 49.3% of the population according to the 2021 Population Census (see **table** below).

Table6 –44 : Population evolution by gender in the Prefecture of Kavala per Regional Unit and Municipality

Territorial Unit	Total 2011	Males	Females	Total 2021	Males	Females
KAVALA	124,917	4	51.3	116,195	48.5	51.5
MUNICIPALITY OF KAVALA	70,501	48.2	51.8	66,376	48.0	52.0
MUNICIPALITY OF NESTOS	22,331	49.5	50.5	20,311	49.5	50.5
MUNICIPALITY OF PAGGAIO	32,085	49.3	50.7	29,508	49.1	50.9
PE THASOU	13,770	49.3	50.7	13,104	48.7	51.3
MUNICIPALITY OF THASOS	13,770	49.3	50.7	13,104	48.7	51.3

(Source: ELSTAT (population censuses))

Population trends should also be examined in conjunction with the age stratification of the population. According to the Regional Development Program of the Region of Eastern Macedonia and Thrace 2021-2025[69] , the region's population tends to be older, and the ratio of elderly people who need support to people of working age shows a strong age dependency, as the corresponding dependency ratio[70] stood at 0.367 in 2019, which is higher than the corresponding figure for the country (0.346). The increase in the population aged 65 and over is striking in all OECD countries. This increase was particularly rapid for the population aged 80 and over. Between 2019 and 2050, the share of the population aged 80 and over is expected to more than double in OECD member countries, from 4.6% to 9.8% on average. In Greece, it is estimated that by 2050, more than one in eight people will be aged 80 and over . [71]

The solar distribution of Greece and the Region of Eastern Macedonia and Thrace, as well as the change between 2011 and 2021 according to the 2011 and 2021 Population Censuses, are presented in **the table** below.

[69] https://www.eydamth.gr/#

[70] ratio of people aged 65 and over to people aged 15-64

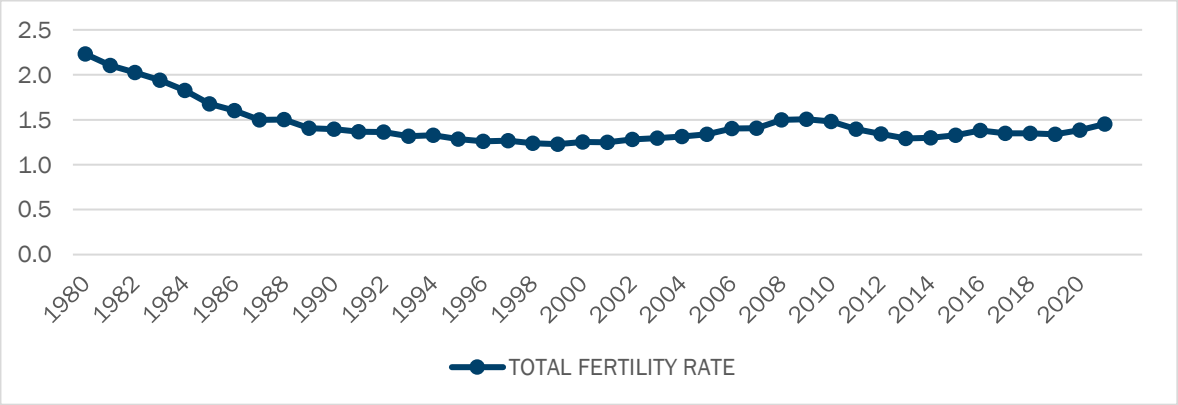
[71] *OECD (2021), Health at a Glance 2021: OECD Indicators, OECD Publishing, Paris, https://doi.org/10.1787/ae3016b9-en.*

Table6 –45 : Solar distribution of the Region of Eastern Macedonia and Thrace and the country as a whole

	2011	2021	Change 2011/2021	20	20	Change 2011/2021
Age group	TOTAL FOR THE COUNTRY			REGION OF EASTERN MACEDONIA AND THRACE		
0	2,122,544	1,946,707	-	124,254	107,947	-13.1
20	2,986,172	2,309,697	-22.7	159,679	121,426	-24.0
40	2,972,949	3,139,368	5.6	159,189	159,951	0.5
60	2,734,621	3,086,715	12.9	165,060	172,877	4.7

(Source: ELSTAT (population censuses))

The **total fertility rate** is used to determine the level of generational replacement, which in developed countries is considered to be 2.1. According to ELSTAT data, in Greece this index has fallen from 2.2 in 1980 to 1.5 in 2021, as shown in **the figure** below.



6 –65 : Evolution of the total fertility rate in Greece between 1980 and 2021

The age distribution of the population, combined with the low fertility rate, paints an alarming demographic picture. Demographic models for future demographic trends show that the aging population pattern, which is increasingly evident in EU regions, is expected to have serious implications for a wide range of policy areas with an impact on the school-age population, health care, labor force participation, social protection, social security issues, and public finances, among others[72] .

Population density, defined as the number of inhabitants in a given area expressed in relation to its size measured in square kilometers, highlights not only population trends but also the degree of urbanization.

[72] *https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:%CE%A0%CE%BB%CE%B7%CE%B8%CF%85%CF%83%CE%BC%CE%B9%CE%B1%CE%BA%CE%AD%CF%82_%CF%83%CF%84%CE%B1%CF%84%CE%B9%CF%83%CF%84%CE%B9%CE%BA%CE%AD%CF%82_%CF%83%CE%B5_%CF%80%CE%B5%CF%81%CE%B9%CF%86%CE%B5%CF%81%CE%B5%CE%B9%CE%B1%CE%BA%CF%8C_%CE%B5%CF%80%CE%AF%CF%80%CE%B5%CE%B4%CE%BF&oldid=152553*

According to data from the European Statistical Service, for 2022, the population density in the Region of Eastern Macedonia and Thrace was the fifth lowest in the country, with 40 inhabitants per square kilometer, compared to 80.3 for the country as a whole and 109.1 for the EU on average. The estimate of the seasonal population is based on data presented in the Amended National Waste Management Plan 2020-2030[73] , which uses data from ELSTAT on overnight stays in tourist accommodation in the country (hotels, rented rooms, campsites). Overnight stays relating to inbound tourism, i.e. foreigners, were taken into account. According to the data, the percentage distribution of the seasonal population for 2018 in the Region of Eastern Macedonia and Thrace amounted to 1.66%. The following table shows the overnight stays and equivalent population for the whole country and the Region of Eastern Macedonia and Thrace for the years 2008 to 2018.

Table6 –46 : Overnight stays and equivalent population for the whole country and the Region of Eastern Macedonia and Thrace for the years 2008 to 2018

YEAR	TOTAL COUNTRY - overnight stays	TOTAL COUNTRY - Equivalent population	REGION OF EASTERN MACEDONIA AND THRACE - overnight stays	REGION OF EASTERN MACEDONIA AND THRACE - Equivalent population
2008	57,568,739	157,723	631,898	1,731
2009	56,012,384	153,459	624,268	6,958
2010	58,783,363	161,050	610,097	6,332
2011	65,421,835	179,238	710,365	7,713
2012	61,313,878	167,983	711,598	8,259
2013	68,993,000	189,022	899,788	11,735
2014	80,174,000	219,655	958,407	11,457
2015	85,155,000	233,301	1,112,229	14,527
2016	87,913,000	240,858	1,050,161	12,545
2017	97,033,832	265,846	1,251,121	16,132
2018	102,571,336	281,017	1,287,793	16,168

(Source: Revised National Waste Management Plan 2020-2030)

[73] http://www.opengov.gr/minenv/wp-content/uploads/downloads/2022/10/%CE%A4%CE%A1%CE%9F%CE%A0%CE%9F%CE%A0%CE%9F%CE%99%CE%97%CE%9C%CE%95%CE%9D%CE%9F-%CE%95%CE%98%CE%9D%CE%99%CE%9A%CE%9F-%CE%A3%CE%A7%CE%95%CE%94%CE%99%CE%9F-%CE%94%CE%99%CE%91%CE%A7%CE%95%CE%99%CE%A1%CE%99%CE%A3%CE%97%CE%A3-%CE%91%CE%A0%CE%9F%CE%92%CE%9B%CE%97%CE%A4%CE%A9%CE%9D_%CE%95%CE%A3%CE%94%CE%91_2020-2030_%CE%A4%CE%95%CE%9B%CE%99%CE%9A%CE%9F.pdf

6.11.2 Economic Activities and Labor Market

6.11.2.1 Key Economic Indicators and Production Structure

From 2008 to 2016, Greece lost more than a quarter of its GDP at constant prices, while the unemployment rate rose by about 16 percentage points. In addition, per capita GDP in purchasing power parity fell to 67.4% of the EU average in 2018, from 93.3% in 2008. At the same time, the ratio of non-performing loans (NPLs) to total loans jumped to around 50%, while there was a large wave of emigration of educated Greeks (brain drain) and significant disinvestment, with very significant economic and social consequences[74] . Following the return of economic growth in 2017 and its successful exit from the European Stability Mechanism support program in August 2018, continued its recovery in 2019, despite the slowdown in the global economy, with the economy's growth rate stabilizing at around 2% prior to the COVID-19 pandemic. The COVID-19 pandemic had a particularly negative impact on GDP growth and the fiscal recovery of the global economy. In 2021, the Greek economy grew significantly, by 8.3%. In addition to GDP growth, there was also an increase in exports and a decrease in unemployment[75] . In 2022 and 2023, despite the unfavorable international environment, the Greek economy continued to grow at a high rate. Real GDP grew by 5.9% in 2022, mainly due to an increase in private consumption and investment, as well as a significant rise in tourism, and by 2% in 2023, mainly due to private consumption, exports, and investment. Developments in the labor market were also favorable, with the unemployment rate falling in 2022 and declining further in 2023. The unemployment rate fell to 11.1% (from 12.4% in 2022), while the long-term unemployment rate also recorded a significant decline[76] .

According to the European Commission's latest macroeconomic forecasts for Greece[77] , economic growth is expected to remain broadly stable at 2.3% in 2024 and 2025. Investment is expected to increase significantly as the implementation of **the Recovery and Resilience Plan (RRP)** accelerates and financing conditions ease, but investment is likely to trigger higher demand for imports of both goods and services, which is projected to reduce the positive contribution of net exports in 2024-25.

At the regional level, as noted in the Regional Development Program of the Region of Eastern Macedonia and Thrace 2021-2025[78] , the Region's GDP declined from 2010 (€9.2 billion) to 2017 (€6.95 billion), following the national pattern of the Greek economic crisis. According to data from the European Statistical Service (Eurostat), the GDP of the Region of Eastern Macedonia and Thrace has recovered after the end of the pandemic, reaching €8.12 billion in 2022, which corresponds to 3.93% of the national GDP (8th among the regions).

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[74] *https://www.bankofgreece.gr/enimerosi/grafeio-typoy/anazhthsh-enhmerwsewn/enhmerwseis?announcement=fc915812-ab24-47ab-9e60-a566653a1f42*

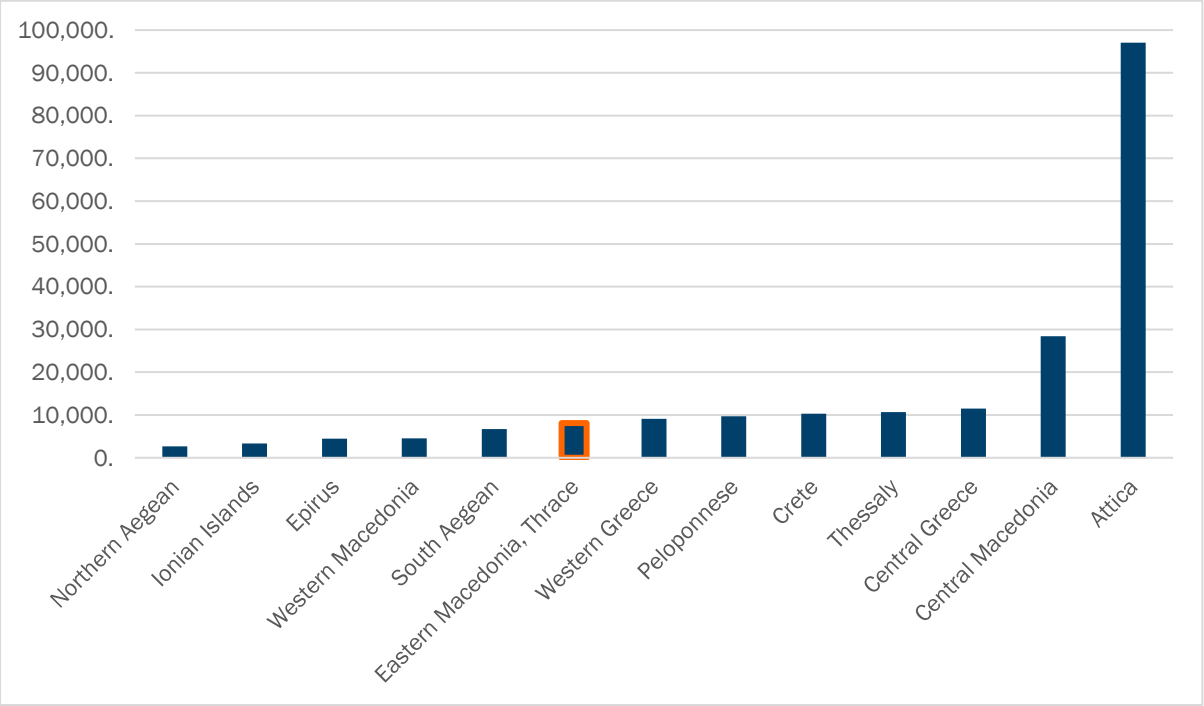
[75] *https://www.enterprisegreece.gov.gr/h-ellada-shmera/giati-ellada/h-ellhnikh-oikonomia*

[76] *Reports of the Governor of the Bank of Greece 2022 & 2023, https://www.bankofgreece.gr/ekdoseis-ereyna/ekdoseis/ekthesh-dioikhth*

[77] *https://economy-finance.ec.europa.eu/economic-surveillance-eu-economies/greece/economic-forecast-greece_el*

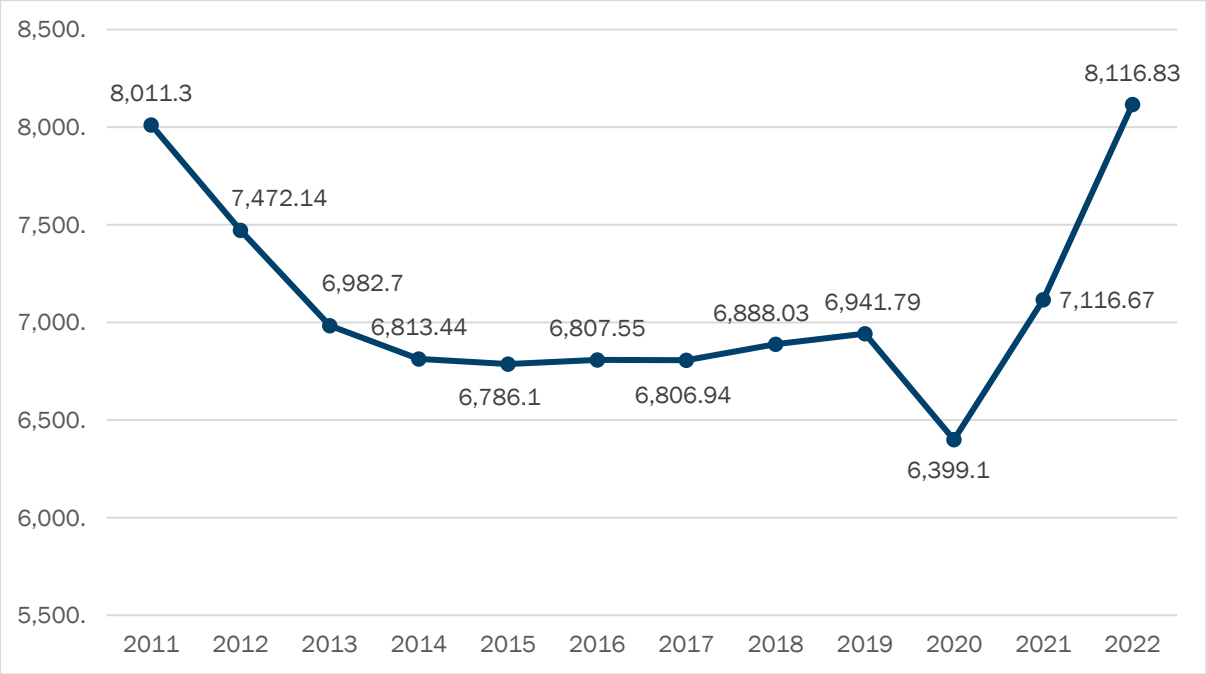
[78] https://www.eydamth.gr/#

The GDP of each Region in 2022 and the evolution of the GDP of the Region of Eastern Macedonia and Thrace between 2011 and 2022 are presented in **the** following **Figures**.



(Source: Eurostat)

Figure6 –66 : GDP growth of regions in 2022 (€ million)



(Source: Eurostat)

6 –67 : GDP growth in the Region of Eastern Macedonia and Thrace between 2011 and 2022 (€ million)

According to the 2021 Report of the Small Business Institute - General Confederation of Greek Small Businesses and Traders (IME GSEVEE)[79] , at the Regional Unit level, in 2018, the Regional Units of Kavala and Thasos accounted for 27% of the Region's GDP, which is comparable to the GDP of the Regional Unit of Evros. During the economic crisis, between 2008 and 2016, the GDP of the Kavala and Thasos Regional Units together fell by 31.3%, from €2.571 billion in 2008 to €1.767 billion in 2016. The decline is clearly higher than both the average decline in the Region of Eastern Macedonia and Thrace (-28.1%) and the average decline in Northern Greece (-26.5%) and the country as a whole (-28%), respectively.

Regarding the growth dynamics of the Region of Eastern Macedonia and Thrace, according to the recent report by the Foundation for Economic & Industrial Research (IOBE) on social and economic trends in the Greek regions[80] , between 2019 and 2021, the Region managed to recover its pre-pandemic GDP level in 2021 and had the second largest change in Gross Value Added (GVA) compared to the pre-pandemic level (+3.1%).

The EU **Regional Competitiveness Index** (RCI) measures a region's ability to offer an attractive environment for businesses and residents. According to the latest edition, updated in 2023[81] , the competitiveness of the Greek economy as a whole, while showing a significant improvement compared to 2016, lags significantly behind the EU (73.1 for Greece, compared to 99 for the EU-27). At the level of the Region of Eastern Macedonia and Thrace, in contrast to its growth momentum in terms of GDP, the DPI is the second lowest at national level (56.2), ranking the region 225th out of 234 EU regions . [82]

The Region of Eastern Macedonia and Thrace has significant resources that continue to be key productive factors and, at the same time, opportunities for business and productive activities, such as: non-metallic minerals, geothermal fields, highly productive land, forest and water resources. The economy is characterized by a production model focused mainly on the agricultural sector and the processing of strong inputs from the primary sector, as well as a significant accumulation of invested capital, mainly in the form of infrastructure.

6.11.2.1.1 Primary Sector

According to the "Eastern Macedonia and Thrace" Program 2021-2027[83] , the Region of Eastern Macedonia and Thrace has historically specialized in the agricultural sector, with its GVA being almost double the national level, showing a significant interconnection between the primary sector and the other two productive sectors (manufacturing and tourism). In fact, it was the second region in the country after the Peloponnese

[79] https://imegsevee.gr/wp-content/uploads/2021/05/meta-covid-kavala.pdf
[80] https://iobe.gr/docs/research/RES_01_11032024_REP_GR.pdf
[81] https://ec.europa.eu/regional_policy/assets/regional-competitiveness/index.html#/
[82] https://ec.europa.eu/regional_policy/assets/regional-competitiveness/index.html#/
[83] https://www.eydamth.gr/images/site_2017/ArticleID_516/ProgrammaPAMTH_2021_2027.pdf

with the highest percentage of people employed in the primary sector (25%: 2019), which was more than double the national average (11%: 2019).

However, in terms of primary sector productivity, the Region ranks lowest in the country and is also below the EU average. This is due, among other things, to the characteristics of the human resources (old age, inadequate level of vocational training/specialization), the lack of scientific and technical support for the production process, the reluctance of young people to work in the agricultural sector, and the lack of cooperation between producers.

In the agriculture and livestock sector, according to data from the 2021 ELSTAT census, the **Utilized Agricultural Area (UAA)** in Greece is estimated at 28,244,494.8 stremmas. In the Region of Eastern Macedonia and Thrace, UAA decreased by 10.8% between 2009 and 2020, reaching 3,092,124.2 stremmas, with an average UAA per farm of 87.1 stremmas.

The following **table** shows the number of agricultural holdings and the agricultural area used in the whole country and in the Region of Eastern Macedonia and Thrace.

Table6 –47 : Number of agricultural holdings and utilised agricultural area, 2020 (stremmas)

Geographical Unit	Number of farms	Farms with utilised agricultural area	Farms with irrigated land	Irrigated land (acres)	Utilized agricultural area (acres)
Greece	530,679	525,284	326,256	9,606,841.1	28,244,494.8
Eastern Macedonia and Thrace	36,188	35,512	3,092,124.2	26,950	3,092,124.2

(Source: ELSTAT, 2021)

The distribution of farms by main categories of use in the Region of Eastern Macedonia and Thrace and their change between 2009 and 2020 are presented in **the table** below.

Table6 –48 : Distribution of farms by main categories of use, 2009-2020, acres

Basic category of use	2009	2020	Change
Arable crops	41,606	28,125	-32.4
Vines and raisin vines	4,678	3,654	-
Tree crops	14,465	12,686	-12.3
Greenhouses	252	280	+11.1
Other areas	25,815	22,438	-13.1

(Source: ELSTAT, 2021)

In the livestock sector, in the Region of Eastern Macedonia and Thrace, according to data from the 2021 ELSTAT census, there were 156,421 livestock units in operation in 2020, representing a decrease of 28% compared to 2009. The majority of units are involved in poultry farming and sheep production, as shown in **the table** below.

Table6 –49 : Livestock farms, by animal type, 2009-2020

Basic category of use	2009	2020	Change
Cattle	3,373	1,919	-43.1
Sheep	4,220	2,537	-39.9
Goats	2,877	1,735	-39.7
Pigs	1,152	284	-75.3
Poultry	19,839	6,635	-

(Source: ELSTAT, 2021)

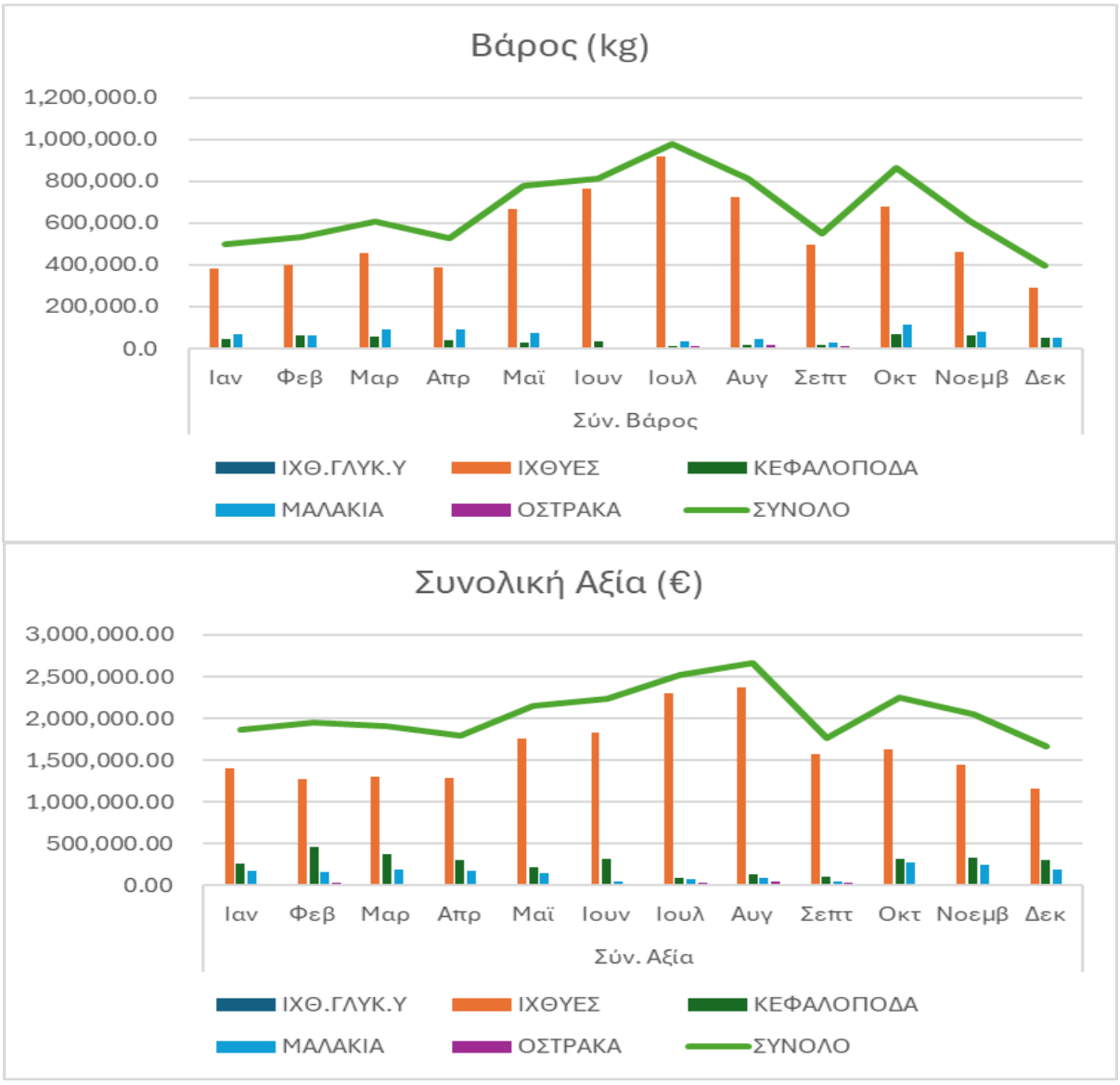
The fishing and aquaculture sector is also particularly dynamic, showing growth in all the regional units of the Region. Fish and shellfish farming units are mainly located in the wetlands of the sea front and to a lesser extent in inland waters. The coastal fishing sector is also an important productive sector for the Region, with a presence in all the regional units that have a sea front. According to the results of the 2022 Motorized Boat Sea Fishing Survey, the largest quantities of fish in the country are found in the fishing area: Strymonikos and Kavala bays, the coast of Thasos island and the Thracian Sea, 16,299.2 tons and a percentage of 25.0%[84] .

As stated in the Strategic Plan of the Municipality of Kavala 2023[85] , domestic production is dominated by freshwater fish farming, particularly rainbow trout, anchovies, sardines, cod, sea bream, and farmed sea bass, cephalopods such as octopus and squid, mollusks such as cuttlefish, and shellfish such as Mediterranean mussels. **The** following **figures** show the weight and total value of catches relating to the Kavala Fish Market, according to data from the Central Markets and Fisheries Organisation (OKAA) for 2023[86] .

[84]https://www.statistics.gr/el/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_ln=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_documentID=506607&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_locale=en

[85] https://kavala.gov.gr/getattachment/o-dimos/diafaneia-sto-dimo/epixeirisiako-programma/%CE%95%CF%80%CE%B9%CF%87%CE%B5%CE%B9%CF%81%CE%B7%CF%83%CE%B9%CE%B1%CE%BA%CE%BF-%CE%A0%CF%81%CE%BF%CE%B3%CF%81%CE%B1%CE%BC%CE%BC%CE%B1-%CE%94%CE%B7%CE%BC%CE%BF%CF%85-%CE%9A%CE%B1%CE%B2%CE%B1%CE%BB%CE%B1%CF%82-2021-2023-%CE%91-%CE%A6%CE%91%CE%A3%CE%97.pdf

[86] https://www.okaa.gr/gr/organismos/open-data/



(Source: Central Markets and Fisheries Organisation S.A., 2023)

Figure6 –68 : Summary statistical reports on catches (2023)

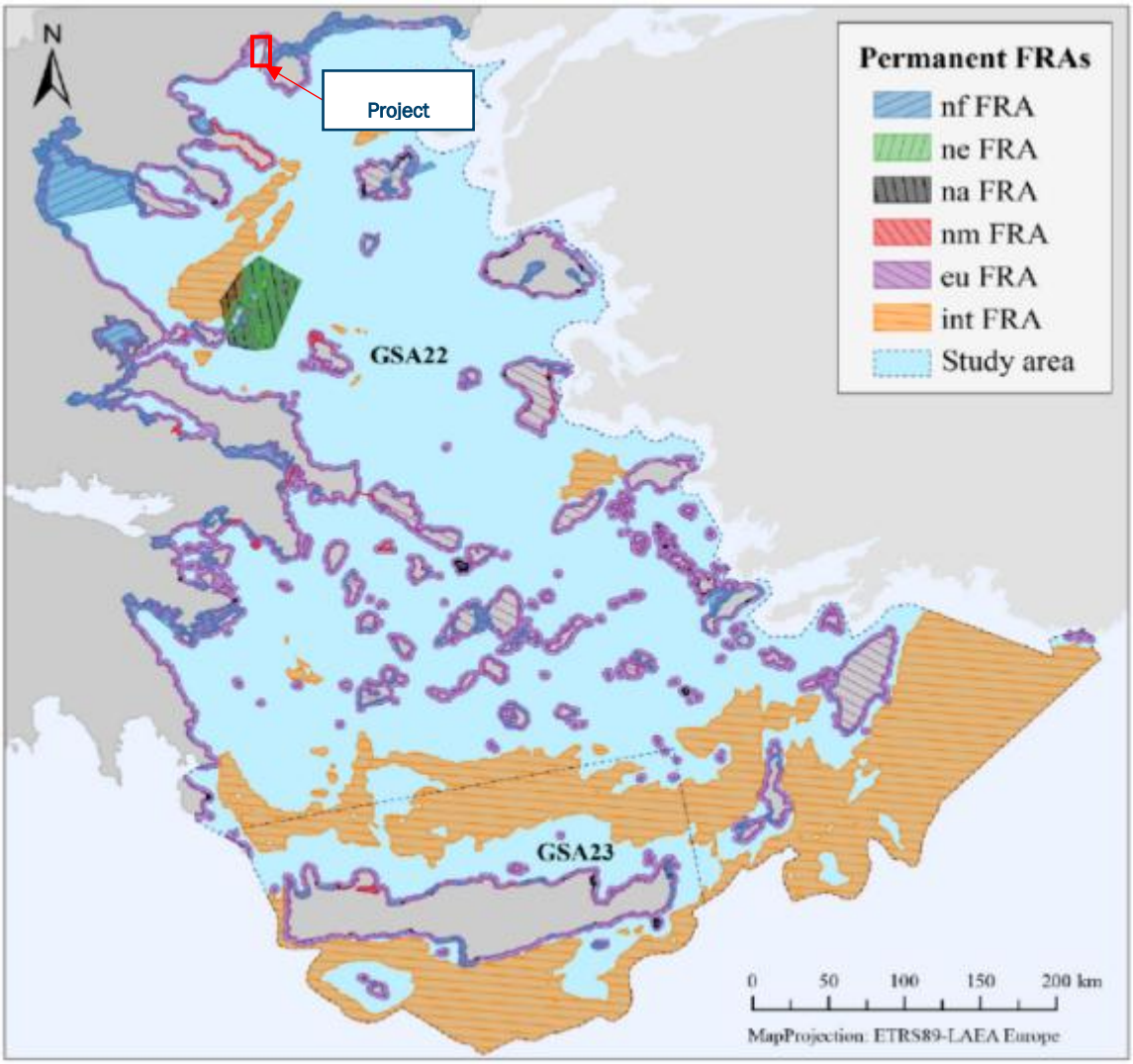
Fishing Restricted Areas (FRAs) are geographically defined areas in which all or certain fishing activities are prohibited or restricted, either temporarily or permanently, in order to improve the conservation and sustainable exploitation of living aquatic resources and the protection of marine ecosystems.

Prohibited Fishing Areas, according to a study whose results have been published in the journal Mediterranean Marine Science, include[87] :

[87] https://maritime-spatial-planning.ec.europa.eu/practices/reviewing-and-mapping-fisheries-restricted-areas-aegean-sea

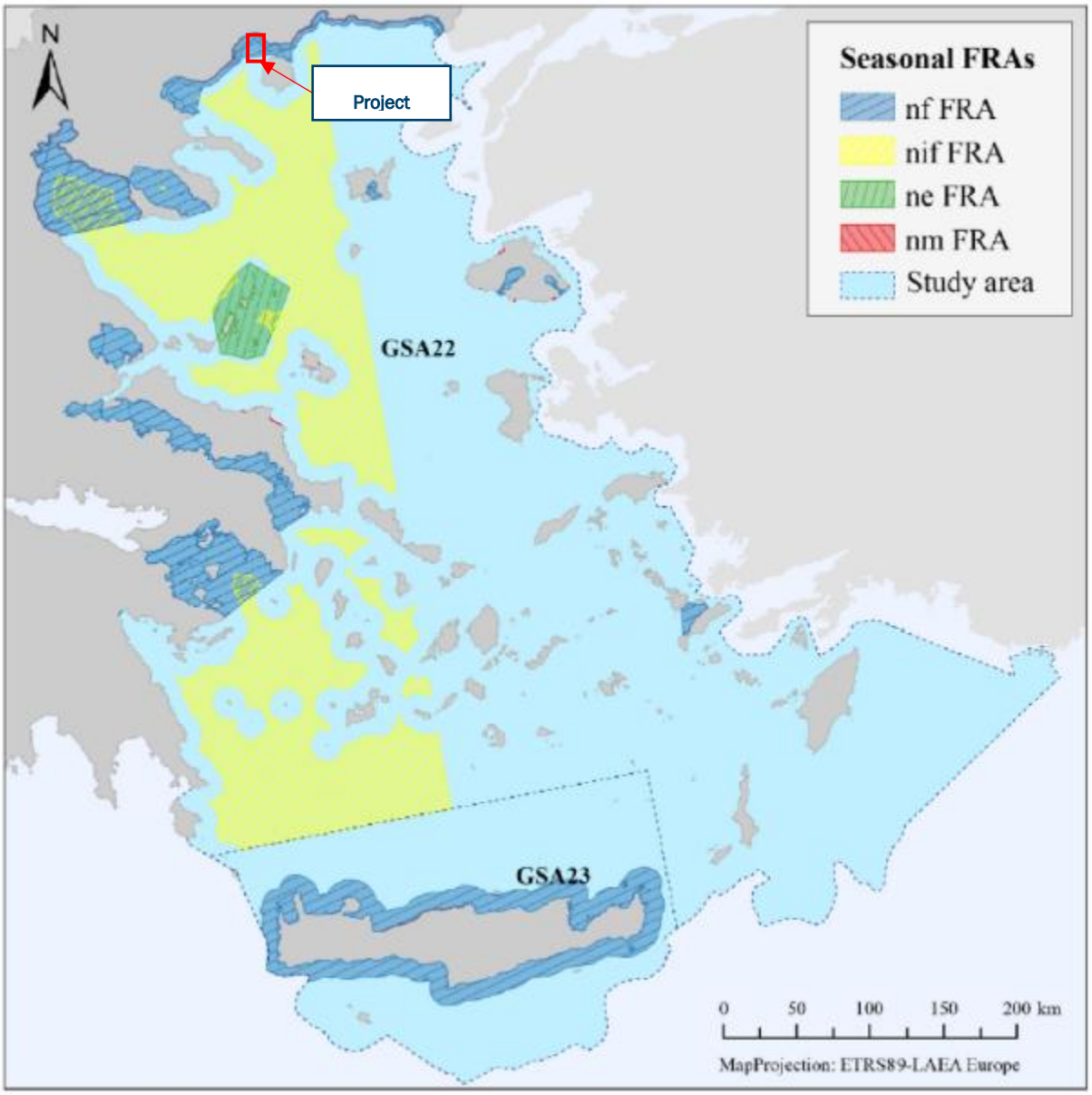
- FRAs established by national restrictions on fishing activities issued under fisheries legislation (nfFRA)
- FRAs established by national environmental legislation FRAs related to nature protection areas (neFRAs)
- FRAs established by national archaeological legislation FRAs (naFRAs)
- FRAs established by national maritime legislation (nmFRAs)
- FRAs established by the European Union (eu-FRAs)
- FRAs established by international fisheries organizations (intFRAs)

The following **figure** illustrates permanent and seasonal FRAs.



(Source: https://maritime-spatial-planning.ec.europa.eu/practices/reviewing-and-mapping-fisheries-restricted-areas-aegean-sea)

Figure6 –69 : Permanent Fisheries Restricted Areas (FRAs)



(Source: https:// maritime- spatial- planning. ec. europa. eu/ practices/ reviewing- and- mapping- fisheries- restricted- areas- aegean- sea)

Figure6 –70 : Seasonal Prohibited Fishing Areas (FRAs)

Table6 –50 : Local prohibitions in the jurisdiction of the Port Authority of Kavala ,

Απαγόρευση	Σχετική Νομοθεσία
ΑΠΑΓΟΡΕΥΕΤΑΙ Η ΑΛΙΕΙΑ ΜΕ ΚΑΘΕ ΕΙΔΟΥΣ ΣΤΑΤΙΚΟ ΑΛΙΕΥΤΙΚΟ ΕΡΓΑΛΕΙΟ (ΔΙΧΤΥΑ, ΒΟΛΚΟΙ, ΠΑΡΑΓΑΔΙΑ) ΑΠΟ 15 ΙΟΥΝΙΟΥ ΜΕΧΡΙ 15 ΣΕΠΤΕΜΒΡΙΟΥ ΚΑΘΕ ΕΤΟΥΣ ΣΕ ΑΠΟΣΤΑΣΗ ΚΑΤΩ ΤΩΝ 300 Μ. ΑΠΟ ΤΙΣ ΑΚΤΕΣ	Α.Π.:3111.4β/4/96/18-07-1996 ΑΠΟΦΑΣΗ Κ.Λ.ΚΑΒΑΛΑΣ
ΑΠΑΓΟΡΕΥΕΤΑΙ Η ΕΙΣΟΔΟΣ ΠΑΝΤΟΣ ΕΝ ΓΕΝΕΙ ΑΤΟΜΟΥ, ΠΛΟΙΟΥ, ΥΠΟΒΡΥΧΙΟΥ Η ΠΛΩΤΟΥ ΝΑΥΠΗΓΗΜΑΤΟΣ ΣΤΗΝ ΘΑΛΑΣΣΙΑ ΖΩΝΗ ΑΣΦΑΛΕΙΑΣ ΤΩΝ ΕΞΕΔΡΩΝ ΚΑΣΕ ΑΠΟΣΤΑΣΗ 500 ΜΕΤΡΩΝ ΑΚΤΙΝΟΕΙΔΩΣ ΚΑΘ΄ ΟΛΟ ΤΟ ΕΤΟΣ	ΑΡΘΡΟ 10 Ε.Κ.Λ. ΑΡΙΘ.03 /24-01-1980 (ΦΕΚ 63Β'/80)
ΑΠΑΓΟΡΕΥΕΤΑΙ Η ΑΛΙΕΙΑ ΠΑΝΩ ΑΠΟ ΒΥΘΟΥΣ ΜΕ ΘΑΛΑΣΣΙΑ ΒΛΑΣΤΗΣΗ, ΙΔΙΩΣ POSIDONIA OCEANICA Η ΑΛΛΑ ΘΑΛΑΣΣΙΑ ΦΑΝΕΡΟΓΑΜΑ	ΚΑΝ ΕΚ 1967/2006 Υ.Α 167378/2007 (ΦΕΚ 241 Δ)
ΑΠΑΓΟΡΕΥΕΤΑΙ Η ΑΛΙΕΙΑ ΜΕ ΔΙΧΤΥ ΤΡΑΤΑΣ ΒΥΘΟΥ ΣΕ ΑΠΟΣΤΑΣΗ ΔΥΟ(02) ΝΑΥΤΙΚΩΝ ΜΙΛΙΩΝ ΑΠΟ ΤΙΣ ΑΚΤΕΣ ΘΡΑΚΗΣ – ΑΝ.ΜΑΚΕΔΟΝΙΑΣ ΑΠΟ ΕΚΒΟΛΕΣ Π.ΕΒΡΟΥ ΜΕΧΡΙ ΚΟΛΠΟ ΙΕΡΙΣΣΟΥ) - ΚΑΤΑ ΤΟΥΣ ΜΗΝΕΣ ΜΑΡΤΙΟ ΜΕΧΡΙ ΝΟΕΜΒΡΙΟ ΚΑΘΕ ΕΤΟΥΣ	ΑΡΘΡΟ 5§2 ΤΟΥ Β.Δ. 917/66 (ΦΕΚ 248Α)
ΑΠΑΓΟΡΕΥΕΤΑΙ Η ΑΛΙΕΙΑ ΜΕ ΜΗΧΑΝΟΤΡΑΤΑ ΣΤΟΝ ΚΟΛΠΟ ΚΑΒΑΛΑΣ (ΕΣΩΘΕΝ ΓΡΑΜΜΗΣ ΑΚ.ΒΡΑΣΙΔΑΣ ΟΡΜΟΥ ΕΛΕΥΘΕΡΩΝ ΚΑΙ ΠΑΧΥ ΘΑΣΟΥ ΚΑΙ ΓΡΑΜΜΗΣ ΑΚ.ΚΑΛΟΓΕΡΟΣ ΘΑΣΟΥ ΚΑΙ ΕΚΒΟΛΕΣ Π.ΝΕΣΤΟΥ) - ΚΑΤΑ ΤΟΥΣ ΜΗΝΕΣ ΑΠΡΙΛΙΟ ΜΕΧΡΙ ΟΚΤΩΒΡΙΟ ΚΑΘΕ ΕΤΟΥΣ	ΑΡΘΡΟ 10§1 ΤΟΥ Β.Δ. 917/66 (ΦΕΚ 248Α)
ΑΠΑΓΟΡΕΥΕΤΑΙ Η ΑΛΙΕΙΑ ΜΕ ΜΗΧΑΝΟΤΡΑΤΕΣ ΣΕ ΑΠΟΣΤΑΣΗ 3ΝΜ ΑΚΤΙΝΟΕΙΔΩΣ ΑΠΌ ΤΙΣ ΕΚΒΟΛΕΣ ΤΟΥ ΠΟΤΑΜΟΥ ΝΕΣΤΟΥ	ΑΡΘΡΟ 7§1 Β.Δ. 917/66 (ΦΕΚ 248Α)
ΑΠΑΓΟΡΕΥΕΤΑΙ Η ΑΛΙΕΙΑ ΜΕ ΜΗΧΑΝΟΤΡΑΤΕΣ ΣΕ ΑΠΟΣΤΑΣΗ 3ΝΜ ΑΚΤΙΝΟΕΙΔΩΣ ΑΠΌ ΤΙΣ ΕΚΒΟΛΕΣ ΤΟΥ ΠΟΤΑΜΟΥ ΣΤΡΥΜΩΝΑ	ΑΡΘΡΟ 7§1 Β.Δ. 917/66 (ΦΕΚ 248Α)
ΑΠΑΓΟΡΕΥΕΤΑΙ Η ΕΡΑΣΙΤΕΧΝΙΚΗ ΑΛΙΕΙΑ(ΠΕΤΟΝΙΑ-ΚΑΛΑΜΙ-ΣΑΛΑΓΓΙΑ ΚΛΠ) ΑΠΟ ΞΗΡΑ ΣΤΗ ΧΕΡΣΑΙΑ ΖΩΝΗ ΛΙΜΕΝΑ ΘΑΣΟΥ Α) ΑΝΑΤΟΛΙΚΟ ΛΙΜΕΝΟΒΡΑΧΕΙΟΝΑ ΤΗΣ ΜΑΡΙΝΑΣ (ΚΟΚΚΙΝΟΣ ΦΑΡΟΣ) Β) ΣΕ ΟΛΟ ΤΟ ΜΗΚΟΣ ΤΩΝ ΚΕΚΛΙΜΕΝΩ (ΡΑΜΠΕΣ) ΤΟΥ ΝΕΟΥ ΛΙΜΑΝΙΟΥ ΠΟΡΘΜΕΙΩΝ ΘΑΣΟΥ ΚΑΙ Γ) ΣΤΟ ΤΜΗΜΑ ΤΟΥ ΑΡΧΑΙΟΥ ΛΙΜΑΝΙΟΥ ΑΠΟ ΤΟ ΥΨΟΣ ΞΕΝΟΔΟΧΕΙΟΥ ΄΄ ΑΓΓΕΛΙΚΑ΄΄ ΕΩΣ ΤΟ ΚΑΦΕ-ΜΠΑΡ ΄΄ΚΑΡΑΝΤΙ΄΄ - ΤΗΝ ΠΕΡΙΟΔΟ 01/05 ΕΩΣ 30/09 ΚΑΘΕ ΕΤΟΥΣ	Α.Π:2134.1/01/10/29-10-2010 ΑΠΟΦΑΣΗ Κ.Λ.ΚΑΒΑΛΑΣ
ΑΠΑΓΟΡΕΥΕΤΑΙ Η ΕΡΑΣΙΤΕΧΝΙΚΗ ΑΛΙΕΙΑ(ΠΕΤΟΝΙΑ-ΚΑΛΑΜΙ-ΣΑΛΑΓΓΙΑ ΚΛΠ) ΑΠΟ ΞΗΡΑ ΣΤΗ ΧΕΡΣΑΙΑ ΖΩΝΗ ΛΙΜΕΝΑ ΚΕΡΑΜΩΤΗΣ ΑΠΟ ΣΚΑΛΑ ΚΕΡΑΜΩΤΗΣ ΜΕΧΡΙ ΚΑΙ ΤΟΝ ΕΜΠΟΡΙΚΟ ΛΙΜΕΝΑ) ΜΕ ΜΟΝΗ ΕΞΑΙΡΕΣΗ ΓΙΑ ΤΟΝ ΕΜΠΟΡΙΚΟ ΛΙΜΕΝΑ ΑΠΟ ΤΟ ΣΗΜΕΙΟ ΠΟΥ ΒΡΙΣΚΕΤΑΙ ΤΟ ΛΙΜΕΝΙΚΟ ΦΥΛΑΚΙΟ ΠΡΟΣ ΤΟ ΕΜΠΟΡΙΚΟ ΛΙΜΑΝΙ ΚΑΙ ΣΕ ΑΠΟΣΤΑΣΗ 50 ΜΕΤΡΩΝ – ΚΑΘ΄ ΟΛΟ ΤΟ ΕΤΟΣ	Α.Π:2134.1/11/11/18-10-2011 ΑΠΟΦΑΣΗ Κ.Λ.ΚΑΒΑΛΑΣ
ΑΠΑΓΟΡΕΎΕΤΑΙ Η ΑΛΙΕΊΑ ΜΕ ΔΊΧΤΥΑ ΤΡΆΤΑΣ, ΔΡΆΓΕΣ ΓΡΙ-ΓΡΙ, ΓΡΊΠΟΥΣ ΣΥΡΌΜΕΝΟΥΣ ΑΠΌ ΣΚΆΦΟΣ Ή ΠΑΡΌΜΟΙΑ ΔΊΧΤΥΑ ΣΤΗ ΘΑΛΆΣΣΙΑ ΠΕΡΙΟΧΉ ΤΗΣ ΚΕΡΑΜΩΤΗΣ ΚΑΒΆΛΑΣ ΠΟΥ ΟΡΙΟΘΕΤΕΊΤΑΙ ΕΝΤΌΣ ΤΗΣ ΠΡΏΤΗΣ ΙΣΟΒΑΘΟΎΣ ΤΩΝ 20 ΜΈΤΡΩΝ ΠΟΥ ΣΥΝΑΝΤΆΤΑΙ ΑΠΌ ΤΗΝ ΑΚΤΟΓΡΑΜΜΉ ΚΑΙ ΤΩΝΜΕΣΗΜΒΡΙΝΏΝ 24 43.102'Ε ΚΑΙ 24 48.056'Ε	ΥΑ Αριθμ. 2886/142447 /26-02-2019 (ΦΕΚ 105Δ΄)
ΑΠΑΓΟΡΕΎΕΤΑΙ Η ΑΛΙΕΊΑ ΜΕ ΔΊΧΤΥΑ ΤΡΆΤΑΣ, ΔΡΆΓΕΣ ΓΡΙ-ΓΡΙ, ΓΡΊΠΟΥΣ ΣΥΡΌΜΕΝΟΥΣ ΑΠΌ ΣΚΆΦΟΣ Ή ΠΑΡΌΜΟΙΑ ΔΊΧΤΥΑ ΣΤΗ ΘΑΛΆΣΣΙΑ ΠΕΡΙΟΧΉ ΤΗΣ ΑΝΑΤΟΛΙΚΉΣ ΘΆΣΟΥ (ΚΟΙΝΥΡΑ) ΠΟΥ ΟΡΙΟΘΕΤΕΊΤΑΙ ΕΝΤΌΣ ΤΗΣ ΠΡΏΤΗΣ ΙΣΟΒΑΘΟΎΣ ΤΩΝ 30 ΜΈΤΡΩΝ ΠΟΥ ΣΥΝΑΝΤΆΤΑΙ ΑΠΌ ΤΗΝ ΑΚΤΟΓΡΑΜΜΉ ΚΑΙ ΤΩΝ ΠΑΡΑΛΛΉΛΩΝ 40 40.397'Ν ΚΑΙ 40 38.706'Ν.	ΥΑ Αριθμ. 2886/142447 /26-02-2019 (ΦΕΚ 105Δ΄)
ΑΠΑΓΟΡΕΎΕΤΑΙ Η ΑΛΙΕΊΑ ΜΕ ΔΊΧΤΥΑ ΤΡΆΤΑΣ, ΔΡΆΓΕΣ ΓΡΙ-ΓΡΙ, ΓΡΊΠΟΥΣ ΣΥΡΌΜΕΝΟΥΣ ΑΠΌ ΣΚΆΦΟΣ Ή ΠΑΡΌΜΟΙΑ ΔΊΧΤΥΑ ΣΤΗ ΒΟΡΕΙΟΔΥΤΙΚΉ ΘΆΣΟ ΕΝΤΌΣ ΤΗΣ ΠΡΏΤΗΣ ΙΣΟΒΑΘΟΎΣ ΓΡΑΜΜΉΣ ΤΩΝ 20 ΜΈΤΡΩΝ ΑΠΌ ΤΗΝ ΑΚΤΟΓΡΑΜΜΉ ΚΑΙ ΣΥΓΚΕΚΡΙΜΈΝΑ ΣΤΗ ΘΑΛΆΣΣΙΑ ΠΕΡΙΟΧΗ ΠΟΥ ΕΣΩΚΛΕΊΕΤΑΙ ΜΕΤΑΞΎ ΤΗΣ ΝΟΗΤΉΣ ΓΡΑΜΜΉΣ ΠΟΥ ΟΡΊΖΟΥΝ ΤΑ ΣΗΜΕΊΑ: Α: 40 40.878Ν' 24 31.362'Ε Β: 40 40.998'Ν 24 30.922'Ε Γ: 40 48.909'Ν 24 33.68' Ε Δ: 40 47.16' Ν 24 44.691'Ε Ε: 40 45.311'Ν 24 44.637'Ε	ΥΑ Αριθμ. 2886/142447 /26-02-2019 (ΦΕΚ 105Δ΄)

ΑΠΑΓΟΡΕΎΕΤΑΙ Η ΑΛΙΕΊΑ ΜΕ ΔΊΧΤΥΑ ΤΡΆΤΑΣ, ΔΡΆΓΕΣ ΓΡΙ-ΓΡΙ, ΓΡΙΠΟΥΣ ΣΥΡΌΜΕΝΟΥΣ ΑΠΌ ΣΚΆΦΟΣ Ή ΠΑΡΌΜΟΙΑ ΔΊΧΤΥΑ ΣΤΗ ΘΑΛΆΣΣΙΑ ΠΕΡΙΟΧΉ ΤΟΥ ΣΤΡΥΜΟΝΙΚΟΎ ΚΌΛΠΟΥ ΠΟΥ ΟΡΙΟΘΕΤΕΊΤΑΙ ΕΝΤΌΣ ΤΗΣ ΠΡΏΤΗΣ ΙΣΟΒΑΘΟΎΣ ΤΩΝ 30 ΜΈΤΡΩΝ ΠΟΥ ΣΥΝΑΝΤΆΤΑΙ ΑΠΌ ΤΗΝ ΑΚΤΟΓΡΑΜΜΉ ΚΑΙ ΤΩΝ ΜΕΣΗΜΒΡΙΝΏΝ 23 47.034'Ε ΚΑΙ 23 52.937'Ε.	ΥΑ Αριθμ. 2886/142447 /26-02-2019 (ΦΕΚ 105Δ΄)
ΑΠΑΓΟΡΕΥΕΤΑΙ ΚΑΘΌΛΗ ΤΗ ΔΙΑΡΚΕΙΑ ΤΟΥ ΕΤΟΥΣ Η ΑΛΙΕΙΑ ΔΙΑ ΤΟΥ ΑΛΙΕΥΤΙΚΟΥ ΕΡΓΑΛΕΙΟΥ ΓΡΙ-ΓΡΙ ΗΜΕΡΑΣ ΕΙΣ ΘΑΛΑΣΣΙΑ ΠΕΡΙΟΧΗ ΟΡΙΖΟΜΕΝΗ ΑΠΌ ΤΟΥ ΣΗΜΕΙΟΥ ΑΜΜΩΔΗΣ ΑΚΡΑ ΤΟΥ ΚΟΛΠΟΥ ΚΑΒΑΛΑΣ ΜΕΧΡΙ ΤΟΥ ΑΚΡΟΥ ΦΑΝΑΡΙ ΤΟΥ ΟΡΜΟΥ ΠΟΡΤΟ ΛΑΓΟΣ ΕΙΣ ΑΠΟΣΤΑΣΗ 4 Ν.Μ. ΑΠΌ ΤΗΝ ΑΚΤΗ ΚΑΙ ΑΠΟ ΤΟΥ ΣΗΜΕΙΟΥ ΑΚΡΩΤΗΡΙΟΝ ΑΧΛΑΔΑ ΙΜΕΡΟΥ ΡΟΔΟΠΗΣ ΜΕΧΡΙ ΤΟΥ ΑΚΡΟΥ ΦΑΝΑΡΙ ΤΟΥ ΟΡΜΟΥ ΠΟΡΤΟ ΛΑΓΟ ΕΙΣ ΑΠΟΣΤΑΣΙΝ 2 Ν.Μ. ΑΠΟ ΤΗΝ ΑΚΤΗ	ΠΔ 1358/1981 (ΦΕΚ 338 Α΄ /81)
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(Source: Fisheries Control Directorate, https://alieia.hcg.gr/prohibitions/local/KABALA.php)

6.11.2.1.2 Secondary Sector

The secondary sector of production includes mineral resource exploitation, manufacturing (industry, crafts), energy production, and construction (building construction, technical works, etc.). According to the "Eastern Macedonia and Thrace" Program 2021-2027, the secondary sector employed 12% of the workforce in 2017, while the GVA in the regional economy was approximately 19%. The sector is particularly dependent on the primary sector, as it mainly concerns the exploitation of agricultural production (food and beverage industry, textiles, cigarette manufacturing) and quarrying and mining, as well as the processing of other raw materials (chemicals, non-metallic minerals, etc.). The majority of businesses are small in size.

The sector is structured around three main branches: mineral exploitation, manufacturing, and construction. The first sector currently consists of two categories: oil exploitation in the regional units of Kavala and Thasos, and marble quarries in the regional units of Kavala and Drama. while in recent years, the slate quarries of Eleftheroupoli, which are developing in the southeastern part of the Pangeo Mountains in the regional unit of Kavala, have also emerged. Manufacturing activity is developing along the main road axes in organised clusters or organic concentrations of businesses, with a high density near large urban centres. The sector lags behind in competitiveness compared to neighboring regions and countries, particularly Bulgaria due to significant differences in taxation and state aid, and Central Macedonia due to its proximity to large urban centers and multimodal transport networks. The main feature of the sector is the prolonged recession, due to the closure of large units and the relocation of others to neighboring countries. The few new and dynamic plants that are being created are choosing locations outside organized industrial zones, even though the existing industrial zones have the capacity to accommodate them and offer prospects, given that most of

them have incorporated significant infrastructure (connection to road networks, water supply, electricity, fiber optics, wastewater disposal, and treatment plants) that offer significant advantages.

6.11.2.1.3 Tertiary sector

The tertiary sector accounts for the largest share of employment. It includes public administration, scientific and technical services, arts and entertainment services, as well as real estate management services, in the sectors of trade, accommodation, catering, transport, and communications, while a very small percentage relates to financial and insurance services.

The trade, catering, and leisure sectors experienced an unprecedented downturn due to the pandemic, with incalculable consequences in terms of business sustainability, jobs, and reduced consumer spending.

The tourism sector is showing an upward trend in international arrivals, which gives it a more dynamic role in the wider Balkan and Mediterranean region. According to the Annual Report on Competitiveness and Structural Adjustment in the Tourism Sector for 2022 by the Institute of the Association of Greek Tourism Enterprises (INSETE)[88] , the revenue of the Region of Eastern Macedonia and Thrace from tourism in 2022 represented 2% (€508 million) of the country's total revenue, while the direct contribution of tourism to the Region's GDP amounted to 6%; at the national level, the direct contribution of tourism to the country's GDP in 2022 was 11.5% or €23.9 billion. According to the INSETE study, "Greek Tourism 2030"[89] , only 1.9% of Greece's travel agencies operate in the Region of Eastern Macedonia and Thrace. Of these, 20.2% are located in the Thasos Regional Unit, while 18.3% of the relevant businesses in the Region are located in the Kavala Regional Unit. Only 1.0% of Greece's vehicle rental companies operate in the Region of Eastern Macedonia and Thrace. More than half (50.3%) are located in the Thasos Regional Unit, while 31.8% of the relevant businesses in the Region are located in the Kavala Regional Unit. The region increased its human resources in the accommodation and catering sectors by 2.0% between 2010 and 2019, one of the highest rates in the country.

The main beaches are:

- For the Kavala Prefecture: Ammoglossa – Keramoti 1, Tosca Beach, Batis, Ammolofoi, Nea Iraklitsa, Nea Iraklitsa – Rembi, Nea Peramos, Ofrinio / Touzla, Sarakina, Orfani, Timari, Costa Vita, Psatha, Vrasidas, Almyra, Ocean View, Sarakina, Apollonia
- For the Thasos Regional Unit: Makryammos, Pefki 2 / Alexandra Beach, Prinos Dasilio 2 / Ilio Mare Beach, Skala Kallirachis, Skala Marion, Atspas, Fari, Trypiti, Limenaria, Metallia, Pefki Potou, Pefki, Potos, Agios Antonios, Rusogremos, Oxyas, Psili Ammos, Astris, Salonikios, Giola, Livadi, Arsanas, Thymonia, Skidia, Alyki, Agios Giannis, Paradisos, Loutros, Koinura, Krini, Chrysi Akti, Skala Potamias, Chrysi Ammoudia, Vathi, Marmaradika, Saliara, Archangelos, Agios Vasileios, Nysteri, Glyfada, Glykadi, Glyfoneri, Pachis, Skala Rachoniou, Skala Sotiras, Limenas Thasou

[88] https://insete.gr/wp-content/uploads/2020/05/23-12_Eastern_Macedonia_Thrace.pdf
[89] https://insete.gr/wp-content/uploads/pdf/perifereies/an-makedonia-and-thraki-analusi.pdf

The passenger port of Kavala "APOSTOLOS PAULOS" is the main port for cruise ships in the Region of Eastern Macedonia and Thrace, where floating platforms have been installed to allow the mooring of recreational boats: 68 berths for boats over 10 m in length, 115 berths for boats under 10 m in length, and 16 berths for boats of any length. Thasos has a marina with 280 mooring places. In addition, three tourist boat shelters or anchorages (2 in Thasos and 1 in Kavala) with 184 mooring places have been located in the Region.

In 2023, Kavala Airport recorded a 19% increase in arrivals, and on the island of Thasos, the increase in ferry routes was 17% according to data released by the Central Port Authority of Kavala for 2023, with more than two million passengers traveling to and from the island of Thasos via the Keramoti-Limenas route. A total of 35 cruise ships carrying more than 20,000 passengers docked at the central passenger port of "Apostolos Pavlos" in 2023.

The following **table** shows the turnover of businesses in the Accommodation and Food Services sectors in the regional units of Kavala and Thasos.

Table6 –51 : turnover of businesses in the Accommodation and Food Services sectors, 2019-2023

Regional	2019	20	20	20	2023
Thasos	€ 32,714,362	€ 9,232,867	€ 24,933,595	€ 37,201,866	€ 45,241,822
Kavala	€ 15,370,596	€ 8,063,903	€ 11,278,329	€ 20,453,089	€ 28,351,321

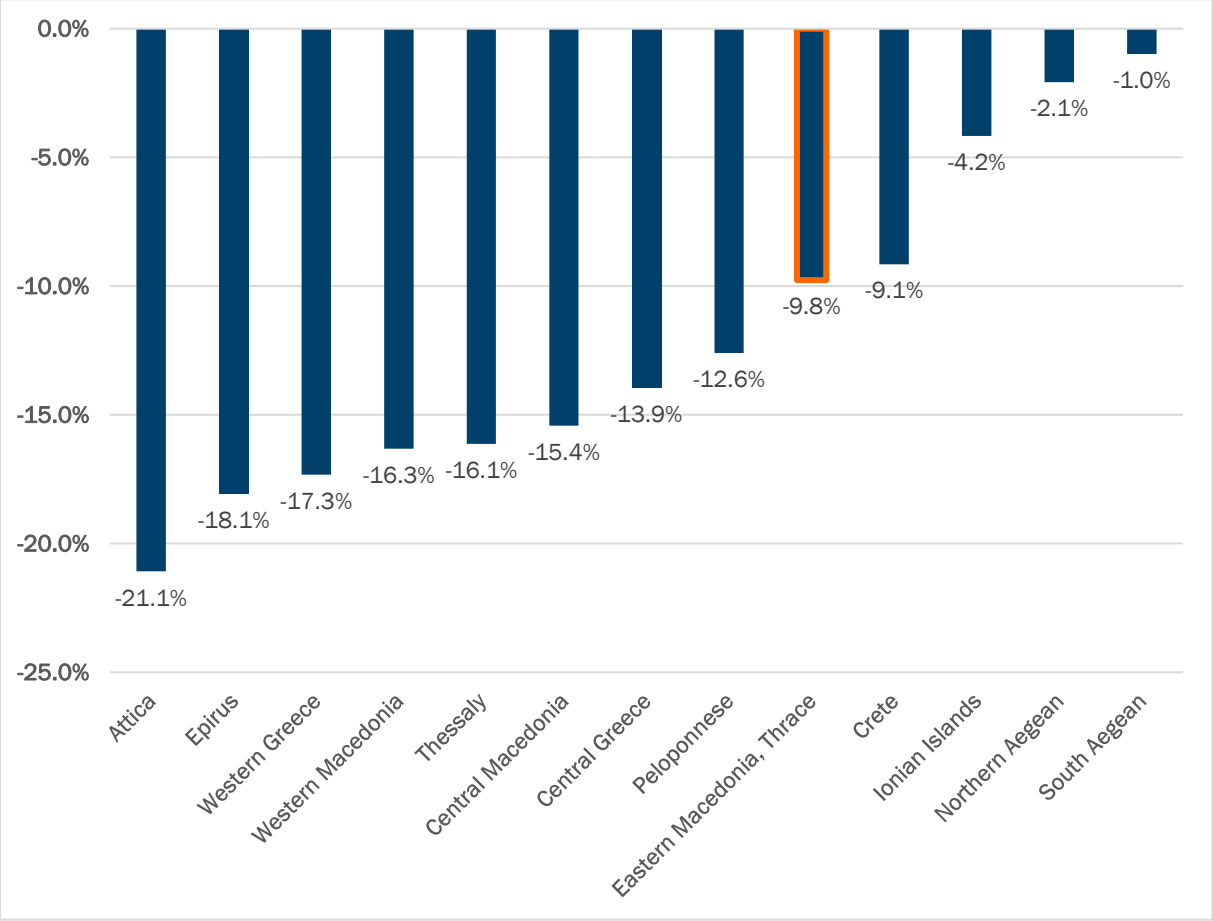
(Source: ELSTAT)

6.11.2.2 Employment and Unemployment

Employment and good working conditions support economic stability, the development of social networks, and health. Employment data is also an important barometer of a region's economic activity and contributes to understanding its current and future development. Below are data on the labor market and working conditions.

According to the OECD Regional Policy Report for Greece after 2020[90] , between 2007 and 2018, the economic crisis caused significant job losses in Greece, amounting to approximately 725,000. Ten of the 13 regions in Greece employed 9% to 20% fewer people in 2018 than in 2007. In the Region of Eastern Macedonia and Thrace, job losses reached 9.8%.

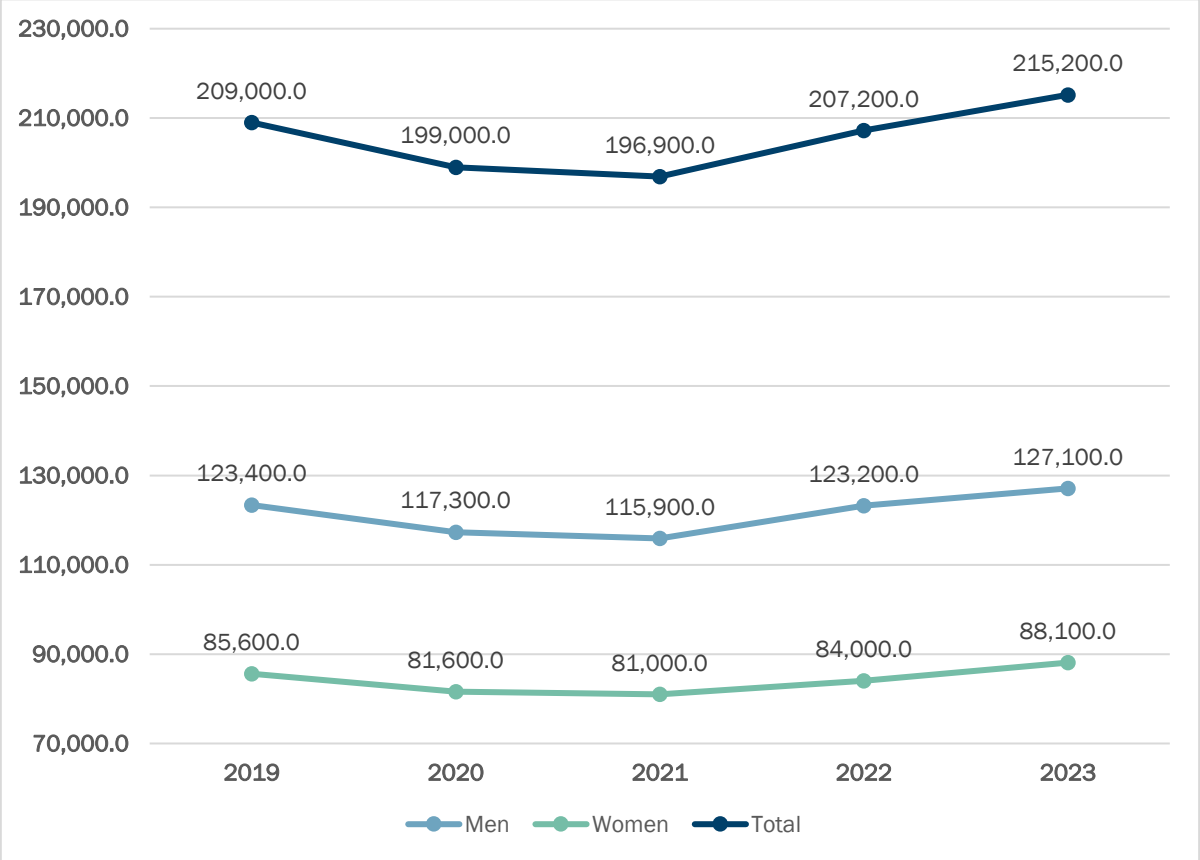
[90] *OECD (2020), Regional Policy for Greece Post-2020, OECD Territorial Reviews, OECD Publishing, Paris, https://doi.org/10.1787/cedf09a5-en.*



(Source: OECD)

Figure6 71 : Changes in employment by region, 2007-2018)

Employment among 15-64 year olds in the Region of Eastern Macedonia and Thrace showed a gradual increase between 2015 and 2019. However, the dual crisis, health (COVID-19) and economic, that followed caused new significant negative consequences in the labor market. Below is the evolution of employment (15-64 years old) from 2019 onwards.



(Source: Eurostat)

Figure6 –72 : Employment trends (aged 15-64) and gender distribution in the Region of Eastern Macedonia and Thrace 2019–2023

Every year, ELSTAT conducts a Labor Force Survey, which, in addition to employment data, includes estimates of the population, the economically active population, employment and unemployment indicators, etc. The economically active population constitutes the labor force of the economy and includes persons aged 15 and over who are able to work and at the same time want to work. Persons aged over 15 represent 85% and 86% of the country's population in 2015 and 2020, respectively, of which 52% and 51% in 2015 and 2020, respectively, constituted the economically active population. In 2023, this percentage is estimated at 52.2%.

With regard to the economically active population in the individual regions, in the Region of Eastern Macedonia and Thrace the percentage for 2023 reaches 50.1%, ranking the Region 5th from the bottom among the 13 Regions.

According to ELSTAT data, the three sectors that employed the largest number of workers in the Region of Eastern Macedonia and Thrace in 2021 were: (1) Wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage, accommodation and food service activities, (2) Public administration and defense, education, activities related to human health and social welfare, and (3) agriculture, forestry, and fishing.

Table6 –52 : Gross Value Added and Employment by Sector in the Region of Eastern Macedonia-Thrace 2021

Sector	GVA (At current prices. In € million)	Employees
Agriculture, forestry, and fishing	485	56,925.6
Mining and Quarrying, Manufacturing, Electricity, Gas, Steam and Air Conditioning Supply, Water Supply, Sewage Treatment, Waste Management and Remediation Activities	1,301	20,138.5
Construction	10	8,294.4
Wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage, accommodation and food service activities	1,294	62,141
Information and communication	1	2,381.2
Financial and insurance activities	166	2,320.4
Real estate management	663	576.2
Professional, scientific, and technical activities, administrative and support activities	176	12,600
Public administration and defense, education, activities related to human health and social welfare	1,749	61,051
Arts, Entertainment and Recreation, Other Service Activities, Activities of households as employers, undifferentiated activities of households related to the production of goods and services for own use, activities of extraterritorial organizations and bodies	159	7,262.4

(Source: ELSTAT)

The following table shows the employment situation for the Region of Eastern Macedonia and Thrace in the fourth quarter between 2020 and 2023[91] ,[92] ,[93] ,[94] .

Table6 –53 : Employment situation for the Region of Eastern Macedonia and Thrace in the fourth quarter of 2020-2023

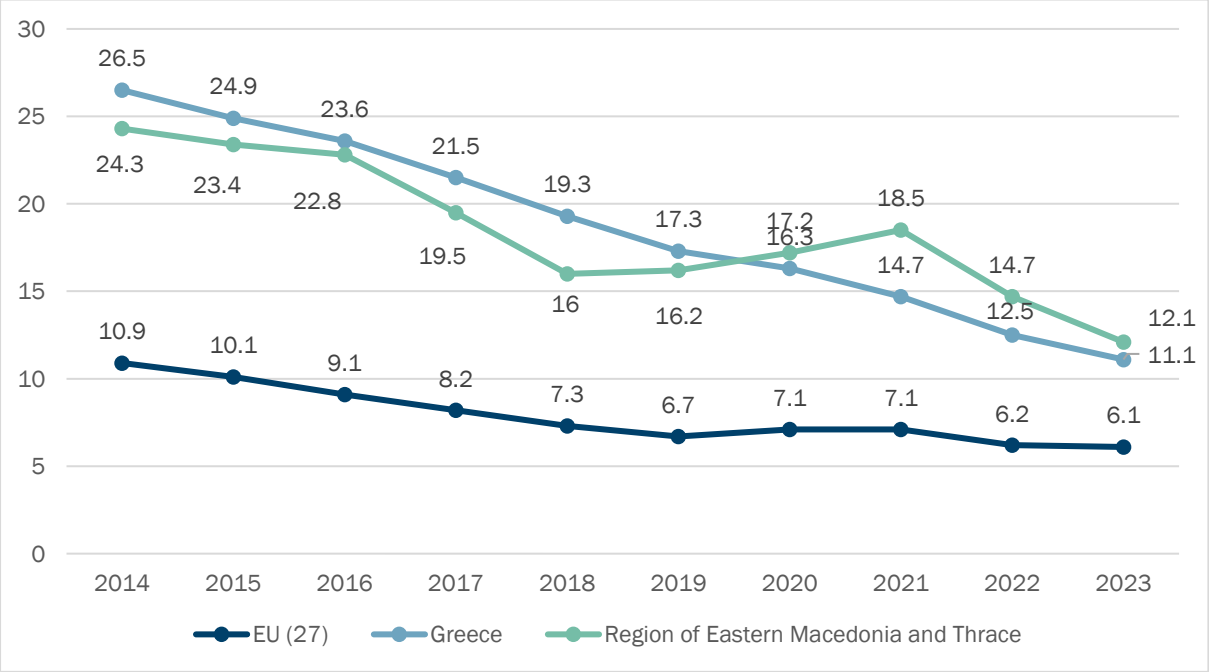
	Employed (In thousands)	Unemployed (In thousands)	People outside the labor force (In thousands)	Unemployment rate	Labor force participation rate
Fourth quarter of 2020	202.0	43	260.5	17.7	48.5
Fourth quarter of 2021	210.1	39	256.2	15.7	49.3

[91] https://www.statistics.gr/el/statistics/-/publication/SJ001/2020-Q4
[92] https://www.statistics.gr/el/statistics/-/publication/SJ001/2021-Q4
[93] https://www.statistics.gr/el/statistics/-/publication/SJ001/2022-Q4
[94] https://www.statistics.gr/el/statistics/-/publication/SJ001/2023-Q4

	Employed (In thousands)	Unemployed (In thousands)	People outside the labor force (In thousands)	Unemployment rate	Labor force participation rate
Fourth quarter of 2022	217.4	34.7	252.8	13.8	49.9
Fourth quarter of 2023	227.8	24.6	252.3	9.7	50.0

(Source: ELSTAT)

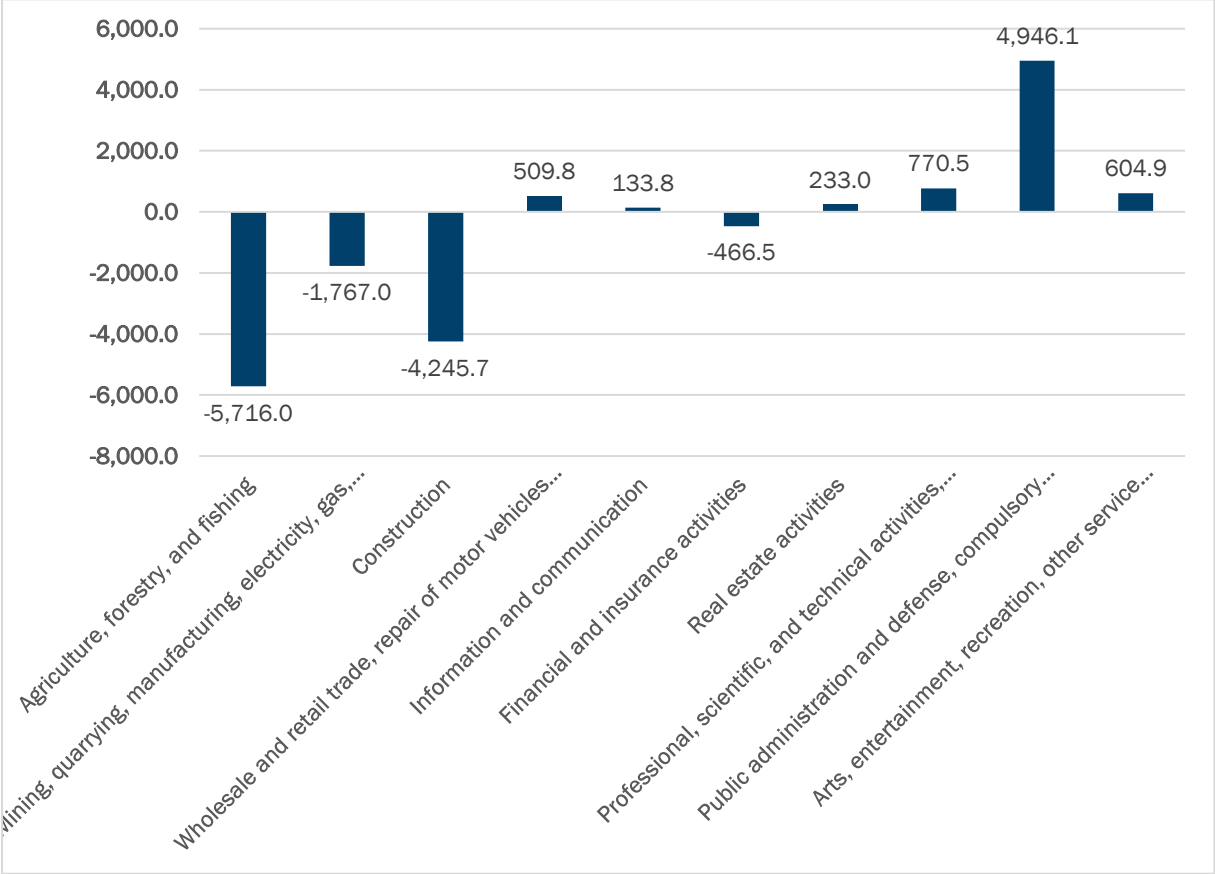
The successive crises also had a negative impact on unemployment levels in the Region of Eastern Macedonia and Thrace. Despite the recovery, unemployment levels in the Region remain higher than the national average and significantly higher than the EU average, as shown in **the figure** below**.**



(Source: Eurostat)

Figure6 –73 : Evolution of unemployment rate (%) 2014–2023

Between 2010 and 2021, the largest decline in the number of employed persons was recorded in the construction and agriculture, forestry, and fishing sectors (-4,245 and -5,716 respectively), while the largest increase was recorded in the sectors of public administration and defense, education, and activities related to human health and social welfare (+4,946).



(Source: ELSTAT)

Figure6 –74 : Changes in the number of people employed per sector, 2010-2021

At the regional level, according to the Operational Program of the Municipality of Kavala 2023 [95]

- Before the economic crisis, unemployment in the Kavala region had reached 9.4% in 2008, higher than the corresponding rate for the country as a whole (7.8%).
- During the crisis, e.g. in 2013, unemployment in the Kavala Regional Unit reached 23.2%, but was lower than the increase in the country as a whole.
- After 2015, unemployment in the Kavala regional unit began to decline at a faster rate than in the country and the region of Eastern Macedonia and Thrace, reaching 10.1% in 2019.

Comparatively, the pattern of unemployment in the Kavala regional unit is similar to that of less rural areas. In other words, while areas with greater participation in agricultural production experienced a smaller increase in unemployment during the crisis, as the country emerged from the crisis after 2015-2016, the

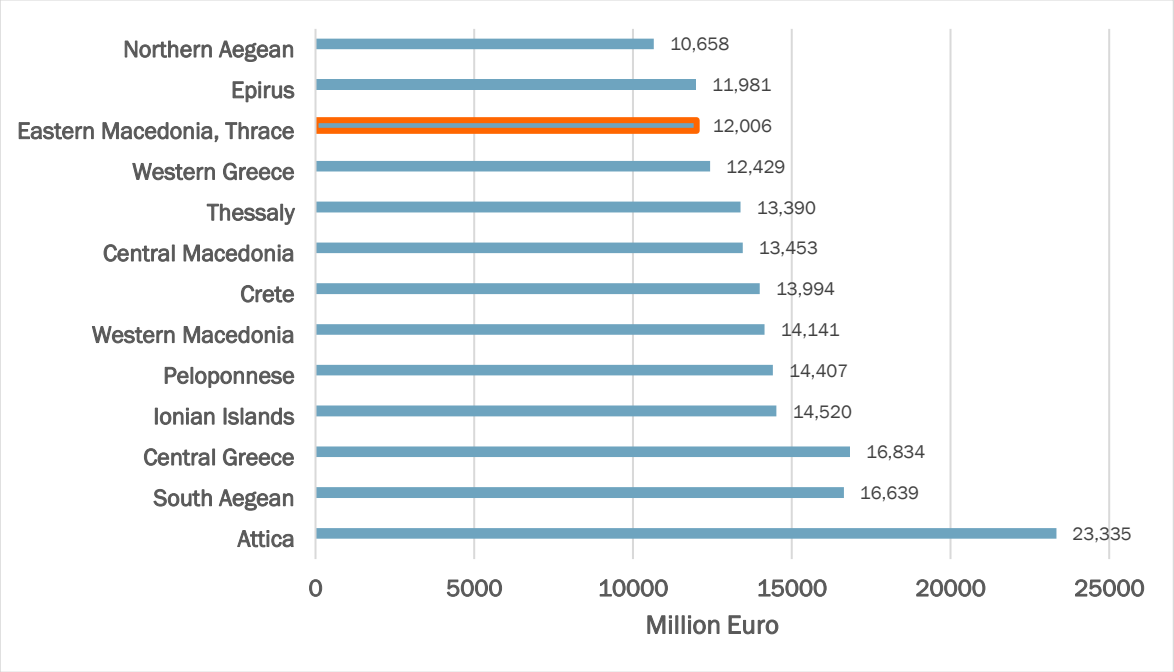
[95] https://kavala.gov.gr/getattachment/o-dimos/diafaneia-sto-dimo/epixeirisiako-programma/%CE%95%CF%80%CE%B9%CF%87%CE%B5%CE%B9%CF%81%CE%B7%CF%83%CE%B9%CE%B1%CE%BA%CE%BF-%CE%A0%CF%81%CE%BF%CE%B3%CF%81%CE%B1%CE%BC%CE%BC%CE%B1-%CE%94%CE%B7%CE%BC%CE%BF%CF%85-%CE%9A%CE%B1%CE%B2%CE%B1%CE%BB%CE%B1%CF%82-2021-2023-%CE%91-%CE%A6%CE%91%CE%A3%CE%97.pdf

regions with greater participation in the secondary and tertiary sectors experienced a greater decline in unemployment.

6.11.2.3 Income and Living Conditions

According to the Regional Development Program of the Region of Eastern Macedonia and Thrace 2021-2025[96] , per capita GDP, starting at €15,000 in 2010, fell to €11,500 in 2017. The decline was gradual until 2015 and began to recover in 2016, reaching €11.9 thousand (at current prices) in 2018.

In 2021, the Region of Eastern Macedonia and Thrace ranks third from the bottom in terms of this indicator compared to the other regions of the country, lagging behind the corresponding national indicator (€17,058 thousand). It is characteristic that it is at half the level recorded for Attica, which ranks first.



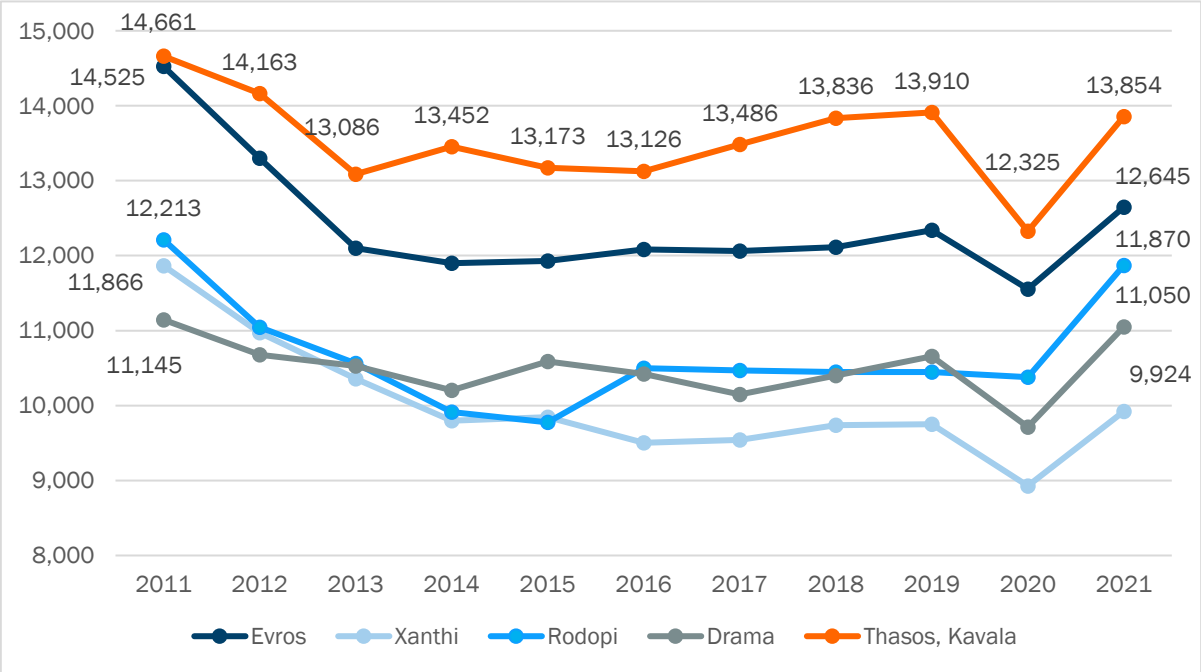
(Source: ELSTAT)

Figure6 –75 : Gross domestic product per capita by region, 2021

[96] https://www.eydamth.gr/#

At the regional level, according to ELSTAT data, the prefecture of Kavala has the highest GDP per capita.

The regional units of Kavala and Thasos account for 27% of the region's gross domestic product, roughly on par with the GDP of the regional unit of Evros.



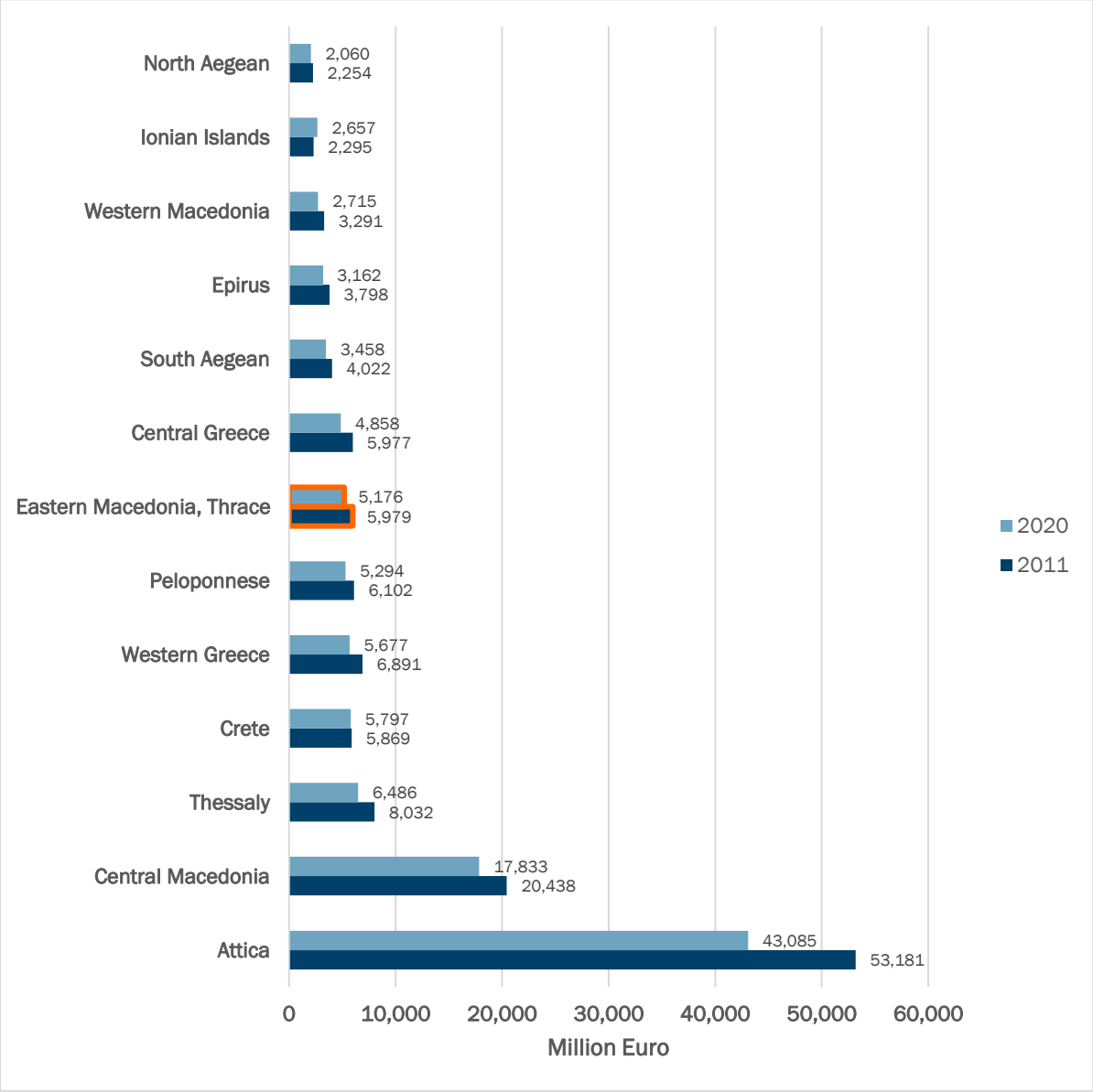
(Source: ELSTAT)

Figure6 –76 : Per capita gross domestic product by prefecture in the Region of Eastern Macedonia and Thrace, 2011-2021

Net disposable income of households is the income that can be spent or saved (after taxes and social security contributions have been paid and social benefits have been received) by a household and is used as an indicator of living standards.

According to data from the European Statistical Service[97] , the net disposable income of households in the Region of Eastern Macedonia and Thrace amounted to €5,176.45 million in 2020, down from €5,978.95 million in 2011.

[97] *https://ec.europa.eu/eurostat/databrowser/view/NAMA_10R_2HHINC__custom_3644517/default/table?lang=en*



(Source: Eurostat)

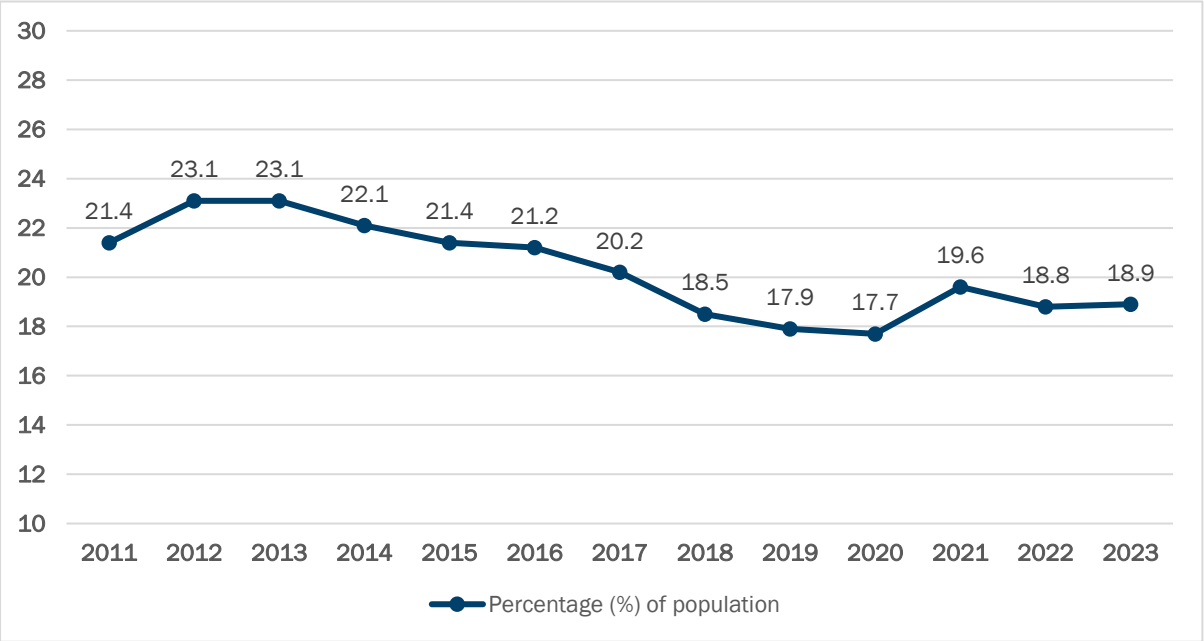
Figure6 –77 : Net disposable income of households by region 2011-2020

Based on data from the Household Income and Living Conditions Survey (ELSTAT)[98] , in 2023 (income reference period 2022), the population at risk of poverty or social exclusion will amount to 26.1% of the

98 https://www.statistics.gr/el/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_ln=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_documentID=521338&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_locale=en

country's population (2,658,400 people), representing a decrease of 0.2 percentage points compared to 2022 (26.3%). The poverty threshold is €6,030 per year for a single-person household and €12,663 for households with two adults and two dependent children under the age of 14, and is defined as 60% of the median total equivalent disposable income of households, which was estimated at €10,050, while the average annual disposable income of households in the country was estimated at €18,755.

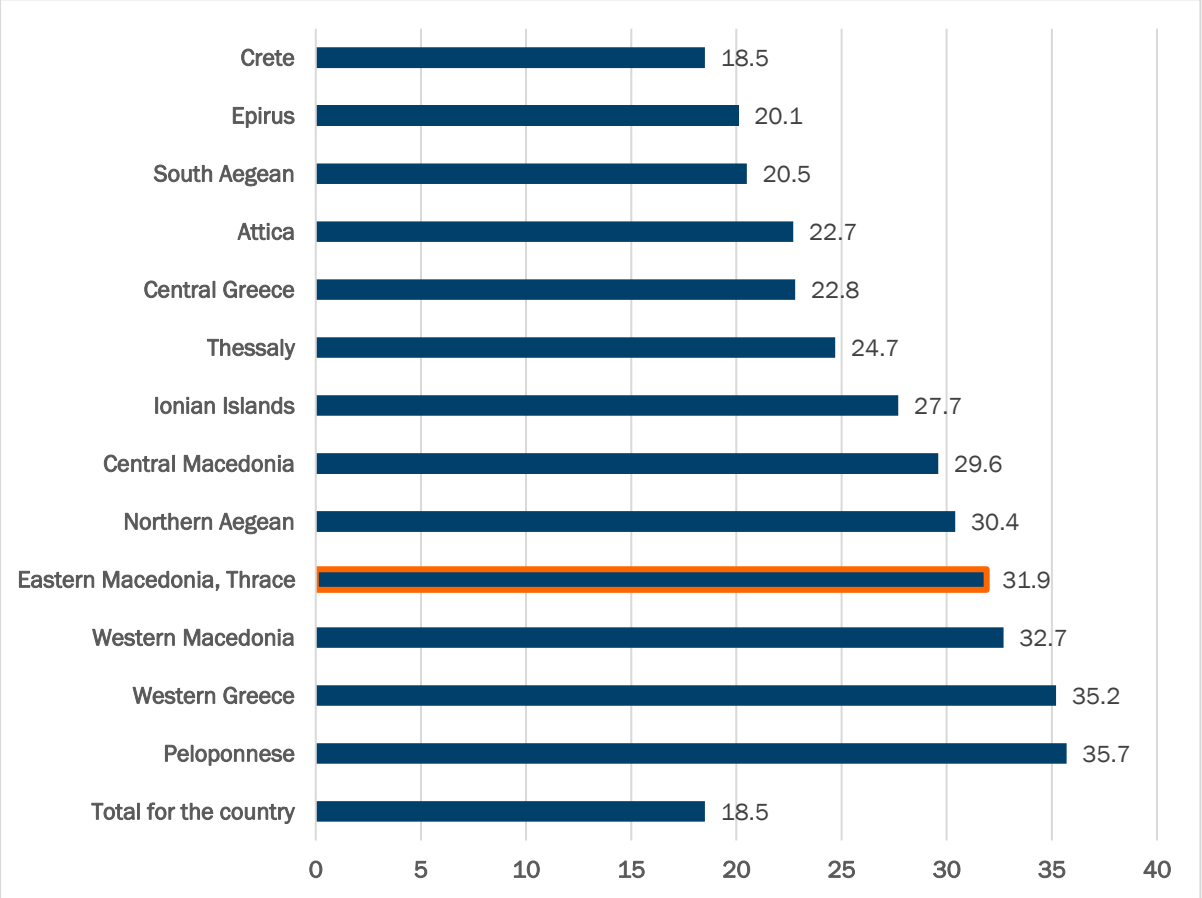
The change in the percentage of the population at risk of poverty is illustrated in **the figure** below.



(Source: ELSTAT)

6 –78 : Percentage of population at risk of poverty, 2011–2023

Six (6) regions (Crete, Epirus, South Aegean, Attica, Central Greece, and Thessaly) have lower rates of poverty or social exclusion than the country as a whole, while the remaining seven (7) regions (Peloponnese, Western Greece, Western Macedonia, Eastern Macedonia and Thrace, North Aegean, Central Macedonia, and Ionian Islands), the corresponding rates are higher, as shown in **the figure** below.

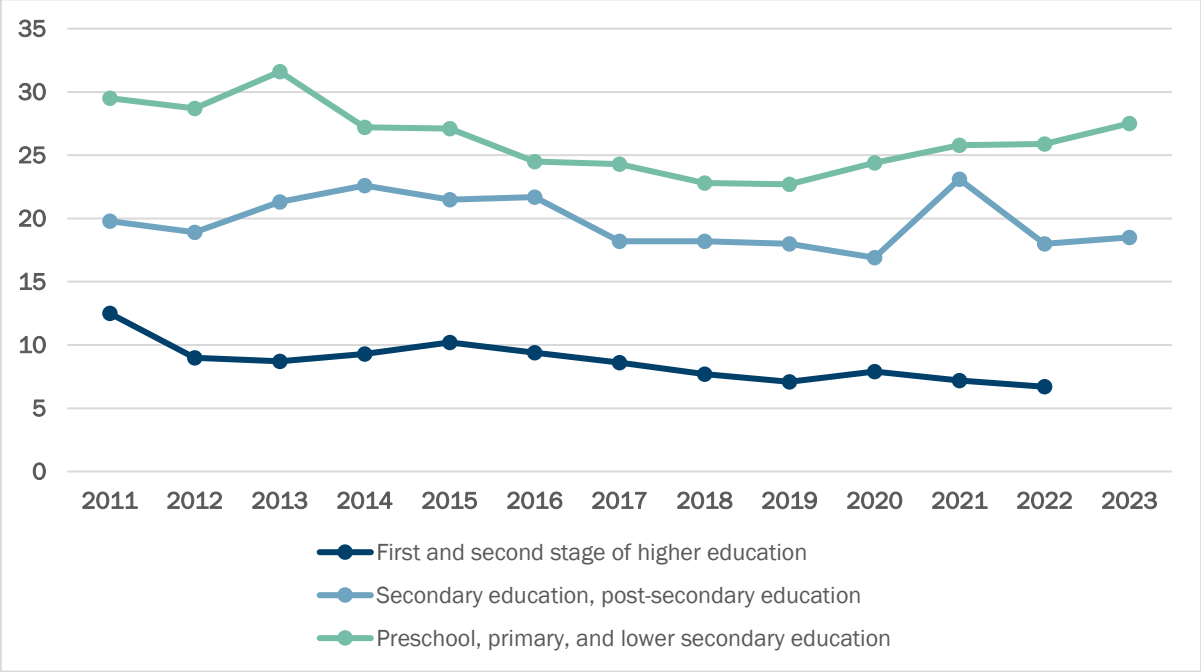


(Source: ELSTAT)

Figure6 –79 : Percentage of population at risk of poverty by region in 2023

With regard to some of the characteristics of the population at risk of poverty, workers aged 18 and over face a lower risk of poverty compared to the unemployed and economically inactive (housewives, etc.). The at-risk-of-poverty rate for employed persons aged 18 and over stands at 9.9%, a decrease of 0.7 percentage points compared to 2022. For the unemployed, the risk of poverty is significantly higher, at 48.0%, with a significant difference between men and women (55.5% and 42.6% respectively). The risk of poverty for those who are economically inactive (excluding pensioners) increased by 2.3 percentage points compared to 2022 and stood at 31.4%. The at-risk-of-poverty rate for workers aged 18-64 stands at 9.8%, a decrease of 0.8 percentage points compared to 2022. The risk of poverty for full-time workers stands at 9.0%, while for part-time workers it stands at 21.8%.

Data from studies highlight the correlation between educational attainment and living conditions. The figure below, presented in the 2023 Household Income and Living Conditions Survey, shows the link between educational attainment and reduced risk of poverty The higher the level of education, the lower the risk of poverty. For the year 2023, the risk of poverty is estimated at 27.5% for those who have completed preschool, primary, and the first stage of secondary education, 18.5% for those who have completed the second stage of secondary education and post-secondary education, and 6.7% for those who have completed the first and second stages of tertiary education.

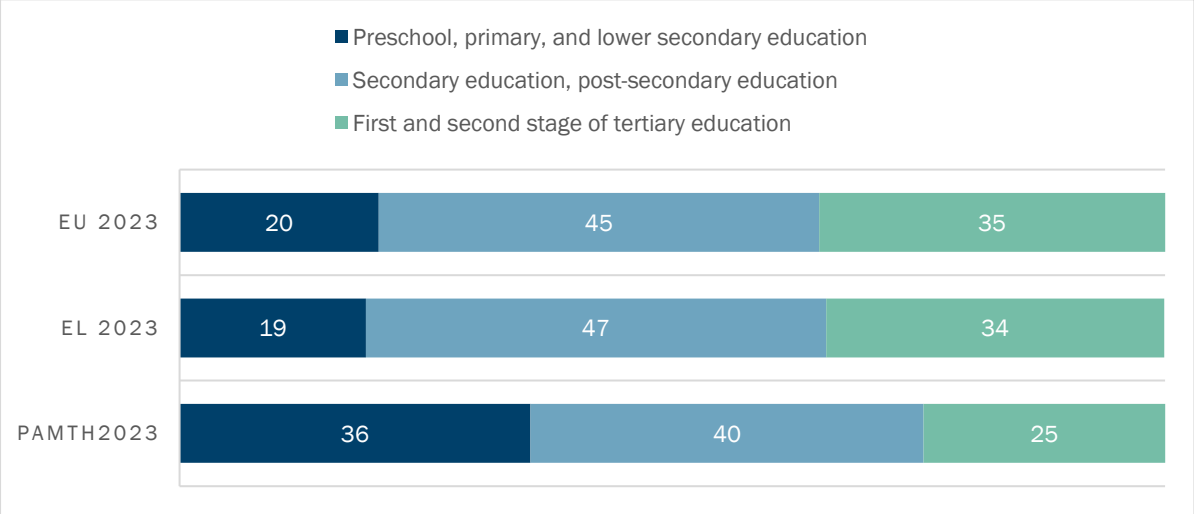


(Source: ELSTAT)

Figure6 –80 : Percentage of the population aged 16 and over at risk of poverty by level of education: 2011-2023

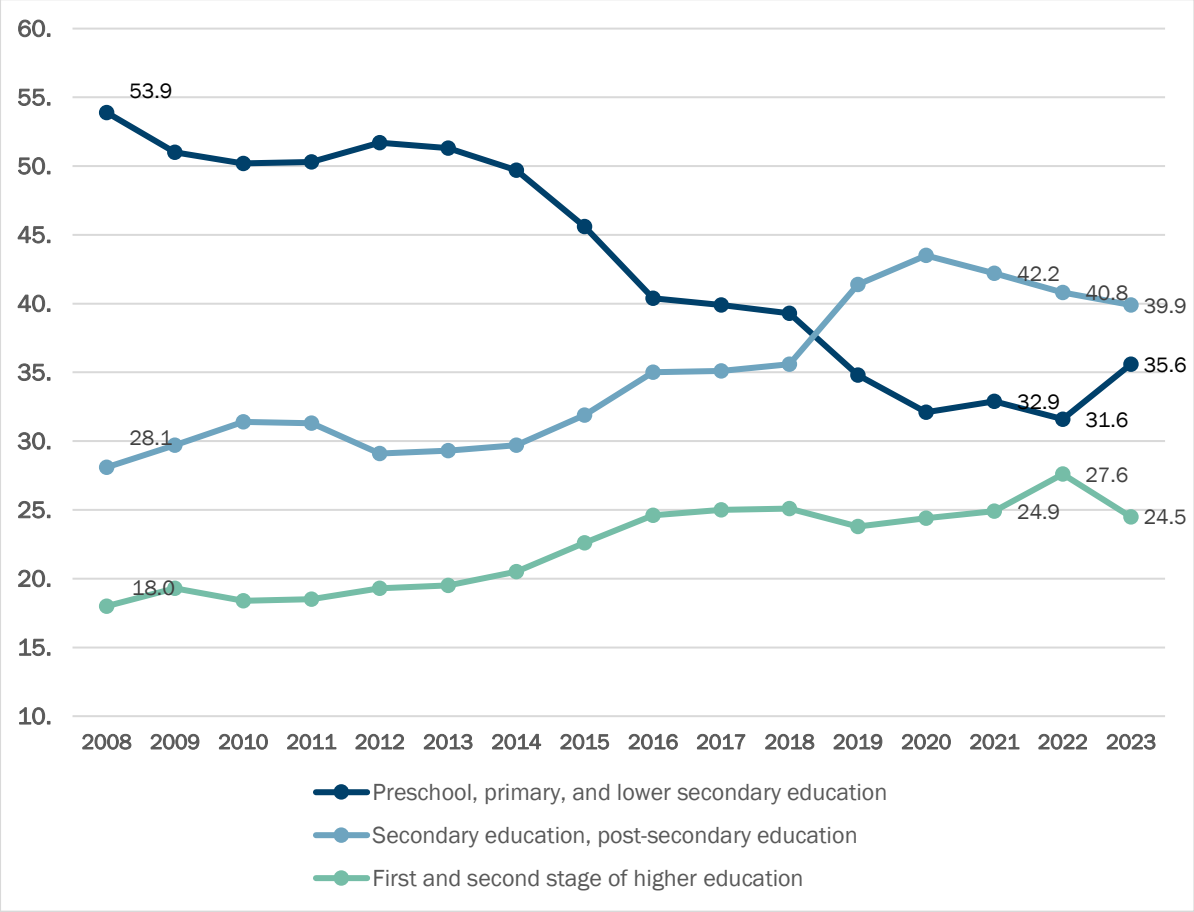
The following **figures** show the population by educational level in 2023 in the EU, Greece, and the Region of Eastern Macedonia and Thrace, as well as the evolution of the educational level in the Region from 2008 to 2023, according to data from the European Statistical Service[99] . It is worth noting that since 2008, in the Region, the percentage of the population aged 25 to 64 who have completed both upper secondary education and post-secondary education or the first and second stages of tertiary education has increasedcompared to the percentage that has completed pre-school, primary, and the first stage of secondary education, with the percentages in 2023 remaining lower than the national and EU averages.

[99]https://ec.europa.eu/eurostat/databrowser/view/edat_lfse_04/default/table?lang=en&category=reg.reg_educ.reg_educ_



(Source: Eurostat)

6 –81 : Population by educational attainment in the EU, Greece (EL), and the Region of Eastern Macedonia and Thrace (PA.M.TH.) (%): 2023



(Source: Eurostat)

Figure6 –82 : Evolution of educational level in the Region of Eastern Macedonia and Thrace (%), 2008-2023

6.12 SOCIAL AND TECHNICAL INFRASTRUCTURE

6.12.1 Social Infrastructure

6.12.1.1 Health Services

Most EU countries have achieved universal coverage for a significant range of health services. With Law 4368/2016 and Joint Ministerial Decision A3(c)/GP/oik.25132/4-4-2016, the right of free access to all public health structures for the provision of nursing and medical care to uninsured and vulnerable social groups was established[100] . This legislation established universal health coverage for all Greek citizens, including more than 2 million people who had lost coverage during the crisis due to long-term unemployment or inability to pay contributions. The National Health System provides access to a unified package of benefits, which includes primary care, diagnostic tests, specialized outpatient and inpatient care.

Health expenditure has increased but remains relatively low compared to most other EU countries. In 2021, health expenditure amounted to 9.2% of GDP, compared to the EU average of 11.0%.. Total funding for health expenditure as a percentage of GDP in Greece for 2022 was even lower, at 8.5%[101] .

At €1,874 per capita in 2021, Greece spent less than half the EU average on total health expenditure. Public expenditure is the main source of funding (62%), but it is significantly lower than the EU average of 81%. Most private expenditure takes the form of direct private payments (33%), which is well above the EU average (15%). Inpatient care accounts for the largest share of health expenditure (42%), followed by pharmaceuticals (30%). The EU average is 28% and 18% respectively. In contrast, Greece spends much less on outpatient care, both in absolute terms and as a percentage of total health expenditure (21%), despite efforts to expand the availability and use of primary care[102] .

Health system resources are unevenly distributed across the country due to historical, demographic, geographical, and other factors. The following **tables** show the capacity of the health system per region, both in absolute numbers and per 100,000 people for 2022.

[100] *https://www.moh.gov.gr/articles/health/anaptyksh-monadwn-ygeias/3999-prosbash-twn-anasfalistwn-sto-dhmosio-systhma-ygeias*

[101] https://www.statistics.gr/el/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_ln=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_documentID=519085&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_locale=en

[102] *OECD, State of Health in the EU · Greece · Health Profile 2023*

Table6 –54 : Healthcare system capacity (number) per region, 2022

Territorial Unit	Health centers	Doctors	Nurses	Other staff	Medical equipment	Public hospitals	Private hospitals	Private clinics
TOTAL FOR THE COUNTRY	311	3,513	5,153	3,426	3,726	124	4	139
REGION OF EASTERN MACEDONIA AND THRACE	20	147	398	206	334	6		10
REGION OF CENTRAL MACEDONIA	46	531	925	538	606	17	1	24
REGION OF WESTERN MACEDONIA	11	122	211	99	147	5		4
REGION OF EPIRUS	20	126	349	165	20	5		2
REGION OF THESSALIA	21	166	484	199	247	5		27
REGION OF CENTRAL GREECE	22	169	312	191	193	8		2
REGION OF THE IONIAN ISLANDS	12	68	82	58	10	5		1
REGION OF WESTERN GREECE	29	211	365	235	205	10		4
REGION OF PELOPONNESE	30	167	327	204	30	8		2
REGION OF ATTICA	57	1,417	1,218	996	742	35	2	53
REGION OF NORTH AEGEAN	10	51	115	159	209	5		2
SOUTH AEGEAN REGION	14	112	111	119	172	7	1	1
REGION OF CRETE	19	226	256	257	267	8		7

(Source: ELSTAT)

Table6 –55 : Healthcare system capacity (per 100,000 people) by region, 2022

Territorial Unit	Health centers	Doctors	Nurses	Other staff	Medical equipment	Public hospitals	Private hospitals	Private clinics
TOTAL FOR THE COUNTRY	3	34	49	33	36	1	0	14
REGION OF EASTERN MACEDONIA AND THRACE	4	26	71	37	60	1	0	2
REGION OF CENTRAL MACEDONIA	3	30	52	30	34	1	0	1
REGION OF WESTERN MACEDONIA	4	48	83	39	58	2	0	2
REGION OF EPIRUS	6	39	109	52	63	2	0	1
REGION OF THESSALIA	3	24	71	29	36	1	0	4
REGION OF CENTRAL GREECE	4	33	62	38	38	2	0	0
REGION OF THE IONIAN ISLANDS	6	33	40	28	5	2	0	0
REGION OF WESTERN GREECE	4	33	56	36	32	2	0	1
REGION OF PELOPONNESE	6	31	61	38	56	1	0	0
REGION OF ATTICA	1	37	32	26	19	1	0	1
NORTH AEGEAN REGION	5	26	59	81	10	3	0	1
SOUTH AEGEAN REGION	4	34	34	36	53	2	0	0
REGION OF CRETE	3	36	41	41	43	1	0	1

(Source: ELSTAT)

The total number of hospital beds (in intensive care and non-intensive care units) has gradually decreased since 2000, reaching 4.3 per 1,000 inhabitants in 2021, which is lower than the EU average of 4.8 beds. The COVID-19 pandemic put pressure on hospital beds in both intensive and non-intensive care units (ICUs)

during peak periods, while in the most affected areas, beds in private sector facilities sometimes had to be used[103] .

In the Region of Eastern Macedonia and Thrace, according to the IOBE Report on Social and Economic Trends in Greek Regions[104] , the number of inpatient beds per 100,000 people increased by 55 between 2013 and 2021, reaching 439, higher than the average for the country as a whole (427). The number of doctors per 100,000 people also increased by 55 between 2013 and 2021, reaching 534, but remains lower than the average for the country as a whole (629).

The public health structures of the prefecture of Kavala fall under the 4th Health Region of Macedonia and Thrace. The Kavala Health Unit has the following infrastructure:

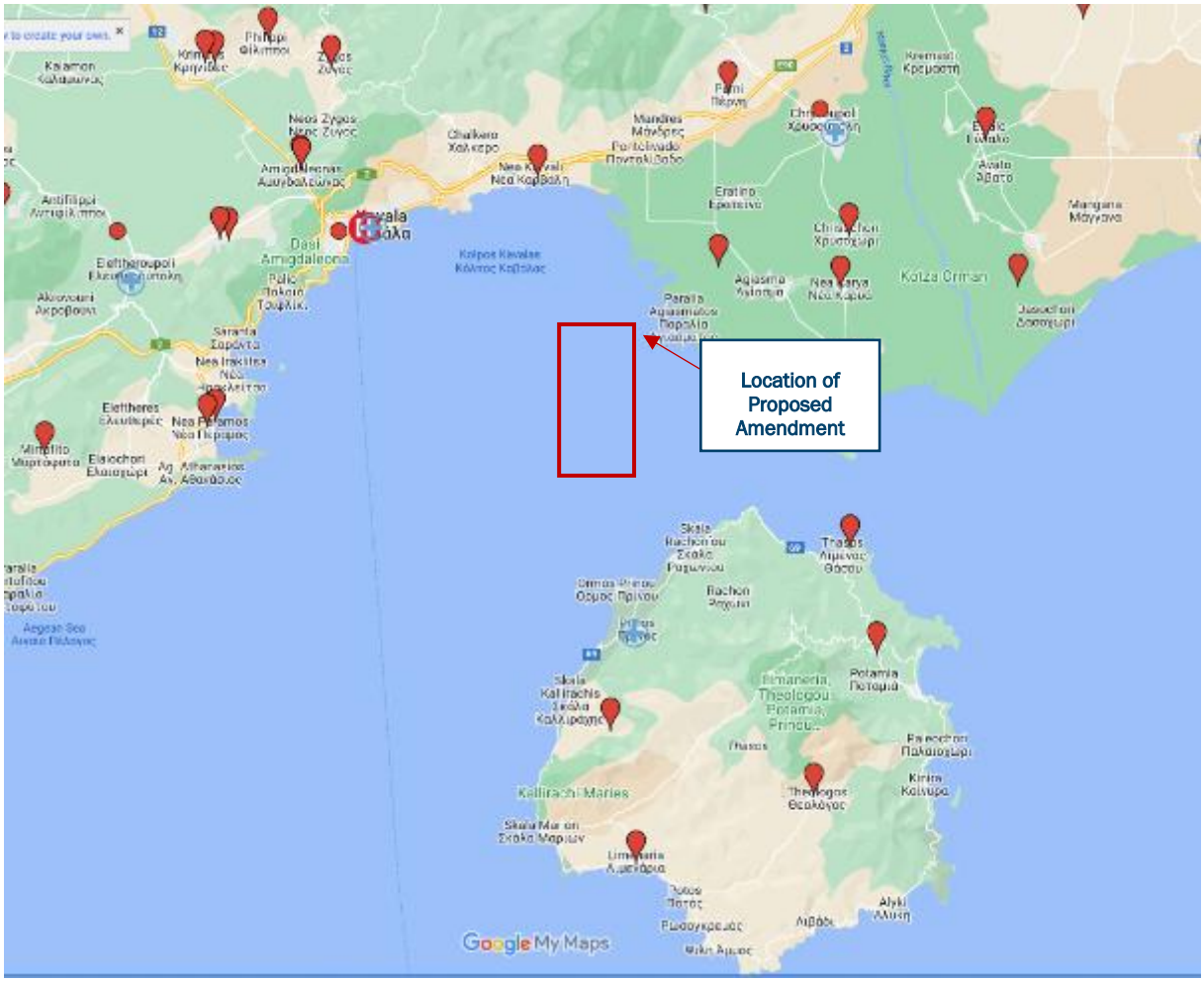
- The General Hospital (GH) of Kavala is part of the National Health System and provides primary and secondary care, equally to all citizens, regardless of their economic, social, and professional status. This is the general hospital for the region.
- The General Hospital is responsible for the operation of the Center for Physical Medicine and Rehabilitation (KEFIAP) in Chrysoupoli, whose purpose is to provide health and nursing services to inpatients and outpatients suffering from muscular, nervous, circulatory, skeletal, respiratory system, as well as people of all ages with motor or intellectual problems, and the Mental Health Center of Kavala, which aims to promote the mental health of the population and to treat and rehabilitate mental disorders. Under the responsibility of the Hospital, as part of the community operational program "Psyharagos Phase A" for the integration and reintegration of people with mental illnesses into the labor market, a hostel with ten residents is in operation.
- The General Hospital of Kavala also administers the Prefecture's Health Centers, along with their regional clinics.
    - Eleftheroupoli Health Center
    - Chrysoupoli Health Center
    - Prinos Health Center
    - Mental Health Center

Below are the hospitals, health centers, regional clinics, and other public health facilities of the 4th Health Region of Macedonia and Thrace around the Gulf of Kavala[105] .

[103] *OECD, State of Health in the EU · Greece · Health Profile 2023*

[104] https://iobe.gr/docs/research/RES_01_11032024_REP_GR.pdf

[105] https://www.4ype.gr/4i-y-pe/enopoiimenos-chartis-ygeias/



Νοσοκομεία Κέντρα Υγείας Περιφερειακά Ιατρεία Άλλες δομές υγείας

Figure6 –83 : Public Health Facilities

The National Emergency Aid Center (EKAV) is responsible for transporting patients or injured persons to healthcare facilities. EKAV is part of the National Health System. In case of emergency, accidents, or accident situations, first aid is provided by healthcare facilities until the injured have access to more specialized care from general hospitals or larger health centers, if needed (i.e., Thessaloniki).

Finally, the issue of access to health services is also important. A very important indicator that emerges from the European Union Statistics on Income and Living Conditions (EU-SILC) survey is self-reported unmet needs for medical care due to cost, geographical distance, or waiting lists. In the midst of the crisis (2016), the percentage of the population in Greece reporting problems accessing healthcare or unmet needs reached 13.1%, compared to just 2.8% for the European average, the second highest percentage in the EU after Estonia, falling to 9% of the population in 2021, but remaining the second highest percentage in Europe, and indeed considerably higher than the percentages recorded in most European countries. According to a

recent report by the Foundation for Economic and Industrial Research (IOBE)[106] , Eastern Macedonia and Thrace are among the regions where self-reported access problems are particularly high, reaching 11.7% in 2022.

6.12.1.2 Social Protection

The ELSTAT Survey of Social Care Units (Public Law) is conducted every two years and aims to record non-financial data on these units, such as the staff they employ and the number of people they accommodate or serve. According to the data from the most recent Survey for the year 2021[107] , there are 55 **Social Welfare Centers (KWP)** and 23 units of other Public Law Entities (NPDE) operating at the national level. **The table** below shows the units (NPLJ) for 2019 and 2021 by category.

Table6 –56 Number of Social Care Units (NPDD) in 2019 and 2021 by category

Category of Social Care Units	2019		2021	
	KPP Units	Other NPDD Units	KKPP Units	Units of other public entities
TOTAL FOR THE COUNTRY	54	23	55	2
Units for People with Disabilities / Chronic Illnesses	28	8	28	8
Child Protection Units	16	5	17	5
Rehabilitation and Recovery Units for People with Disabilities and Other Vulnerable Groups	10	4	10	4
Other Vulnerable Groups	0	6	0	6

(Source: ELSTAT)

In 2021, both the number of beneficiaries of closed and open care and the number of employees in KKP decreased compared to 2019. In other public entities, there was a decrease in the number of beneficiaries of closed care, while the number of beneficiaries of open care and employees increased, as shown in **the table** below**.**

[106] https://iobe.gr/docs/research/RES_01_11032024_REP_GR.pdf

[107]https://www.statistics.gr/el/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_ln=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_documentID=486894&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_locale=en

Table6 –57 Social Care Units, Employees and Beneficiaries in 2019 and 2021

	2019		20	
	CCU Units	Other NPDD units	SCCUs	Units of other public entities
TOTAL FOR THE COUNTRY - number of units	54	23	55	23
Employees	2,352	457	2,339	563
Closed Care Beneficiaries	2,322	685	2,205	589
Open Care Beneficiaries	791	405	616	462

(Source: ELSTAT)

In 2021, the Region of Eastern Macedonia and Thrace had 6 public Social Care Units (NPDD) and served 7.2% of beneficiaries (278) while employing 7.4% of staff (215). The Social Welfare Center of the Region of Eastern Macedonia and Thrace is based in Kavala and is the only public body in the Region of Eastern Macedonia and Thrace active in the sensitive sector of welfare, with the aim of supervising, coordinates and directs contemporary social policy actions, with the aim of providing social care and protection for families, children, young people, the elderly, people with disabilities, the chronically ill, and vulnerable groups of the region's population.

Two of the branches of the Social Welfare Center of the Region of Eastern Macedonia and Thrace are located in Kavala:

- The Kavala Child Protection Branch, which operates on a 24-hour basis and is classified as a closed care unit for children aged 5-18 who are at risk. The facility provides accommodation, food, clothing, footwear, education, medical care, social and psychological support, and implements alternative forms of child protection programs.
- The Kavala Chronic Disease Annex, located in Eleftheroupoli, is classified as an open social care unit that operates pre-vocational workshops and provides high-quality treatment and rehabilitation services for people with disabilities over the age of 18. In addition to therapeutic programs, many educational and recreational programs are also offered.

6.12.1.3 Education Infrastructure

As mentioned above, data from studies highlight the correlation between educational attainment and living conditions. Compulsory education in Greece consists of:

- Two years of compulsory preschool education
- Six years of primary school
- Three years of secondary school

The standard education system in Greece includes:

- Primary education
- Secondary education

- Second Chance Schools (SDE)
- Post-secondary vocational education and training level 3
- Post-secondary vocational training level 5
- Higher education

In Greece, education is provided free of charge at all three levels: primary, secondary, and higher education, and is mainly funded through the state budget from resources of the Ministry of Education and Religious Affairs. The state budget consists of two parts: the Regular Budget, which covers operating expenses, and the Public Investment Budget, which finances the Public Investment Program (PIP).

Regional education authorities contribute to the design of education policy at the regional level. The basic structure for the administration and governance of school education at regional level is the Regional Directorate of Primary and Secondary Education. The following **tables** show the number of primary and secondary education schools, the teaching staff, and the number of students enrolled in the whole country and in the Region of Eastern Macedonia and Thrace for the school years 2020/2021 and 2021/2022, according to data from ELSTAT[108] ,[109] . Note that between school years, the number of schools in the Region decreased in kindergartens, primary schools, junior high schools, and high schools. There has also been a decrease in teaching staff (with the exception of kindergartens) and enrolled students (with the exception of junior high schools).

Table6 –58 Number of schools, teaching staff, and enrolled students - Kindergartens

	Number of schools		Teaching staff		Enrolled students	
	2020	2021	2020	2021	2020	2021
TOTAL PUBLIC	4,904	4,901	16,615	17,488	154,311	153,108
TOTAL PRIVATE	722	817	1,323	1,721	20,797	24,264
PAMTH	320	315	937	966	9,600	9,462

(Source: ELSTAT)

[108] https://www.statistics.gr/documents/20181/ead51219-dfc6-9542-c5ca-be2976c87c0e
[109] https://www.statistics.gr/documents/20181/8fa5c436-3169-54c0-3ad1-1474a9caef0e

Table6 –59 Number of schools, teaching staff, and enrolled students - Primary schools

	Number of schools		Teaching staff		Enrolled students	
	2020	2021	2020	2021	2020	2021
TOTAL PUBLIC	4,242	4,202	70,720	68,928	564,836	543,398
TOTAL PRIVATE	160	159	3,953	3,629	41,564	40,634
PAMTH	327	315	4,151	4,015	32,397	30,943

(Source: ELSTAT)

Table6 –60 Number of schools, teaching staff, and enrolled students - Junior high schools

	Number of schools		Teaching staff		Enrolled students	
	2020	2021	2020	2021	2020	2021
TOTAL PUBLIC	1,727	1,732	38,559	37,396	311,111	312,078
TOTAL PRIVATE	98	109	2,508	2,419	17,471	20,335
PAMTH	100	99	2,226	2,171	17,730	17,750

(Source: ELSTAT)

Table6 –61 Number of schools, teaching staff, and enrolled students – High schools

	Number of schools		Teaching staff		Enrolled students	
	2020	2021	2020	2021	2020	2021
TOTAL PUBLIC	1,262	1,268	22,216	21,511	215,182	214,205
TOTAL PRIVATE	93	103	2,137	2,055	15,113	16,871
PAMTH	64	63	1,087	1,036	11,023	10,795

(Source: ELSTAT)

In the prefecture of Kavala, according to data from the Regional Directorates of Primary and Secondary Education of the Region of Eastern Macedonia and Thrace, the following schools are in operation[110] :, [111]

- 87 Kindergartens
- 65 Primary schools

[110] http://dipe.kav.sch.gr/

[111] https://dide-new.kav.sch.gr/

- 43 Junior high schools and high schools

Higher education in Greece is provided by Higher Education Institutions (25 in total) and consists of two distinct sectors:

- The university sector, which includes universities, polytechnics, and the Higher School of Fine Arts
- The technological sector, which includes Technological Educational Institutes (TEIs) and the Higher School of Pedagogical and Technological Education (ASPETE).

It should be noted that all TEIs in the country have now been incorporated into university institutions.

All higher education institutions in Greece are public. Most university courses last four years, except for departments in polytechnic schools, agricultural schools, the departments of Dentistry and Pharmacy, the School of Fine Arts, and ASPETE, which are five years, while in medical schools, the program lasts six years. The list of higher education institutions is presented below[112] :

1 Higher School of Fine Arts

2 Higher School of Pedagogical and Technological Education (Former name: School of Professional & Technical Education Teachers)

3 Agricultural University of Athens (Previous name: Higher Agricultural School of Athens)

4 Agricultural University of Athens, incorporated TEI of Central Greece)

5 Democritus University of Thrace

6 International University of Greece (incorporated: TEI of Central Macedonia, TEI of Eastern Macedonia and Thrace, TEI of Thessaloniki)

7 National Technical University of Athens

8 National and Kapodistrian University of Athens (incorporated: TEI of Central Greece)

9 Hellenic Open University

10 Hellenic Mediterranean University (Emerged from: TEI of Crete)

11 Ionian University (Incorporated: TEI of the Ionian Islands)

12 Athens University of Economics and Business (Former name: Athens University of Economics and Business)

13 University of the Aegean

14 University of West Attica (Emerged from: Technological Educational Institute of Athens, Technological Educational Institute of Piraeus)

[112] https://www.doatap.gr/enhmerosh/idrumata-ellados/

15 University of Western Macedonia (Incorporated: Technological Educational Institute of Western Macedonia (formerly Technological Educational Institute of Kozani))

16 University of Thessaly (Incorporated: University of Central Greece, Technological Educational Institute of Central Greece, Technological Educational Institute of Thessaly (formerly Technological Educational Institute of Larissa))

17 University of Ioannina

18 University of Crete

19 University of Macedonia

20 University of Patras (Incorporated: TEI of Western Greece (formerly TEI of Patras))

21 University of the Peloponnese (Incorporated: Technological Educational Institute of Western Greece (formerly Technological Educational Institute of Patras), Technological Educational Institute of the Peloponnese)

22 University of Piraeus (Former name: Higher Industrial School of Piraeus)

23 Panteion University of Social and Political Sciences

24 Technical University of Crete

25 Harokopio University

The leading academic and research institutions in the Region of Eastern Macedonia and Thrace are the Democritus University of Thrace and the International University of Greece. The following schools of the International University of Greece Educational Foundation operate in the Prefecture of Kavala:

Table6 –62 Schools in Kavala

School	Type of educational institution	City
Chemistry	University	Kavala
Information Technology	University	Kavala
Physics	University	Kavala
Administrative Science and Technology	University	Kavala
Accounting and Finance	University	Kavala

(Source: https://aeitei.gr/index.php?idrima=100)

According to data from the European Statistical Service, participation in level 6 education of the IECSD (International Standard Classification of Education) increased by 22% in the country as a whole and by 30% in the Region of Eastern Macedonia and Thrace between 2013 and 2021. Participation in IECSD level 7 education has also increased by 98% across the country and 147% in the Region of Eastern Macedonia and Thrace. However, in IECSD level 8 education (Doctorate or equivalent), although there has been a 47%

increase at national level, there has been a 1% decrease in the Region. The data from the European Statistical Service are presented in **the table** below**.**

Table6 –63 Enrolled students in IECSD (International Standard Classification of Education) levels 6, 7, and 8, 2013-2021

	IECSD level 6 Bachelor's degree or equivalent		Level 7 of the IECSD Master's degree or equivalent		Level 8 of IECSD Doctorate or equivalent	
	2013	2021	2013	2021	2013	2021
EU 27	10,262,400	11,058,492	5,186,679	5,435,376	-	671,828
TOTAL FOR THE COUNTRY	588,201	715,148	48,072	94,971	23,011	33,713
PAMTH	31,282	40,601	2,124	5,245	1,689	1,678

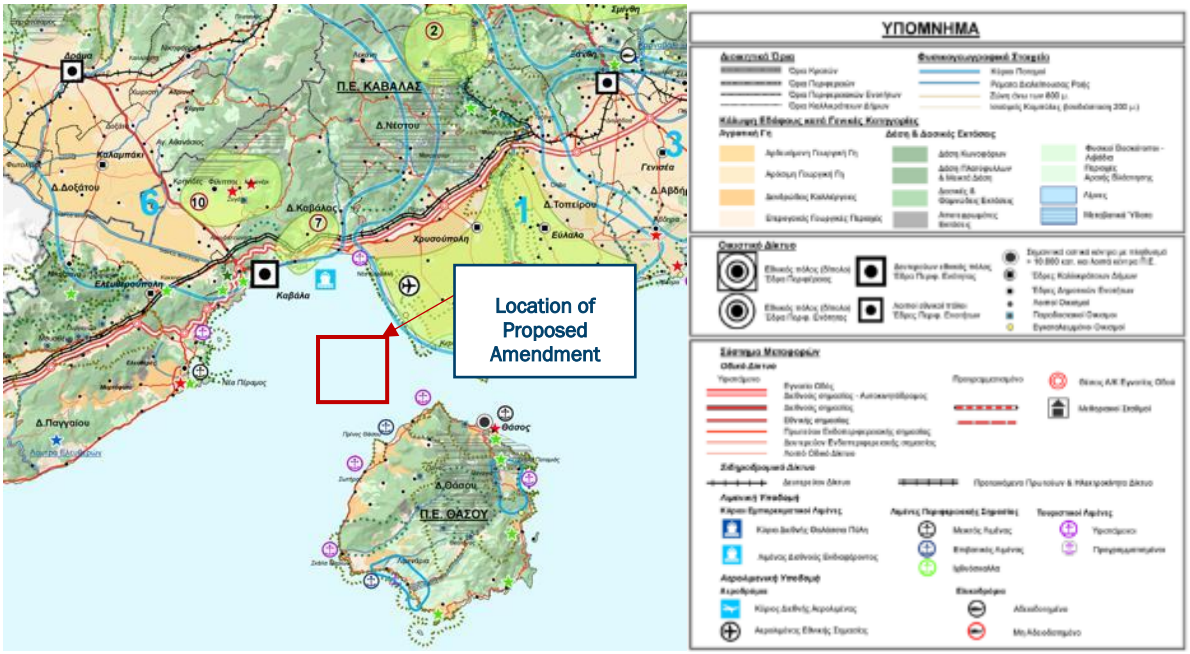
(Source: Eurostat)

6.12.2 Transport Infrastructure

6.12.2.1 Road Network

The established road network of the Region of Eastern Macedonia and Thrace includes national and provincial roads and has a total length of 3,191 km (828 km National Network, 2,363 km Provincial Network). Specifically, important transport axes for this Region are the Egnatia Road, which connects the Region with the Greek mainland and neighboring Turkey, as well as its vertical axes, which connect its settlements and provide access to Bulgaria (e.g. Alexandroupoli - Ormenio, Komotini - Nymfaia, Xanthi - Echinos - Greek-Bulgarian border, Drama - Nevrokopi - Exochia).

The national and provincial road network is sufficiently dense, in good condition, and allows for smooth access. The coastal areas are connected to each other via regional roads. The following **figure** shows the road axes of the Region of Eastern Macedonia and Thrace.



(Source: Regional Spatial Framework of the Region of Eastern Macedonia and Thrace, 2018 (Government Gazette 248 / ΑΑΡ / 29-12-2017))

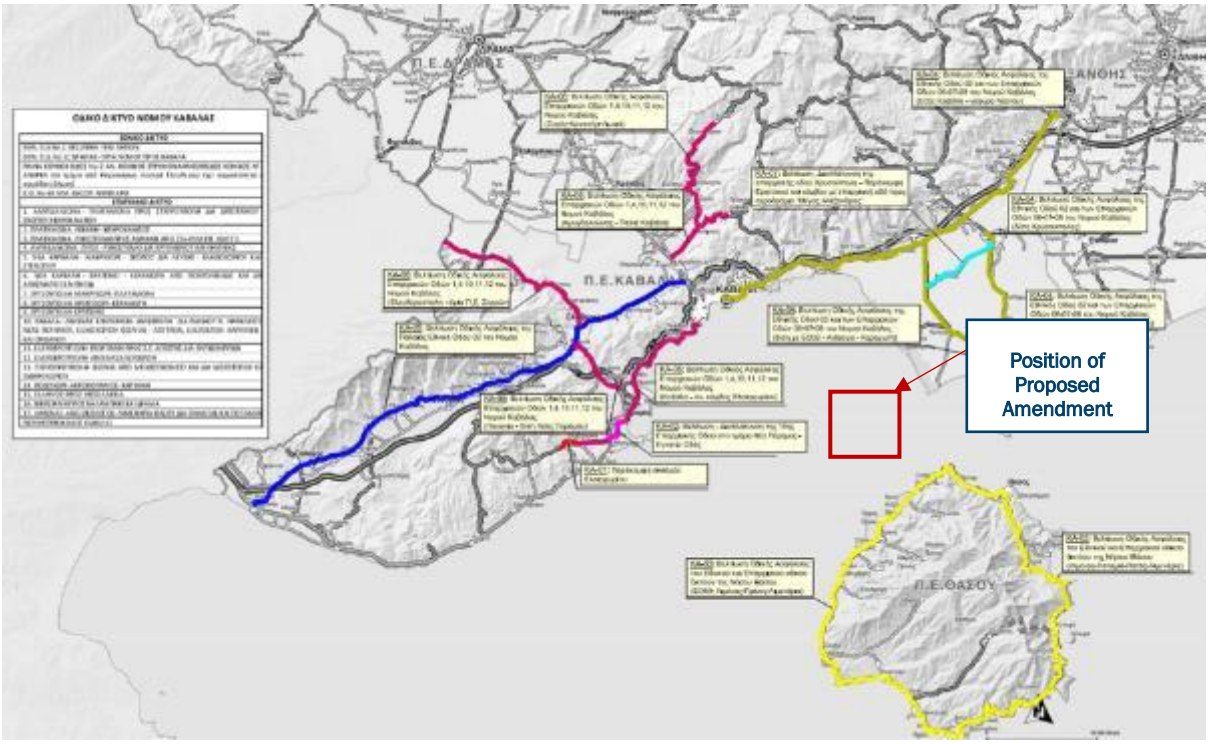
Figure6 –84 : Road and rail axes of the Regional Unit of Kavala

At the municipal level, the municipal road network is not satisfactory. The roads connecting the municipal districts with each other and with the municipal seat of Kavala provide a satisfactory level of transport service, but they usually do not meet the specifications in terms of layout, pavement quality, or safety equipment.

It should be noted that, according to the "Operational Program for the Region of Eastern Macedonia and Thrace 2014-2020," specific interventions are proposed to improve road safety throughout the region's road network. The main objective of the "Integrated Road Safety Plan for Eastern Macedonia and Thrace" project is to draw up a documented and comprehensive plan to improve road safety in the region. In this case, the following actions were proposed for the Regional Unit of Kavala:

- Improvement - Widening of the 10th Provincial Road in the section Nea Peramos - National Road
- Improvement of road safety on the national and provincial road network of Thasos
- Improvement of road safety on National Road 02 and Provincial Roads 06-07-08 in the Prefecture of Kavala
- Improvement - Widening of the provincial road Chrysoupoli - Eratino bypass and junction with provincial road to "Megas Alexandros" airport.

The proposed actions for the Regional Unit of Kavala, as described in the aforementioned Operational Program 2014-2020, are presented in **the** following **Figure**.

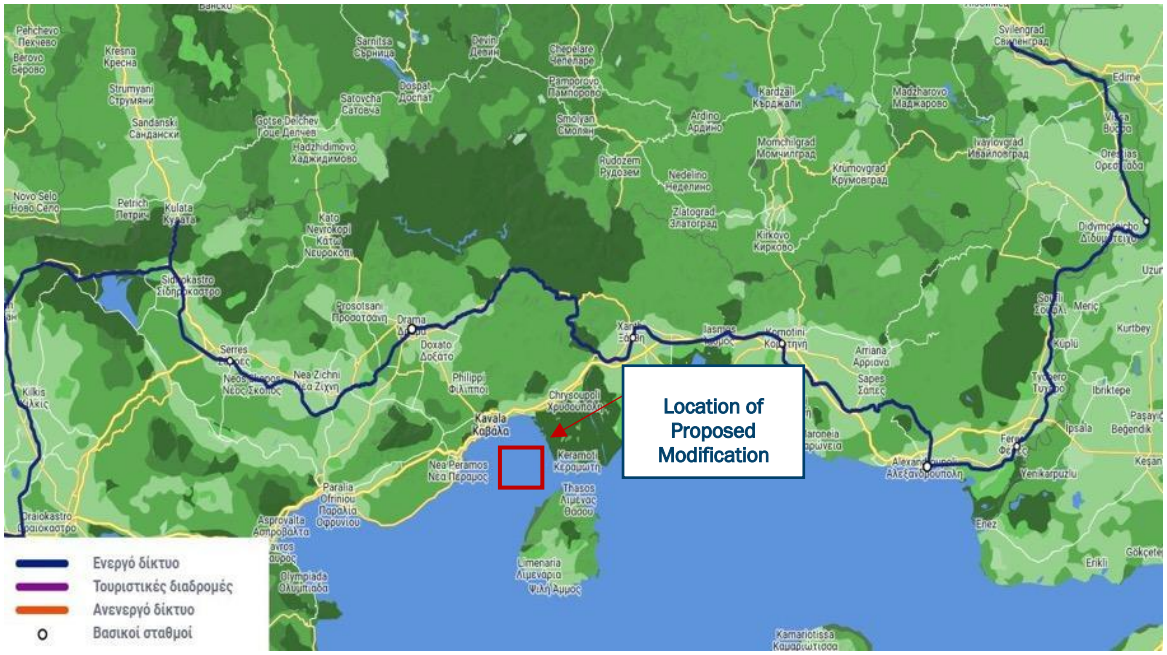


(Source: Operational Program for the Region of Eastern Macedonia and Thrace 2014-2020, 2014)

Figure6 –85 : Proposed actions for improving the road network in the Prefecture of Kavala (OSOA - PAMTH 2014-2020)

6.12.2.2 Railway Network

The Region of Eastern Macedonia and Thrace has a railway network connecting Thessaloniki with Ormenio Evros and the Greek-Bulgarian border, passing through all urban centers except Kavala. It should be noted that there are currently no passenger train services in the Region of Eastern Macedonia and Thrace. The following **figure** shows the railway network in the wider area of the Project. The nearest station is that of Xanthi, located approximately 37 km northeast of the Project's land facilities.



(Source: Hellenic Railways Organization, https://ose.gr/, June 19, 2024)

Figure6 –86 : Railway network in the Region of Eastern Macedonia and Thrace

6.12.2.3 Ports

In the Region of Eastern Macedonia and Thrace, the main ports are those of Alexandroupolis and Kavala. The region's ports also include those of Porto Lagos, Thasos, Kamariotissa (on Samothrace), Keramoti, Nea Karvali, Prinos, and the port of Eleftheron-Peramos. The nearest port to Nea Karvali, "Filippos B," is located approximately 6.2 km southwest of the Project's land facilities.

According to data from the Annual Report on Competitiveness and Structural Adjustment in the Tourism Sector for the year 2022 (INSETE, 2023), passenger traffic in the Region of Eastern Macedonia and Thrace shows a decrease of -5% (from 71.5 million in 2019 to 67.8 million in 2022). During the period 2019-2022, passenger traffic at the region's ports recorded a decline of -5% (from 4.6 million in 2019 to 4.3 million in 2022).

Specifically, the picture was mixed, with the ports of Kavala (-7%, from 2.2 million in 2019 to 2.1 million in 2022) and Thasos (-7%, from 2.0 million in 2019 to 1.9 million in 2022) recording a decrease in traffic, while, on the contrary, the port of Alexandroupolis (+20%, from 271,000 in 2019 to 326,000 in 2022) recorded an increase, as shown in **the** following **table.**

6 –64 Table Domestic traffic at the ports of the Region of Eastern Macedonia & Thrace by Regional Unit, 2019-2022

Regional Unit	2019	2021	2022	%Δ (2019-2021)	%Δ (2019-2022)
Kavala	2,246,326	1,374,953	2,097,170	-39	-7
Thasos	2,042,972	1,220,169	1,903,160	-40	-7
Evros	270,844	259,064	326,038	-4	-20
PAMTH	4,560,142	2,854,186	4,326,368	-37	-5

(Source: INSETE, 2023)

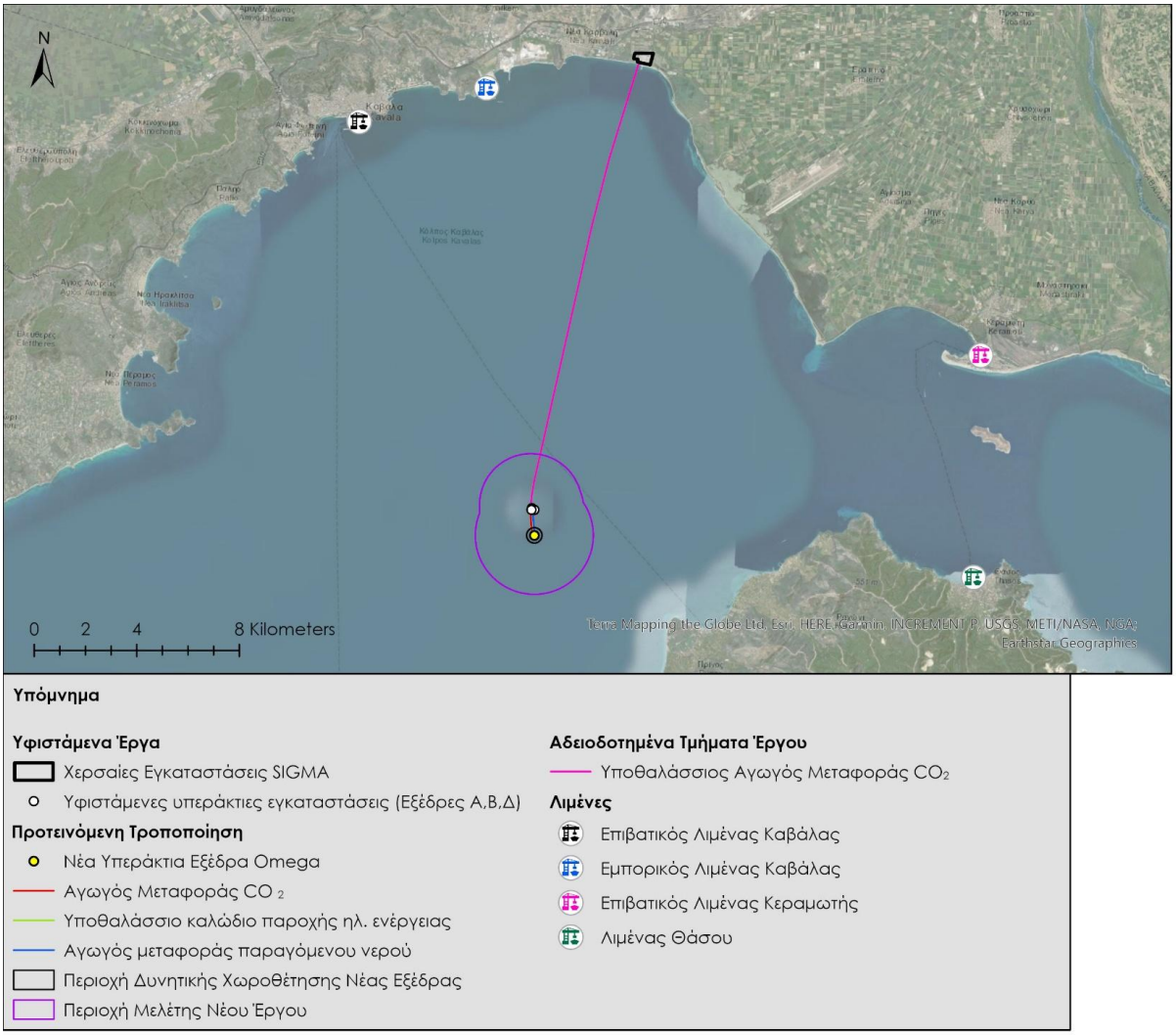
The Port of Kavala is a Port of International Interest according to the national classification of ports No. 8315.2/02/07/02.02.2007 Joint Ministerial Decision (Government Gazette 202/B/16.02.2007). Specifically, it serves i) the fishing fleet, ii) tourism, iii) passengers to and from Thasos, Lemnos, Mytilene, and Samothrace, iv) water sports. It has an extensive land area consisting of a zone of varying width that extends for a total length of 3,000 m in front of the city of Kavala and includes the Central Port and the Fish Market. In total, the Port of Kavala currently has:

- A total quay length of approximately 2 km, including the quays of the piers
- Administrative and technical support buildings
- Warehouses, shelters, and other facilities

The port of Nea Karvali, called "Filippos B," is used for commercial purposes. The ports of Keramoti (Keramoti - Thasos Ferry) and the central port of Thasos are also considered important for use by passengers and the fishing fleet. The port of Prinos and the ports of the Regional Unit of Thasos, as well as the port of Nea Peramos, mainly serve local passenger transport. The latter also serves the transport of workers to oil extraction facilities.

Tourism and yacht ports consist of zones in existing ports, harbors, and fishing shelters. There are no planned connections between them, while the exclusive yacht port (marina) in Limenaria, Thasos, with a capacity of 70 recreational boats (compared to 230 recreational boats that were planned in the R.F.S.P.S.S) was included in the sectoral program for Competitiveness and Shipping on 09/26/2011.

The following **figure** shows the nearest ports in the study area.



6 –87 : Map of ports near the study area

The following **tables** show the number of passengers arriving at the ports of Kavala, Keramoti, and Thasos in recent years.

Table6 –65 Passenger traffic at the ports of Kavala, Keramoti, Thasos, and Samothraki

Passengers boarding coastal shipping and ferries by port				
Year	Port of Kavala	Port of Thasos	Keramoti	Samothraki
2023				
Third quarter of 2023	114,187	693,688	612,325	51,408
Second quarter of 2023	40,918	240,796	262,263	16,981
First quarter of 2023	14,166	63,910	59,338	7,031
2022				
Q3 2022	20,189	82,689	66,716	9,694
Third quarter of 2022	126,310	612,157	533,259	49,553

Passengers boarding coastal shipping and ferries by port				
Second quarter of 2022	36,691	201,951	215,284	15,472
First quarter of 2022	9,839	50,429	47,428	5,985
2021				
Q3 2021	13,791	63,861	53,517	7,326
Third quarter of 2021	89,681	429,362	344,408	43,174
Second quarter of 2021	18,158	112,247	113,016	8,027
First quarter of 2021	4,047	28,863	28,811	3,616
2020				
Q3 2020	11,829	45,676	37,197	5,634
Third quarter of 2020	70,369	267,096	228,247	32,912
Second quarter of 2020	11,820	56,342	64,088	5,568
First quarter of 2020	17,734	57,712	50,606	5,309

(Source: ELSTAT, 2024)

Coastal shipping traffic between 2015 and 2018 showed a significant increase of approximately 43%, while passenger traffic showed a much smaller increase of approximately 10%. Between 2019 and 2021, coastal shipping traffic remained almost stable, while passenger traffic decreased by approximately 46%, which is justified by the restrictions on travel due to the COVID-19 pandemic.

As for cruise traffic, cruise ship traffic decreased significantly by around 70% from 2016 to 2018, with a corresponding decrease of around 70% in cruise passengers between those years. As expected for the period 2019-2021, due to the COVID-19 pandemic that broke out worldwide, cruise traffic continued to decline by approximately 60%, with a corresponding 60% decrease in cruise passengers. In fact, in 2020, which saw the lowest number of cruise ships in the Central Port of Kavala, there was a global halt in cruise activity due to the pandemic. The following table shows cruise passenger traffic for the years 2019-2023.

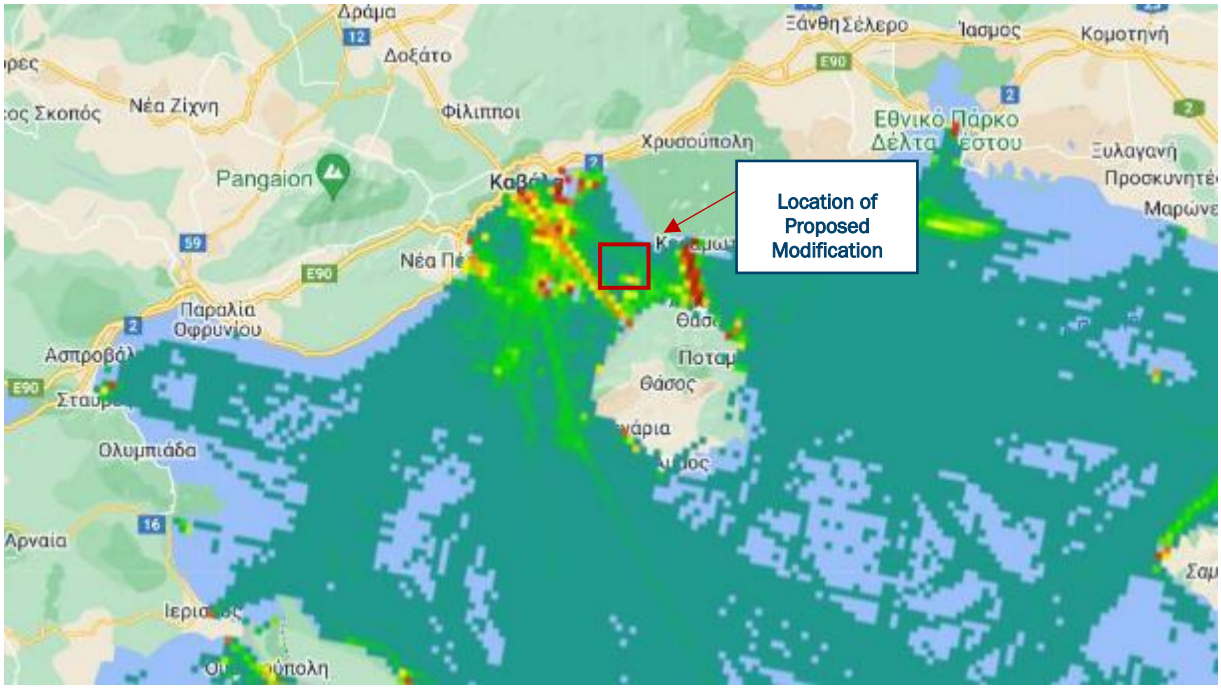
It should be noted that the Port of Kavala is the only port in the Region of Eastern Macedonia and Thrace that records cruise ship traffic. The outlook for 2019-2022 is positive, with a +400% increase in cruise ship traffic at the port of Kavala (from 7 cruise ships in 2019 to 35 cruise ships in 2022 (see **table** below)).

6 –66 table Cruise passenger traffic at the Port of Apostolos Pavlos

Year	Cruise passengers
2019	2,699
20	45
2021	938
2022	13,315
2023	20,777

(Source: ELSTAT, 2024)

Four ferry routes depart from the port of Kavala: "Kavala – Lemnos," "Kavala – Samothraki," "Alexandroupoli – Kavala," and "Kavala – Ormos Prinos – Thasos," as shown in **the** following **figure,** which also shows the density of ship traffic in the wider area of the Project.



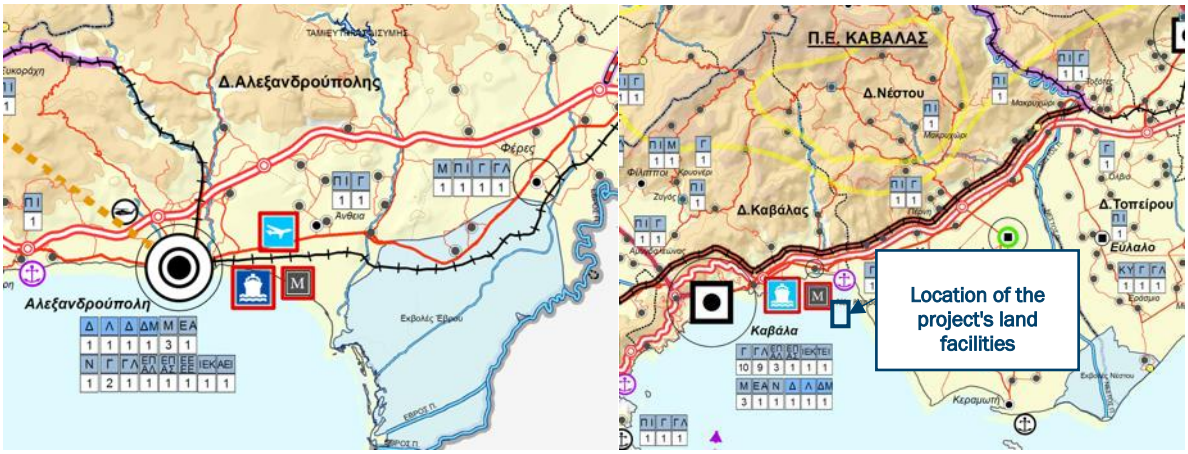
(Source: Oikoscope, http://www.oikoskopio.gr/map/, June 19, 2024)

Figure6 –88 : Map of route density for the port of Kavala

6.12.2.4 Airports

There are two (2) civil airports in the Region of Eastern Macedonia and Thrace, Kavala "Alexander the Great" and Alexandroupolis "Demokritos." The Regional Unit of Kavala is served by the "Alexander the Great" airport, located in Chrysoupoli, approximately 7 km southeast of the Project's land facilities. This airport operates regular flights to and from Athens, with a fixed number of 36 weekly flights (18 "Kavala-Athens" flights and 18 Athens-Kavala), as well as international charter flights during the summer.

The following **figure** shows the locations of airports in the Region of Eastern Macedonia and Thrace.



(Source: Regional Spatial Framework of the Region of Eastern Macedonia and Thrace, 2018 (Government Gazette 248 / AAP / 29-12-2017))

Figure6 –89 : Airport locations within the Region of Eastern Macedonia and Thrace

6.12.3 Technical Infrastructure

6.12.3.1 Water Supply/Irrigation

The study area falls within the Nestos River Basin District of the Thrace Water District (EL 12) and the Strymon River Basin District of the Eastern Macedonia Water District (EL 11).

Water supply services - refined or clean drinking water and sewerage (collection and treatment of wastewater up to secondary treatment) are generally provided by Municipal Water Supply – Sewerage (DEYA) or Local Government Organizations (OTA) services, in cases where no DEYA has been established.

Specifically, in Water District 12 of Thrace, water supply and sewerage services are provided by seven (7) DEYAs and ten (10) Local Government Organizations (Municipalities). Specifically, services are provided in the Nestos Water District (EL1207) by the DEYAs of Nestos and Xanthi. Water services are also provided by the Municipalities of Drama, Kato Nevrokopi, Myki, Parenesti, and Topiros. Similarly, in Water District 11, water supply and sewerage services are provided by seven (7) DEYAs and seven (7) Local Government Organizations (Municipalities). Specifically, in the Regional Unit of Kavala, water supply services are provided by the DEYAs of Kavala and Paggaio.

Based on the SEA of the 2nd Revision of the Eastern Macedonia River Basin Plan (EL 11), which is currently under consultation, 550 water abstraction points have been recorded in the Water District from which water intended for human consumption is pumped. Of these, the majority (94.3% of the total) are 519 boreholes, while 31 are springs (5.7% of the total).

Accordingly, according to the SEA of the 2Revision of the Thrace River Basin Plan (EL 12) in the Thrace Water District (EL12), 724 water abstraction points have been recorded from which water intended for human consumption is pumped. Of these, the majority (55.8% of the total) are boreholes (404), springs account for 315 (43.5% of the total), while there are three (3) water abstraction points (0.4% of the total) relating to wells and two (2) water abstraction points (0.2% of the total) relating to surface water. The latter concern the Aisymi Reservoir (EL1210RL009010004H), which is used to supply water to the municipality of

Alexandroupolis, and the Chionorema stream (western tributary of the Vozvozis - EL1209R0000030090N), which is used to supply water to the municipality of Komotini.

According to Phase A of the Operational Program for the Municipality of Kavala (2023), the municipality's water supply needs are served by DEYAK, which has been operating since 1984. This water supply network is 300,000 km long and includes 44,270 water meters and 19 water supply boreholes, while average annual consumption amounts to 4,265,454 m3.

According to the 2nd Revision of the River Basin Plan, in the Thrace Water District, the estimated annual water abstraction for irrigation corresponds to 660.34×10^6 m^3 , which constitutes 91% of the total abstraction of the WD. In the Nestos River Basin (EL1207), total annual water abstraction for all activities and uses was estimated at $180.5 \times 10^{(6)}$ $m^{(3)}$,based on the annual needs of the river basin. Agriculture (irrigated land), which is the main water user, consumes 91.63% ($165.4 \times 10^{(6)}$ $m^{(3)}$)of total water needs, water supply 4.85% ($8.75 \times 10^6 m^3$), 0.55% ($10^6 m^3$) in livestock farming, and 2.96% ($5.35 \times 10^6 m^{(3)}$) in industry.

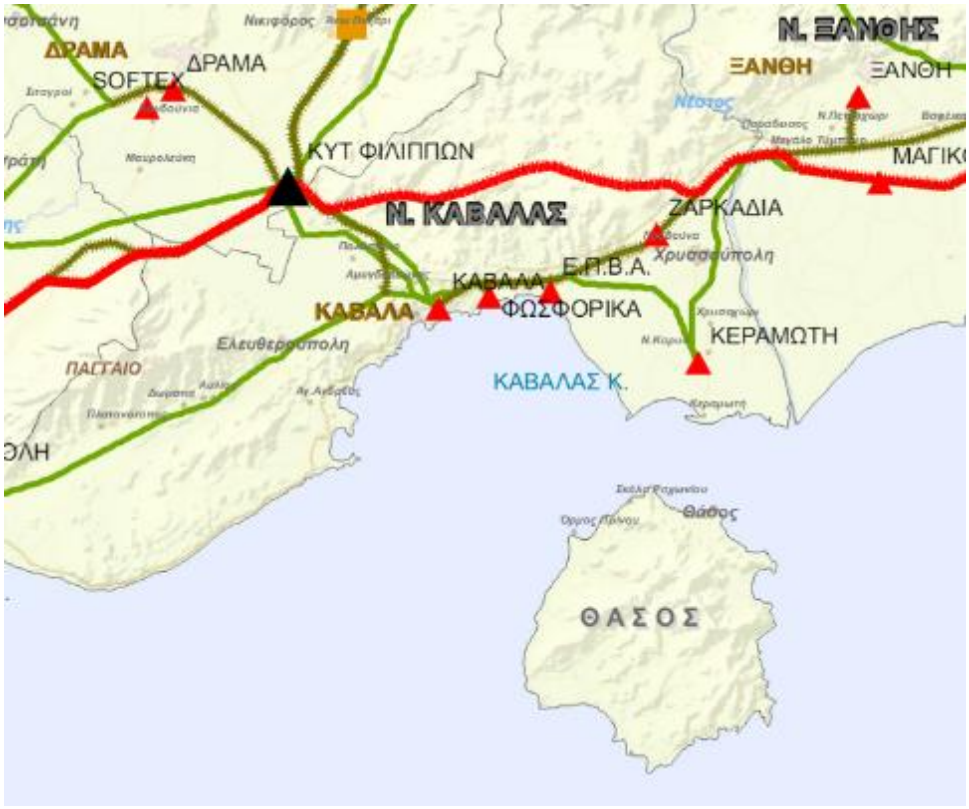
Similarly, in the Eastern Macedonia River Basin, total annual water abstraction amounts to 815.9×10^6 m^3 , of which 762.7×10^6 m^3 (93.5%) is used for irrigation in the Strymonas River Basin.

According to Phase A of the Operational Program for the Municipality of Kavala (2023), there are 35 boreholes in the municipality for irrigation purposes.

6.12.3.2 Energy

Electricity

In the Region of Eastern Macedonia and Thrace, according to official data from the Independent Power Transmission Operator (ADMIE), the state of the electricity transmission network appears to be satisfactory. It consists of a high, medium, and low voltage network. The energy distributed is produced by the stations operating in the Region. The substations closest to the study area are: YS FOSFORIKA 150/20kV and YS KAVALA 150/20kV. The YS KAVALA OIL (EPBA) 150/20kV substation is located within the Project's land facilities.



(Source: ADMIE, https://www.admie.gr/systima/perigrafi/hartis-grammon, June 21, 2024

Figure6 –90 : Map of the National Register of Water Intake Points in the project installation area

Natural Gas

The national natural gas distribution system constructed by DESFA crosses the study area from Kipoi to Thessaloniki. The pipeline of the National Natural Gas Transmission System (ESMFA) passes 1.3 km north of the project's land facilities. A metering station is located at the ESFGA pipeline valve station in Kavala, with the aim of supplying the city of Kavala and the neighboring towns of Palio and Eleftheroupoli. The construction of a 66 km natural gas distribution network in Kavala is expected to be completed by 2024, while work on consumer connections is currently underway. Kavala is the fifth city in the Region of Eastern Macedonia and Thrace to be connected to natural gas, after Alexandroupoli, Drama, Xanthi, and Komotini, with Orestiada soon to be added.

The KAVALA OIL industry in the immediate vicinity of the proposed project has been connected to the ESFMA with a 6" high-pressure pipeline, approximately 2 km long, including the necessary facilities (valve station, trap station, hot tapping) and a metering station.

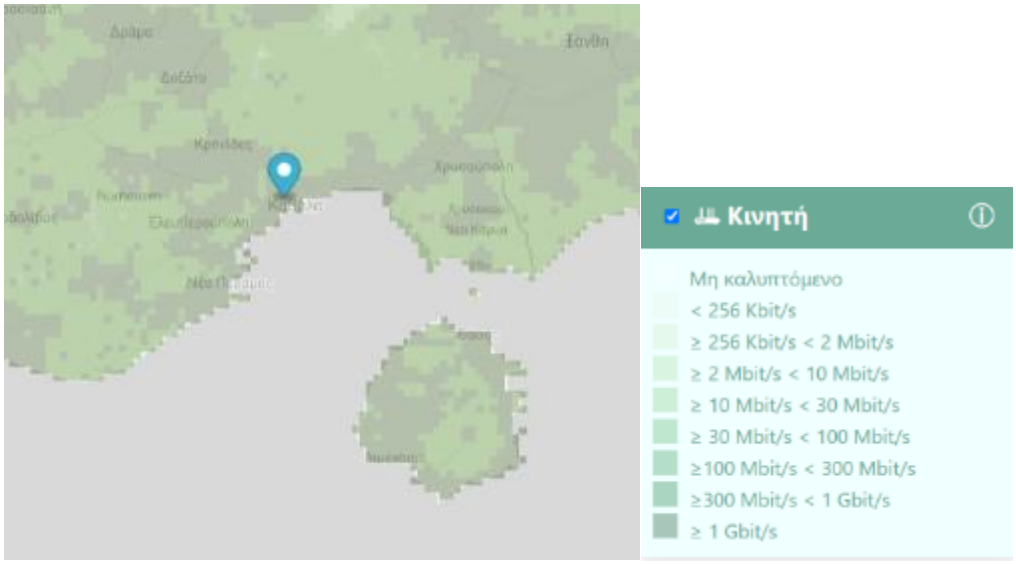
The Trans Adriatic Pipeline (TAP) passes 1 km north of the Project's onshore facilities.

(Source: PAMTH PDP, YPEN/DXORS/68605/1092 (Government Gazette 248/AAP/25-10-2018))

Figure6 –91 : Natural gas pipeline route in the area of the Project's land facilities

6.12.3.3 Telecommunications

According to the Hellenic Telecommunications and Post Commission (EETT), the immediate area is served by the fixed and mobile telephone networks of private providers. As regards the existing broadband infrastructure, the wider study area, as shown in the map below, is served by the available broadband service networks.



(Source: Broadband Map & Network Registry)

6 –92 : Mobile telephony map of the wider study area

6.12.4 Environmental Infrastructure

6.12.4.1 Wastewater Management Infrastructure

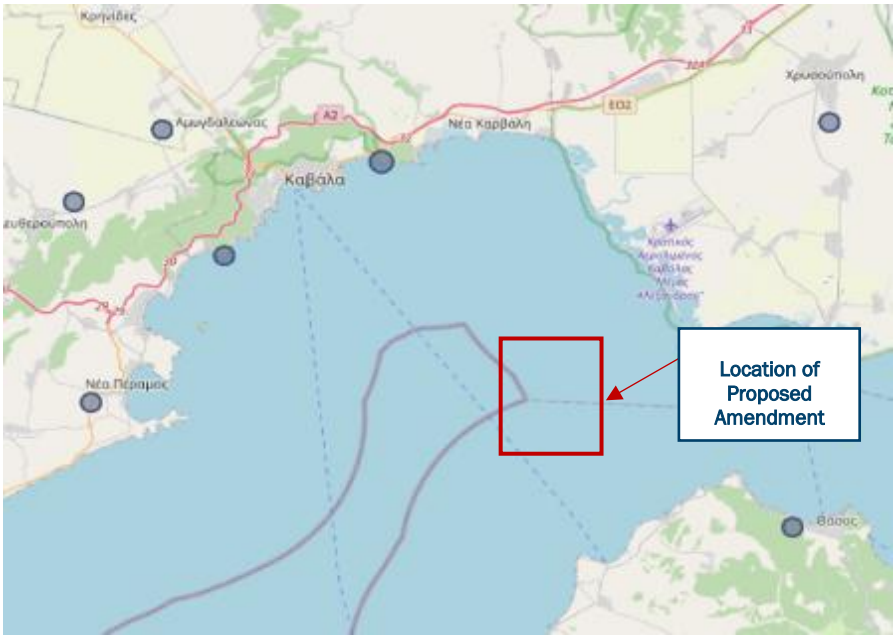
With regard to wastewater management infrastructure, 48% of the total population of the Region of Eastern Macedonia and Thrace lives in settlements connected via a sewerage network to priority A wastewater treatment plants (sensitive receptor, equivalent population of over 10,000 inhabitants, deadline 31.12.1998) & priority B (normal receptor, equivalent population over 15,000 inhabitants, deadline 31.12.2000).

The following wastewater treatment plants are located and operate in the wider study area and within the Regional Unit of Kavala and Thasos (see **Table** below), which comply with the limits of Directive 91/271/EEC. The following **figure** shows the wastewater treatment plants located near the study area, according to data from the Special Secretariat for Water of the Ministry of Environment and Energy. The nearest WWTP is located approximately 7.5 km southwest of the Project's land facilities.

Table6 –67 Wastewater Treatment Plants (WWTP) near the study area

WWTP name	WWTP code	Type of Treatment	Total inflow to the WWTP (m^3/day)	Recipient
CHRYSOUPOLI	EL115011018	Secondary treatment with nitrogen removal and disinfection	1,951	EL1150110180
KAVALA	EL115001016	Secondary treatment with nitrogen and phosphorus removal	13,500	EL1150010160
PALEO TSIFLIKI	EL1150010111	Secondary treatment with nitrogen and phosphorus removal	1,200	EL11500101117
NEA PERAMOS KAVALA	EL1150030115	Secondary treatment with nitrogen and phosphorus removal and disinfection	1,834	EL11500301150
THASOS	EL1150040116	Secondary treatment with nitrogen and phosphorus removal and disinfection	1,123	EL1150040116
PHILIPPI	EL1150100118	Secondary treatment with nitrogen and phosphorus removal and disinfection	2,430	EL1150100118
ELEFTHEROPOLI	EL1150020114	No data	2,400	EL11500201140

(Source: Special Secretariat for Water, Wastewater Treatment Plants Operation Monitoring Database, June 19, 2024)



(Source: Special Secretariat for Water, Wastewater Treatment Plants Operation Monitoring Database, June 19, 2024)

6 –93 : Wastewater Treatment Plants (WWTPs) in the wider study area

6.12.4.2 Solid Waste Management Infrastructure

According to the approved Regional Waste Management Plan (PESDA 2016) for the Region of Eastern Macedonia and Thrace, approximately 56,035 tn of MSW were produced in the Prefecture of Kavala in 2020, 4,099 tons/year of sludge from WWTPs, and 29 tons/year of sludge from tourist facilities for 2015. The existing Landfill Sites in the Region of Eastern Macedonia and Thrace are presented in **the** following **Table.**

Table6 –68 Landfills in the Region of Eastern Macedonia and Thrace

No	LDS	Municipalities served
1	Kavala	Kavala, Nestos, Paggaio, Drama, Doxato, Prosotsani, Paranesti, K. Nevrokopi
2	Alexandroupolis	Alexandroupolis, Soufli, Komotini, Maroneia-Sapes, Arriana, Iasmos
3	Thasos	Thasos
4	Samothrace	Samothrace
5	Xanthi	Xanthi, Myki, Avdira, Topiros
6	B. Evros	Did/hou, Orestiada

(Source: PESDA, 2016)

To meet the solid waste management needs of the Municipality of Kavala, the Kavala Landfill and the Kavala Waste Treatment Plant are in operation. It should be noted that the expansion of the existing Kavala Landfill by 31 acres on an adjacent plot above the current site is expected to be completed. With the operation of the "waste plant" (or the so-called M.E.A.) in the wider area of Aspri Ammos, it will be converted into a Sanitary Landfill Site (SLS). The monthly variation in MSW produced in the Municipality of Kavala that enters the Kavala landfill facilities during the period 2017-2020 is summarized in **the** following **table.**

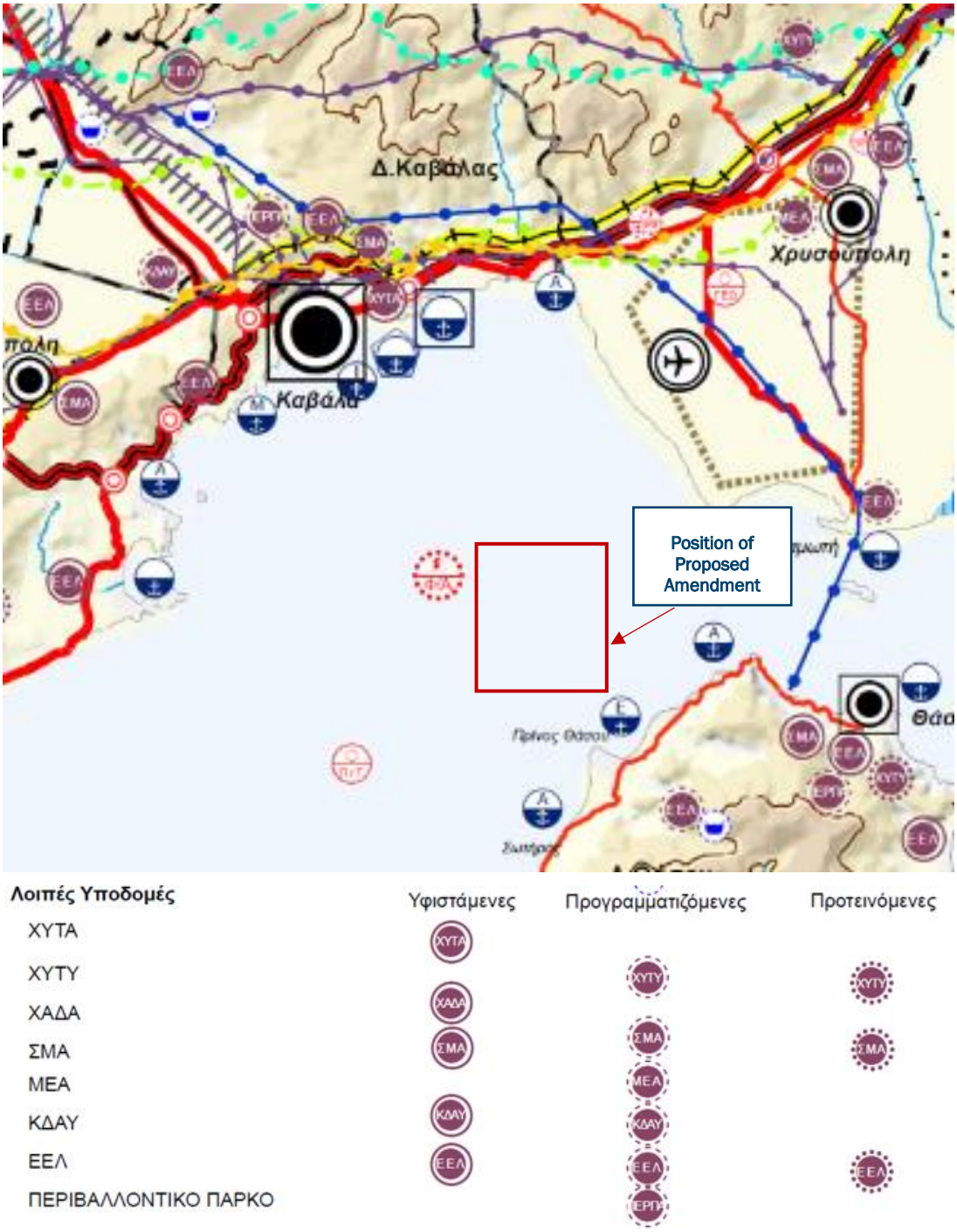
Table6 –69 Monthly variation in MSW in the Municipality of Kavala for the years 2017–2020

Month	Distribution of MSW production (% of total annual production)
JANUARY	6.80
FEBRUARY	6.59
MARCH	7.66
APRIL	8.37
MAY	9.15
JUNE	8.42
JULY	10.02
AUGUST	9.75
SEPTEMBER	8.66
OCTOBER	8.77
NOVEMBER	8.17
DECEMBER	7.65

(Source: PESDA, 2016)

As can be seen, during the tourist season from May to September, approximately 46% of total annual production is expected, while in the two months from July – August, approximately 19.8% of the total annual MSW production in the Municipality of Kavala is expected. In contrast, MSW production appears to be minimal during the period January–February (approximately 6.8% and 6.6% of total annual MSW production, respectively).

Both mixed and MSW are currently transferred to the Kavala, Chrysoupoli, and Eleftheroupoli MSW facilities.



(Source: Regional Spatial Framework of Eastern Macedonia and Thrace, 2018)

Figure6 –94 : Existing solid waste management facilities in the Regional Unit of Kavala (2016)

6.13 EXISTING PRESSURES ON THE HUMAN AND NATURAL ENVIRONMENT

The existing pressures on the human and natural environment identified in the immediate study area and the corresponding wider study area, both for the licensed project and the proposed modification, are described in detail in **Section 8.13** of the approved EIA for the project.

6.14 ENVIRONMENTAL TRENDS WITHOUT THE PROJECT

As regards the state of the natural environment, as it is expected to be in the future in the project development area and its accompanying infrastructure (including the interventions of the proposed amendment), no significant changes from the existing anthropogenic pressures are expected.

At the locations of the project's land facilities, anthropogenic activities are expected to continue to dominate in the future, as they are part of existing industrial facilities and activities with an extremely low degree of naturalness. Similarly, no changes or significant changes in flora and fauna species are expected.

Similarly, the offshore facilities of the proposed project are located in areas/sites with existing industrial infrastructure (industrial facilities for the extraction of hydrocarbons). Therefore, both in the short and medium term, it is expected that human activities will continue to dominate the locations of the project's offshore facilities.

In conclusion, with regard to future environmental conditions and without the implementation of the proposed project, the following is estimated: The situation as it is expected to develop in the proposed project development area after 20 years does not appear to differ greatly from the current situation. These areas and their specific characteristics are not suitable for any other development (in particular, no population is expected to settle in the immediate vicinity of the project and, therefore, no technical infrastructure is planned).

Assessing the above and taking into account the development trends in the area with or without the implementation of the project under study, the following should be noted regarding future environmental conditions (with the construction and operation of the project):

- The natural environment is not expected to be significantly affected in the areas of the land facilities, as these are not distinguished for their naturalness, since they are part of land facilities and activities.
- The natural environment is generally expected to deteriorate locally in the area affected by offshore projects, while it will remain at current levels in the rest of the study area, as the impact on the biotic elements of the environment in the immediate study area is expected to be small in geographical scale.
- Land use is not expected to change.

If the project under study is not constructed, a number of positive socio-economic effects described in detail in **Section 5.1** of the project feasibility study will not be achieved in the area.

6.15 RISKS TO HUMAN HEALTH, CULTURAL HERITAGE, AND/OR THE ENVIRONMENT, MAINLY DUE TO ACCIDENTS OR DISASTERS

6.15.1 RISKS TO HUMAN HEALTH, CULTURAL HERITAGE AND/OR THE ENVIRONMENT MAINLY DUE TO ACCIDENTS OR DISASTERS

This section presents the risks to human health, cultural heritage, and/or the environment due to accidents and disasters, in accordance with the requirements of Directive 2014/52/EU, which was transposed into Greek law by the following legislation:

- Joint Ministerial Decision No. 5688/2018 "Amendment of the annexes to Law 4014/2011 (Government Gazette 209/A) in accordance with Article 36A of that law, in compliance with Directive 2014/52/EU "amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment" of the European Parliament and of the Council of 16 April 2014 (Government Gazette 988/B/2018) and
- Joint Ministerial Decision 1915/2018 "Amendment of Joint Ministerial Decision No. 48963/2012 (B' 2703) and Ministerial Decision No. 170225/2014 (B' 135), issued pursuant to Law 4014/2011 (Government Gazette 209/A) in compliance with Directive 2014/52/EU "amending Directive 2011/92/EU on the assessment of the effects *of* certain *public and private projects on the environment"* of the European Parliament and of the Council of 16 April 2014 (Government Gazette 304/B/2018)

The definitions of terms related to the subject matter of the paragraph are set out below. More specifically:

- Natural disaster: The likelihood of a potentially catastrophic event such as extreme weather phenomena occurring in nature (e.g., storms, floods, extreme temperatures) or hazards related to the ground (e.g. earthquakes) that are likely to cause an event within a period of time and in a specific geographical area. According to Directive 2014/52/EU, natural disasters include floods, sea level rise (which is linked to climate change), and earthquakes. The United Nations (UN), defined natural disasters in 1992 as serious disruptions to the functioning of society that cause extensive human, material, or environmental losses that exceed the capacity of society to cope with them using its own resources. According to the UN, natural disasters kill around 90,000 people and affect 160 million people worldwide every year.
- Major accident: Directive 2014/52/EU does not contain a corresponding definition of a major accident. A relevant definition exists in Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances, where a major accident is defined as an event, such as a major leak, fire, or explosion resulting from uncontrolled developments during the operation of any establishment covered by the directive, which causes serious risks, immediate or delayed, to human health or the environment, inside or outside the establishment and involving one or more dangerous substances. A major accident can generally be considered to be an event which causes, immediately or with a delay, serious damage to human health, well-being, and/or the environment, i.e., loss of life or permanent injury and/or permanent or long-term damage to environmental areas that cannot be remedied by minor clean-up and restoration efforts.

- **Exposure:** People, property, systems, or other elements located within risk zones and therefore subject to potential losses (UNISDR Terminology on Disaster Risk Reduction, United Nations, 2009).
- **Vulnerability:** The characteristics and conditions of a community, system, or asset that make it susceptible to the harmful effects of hazards (UNISDR Terminology on Disaster Risk Reduction, United Nations, 2009).
- **Risk of occurrence:** The probability of an impact occurring in combination with the effect or consequences of the impact on a receiver (if it occurs) (UNISDR Terminology on Disaster Risk Reduction, United Nations, 2009).
- **A significant impact** can be considered to be the impact of an event that leads to loss of life or permanent injury or long-term damage to an area of the environment.

The literature refers to various ways of distinguishing and classifying natural disasters, depending on their cause and severity. The World Health Organization classifies natural disasters into the following categories:

- **Hydrological**, such as floods.
- **Geophysical**, which includes earthquakes, volcanic eruptions, and landslides.
- **Meteorological**, such as storms and thunderstorms.
- **Climatic**, such as extreme high or low temperatures and natural fires.
- **Biological**, caused by the exposure of living organisms to pathogenic microorganisms.

In terms of the time scale of natural phenomena, the size-frequency relationship reflects the intensity of the damage that can be caused by a specific destructive event, as a result of its size and frequency of occurrence. In general, large-scale events do not occur often enough to be considered the most significant, while phenomena that occur more frequently are usually of lesser intensity. The average consequences are therefore calculated by multiplying the magnitude of the event by its frequency of occurrence.

In Greece, the most common natural disasters are caused by earthquakes, heavy rainfall and floods, fires that can lead to deforestation in areas with steep slopes that are prone to landslides, and heat waves.

However, in addition to natural disasters, there are also **technological disasters**, which are basically considered to be man-made. Technological disasters are usually caused by technological risks, which are not initially addressed in an appropriate manner, or by technological events (accidents) caused by human error, equipment failures, organizational or administrative malfunctions, etc., and get out of control. However, they can also be the result of other natural disasters (earthquakes, lightning, heavy rainfall, etc.) or deliberate human actions. In general, technological disasters are considered to occur infrequently (i.e., they have a very low probability of occurrence) but have the potential for very serious consequences.

Depending on their intensity and extent, technological disasters can cause loss of life or injury (both to workers at the site of the accident and to people who are permanently or temporarily "nearby" -see the relevant guidelines on the meaning of 'nearby' - at the site of the accident), destruction of property, disruption of social and economic life, and environmental degradation.

The usual classification of technological accidents is as follows:

- Chemical accidents in industrial facilities: these occur in industrial facilities (production, processing, or storage) and result in serious environmental pollution from the release of heavy metals and toxic chemicals.
- Accidents involving the transport of dangerous goods: these occur during the transport of dangerous materials by various means of transport (road, rail, sea, air).
- Transport accidents: road, rail, sea, air. These are conventional transport accidents, which usually cause loss of life and injury, but do not have a major impact on the environment.
- Dam Collapses: these occur rarely and have a major impact, both in terms of loss of human life and on the environment.
- Nuclear Accidents: these are usually associated with the release of radioactive elements into the environment and have long-term effects on both human health and the environment.

Although environmental disasters are not a daily occurrence and are therefore not often responsible for deaths or material damage, their potential for unexpected catastrophic losses makes them highly significant and defines their character. Environmental disasters share some common **characteristics:**

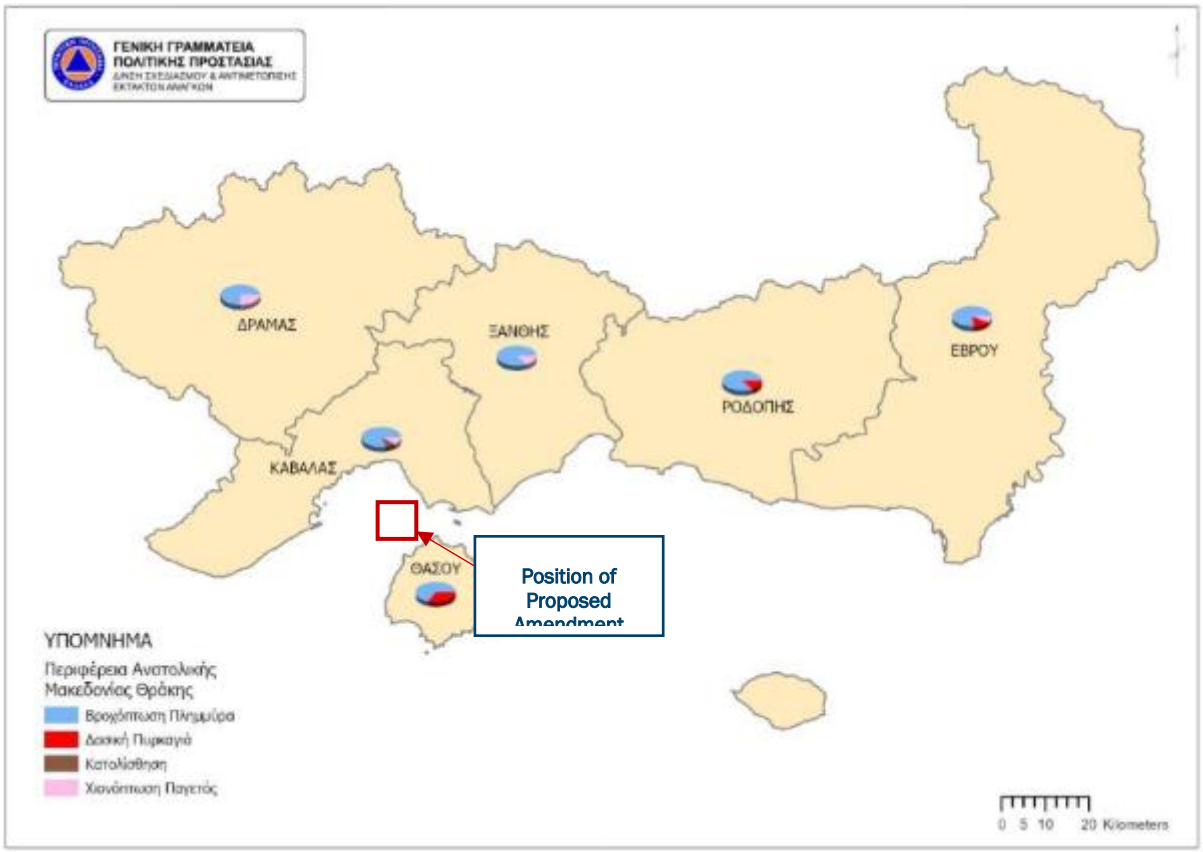
- The source of the catastrophic event is clear and produces characteristic effects (e.g., flooding causes deaths by drowning).
- The warning time is usually short.
- The greatest number of losses, whether in human lives or property, occur immediately after the event.
- The risk of exposure is largely involuntary, usually due to the location of populations in hazardous areas.
- The destruction is so intense and widespread that it requires an immediate response.

This **section** therefore describes the potential risks of serious accidents or disasters in the study area caused by external factors (outside the Project) in accordance with the requirements of Joint Ministerial Decision 1915/2018, taking into account the information provided in the previous sections of **Chapter 6.** The potential risks of serious accidents or disasters caused by external factors in the study area to which the project under study is potentially vulnerable, taking into account the guidelines of Directive 2014/52/EU, mainly concern natural causes and include, in order of priority:

- Natural Disasters:
  - Sea level rise,
  - Extreme weather events (windstorms, lightning, frost, hail),
  - Earthquakes,
  - Pandemics (e.g., Covid-19, H1N1).
- Man-made accidents/disasters:
  - Transport accidents (vehicle collisions, vehicle rollovers, explosions, fires, etc.),
  - Technological accidents/disasters caused by failures of existing technical works or other human activities (fuel stations, livestock farms, photovoltaic stations, agriculture, etc.),

- Sabotage (e.g., arson, vandalism, explosive devices, use of radioactive, nuclear, biological, and chemical substances, other illegal actions).

The following **figure** shows the distribution of the number of declarations in the Region of Eastern Macedonia and Thrace by type of disaster during the period 2014-2020, according to the "Statistical overview of emergency declarations" by the General Secretariat for Civil Protection (GSCP).



(Source: GSCP, 2020)

Figure6 –95 : Distribution of declarations by category of natural phenomenon in the Region of Eastern Macedonia and Thrace

As can be seen from the above **figure**, throughout the Region of Eastern Macedonia and Thrace, the main destructive phenomena recorded relate to extreme rainfall, floods, and forest fires, followed to a lesser extent by snowfall, frost, and finally landslides.

The above risks are described in more detail below, along with their probability of occurrence in the wider study area and their potential intensity, taking into account the current state of the natural and man-made environment in the region.

6.15.2 Natural Disasters

6.15.2.1 Seismic Hazard

Greece is located at the boundary and convergence of the African lithospheric plate and the Euro-Asian plate. For this reason, tectonic activity in the area is intense, with Greece experiencing the highest seismicity in Europe, releasing half of the energy released by earthquakes throughout Europe (European Spatial Planning Observation Network (ESPON), 2006).

Earthquakes are phenomena that occur without clear warning, cannot be prevented and, despite their short duration, can cause extensive material damage to human infrastructure, resulting in serious injuries and loss of life.

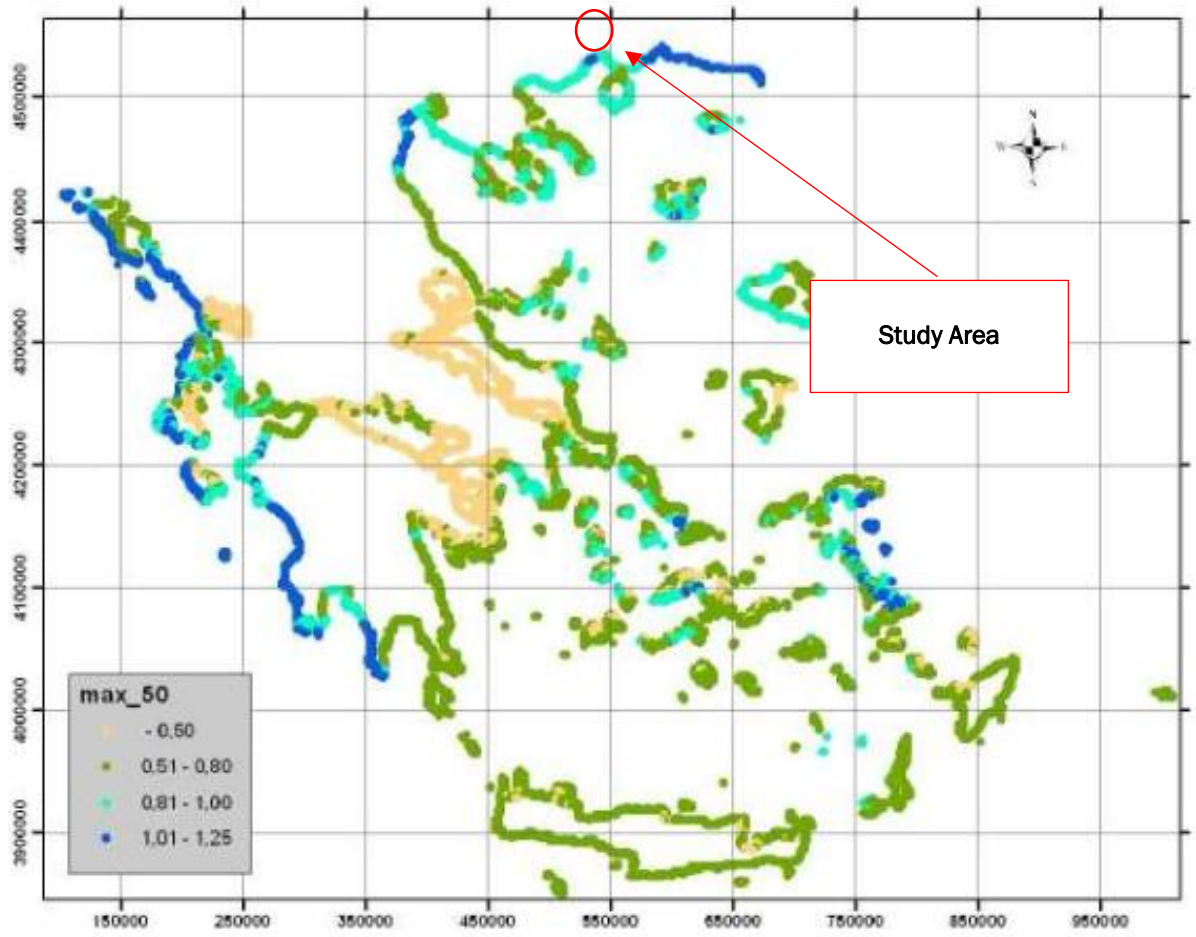
Greece ranks first in Europe in terms of seismicity and sixth worldwide. Its geographical location coincides with an area of our planet where major geotectonic phenomena occur, such as the convergence of the African and Eurasian lithospheric plates, resulting in the high seismicity observed in this region.

The seismic risk in the Project area is analysed in **Section 6.4.3** of this EIA.

6.15.2.2 Raising of mean sea level

According to Deliverable 5 of the SDCP Flood Risk Maps for YD12, the elevation of the MSL due to waves is estimated at 7% of the open sea wave height. The maximum wave height is derived from the calculation of the height values in each of the eight main wind directions and is calculated from the open sea development, wind speed, and wind duration.

The following **figure** shows the maximum MSF elevation on the coastline for a period of T=50 years.



(Source: Flood Risk Management Plan, YD12 Thrace (Government Gazette 2690/B/2018))

6 –96 : Total maximum MSL rise on the Aegean coastline due to waves (for a 50-year return period)

According to the Approved Flood Risk Management Plan of the Thrace River Basin District (Government Gazette 2688/B/2018), it is noted that for a 100-year return period, the meteorological tide is not expected to vary significantly, while flooding from waves will be 10-20% greater. Thus, to estimate the rise in water level for a 100-year return period, the astronomical tide is added to the meteorological tide and the wave flooding increased by 15%. At this stage, it is not possible to reliably estimate the flood corresponding to a 1,000-year return period.

Taking into account that:

- coastal urban areas generally have some form of quay or protection from waves approximately 1.0 m above the MSL,
- irrigation uses are generally located approximately 1.0 m above the MSL,
- habitats are located around the MSL but are subject to periodic flooding.

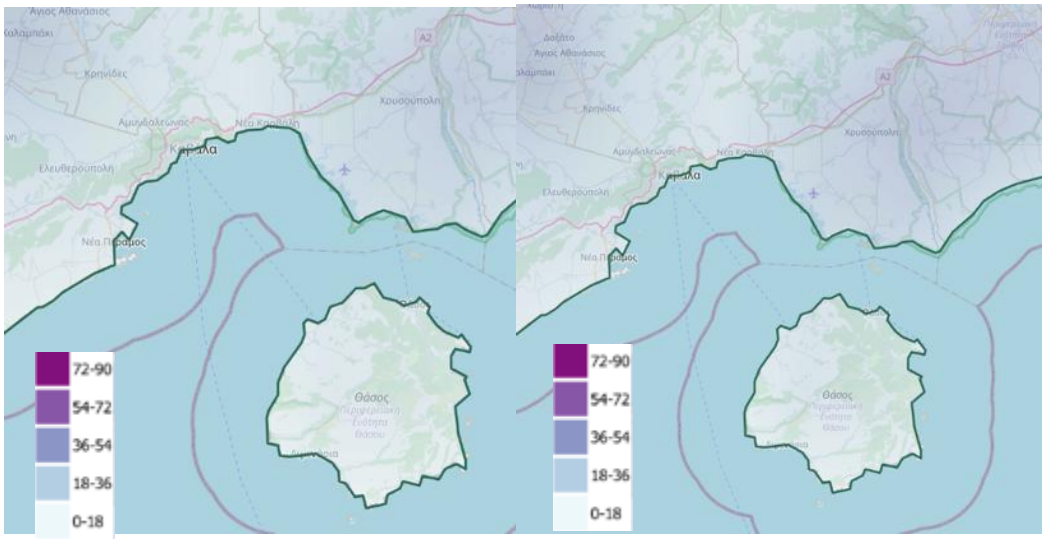
It was estimated that coastal areas at risk are those where the average sea level is expected to rise by at least 1 m.

In the Thrace Region, ZDYKP GR12RAK0001 presents a risk, as it borders coastal waters and the total sea level rise is estimated to be greater than 1 m. Specifically, the total sea level rise is 1.11 and 1.23 m for a return period of T=50 and T=100 years, respectively.

6.15.2.3 Extreme weather events

The risks arising from extreme meteorological events are as follows:

- **Storm – Hurricane**. As with any other meteorological phenomenon, it depends on the specific local conditions of the area and is related to factors such as gas mass transport, humidity, temperature changes, etc. Floods and storms are the most significant natural hazards in Europe in terms of economic losses. The factors that contribute to the intensity of their impact on the affected area are related to the intensity, duration, surface conditions, morphology, and slope of the catchment basin. In particular, with regard to the study area, according to the records of the nearest meteorological station, the wind conditions in the area are relatively mild and strong winds are not particularly frequent but do occur. Consequently, the vulnerability of the area to storms and winds is moderate and the corresponding risk to human health, cultural heritage, and/or the environment is real.
- **Extreme temperatures**. The occurrence of extreme (low or high) temperatures poses a real risk, mainly to human life. However, in Greece, mortality rates due to this risk are low and are not assessed. In areas where there is no intense urban element and dense construction, such as in the study area, vulnerability to extreme temperatures is extremely limited and, accordingly, the relative risk to human health, cultural heritage, and/or the environment is not assessable. The following **figures** show the number of very hot days (TX > 35 °C) for the years 2031-2060 and the two climate scenarios RCP 4.5 (absolute values) and RCP 8.5 (absolute values).



(Source: Adaptive Greece, https://geo.adaptivegreecehub.gr/ ,2024)

Figure6 –97 : Number of very hot days (TX > 35°C) for climate scenarios RCP 4.5 (left) and RCP 8.5 (right)

As can be seen from the above figures, the study area is not expected to experience extreme temperatures.

As mentioned above, the Eastern Macedonia - Thrace region has a low to moderate frequency of extreme weather events, with 10-20 recorded events in the period 2000-2020, of which 10-15 events had very serious social/ economic consequences, resulting in 1-10 human casualties depending on the prefecture.

The events with social/economic impacts recorded in the Eastern Macedonia-Thrace region during the period 2000-2020 mainly concern flash floods, with a total of 16-30 events and 1-5 events in the prefectures of Xanthi, Rodopi, and Drama, while windstorms with 1-4 incidents, except for the prefecture of Kavala with a frequency of 5-8 incidents.

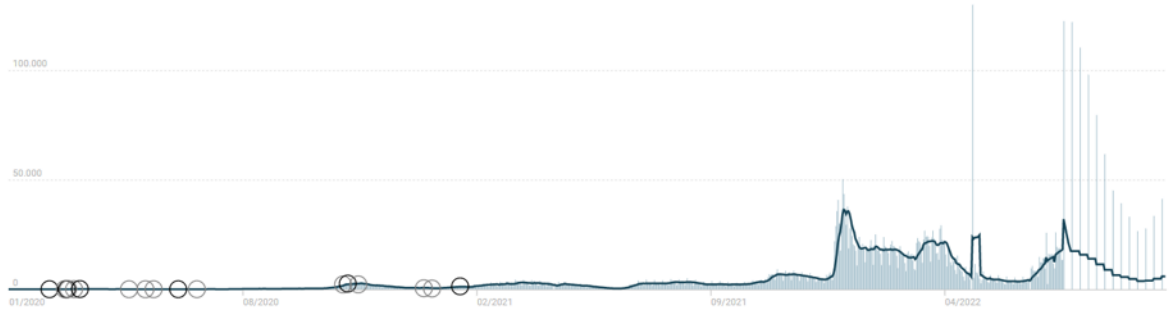
Taking the above into account, the probability of extreme weather events occurring in the study area is estimated to be low and of low to moderate intensity.

6.15.2.4 Pandemic / Infectious Diseases

A pandemic is an epidemic that goes beyond the borders of a region or country and spreads worldwide. Historically, there have been several pandemics, such as the HIV pandemic, the influenza pandemics of 1918-1920 and the influenza pandemic of 2009 (H1N1). The 2019 novel coronavirus disease (COVID-19) pandemic currently affecting the planet was caused by the SARS-CoV-2 virus and began in December 2019. The virus was first detected in the Yuhan region of China and has since spread to more than 114 countries around the world. This widespread spread of the virus is the reason for global concern, and the World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020.

The new SARS-CoV-2 coronavirus strain spreads from person to person through droplets from coughing or sneezing, and symptoms usually appear within 2-5 days (maximum 14 days) of infection. According to WHO estimates, each patient infects 1.4–2.5 other people (compared to seasonal influenza, where each patient infects an average of 1.3 other people). Symptoms of infection in cases requiring hospitalization mainly include fever, cough, and respiratory distress, and chest X-rays showed severe changes in both lungs.

The evolution of COVID-19 cases in Greece from February 2020 to October 2022 is shown in **the** following **figure**.



(Source: https://covid19.gov.gr/covid19-live-analytics/, 7/10/2022)

Figure6 –98 : Evolution of COVID-19 cases in Greece 2020-2022

The first emergency measures to tackle the pandemic were implemented on February 28 at the local level in the affected areas and resulted in a nationwide lockdown on March 23, which ended in May 2020. To date, at least 10 different vaccines have been developed and licensed by an official regulatory authority. To date, 21,350,000 vaccinations against COVID-19 have been administered. More than 7,600,000 citizens have completed their vaccination, and Greece ranks 12th out of the 27 EU countries in terms of the percentage of people vaccinated with at least one dose, exceeding the EU average. As for the booster dose, 5,845,000 people have gotten one. Also, more than 555,000 people have gotten a second booster dose so far.

According to the Covid-19 health security and protection map (see **figure** below), the Kavala region is classified as a Level 2 (Surveillance) area. Taking the above into account, the likelihood of a pandemic occurring in any case is estimated to be moderate and low in terms of socio-economic impact on the region.

(Source: https://covid19.gov.gr/wp-content/covid-measures/, June 2024)

Figure6 –99 : Excerpt from the Health Safety and Protection Map from Covid-19 infection

6.15.3 Man-made Accidents/Disasters

6.15.3.1 Risks of Accidents from Maritime Transport

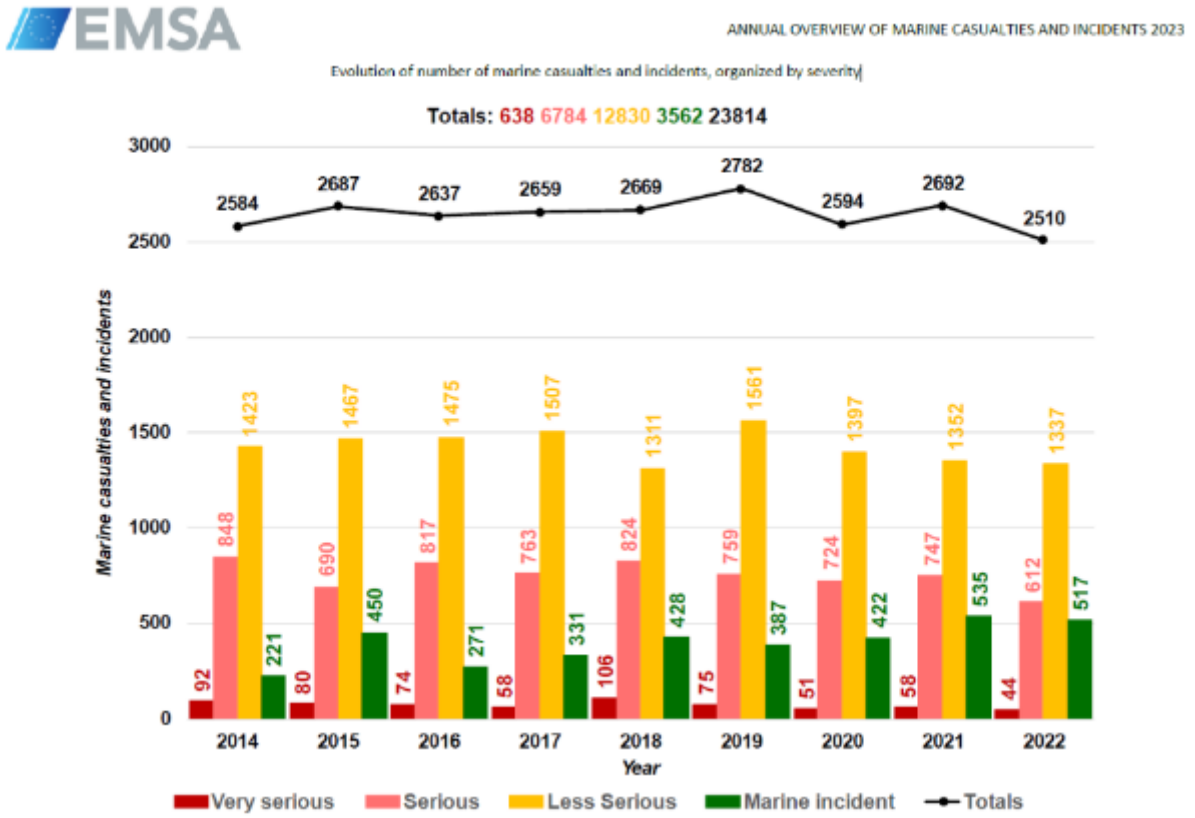
Maritime transport is of strategic importance for the economy of both the country and the EU, as well as for connections between cities or member states. Shipping operations are based on fundamental principles and regulations, i.e. harmonized national rules based on international conventions and resolutions issued by the International Maritime Organization (IMO). In recent years, the IMO has been adopting regulations aimed at preventing maritime accidents, limiting their adverse consequences and, by extension, increasing safety in international maritime transport.

According to IMO Resolution A.849 of November 27, 1997, on the adoption of the Casualty Investigation Code, a marine casualty is defined as "*any incident or sequence of incidents at sea that resulted in loss of life, total actual loss, material damage to the ship, grounding or the ship's inability (unseaworthiness) to sail or the ship's involvement in a collision, material damage to the ship's external marine infrastructure, serious damage to the environment or the possibility of serious damage to the environment*" (IMO, 2008).

The level of maritime safety in EU waters is currently very high, but according to the annual Report on Maritime Accidents and Incidents published by the European Maritime Safety Agency (European Maritime

Safety Agency – EMSA) for 2023, the total number of maritime accidents for 2022 exceeds 2,000 (EMSA, 2023).

The following **figure** shows the evolution of the number of maritime accidents and incidents according to their severity.



(Source: Annual Report on Maritime Accidents and Incidents, EMSA, June 2023)

Figure6 –100 : Number of maritime accidents and incidents in the EU by severity for the years 2014-2022

The total number of maritime accidents and incidents mentioned above for the period from 2014 to 2022 was 23,814, with an annual average of 2,646 accidents.

The main risks arising in maritime transport are:

- Possible collision or grounding of vessels with platforms
- Possible anchoring that compromises the integrity of the pipelines
- Accidental spillage of chemical, liquid, or solid waste

6.15.3.2 Risks of accidents/disasters due to failures of existing technical works or other human activities

The Prinos offshore development project is located in the immediate vicinity of the Project, as described below.

According to the current AEPO DIPA/8413/24.04.2018 (ADA: ΨΓΛ14653Π8-Ζ79), the **Prinos Offshore Development Project** concerns the existing offshore oil and natural gas extraction facilities located in the Gulf of Kavala, in the northeastern Aegean Sea, and its expansion with two new platforms, one of which is long-term. The total production capacity is 27,000 barrels/day of stabilized crude oil.

No significant accidents have been recorded in the operation of the Prinos Offshore Development project, due to the technical excellence of these facilities and the completeness of the HSE Plans and Procedures implemented by Energean. However, **the proposed project interacts directly with elements of the Prinos offshore development project and therefore there is a theoretical possibility of accident/destruction due to failures of existing technical works or other human activities**.

6.15.3.3 Sabotage, Vandalism, and Other Illegal Acts

Sabotage (vandalism, arson, etc.) is a potential cause of serious accidents and disasters in the study area, especially arson. However, to date, no such incidents have been recorded in the study area and the likelihood of their occurrence is extremely low, mainly due to the security procedures followed by Energean.

7 MONITORING AND INSPECTION RESULTS

7.1 MONITORING PROGRAM

7.1.1 General Information

Starting from the approved Environmental Terms of the project and the Environmental Impact Study (EIS) of the project, the framework of the Environmental Monitoring Program of the project has been formed.

The Environmental Monitoring Program of the project is essentially divided into two parts, namely the Monitoring of CO2 storage and the Environmental monitoring of the project.

The following Tables present the relevant Environmental Terms of the project's Environmental Monitoring Agency (YPEN/DIPA/XXXXXXXXX) which determine the framework for the formation of the Environmental Monitoring Program of the project, with regard to the Monitoring of CO2 storage and Environmental monitoring, respectively.

Table 7–1: The relevant Environmental Conditions of the project's AEPO that define the framework for the development of the project's Environmental Monitoring Program with regard to monitoring of CO2 storage

Α/Α ΠΟ της ΑΕΠΟ	Description of the Environmental Term of AEPO
4.6.1.	The project operator must implement a CO2 storage Monitoring Plan in accordance with paragraph 2 of article 14 of Joint Ministerial Decision 48416/2037/E.103/2011, which is prepared in accordance with the requirements of Annex II of the above Joint Ministerial Decision. In this context, monitoring of the injection wells of the storage complex (including, whenever possible, the CO2 plume), and, where applicable, of the surrounding environment, will be carried out. The monitoring plan should include continuous or periodic monitoring, at a minimum, of the following parameters:
4.6.1.1.1.	Fugitive CO2 emissions in injection equipment.
4.6.1.1.2.	Volumetric CO2 flow at injection wellheads.
4.6.1.1.3.	CO2 pressure and temperature at injection wellheads (to determine mass flow).
4.6.1.1.4.	Chemical analysis of the injected material.
4.6.1.1.5.	Reservoir temperature and pressure (to determine phase behavior and state of CO2).
4.6.1.2.	The relevant report of this monitoring plan must include at least the following:
4.6.1.2.1.	Comparison between the actual and modeled behavior of CO2 and formation water at the storage site.
4.6.1.2.2	Detection of significant anomalies.
4.6.1.2.3.	Detection of CO2 migration.
4.6.1.2.4	Detection of potential CO2 leakage.
4.6.1.2.5.	Detection of significant negative impacts on the surrounding environment, including in particular on drinking water, human populations or users of the surrounding biosphere.
4.6.1.2.6.	Assessment of the effectiveness of any corrective measures taken pursuant to Article 17 of Joint Ministerial Decision 48416/2037/E.103/2011.
4.6.1.3	Through the Monitoring Plan of paragraph 2 of Article 14 of Joint Ministerial Decision 48416/2037/E.103/2011, the short-term and long-term safety and integrity of the storage complex (including whether the stored CO2 will remain fully and permanently isolated) will be assessed.

Α/Α ΠΟ της ΑΕΠΟ	Description of the Environmental Term of AEPO
4.6.1.4.	The Plan will be updated in accordance with the requirements of Annex II of JMD 48416/2037/E.103/2011, and in any case every five years to take into account changes in the estimated risk of leakage, changes in the estimated risks to the environment and health, new scientific knowledge and improvements in the best available technology. The updated plans will be submitted to the competent authority for approval.

Table 7–2: The relevant Environmental Conditions of the project's Environmental Monitoring Plan that define the framework for the development of the project's Environmental Monitoring Program with regard to environmental monitoring

Α/Α ΠΟ της ΑΕΠΟ	Description of the Environmental Term of AEPO
4.7.1.	The project operator must prepare an appropriate environmental monitoring program and coordinate its implementation, in order to monitor the impact of the project and the implementation of the environmental conditions related to its operation. The environmental monitoring program will include, at a minimum, monitoring of water and sediment quality, air quality, environmental noise and traffic loads.
4.7.2.	Within the framework of this program, the collection, processing and evaluation of data, results and documentation regarding the environmental issues that will be mentioned in the following paragraphs, should be carried out by appropriate scientific personnel with specialization and experience in each relevant environmental parameter.
4.7.3.	The summary of the final environmental monitoring results will be reflected in a concise annual report, formulated in a manner understandable by the public, and will be made public via the Internet on the website of the project operator.
4.7.4.	The detailed results of the environmental monitoring program will be included in a detailed annual report which will be sent to the service units of the Ministry of Environment that exercise responsibilities for environmental licensing, environmental inspection and control, as well as biodiversity and protected area management. The detailed annual report should incorporate in each case:
4.7.4.1.	A thorough analysis of the manner in which the environmental conditions are implemented.
4.7.4.2.	The specifications for the implementation of the monitoring programs, as well as the specifications of the equipment (monitoring equipment, electronic equipment, etc.) that will be used for the implementation of these monitoring programs.
4.7.4.3.	The assessment and evaluation of the effectiveness of the implementation of environmental conditions in the protection of the environment (natural and anthropogenic), including biodiversity and anthropogenic economic activities (e.g. livestock farming, beekeeping, etc.) and any other activities (e.g. ecotourism, agrotourism, etc.).
4.7.4.4.	The results of the monitoring programs.
4.7.4.5.	Any necessary proposals for additional measures (administrative or not) for the protection of the environment in general, if this appears appropriate from the monitoring of the construction and operation of the project.
4.7.5.	The project operator prepares a report supporting the evaluation of the analytical annual results of the environmental monitoring, which is submitted to the Environmental Licensing Directorate of the Ministry of Economic Development and Trade. Within two months, the DIPA informs the project operator whether actions are required after an evaluation of the following criteria:
4.7.5.1.	Are there or not impacts on the environment that were not foreseen by the initial EIA and this EIA, in which case additional conditions need to be imposed or the initial ones need to be changed.
4.7.5.2.	Is it necessary or not to prepare an additional special study or a new EIA, because the conditions of the project or its environment have changed significantly. or to revoke the AEPO if, following a justified judgment, the environmental cases of the project remain.
4.7.6.	The Environmental Monitoring Program for the construction phase of the project must include at least the following:
4.7.6.1.	Detailed records of actions taken to comply with environmental conditions.

Α/Α ΠΟ της ΑΕΠΟ	Description of the Environmental Term of AEPO
4.7.6.2.	Monitoring of the quality of sea water, which will be carried out as follows:
4.7.6.2.1.	The monitoring of the quality of seawater that will arise in the trenches or excavations during the works for the installation of the onshore infrastructure will include the analysis of samples from a point within the trench for the works for the installation of the onshore infrastructure (onshore section of the CO2 transmission pipeline) with a weekly frequency during Phases 3 and 5 of the pipeline installation and burial works and every two months during the implementation of the remaining works within the marine environment.
4.7.6.2.2.	Monitoring of the quality of seawater at three locations (in water samples from the bottom and the surface of the water column), as described in section 12.2.2 of the EIA-CCS-PR, with a weekly frequency during Phases 3 and 5 of the offshore pipeline installation and burial works and every two months during the implementation of the remaining works within the marine environment.
4.7.6.2.3.	The analysis of parameters in seawater samples should include
4.7.6.2.3.1.	General physicochemical parameters: pH, turbidity, dissolved oxygen (DO), total dissolved solids (TDS), temperature, salinity and electrical conductivity
4.7.6.2.3.2.	Total dissolved carbon (TOC), total nitrogen (TN), total phosphorus (TP),
4.7.6.2.3.3	Polycyclic Aromatic Hydrocarbons: 16 USEPA PAHs,
4.7.6.2.3.4.	Heavy metals: Arsenic (As), Cadmium (Cd), Manganese (Mn), Lead (Pb), Iron (Fe), Copper (Cu), Chromium (Cr), Zinc (Zn), Cobalt (Ci), Molybdenum (Mo), Nickel (Ni).
4.7.6.2.4.	In the event of a pollution incident, the relevant Water Directorate, among other competent bodies, is informed of the remedial measures taken by the project operator and the timetable for their completion.
4.7.6.2.5.	The evaluation of the monitoring results of marine waters and sediments is carried out on the basis of the Environmental Quality Standards in force at each time, established under Directive 2000/60/EC. The technical specifications and minimum performance criteria of the analytical methods must comply with the respective specifications drawn up under Directive 2000/60/EC.
4.7.6.3.	Biodiversity monitoring, which will concern at least the following:
4.7.6.3.1.	Analysis of benthic communities as an indication of the ecological status of the marine environment (ecological indicators BENTIX, AMBI, BIPO or corresponding updated indicators), every three (3) months at three locations, as described in section 12.2.2 of the EIA-CCS-PR.
4.7.6.3.2.	Monitoring of the quality of marine sediments every three (3) months at the three locations where samples of the benthic community analysis of paragraph 4.7.8.1 will be taken. The analysis of the parameters in the sediment samples should include the parameters: total dissolved carbon (TOC), total nitrogen (TN), total phosphorus (TP), Polycyclic Aromatic Hydrocarbons (16 USEPA PAHs) and heavy metals (Arsenic (As), Cadmium (Cd), Manganese (Mn), Lead (Pb), Iron (Fe), Copper (Cu), Chromium (Cr), Zinc (Zn), Cobalt (Ci), Molybdenum (Mo), Nickel (Ni)).
4.7.6.3.3.	Monitoring and recording the occurrence of marine mammals (Phocoena phocoena, Tursiops truncates) which are protected objects of the Natura 2000 SPA – SCI with code GR1150014 and name "Kavala – Thassos Marine Area" as follows:
4.7.6.3.3.1.	Continuous monitoring during Phase 3 and Phase 5 of the installation and burial works of the offshore pipeline.
4.7.6.3.3.2	With seasonal frequency, during the implementation of the remaining works within the marine environment and in any case no later than every three (3) months.
4.7.6.3.4.	Monitoring and recording the appearance of the sea turtle Caretta caretta which is a protected object of GR1150001. As well as observation for the other species of sea turtles Chelonia mydas, Dermochelys coriacea, as follows:
4.7.6.3.4.1.	Continuous monitoring during Phase 3 and Phase 5 of the installation and burial works of the offshore pipeline.
4.7.6.3.4.2.	With seasonal frequency, during the implementation of the remaining works within the marine environment and in any case no later than every three (3) months

Α/Α ΠΟ της ΑΕΠΟ	Description of the Environmental Term of AEPO
4.7.6.3.5.	Monitoring and recording of the bird species Phalacrocorax aristotelis desmarestii, Puffinus yelkouan which are protected objects of the marine area Natura 2000 SPA – SCI with code GR1150014 and name "Marine Area of Kavala – Thassos" as well as of the other bird species which are protected objects of the neighboring SPA areas of the Natura 2000 network and regularly use GR1150014. Monitoring must be implemented with seasonal frequency, during the implementation of the works within the marine environment and in any case no later than every three (3) months.
4.7.6.3.6	Monitoring and recording of breeding wading bird species and land turtles (protected objects of GR1150001 and GR1150010) in the sand dune zone / on either side of the Sigma factory, as follows:
4.7.6.3.6.1.	Before the start of work to determine the base values.
4.7.6.3.6.2.	Με εποχική συχνότητα, κατά την υλοποίηση των εργασιών και σε κάθε περίπτωση το αργότερο ανά τρεις (3) μήνες.
4.7.6.3.7.	Identification and recording of dead/injured individuals of fauna and avifauna in the immediate area of influence of the project. The reasons for injury/death of these individuals should be investigated (e.g. in the event that an individual has been injured by the construction activities of the project). In the event that during the implementation phase of the monitoring program, injured avifauna species that are unable to fly or species of fauna that are unable to move are identified, they should be collected and referred for examination and rehabilitation/treatment to appropriate organizations and bodies under the care of the specialist scientists conducting the recordings. In the event that the incident is due to the implementation of the project, the relevant bodies for the protection and management of biodiversity should be informed, and additional targeted protection measures should be considered.
4.7.6.4.	Environmental noise monitoring, which will be carried out on the perimeter of the work front by portable equipment and under representative conditions of humidity, temperature, wind intensity and direction. They will be carried out downstream of the wind direction and not under high humidity and low temperature. The basic principles of the monitoring will be as follows:
4.7.6.4.1.	Measurements will be carried out once a month.
4.7.6.4.2.	Measurements and analysis of the results will be carried out in accordance with Joint Ministerial Decisions 13586/724/2006 and 211773/2012, as applicable.
4.7.6.4.3.	In the event that the implementation of the noise monitoring program reveals that the limit values of term 4.3.5.21 or limits that will be set by a newer or more specific regulatory act are exceeded, appropriate noise protection measures will be taken, following a special acoustic calculation and implementation study, which will be submitted by the project operator for approval to the Directorate of Climate Change and Air Quality of the Ministry of Environment and Energy.
4.7.6.5.	Underwater noise monitoring, which will be carried out on the perimeter of the work front (at a distance of 150m from the work front) with 24-hour measurements with an autonomous recording unit (ARU) on a monthly basis.
4.7.7.	In addition, the Environmental Monitoring Program for the construction phase of the project must include the following, as described in section 12.2.2 of the EIA-CCS-PR:
4.7.7.1.1.	Monitoring of waste production and management on a bi-monthly basis.
4.7.7.1.2.	Monitoring of energy and raw material input on a bi-monthly basis.
4.7.7.1.3.	Monitoring of the condition and organization of the construction sites, the effectiveness of control measures and identification of unforeseen incidents with potential environmental impacts, on a weekly basis.
4.7.7.1.4.	Monitoring of the social performance of the project (social impacts, corporate awareness, etc.).
4.7.7.1.5.	Monitoring of the working conditions, health and safety of the project on a monthly basis, in order to determine whether there are issues that may compromise the level of environmental protection.
4.7.8.	The Environmental Monitoring Program for the operational phase of the project must include, as a minimum, monitoring of the following:
4.7.8.1.	Detailed records of actions taken to comply with environmental conditions.
4.7.8.2.	Results and assessments of the CO2 storage Monitoring Plan of section 4.6.
4.7.8.3.	Monitoring of the quality of sea water, which will be carried out as follows:

Α/Α ΠΟ της ΑΕΠΟ	Description of the Environmental Term of AEPO
4.7.8.3.1.	Monitoring of the quality of the treated water from the pumping wells before its discharge into the marine environment. The parameters to be monitored will be determined based on the characteristics of the water to be pumped from the reservoir and their selection must be documented in the first corresponding annual environmental report to be prepared during the project operation phase. In any case, in addition to the parameters to be determined, the temperature of the treated water must be monitored on a weekly basis, before its discharge into the sea.
4.7.8.3.2.	The monitoring of the quality of seawater will be carried out every three years at three locations (on water samples from the bottom and the surface of the water column), as described in section 12.2.2 of the EIA-CCS-PR.
4.7.8.3.3.	The analysis of the parameters in the seawater samples should include
4.7.8.3.3.1	The general physicochemical parameters: pH, turbidity, dissolved oxygen (DO) total dissolved solids (TDS), temperature, salinity and electrical conductivity.
4.7.8.3.3.2.	Total dissolved carbon (TOC), total nitrogen (TN), total phosphorus (TP),
4.7.8.3.3.3.	Polycyclic Aromatic Hydrocarbons: 16 USEPA PAHs,
4.7.8.3.3.4.	Heavy metals: Arsenic (As), Cadmium (Cd), Manganese (Mn), Lead (Pb), Iron (Fe), Copper (Cu), Chromium (Cr), Zinc (Zn), Cobalt (Ci), Molybdenum (Mo), Nickel (Ni).
4.7.8.3.4.	The evaluation of the monitoring results of marine waters and sediments is carried out on the basis of the Environmental Quality Standards in force at each time, established under Directive 2000/60/EC. The technical specifications and minimum performance criteria of the analytical methods must comply with the respective specifications drawn up under Directive 2000/60/EC.
4.7.8.4.	Marine sediment quality monitoring will be carried out every three years at three locations, as described in section 12.2.2 of the EIA-CCS-PR. The analysis of the parameters in the sediment samples should include the following parameters: total dissolved carbon (TOC), total nitrogen (TN), total phosphorus (TP), Polycyclic Aromatic Hydrocarbons (16 USEPA PAHs) and heavy metals (Arsenic (As), Cadmium (Cd), Manganese (Mn), Lead (Pb), Iron (Fe), Copper (Cu), Chromium (Cr), Zinc (Zn), Cobalt (Ci), Molybdenum (Mo), Nickel (Ni)).
4.7.8.5	Biodiversity monitoring, which will be carried out every three years and will concern at least the following, as described in section 12.2.2 of the EIA-CCS-PR:
4.7.8.5.1.	Analysis of benthic communities as an indication of the ecological status of the marine environment (ecological indicators BENTIX, AMBI, BIPO or corresponding updated indicators), at three locations.
4.7.8.5.2.	Monitoring and recording the occurrence of marine mammals (Phocoena phocoena, Tursiops truncates) which are protected species of the Natura 2000 area with code GR1150014 and name "Kavala - Thassos Marine Area".
4.7.8.5.3.	Monitoring and recording the occurrence of the sea turtle Caretta caretta which is a protected species of the Natura 2000 area with code GR1150001, as well as observation of the other species of sea turtles Chelonia mydas, Dermochelys coriacea.
4.7.8.5.4.	Monitoring and recording of the bird species Phalacrocorax aristotelis desmarestii, Puffinus yelkouan which are protected species of the Natura 2000 marine area with code GR1150014 and name "Kavala - Thassos Marine Area" as well as of the other bird species which are protected species of the neighboring SPAs of the Natura 2000 network and regularly use GR1150014.
4.7.8.5.5.	Monitoring and recording of breeding wading bird species and land turtles (protected species of GR1150001 and GR1150010) in the sand dune zone / on either side of the Sigma factory.
4.7.8.5.6.	Identification and recording of dead/injured individuals of fauna and avifauna in the immediate area of influence of the project. The reasons for injury/death of these individuals should be investigated (e.g. in the event that an individual has been injured by the construction activities of the project). In the event that injured species of avifauna that are unable to fly or species of fauna that are unable to move are identified during the implementation phase of the monitoring program, they should be collected and referred for examination and rehabilitation/care to appropriate organizations and bodies by the special scientists conducting the recordings. In the event that the incident is due to the operation of the project, the relevant biodiversity protection/management bodies are informed and additional targeted protection measures are considered.

Α/Α ΠΟ της ΑΕΠΟ	Description of the Environmental Term of AEPO
4.7.8.6.	Environmental noise monitoring, which will be carried out on the offshore platform and at a location at the boundaries of the onshore installation with portable equipment and under representative conditions of humidity, temperature, wind intensity and direction. They will be carried out downstream of the wind direction and not under high humidity and low temperature. The basic principles of monitoring will be as follows:
4.7.8.6.1.	Measurements will be carried out every 6 months for the first 2 years of operation of the project and every two years thereafter.
4.7.8.6.2.	Measurements and analysis of the results will be carried out in accordance with Joint Ministerial Decisions 13586/724/2006 and 211773/2012, as applicable.
4.7.8.7.	Underwater noise monitoring, which will be carried out on the perimeter of the offshore platform (at a distance of 150m from it) with 24-hour measurements with an autonomous recording unit (ARU) on a monthly basis. Measurements will be carried out every 6 months for the first 2 years of operation of the project and every two years thereafter.
4.7.8.8.	Monitoring of the project's carbon footprint, which will be implemented on an annual basis in accordance with the provisions of article 18 of Law 4936/2022 (Α΄ 105), of the Ministry of Environment and Natural Resources with reference number ΥΠΕΝ/ΔΙΠΑ/143898/9866/30.12.2024 (Β΄ 7322) and the guidelines specified in the European Commission text entitled "Technical guidelines on strengthening the resilience of infrastructure to climate change for the period 2021-2027" (2021/C 373/01). The calculation of GHG emissions will concern direct emissions and indirect emissions from energy consumption.
4.7.9.	In addition, the Environmental Monitoring Program for the project's operational phase must include the following, as described in section 12.2.2 of the EIA-CCS-PR:
4.7.9.1.1.	Monitoring of waste production and management on an annual basis.
4.7.9.1.2.	Monitoring of energy and raw material input on a bimonthly basis.
4.7.9.1.3.	Monitoring of the condition and organization of the project sites, the effectiveness of control measures and identification of unforeseen incidents with potential environmental impacts, on a weekly basis.
4.7.9.1.4.	Monitoring of the social performance of the project (social impacts, corporate awareness, etc.).
4.7.9.1.5.	Monitoring of working conditions, health and safety of the project's operation, in order to determine whether there are any issues that may compromise the level of environmental protection.

However, the licensed project has not yet entered the construction and operation phases. Therefore, data from the relevant Environmental Monitoring Program for the project is not yet available.

7.1.2 Necessity of Modification/Redesign of the Monitoring Program

The amendments proposed herein and described in detail in Chapter 3 do not bring about any substantial change in the environmental aspects of the projects and activities of the licensed project, as described in the previous Sections of this Chapter, and in the corresponding ones of Chapter 7.

Consequently, the Environmental Monitoring Program of the licensed project, as determined by the sub. No. ΥΠΕΝ/ΔΙΠΑ/73654/4819/01.07.2024 (ΑΔΑ: ΡΟΞ4653Π8-Χ4Ψ)] (AEPO of the licensed project), the applicable environmental legislation and the best available practices, is in principle suitable for monitoring the environmental performance of the project (licensed project and proposed amendments). An exception is some issues of the number of sampling points for certain Environmental Parameters, which are proposed to be increased, so as to include the monitoring of Environmental Parameters at the locations of the new interventions included in the proposed modification of the project. The proposed modifications concerning the Environmental Monitoring-related POs of the project are summarized in the following Table.

The proposed modifications concerning the Environmental Monitoring-related POs of the project are codified in Chapter 11.

Table 7–3: Proposed modifications in the context of the formulation of the project's Environmental Monitoring Program

ΠΟ της ΑΕΠΟ	Description of the Environmental Term	Proposed Amendment and Documentation
4.7.6.2.2.	Monitoring of seawater quality at three locations (in water samples from the bottom and surface of the water column), as described in section 12.2.2 of the EIA-CCS-PR, with a weekly frequency during Phases 3 and 5 of the offshore pipeline installation and burial works and every two months during the implementation of the remaining works within the marine environment.	It is proposed to reformulate the EO, so that it also includes the monitoring of the impacts from the installation of the new Omega offshore platform and the related equipment. It is also proposed to add two more sampling points (in relation to those provided for in section 12.2.2 of the EIA-CCS-PR) for the integrated environmental monitoring of the potential impacts from the installation of the new Omega offshore platform and the related equipment. Therefore, it is proposed that the PO be reformulated as follows: "Monitoring of seawater quality at three to five locations (in water samples from the bottom and surface of the water column), as described in section 12.2.2 of the EIA-CCS-PR and in the MT AEPO, with a weekly frequency during Phases 3 and 5 of the offshore pipeline installation and burial works and the installation works of the Omega offshore platform, as well as every two months during the implementation of the remaining works within the marine environment."
4.7.6.3.1.	Analysis of benthic communities as an indication of the ecological state of the marine environment (ecological indicators BENTIX, AMBI, BIPO or corresponding updated indicators), every three (3) months at three locations, as described in section 12.2.2 of the EIA-CCS-PR.	It is proposed to reformulate the EO, so as to include the monitoring of the impacts from the installation of the new offshore Omega platform and the related equipment. It is also proposed to add two more sampling points (in relation to those provided for in section 12.2.2 of the EIA-CCS-PR) for the integrated environmental monitoring of the potential impacts from the installation of the new offshore Omega platform and the related equipment. Therefore, it is proposed to reformulate the EO as follows: "Analysis of benthic communities as an indication of the ecological status of the marine environment (ecological indicators BENTIX, AMBI, BIPO or corresponding updated indicators), every three (3) months at three to five locations, as described in section 12.2.2 of the EIA-CCS-PR. and in the MT AEPO"
4.7.6.3.2.	Monitoring of marine sediment quality every three (3) months at the three locations where samples will be taken for the analysis of benthic communities of paragraph 4.7.8.1. The analysis of the parameters in the sediment samples should include the parameters: total dissolved carbon (TOC), total nitrogen (TN), total phosphorus (TP), Polycyclic Aromatic Hydrocarbons (16 USEPA PAHs) and heavy metals (Arsenic (As), Cadmium (Cd), Manganese (Mn), Lead (Pb), Iron (Fe), Copper (Cu), Chromium (Cr),	It is proposed to reformulate the EO, so as to include the monitoring of the impacts from the installation of the new offshore Omega platform and the related equipment. It is also proposed to add two more sampling points (in relation to those provided for in section 12.2.2 of the EIA-CCS-PR) for the integrated environmental monitoring of the potential impacts from the installation of the new offshore Omega platform and the related equipment.

ΠΟ της ΑΕΠΟ	Description of the Environmental Term	Proposed Amendment and Documentation
	Zinc (Zn), Cobalt (Ci), Molybdenum (Mo), Nickel (Ni)).	Therefore, it is proposed to reformulate the EO as follows: "Monitoring of the quality of marine sediments every three (3) months at the three to five locations where samples will be taken for the analysis of benthic communities of paragraph 4.7.8.1. The analysis of the parameters in the sediment samples should include the parameters: total dissolved carbon (TOC), total nitrogen (TN), total phosphorus (TP), Polycyclic Aromatic Hydrocarbons (16 USEPA PAHs) and heavy metals (Arsenic (As), Cadmium (Cd), Manganese (Mn), Lead (Pb), Iron (Fe), Copper (Cu), Chromium (Cr), Zinc (Zn), Cobalt (Ci), Molybdenum (Mo), Nickel (Ni)).”
4.7.6.3.3.1.	Continuous monitoring during Phase 3 and Phase 5 of the offshore pipeline installation and burial works.	It is proposed that the PO be reformulated to include monitoring of the impacts of the installation of the new Omega offshore platform and associated equipment. Therefore, it is proposed that the PO be reformulated as follows: "Continuous monitoring during Phase 3 and Phase 5 of the offshore pipeline installation and burial works, during the installation of the Omega offshore platform and the drilling of the wells. Particular emphasis should be given during the installation of the Omega platform pylons, where in addition to monitoring, the observers (Marine Mammal Observers) will also perform a visual scan of the area for at least 20 minutes before the start of pylon installation work and the production of percussive or pulsed sound, in order to avoid the presence of marine mammals within a range of at least 500 meters from the source of emission of percussive or pulsed sound.
4.7.6.3.4.1.	Continuous monitoring during Phase 3 and Phase 5 of the offshore pipeline installation and burial works.	It is proposed that the PO be reformulated to include the monitoring of the impacts of the installation of the new Omega offshore platform and associated equipment. Therefore, it is proposed that the PO be reformulated as follows: “Continuous monitoring during Phase 3 and Phase 5 of the offshore pipeline installation and burial works and the installation works of the Omega offshore platform”
4.7.8.3.2.	Marine water quality monitoring will be carried out every three years at three locations (on water samples from the bottom and surface of the water column), as described in section 12.2.2 of the EIA-CCS-PR.	It is proposed to reformulate the EO, so that it also includes the monitoring of the impacts from the installation of the new offshore Omega platform and the related equipment. It is also proposed to add two more sampling points (in relation to those provided for in section 12.2.2 of the EIA-CCS-PR) for the integrated environmental monitoring of the potential impacts from the installation of the new offshore Omega platform and the related equipment. Therefore, it is proposed to reformulate the EO as follows: “The monitoring of the quality of marine waters will be carried out every three years at three to five

ΠΟ της ΑΕΠΟ	Description of the Environmental Term	Proposed Amendment and Documentation
		locations (in water samples from the bottom and the surface of the water column), as described in section 12.2.2 of the EIA-CCS-PR. and in the MT AEPO"
4.7.8.4.	Marine sediment quality monitoring will be carried out every three years at three locations, as described in section 12.2.2 of the EIA-CCS-PR. The analysis of the parameters in the sediment samples should include the parameters: total dissolved carbon (TOC), total nitrogen (TN), total phosphorus (TP), Polycyclic Aromatic Hydrocarbons (16 USEPA PAHs) and heavy metals (Arsenic (As), Cadmium (Cd), Manganese (Mn), Lead (Pb), Iron (Fe), Copper (Cu), Chromium (Cr), Zinc (Zn), Cobalt (Ci), Molybdenum (Mo), Nickel (Ni)).	It is proposed to reformulate the EO, so that it also includes the monitoring of the impacts from the installation of the new offshore Omega platform and the related equipment. It is also proposed to add two more sampling points (in relation to those provided for in section 12.2.2 of the EIA-CCS-PR) for the integrated environmental monitoring of the potential impacts from the installation of the new offshore Omega platform and the related equipment. Therefore, it is proposed to reformulate the EO as follows: "Monitoring of the quality of marine sediments every three years at the three five locations, as described in section 12.2.2 of the EIA-CCS-PR. The analysis of the parameters in the sediment samples should include the parameters: total dissolved carbon (TOC), total nitrogen (TN), total phosphorus (TP), Polycyclic Aromatic Hydrocarbons (16 USEPA PAHs) and heavy metals (Arsenic (As), Cadmium (Cd), Manganese (Mn), Lead (Pb), Iron (Fe), Copper (Cu), Chromium (Cr), Zinc (Zn), Cobalt (Ci), Molybdenum (Mo), Nickel (Ni))."
4.7.8.5.1.	Analysis of benthic communities as an indication of the ecological status of the marine environment (BENTIX, AMBI, BIPO ecological indicators or corresponding updated indicators), at three locations.	It is proposed to reformulate the EO, so as to include the monitoring of the impacts from the installation of the new offshore Omega platform and the related equipment. It is also proposed to add two more sampling points (in relation to those provided for in section 12.2.2 of the EIA-CCS-PR) for the integrated environmental monitoring of the potential impacts from the installation of the new offshore Omega platform and the related equipment. Therefore, it is proposed to reformulate the EO as follows: "Analysis of benthic communities as an indication of the ecological status of the marine environment (ecological indicators BENTIX, AMBI, BIPO or corresponding updated indicators), in three to five locations."

7.2 CERTIFICATION – ENVIRONMENTAL INSPECTIONS

As has been repeatedly reported, the construction phase of the licensed project has not yet begun and therefore no environmental inspections have been implemented in the context of its construction or operation.

In addition, at present the licensed project and its implementing body do not have Environmental Management certifications, as the construction of the project and obviously its operation, have not yet begun.

8 ENVIRONMENTAL AND SOCIAL DELINEATION OF ENVIRONMENTAL STUDY CONTENT FOR THE AMENDMENT OF THE PROJECT'S EIA

8.1 INTRODUCTION

The objective of this investigation into the scope of the EIA for the Project is to highlight the **Environmental Parameters** that should be investigated in greater detail during the evaluation and assessment of the potential environmental and social impacts that may arise from the implementation of the proposed amendment. The purpose of this process is:

- To identify the key environmental issues and potential impacts associated with each of the activities and corresponding life cycle stages of the proposed modification.
- To share this information and the specific details of the proposed project modification with the relevant identified stakeholders in order to ensure that the identified issues reflect the true nature of those issues and, if there are any further issues, they are included in the assessment carried out as part of the EIA of the project.

It should be noted that although the implementation of the scope definition in the context of the preparation of the EIA of the project is not mandatory under the provisions of national legislation, in this case, its preparation and inclusion in this study was deemed useful for the reasons set out below.

Firstly, it is important to note that the existing national legislative framework defines the control process from the outset and clearly delineates the requirements for environmental studies through:

- The classification of all projects and activities according to type/capacity/population served/etc. (control procedure), with Ministerial Decision YPEN/DIPA/17185/1069 (Government Gazette B 841/B/24.02.2022), as amended by YPEN/DIPA/53510/3616 (Government Gazette 3327/B/19.05.2023) and in force,
- The definition of detailed specifications for all categories/classes of projects and activities with Ministerial Decision 170225/2014.
- The specification of specific requirements in cases where the project falls within protected areas or falls within specific Directives (Integrated Pollution Prevention and Control - IPPC, Offshore Operations, etc.) and the definition of the accompanying/supporting studies ( ) required in order to be carried out within the framework of the environmental licensing procedure.

It should be noted that the Greek legislative framework is fully harmonized with all relevant EU Directives and, therefore, the provisions laid down in the above-mentioned legislative acts are in full accordance with EU policies. Specifically, with regard to the provisions of Article 5(2) of Directive 97/11/EC, according to which the Member State (MS) to implement a procedure whereby the project owner may request the opinion of the competent authorities on the information to be submitted in the context of the Environmental Authorization procedure. This procedure is set out in Article 2 of Law 4014/2011, where the scoping report (specifically the Preliminary Determination of Environmental Requirements – PPPA) is part of a "**voluntary**

procedure." In addition, the specifications of the scoping report are set out in Annex 1 of Ministerial Decision 170225/2014 for cases where the project owner wishes to follow it.

Although the voluntary process of the aforementioned scoping report was not followed, Enearth decided to include it in the context of this EIA of the Project (as it had done in the context of drafting the approved EIA for the project) EIA in order to:

- Comply with international best practices and the Performance Requirements (PR) of the European Bank for Reconstruction and Development (EBRD)
- Identify the environmental and social impacts potentially associated with the Project, which should be examined in more detail in the Project's EIA,
- Inform and consult with stakeholders and discuss with them:
  - Basic information (including environmental and social issues of existing facilities related to the construction and operation of the proposed project) and the company's history in the region over the last three decades,
  - The company's plans for further development,
  - Relevant legislative requirements as set out in national, Community, and EEA standards,
  - The methodology for assessing the EIA of the Project,
  - The specialized studies to be carried out as part of the EIA of the Project, as well as the overall design of the new planned developments.

The following **sections** examine the main environmental and social impacts, their significance, and the mitigation measures required to prevent, minimize, address, or restore the effects of these impacts.

8.2 ASSESSMENT AND EVALUATION OF ENVIRONMENTAL IMPACTS

8.2.1 General Information

The following **sections** present the scope of the EIA for the Project, both in the context of normal/routine activities of the proposed project modification (routine activities) in the context of its construction and operation, as well as in the context of unforeseen events and accidents.

The methodology used included the following steps:

1 Identification of the distinct activities of the project for each phase of its life cycle (construction, operation, decommissioning/deinstallation) that could potentially cause some interaction with the abiotic and biotic natural environment, as well as with the anthropogenic environment.

2 Identification of potential receptors in the project area. Receptors were identified in the abiotic and biotic natural environment, as well as in the anthropogenic environment, taking into account both marine and terrestrial receptors.

3 Preparation of **a table** listing the project activities (on the vertical axis) against the potential receptors expected to be affected (on the horizontal axis).

4 The study team of this EIA of the Project, in collaboration with the technical managers and scientific staff of Enearth, compiled a matrix of activities of the facility that arise during the construction phase, the operation phase, and the decommissioning/dismantling phase, each of which was systematically evaluated for possible interactions with the recipients. The interactions were classified as **"outside limits"** (no interaction or negligible interaction) and **"within limits interactions"** (clear negative, positive, or mixed interaction).

5 For "**in-scope** interactions," a detailed description, analysis, and assessment of potential impacts is provided in **Chapter 9**.

6 Discussion with stakeholders of a similar (simplified) **Table** to ensure that they are involved in the process.

8.2.2 Summary Presentation of the Delineation of the Content of the Environmental Study for the Modification of the Project's EIA

The matrices developed in the context of defining the content of this EIA for the Project are presented below by phase of the project life cycle (construction, operation, decommissioning/removal).

8 –1 : Delineation–interaction table during the project construction phase

Construction Phase																																						
Activity/Project Element		Marine Environment												Terrestrial Environment							Anthropogenic Environment																	
		Abiotic Environmental Parameters					Biotic Environmental Parameters							Abiotic Environmental Parameters																										
		Morphological characteristics of the seabed	Qualitative characteristics of the seabed	Geological formations	Qualitative characteristics of marine and coastal waters	Underwater noise and vibrations	Marine habitats	Marine mammals	Sea turtles	Fish	Bird fauna	Protected areas	Climate, microclimate & biodiversity	Climate change	Landscape characteristics	Geological & tectonic characteristics	Air quality	Airborne noise and vibrations	Electromagnetic radiation	Spatial planning and land use	Structure & functions of the human environment – Social cohesion	Underwater Cultural Heritage	Socio-economic environment						Technical Infrastructure & Services								
																								Population & Demographic characteristics	Fisheries / Aquaculture	Tourism	Other economic activities	Employment / Labor force	Community health & safety	Maritime transport / traffic	Other transport infrastructure	Environmental Infrastructure Systems					
Human, material, and natural resources	Mobilization (recruitment, employment, engagement) of the labor force																																					
	Issues relating to the supply chain and procurement of the necessary construction materials, resources, and services for the implementation of the project.																																					
Offshore pipelines (CO2 transport pipeline and produced water transport pipeline) and power cable	**Phase 1**																																					
	Geophysical Survey: A small vessel (15 m long) equipped with seabed scanning equipment will be used to provide basic data within the pipeline corridor.																																					
	Geotechnical Survey: After processing the results of the geophysical survey, soil samples will be taken using a grab and a box corer, which will be sent to laboratories for analysis.																																					
	Phase 3																																					
	Installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable from a special pipeline laying vessel, together with 2 support supply/tug vessels .																																					
	Phase 4																																					
	Installation of a lifting pipe on the Omega platform and diving operations to connect the lifting pipe to the end of the subsea pipeline. Installation of water transfer pipe connections on each platform and electrical connections on each platform.																																					
	Phase 5																																					
	Closing trenches and protecting pipes and cables, commissioning. After the installation of the pipes, cable, and related connections, they will be buried along their entire length. After completion of the construction work, the pipes will be drained of water using a series of pumps from land and the remaining moisture will be removed using chemicals (monoethylene glycol – MEG) so that they are completely dry and ready for operation.																																					
	Maritime traffic - Daily vessel traffic for the installation of pipelines and cable (including transport of workers and movements of support vessels).																																					

| Construction Phase | | |

| Construction Phase | | |

Construction Phase																																	
Activity/Project Element		Marine Environment											Terrestrial Environment							Anthropogenic Environment													
		Abiotic Environmental Parameters					Biotic Environmental Parameters						Abiotic Environmental Parameters										Socio-economic environment							Technical Infrastructure & Services			
		Morphological characteristics of the seabed	Qualitative characteristics of the seabed	Geological formations	Qualitative characteristics of marine and coastal waters	Underwater noise and vibrations	Marine habitats	Marine mammals	Sea turtles	Fish	Bird fauna	Protected areas	Climate, microclimate & biroclimate	Climate change	Landscape characteristics	Geological & tectonic characteristics	Air quality	Airborne noise and vibrations	Electromagnetic radiation	Spatial planning and land use	Structure & functions of the human environment – Social cohesion	Underwater Cultural Heritage	Population & Demographic characteristics	Fisheries / Aquaculture	Tourism	Other economic activities	Employment / Labor force	Community health & safety	Maritime transport / traffic	Other transport infrastructure	Environmental Infrastructure Systems
	Operation of heavy-duty floating crane vessels and other support vessels (support vessels and tugs, floating cargo barges). Waste/sewage production.																																
	Maritime traffic - Definition of exclusion zones due to construction works.																																
	Unforeseen events (structural failures, equipment malfunctions, and accidents during platform installation and facility construction).																																

MEMORANDUM
Out of bounds - No interaction
Out of range - Negligible interaction
Within limits - Clear negative interaction
Within limits - Clear positive interaction
Within limits Clear mixed interaction

8 Table –2 : Table of delimitation – interaction during the project operation phase

| Operation Phase | | |

| Operation Phase | | |

| Operation Phase | | |

Operation Phase																																						
Activity/Project Element		Marine Environment											Terrestrial Environment										Anthropogenic Environment															
		Abiotic Environmental Parameters					Biotic Environmental Parameters						Abiotic Environmental Parameters										Socio-economic environment							Technical Infrastructure & Services							
		Morphological characteristics of the seabed	Qualitative characteristics of the seabed	Geological formations	Qualitative characteristics of marine and coastal waters	Underwater noise and vibrations	Marine habitats	Marine mammals	Marine turtles	Fish fauna	Bird fauna	Protected areas	Climate, microclimate & bioclimate	Climate change	Landscape characteristics	Geological & tectonic characteristics	Air quality	Airborne noise and vibrations	Electromagnetic radiation	Spatial planning and land use	Structure & functions of the human environment – Social cohesion	Underwater Cultural Heritage	Population & Demographic	Fisheries / Aquaculture	Tourism	Other economic activities	Employment / Labor force	Community health & safety	Maritime transport / traffic	Other transport infrastructure	Environmental Infrastructure Systems							
Maritime traffic	Daily boat traffic due to the operation of the project (including the transport of workers and the movement of support vessels).																																					
	Definition of exclusion zones due to the operation of the project.																																					

NOTE
Out of bounds - No interaction
Out of range - Negligible interaction
Within limits - Clear negative interaction
Within limits - Clear positive interaction
Within limits Clear mixed interaction

8 Table –3 : Table defining boundaries – interaction during the project's cessation of operation/uninstallation phase

Shutdown/decommissioning phase																																						
Activity/Project Component		Marine Environment											Terrestrial Environment							Anthropogenic Environment																		
		Abiotic Environmental Parameters					Biotic Environmental Parameters						Abiotic Environmental Parameters																										
		Morphological characteristics of the seabed	Qualitative characteristics of the seabed	Geological formations	Qualitative characteristics of marine and coastal waters	Underwater noise and vibrations	Marine habitats	Marine mammals	Marine turtles	Fish fauna	Bird fauna	Protected areas	Climate, microclimate & bioclimate	Climate change	Landscape characteristics	Geological & tectonic characteristics	Air quality	Airborne noise and vibrations	Electromagnetic radiation	Spatial planning and land use	Structure & functions of the human environment – Social cohesion	Underwater Cultural Heritage	Socio-economic environment					Community health & safety	Technical Infrastructure & Services		
																							Population & Demographic Characteristics	Fisheries / Aquaculture	Tourism	Other economic activities	Employment / Labor force		Maritime Transport / Traffic	Other Transport Infrastructure	Environmental Infrastructure Systems
Human, Material, and Natural Resources	Mobilization (recruitment, employment, engagement) of the workforce																																					
	Supply chain and procurement issues relating to the cessation of operations/decommissioning of the project.																																					
	Energy, fuel, and material consumption																																					
Decommissioning/Removal of offshore pipelines (CO_2 transport pipeline and produced water transport pipeline) and power cable	The offshore pipelines and lifters will be depressurized, cleaned using standard jetting operations, and then inerted by introducing nitrogen. The pipelines will then be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with international standards.																																					
	The pipes from the top of the lift to the wellheads will be depressurized and filled with nitrogen to inert the system. The pipes will be disconnected from the wellheads, covered, and left in place.																																					
	Daily vessel traffic for the implementation of offshore pipeline removal works (including the transport of workers and support vessels).																																					
	Maritime traffic - Definition of exclusion zones due to the implementation of offshore pipeline removal works.																																					
Shutd own/D	**Primary barrier** - If cement is used as a barrier, a cement																																					

Shutdown/decommissioning phase																																		
Activity/Project Component		Marine Environment											Terrestrial Environment							Anthropogenic Environment															
		Abiotic Environmental Parameters					Biotic Environmental Parameters						Abiotic Environmental Parameters																							
		Morphological characteristics of the seabed	Qualitative characteristics of the seabed	Geological formations	Qualitative characteristics of marine and coastal waters	Underwater noise and vibrations	Marine habitats	Marine mammals	Marine turtles	Fish fauna	Bird fauna	Protected areas	Climate, microclimate & bioclimate	Climate change	Landscape characteristics	Geological & tectonic characteristics	Air quality	Airborne noise and vibrations	Electromagnetic radiation	Spatial planning and land use	Structure & functions of the human environment – Social cohesion	Underwater Cultural Heritage	Socio-economic environment					Community health & safety	Technical Infrastructure & Services			
																							Population & Demographic Characteristics	Fisheries / Aquaculture	Tourism	Other economic activities	Employment / Labor force		Maritime Transport / Traffic	Other Transport Infrastructure	Environmental Infrastructure Systems
	column of at least 30 m is required to form a permanent barrier. Where possible, cement plugs of 152 m are installed to overlay these 30 m of cement.																																	
	Secondary barrier - A combined cap of at least 60 m of cement is required to form a secondary barrier. Where possible, 244 m of cement is placed to overlay these 60 m of cement.																																	
	Production of solid and liquid waste.																																	
	Marine traffic - Daily vessel traffic for the implementation of offshore pipeline removal works (including the transport of workers and support vessels).																																	
	Maritime traffic - Definition of exclusion zones due to the implementation of offshore pipeline removal works.																																	
Decommissioning/Dismantling of the Omega offshore platform	Dispersion of drilling cuttings: Accumulated drilling cuttings must be removed from the platform piles. The cuttings will be removed from the jacket platform to prevent obstruction of platform removal operations.																																	
	Removal: The jack-up vessel will then be moved to the area in order to remove the platform. The surface equipment and bridges will be removed first in order to gain access to the interior of the pipelines. The loads will be transferred through the piles and released. Once the piles are cut, the lifting vessel																																	

Shutdown/decommissioning phase																																		
Activity/Project Component		Marine Environment											Terrestrial Environment							Anthropogenic Environment															
		Abiotic Environmental Parameters					Biotic Environmental Parameters						Abiotic Environmental Parameters																							
		Morphological characteristics of the seabed	Qualitative characteristics of the seabed	Geological formations	Qualitative characteristics of marine and coastal waters	Underwater noise and vibrations	Marine habitats	Marine mammals	Marine turtles	Fish fauna	Bird fauna	Protected areas	Climate, microclimate & bioclimate	Climate change	Landscape characteristics	Geological & tectonic characteristics	Air quality	Airborne noise and vibrations	Electromagnetic radiation	Spatial planning and land use	Structure & functions of the human environment – Social cohesion	Underwater Cultural Heritage	Socio-economic environment					Community health & safety	Technical Infrastructure & Services			
																							Population & Demographic Characteristics	Fisheries / Aquaculture	Tourism	Other economic activities	Employment / Labor force		Maritime Transport / Traffic	Other Transport Infrastructure	Environmental Infrastructure Systems
	can lift and load the jackets onto barges.																																	
	Disposal: After removal of the platform, the preferred methods of disposal are considered to be:																																	
	Landfill and material recycling																																	
	Deep sea disposal																																	
	Production of solid and liquid waste																																	
	Maritime traffic - Daily vessel traffic for the implementation of offshore facility decommissioning works (including the transport of workers and support vessels).																																	
	Maritime traffic - Definition of exclusion zones due to the implementation of offshore facility decommissioning works.																																	

MEMORANDUM
Out of bounds - No interaction
Out of range - Negligible interaction
Within limits - Clear negative interaction
Within limits - Clear positive interaction
Within limits Clear mixed interaction

9 ASSESSMENT AND EVALUATION OF ENVIRONMENTAL IMPACTS

9.1 INTRODUCTION

This **chapter** presents the potentially significant E&E impacts of incorporating the proposed modifications into the entire life cycle of the project under consideration (construction, operation, decommissioning/cessation of operation), in accordance with the corresponding thorough analysis undertaken in **the** relevant **chapter** of the approved EIA for the project (LDK, November 2024).

In the context of this study, it was decided to follow the environmental impact assessment methodology applied in the approved EIA for the project, as it is estimated that in this way the conclusions of the E&K impacts (of the EIA of the licensed project and the present one) are fully comparable. This makes it possible to reflect the differentiation of the relevant adverse potential E&I impacts resulting from the interventions of the proposed modification in a realistic and, as far as possible, accurate and objective manner.

Consequently, this **chapter** assesses and evaluates the potentially significant impacts that the proposed amendment to the project may have on the natural and man-made environment of the study area from the use of natural resources, the emission of pollutants, the creation of nuisances, and the disposal of waste produced. The impacts examined concern all abiotic and biotic parameters that shape the natural environment (atmosphere, soil, water, flora, fauna, noise, traffic, landscape, etc.), spatial planning and land use, as well as other socio-economic characteristics of the study area.

The assessment and evaluation of the P&K impacts focuses mainly on the properties of potentially significant impacts (probability of occurrence, extent, intensity, cumulative/synergistic action, etc.) of all activities and individual elements of the project, based on the project design data, supporting studies, the existing environmental situation, and the results of computational models (atmosphere, noise, etc.) used to simulate potential impacts on various **environmental parameters**.

In the context of this study, the potential impacts are examined:

i. For the construction, operation, and decommissioning/shutdown phases of the project under study (Normal/Usual Project Activities),

ii. In terms of the project's vulnerability to risks of serious accidents or disasters related to the project (Non-Normal Operation of the Project), in accordance with Joint Ministerial Decision 1915/2018,

iii. With regard to the resilience of the project to climate change, i.e. its ability to cope with and adapt to expected climate risks, in accordance with the National Climate Law (Law 4936/Government Gazette 105A/27-05-2023),

As analysed in **Chapter 3.4.2.2**, the proposed projects will be constructed within a total duration of approximately 14 months.

Furthermore, as mentioned above, **Phase 1** of the overall Project was examined within the framework of the approved EIA for the project [the operation of the facility is planned to be developed in two distinct phases (Phase 1 and Phase 2)]. Consequently, in subsequent stages of the program's maturation, the next stages of development of the overall project will follow, in which the proposed interventions (within the framework of the approved EIA and this MT) will be used as part of the broader and integrated overall storage infrastructure (which will be licensed under a new independent EIA).

9.2 METHODOLOGICAL REQUIREMENTS

9.2.1 General Information

This **section** summarizes the methodology used in the approved EIA for the project to analyze, assessment, and evaluation of the potentially significant environmental and social impacts that the proposed modification of the project may cause to the natural and man-made environment :

- From the normal/usual operation of the proposed modification of the project.
- From the Vulnerability of the Project to Accident or Disaster Risks Related to the proposed project modification (Emergency Conditions / Unplanned Events).
- From the expected climate risks.

The methodologies for assessing and evaluating the potential impacts from the above sources are presented in detail in **the** following **Sections**, respectively.

9.2.2 Assessment of Potential Impacts from Normal/Usual Project Operation

The assessment and evaluation of the potentially significant impacts from the construction of the proposed project was carried out based on the following steps:

- **1ο Step**: Identification and assessment of the **Significant Environmental Parameters (SEPs or Valued Receptors-VRs)** of the natural and man-made environment of the study area.
- **2ο Step**: Assessment and evaluation of **the Potential Significant Impacts** from the normal activities of the construction and operation phases of the Project under consideration.

9.2.2.1 Identification and Assessment of Significant Environmental Aspects

The Environmental and Social Impact Assessment (ESIA) process initially requires the distinction of the parameters of the natural and man-made environment hosting the impacts into significant or noteworthy elements defined as **Significant Environmental Parameters (SPE).** Any element of the natural and man-made environment that is considered important by the parties involved in the assessment, licensing, and implementation of the project under study (project promoter, competent authorities and services, consultants, other parties directly or indirectly involved or affected by the implementation of the project, etc.).

SPPs are categorized taking into account their environmental value, as derived from the data presented in **Chapter 6** (Current State of the Environment) of this study and in **Chapter 8** of the approved EIA, and, where possible, their sensitivity to the activities of the proposed modification of the Project.

Based on the above, the SPAs are categorized as **Low, Moderate**, and **High Significance**. The significance of each SPA is taken into account as a weighting in the final assessment of impacts during the EIA process, as described in **Section 9.2.2.2**. In this way, the same impact is ultimately assessed as more significant in a High Significance Environmental Parameter than in a Low Significance Environmental Parameter.

In the next stage of the EIA process, the importance of each EPI is correlated with the intrinsic importance of the corresponding relevant potential impacts on it, leading to the integrated final assessment and evaluation of the expected environmental and social impacts.

Based on the assessment of the current environmental situation in the study area (see **Chapter 6** of this study and **Chapter 8** of the approved EIA), the identified SPAs and their corresponding assessment are presented in **the** following **Table.**

Table9 –1 : Identification and Assessment of Significant Environmental Parameters in the study area

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
Ablotic Natural Environment	Climatic and bioclimatic characteristics	Climate, microclimate, and bioclimate	No projects or activities related to significant potential impacts on climate, microclimate, and bioclimate have been identified in the study area (impacts on the climate crisis are examined in the following SEA). Although the project (including the proposed modification) is not associated with any significant impacts on the climate, microclimate, and bioclimate, it does aim to store CO_2 and given that these projects are associated with potential impacts on the climate, microclimate, and bioclimate, this SEA for the current stage of the program is assessed as Moderate.	Moderate
		Climate change	GHG emissions in the wider project area (including the proposed modification) are at calculable levels, as potential air quality impacts may arise from various industrial facilities in the wider area, Energean's industrial and mining activities (onshore and offshore facilities), the facilities of Hellenic Fertilizers and Chemicals (ELFE S.A.), activity at the port of Philippos B, as well as at the ports of Kavala and Keramoti, and road traffic (Egnatia Road, secondary connecting roads, and the urban road network of Kavala). It should be noted that dispersion conditions are satisfactory given the location of the study area (in a coastal and offshore area) and the prevailing climatic conditions. The project (including the proposed amendment) aims to store CO_2 produced from both local and remote sources. Therefore, the project (including the proposed amendment) will serve as a storage site for $CO_{(2)}$ produced by the production activities of third parties and will thus offer CO_2 storage services to LCC producers at local, regional, national, and international levels that find it difficult to reduce CO_2 production through the implementation of their production activities.	High

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			Consequently, the operation of the project (including the proposed amendment) contributes both to achieving the overall GHG emission reduction targets and climate neutrality by 2050, and to offsetting any emissions that remain after 2050 (through negative emissions). Therefore, as the project under consideration aims to store $CO_{(2)}$ and given that these projects are related to potential impacts on tackling the climate crisis, this SPP for the current stage of the program is assessed as High importance.	
	Morphological and landscape characteristics	Morphology	At the offshore facilities of the project (including the proposed modification), the average depth of the Gulf of Kavala is estimated at approximately 32 m, with a maximum depth of approximately 60 m in the basin west of Thasos. According to the Bathymetric Map of the Hellenic Army Geographical Service (HAGS), the depth of existing and future platforms in the wider project area ranges between 28-49 m. However, the bathymetry is constantly changing due to the sediment transported by small rivers and the main river formation, which is the Nestos and its estuary, the slopes of the seabed in the pipeline location area are gentle. Therefore, this SIA is assessed as being of **low** significance.	**Low**
		Landscape	According to Map P2.d of the Assessment and Review of the Spatial Planning and Sustainable Development Framework of the Region of Eastern Macedonia and Thrace for the Landscape, the area of the Project's land facilities is included in a zone of particularly degraded landscape. It should be noted that the proposed amendment does not include interventions in the land section of the project. However, near the offshore facilities of the Project, there is an Area of International Value (ΔΑ), the Nestos Area, as well as Thasos, which is an Area of National Value (ΕΑ). Overall, the area of the offshore facilities of the proposed amendment to the project, due to the panoramic landscape and the aesthetics of the coastal and marine zone of the wider area, has remarkable features. However, the landscape in the project area is complemented by the industrial zone in which the project's onshore facilities are located, making the mark of human presence and commercial activity noticeable.	**Moderate**

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			Therefore, in accordance with the above and the thorough analysis presented in **the** relevant **section** of **Chapter 6** of the approved EIA for the project, the landscape of the study area can be characterized as relatively remarkable and interesting in terms of its aesthetic quality, which is nevertheless reduced due to human interventions and activities. Therefore, this SIA is assessed as being of **moderate** importance.	
	Geological, tectonic, and soil characteristics	Geology	Prinos is a small extension basin within a general arrangement of Neogene basins that extend from Northern Greece, Southern Bulgaria, Northern Macedonia to Eastern Albania and constitute the extension system of the Southern Balkans. Three clearly defined main series can be distinguished in the chronostratigraphic column of the Prinos basin, which are: • Pre-evaporitic series: Contains a variety of rocks with distinct depositional subenvironments. The oldest stratigraphic unit (pre-Prinos group) is characterized by alternations of lagoonal, shelf and terrestrial environments, suggesting sedimentation strongly influenced by the interaction between sea level changes and tectonics. The younger parts of the (Prinos group) are represented by a series of stacked/sandy turbidite flows of high to very high energy, separated by flows dominated by low to very low energy mud. The age of the pre-depositional sequence is mainly Tortonian (11.6 Ma - 7.24 Ma), but older ages (Langian - Serravallian) cannot be ruled out. • Evaporitic series: The evaporitic series is characterized by various layers of salt alternating with conglomerates. The total thickness of this series reaches 800 meters. In the north, the evaporites change laterally into thick anhydrites and limestones alternating with conglomerates rich in marl. The anhydrite and dolomite layers are often intercalated with claystones characterized by metagenetic anhydrite nodules. • Post-evaporitic series: The post-evaporitic series is Pliocene-Quaternary in age, consisting of marine sands, silts, and clays. Towards its upper part, it transitions into a deltaic progradational series fed by the paleo-Nestos River and, at shallower levels, is again penetrated by marine conglomerate sediments. The proven productive reservoirs in the Prinos deposit are located at the top of the pre-evaporitic sequence and mainly consist of channel and distal fan turbidites formed during the rapid subsidence of the basin during the Miocene. They are usually found at depths of 2,490m - 2,790m TVDSS in the Prinos field area.	**Low**

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			The Epsilon deposit is located 4.5 km west-northwest of the Prinos deposit. It is an anticlinal structure with faults covering an area of approximately 4 km² and is separated from the Prinos deposit by a structural low, a saddle point, to the east. In addition, Energean's technical team has conducted a series of special studies and 3D terrain simulations to assess the potential storage of CO_2 in the basin beneath the Prinos structures. These simulations also demonstrate a sealing cap at the top of the structure, the boundaries of the structure described as boundary faults, and the volume of the basin. In addition, Energean's technical team is developing and implementing scenarios with the estimated $CO_{(2)}$ to be stored, potential $CO_{(2)}$ sources,the $CO_{(2)}$ transport network, and related synergies. Therefore, based on the above, as well as the more detailed descriptions provided in **the** relevant **Sections**, this SIA is assessed as **Low** significance.	
		Tectonic	According to the current Anti-Seismic Regulation, EAK 2000, and the Seismic Hazard Zone Map, as revised by Joint Ministerial Decision Δ17α/115/9/ΦΝ275 (Government Gazette 1154/B/12-8-2003), the study area belongs to Hazard Zone I. According to EAK, the horizontal seismic ground acceleration is A=α x g, where α is the ground acceleration relative to the acceleration of gravity. In this case, for Zone I, the horizontal seismic ground acceleration is **A=0.16.** Although the Prinos basin is a tectonically stable area (as required for CO_2 in terms of tectonic (seismic) activity), as theoretically CO_2 storage projects in semi-depleted reservoirs may, under certain conditions, affect the tectonics of the area (the vulnerability of the project to phenomena related to the tectonics of the area is discussed in **Section 9.6)**, this SEA is assessed as Moderate	**Moderate**
		Soil	Furthermore, according to the geomorphological map of the Ministry of Environment and Energy, the soils in the wider study area are mainly characterized by alluvial deposits. Alluvial or alluvial deposits or alluvial fans are	**Low**

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			deposits of clay, sand, gravel, and other transported materials produced by the flow of water in a river environment. Three types of alluvial deposits are common parent materials for soil formation: alluvial fans, floodplains, and river deltas. Overall, the condition (quantitative and qualitative) of the soil resources in the project area is assessed as degraded (this is part of the existing Sigma land facility), and this SPP is assessed as **Low** importance.	
		Seabed	As part of the EIA for the offshore facilities at Prinos, analyses of seabed samples were carried out in November 2023. Looking at the sampling stations as a whole and comparing the results of the laboratory analyses with the corresponding analyses carried out in October 2015 (EIA of the "Prinos Offshore Development" Project, 2015) and July 2021 ("Monitoring Program Report" - hereinafter MPR, 2020), it was found that there were no changes in the concentrations of Polycyclic Aromatic Hydrocarbons (PAHs). More specifically, in all the repeat samples from the aforementioned sampling stations, the detected values are lower than the laboratory detection limit (<0.020 mg/kg) and lower than the EU minimum limits for good environmental status of the marine environment. In addition, the above measurements also included an examination of the distribution of trace elements of metal concentration in bottom sediments. The study of the distribution of trace elements of metal concentration in sediments is important in the context of environmental pollution. Sediments show less variation over time and are therefore preferred as monitoring tools for assessing pollution. Heavy metals enter the coastal environment from various sources, whether natural or anthropogenic, such as the discharge of domestic sewage and industrial waste. Variations in metal concentrations may reflect the mixing of sediments from different sources and contamination from a number of different sources of pollution. Within the framework of the MSFD, in all repeat samples from the above-mentioned sampling stations, the detected values are lower than the EU thresholds for good environmental status of the marine environment. Therefore, this BPS is assessed as being **of moderate** importance.	**Moderate**
	Water	Surface waters (excluding marine waters)	The proposed modification of the project concerns interventions within the marine area, which do not interact with this SEA. Although the proposed project is located at a considerable distance from important surface water recipients, its implementation may, under certain conditions, have adverse effects on the surface water bodies in the study area, mainly in terms of their quantitative characteristics. Therefore, this SEA is assessed as being **of moderate** significance.	**Moderate**

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
		Marine waters	With regard to the quality of coastal water systems in the wider project area (including the proposed modification), the LDK study team conducted seawater sampling at six (6) points in the Gulf of Kavala in November 2023, as part of the 2023 Annual Environmental Monitoring Report (AEM 2023), which concerns the implementation of the environmental monitoring program for the Prinos Offshore Development, in accordance with the requirements of the Environmental Terms Approval Decision (ETAD) 8413/24.04.2018/YPEN. With regard to the concentrations of PAHs, in all repeat samples of seawater, including samples from the Reference Station, these are lower than the detection limit (<0.005 mg/L) as well as lower than the EU and national thresholds for good environmental status of the marine environment (Annex I of Joint Ministerial Decision No. 51354/2641/E103/2010, Ministerial Decision No. 170766/2016). Similar concentrations were recorded in the 2021 sampling (within the framework of the 2020 EPP), where the concentrations of PAHs in the seawater samples were also below the detection limit. Therefore, there is no evidence of PAH pollution of the marine environment in the area under consideration due to the operation of the Project. Similar results were recorded in the measurements carried out on the repeat samples of seawater at all depths, as the concentrations of ammonia ($_{NH_3}$), phosphate (PO_4^{3-}), nitrite ($NO^{(2)\cdot}$) and nitrate ($NO^{(3)\cdot}$) concentrations were similar in all repeat samples, including those from the Reference Station, and are consistent with the concentrations recorded in samples taken over the last 30 years in Greece, and in particular in the North Aegean, according to Souvermezoglou et al. 2014. In conclusion, as confirmed by the above data and those included in 2^h Revision of the SDAPs of the Thrace and Eastern Macedonia River Basin Districts, it is estimated that the ecological status and chemical status of the surface waters examined are assessed as "good." However, as the implementation and operation of the proposed modification of the project may have adverse effects on the coastal and marine waters of the study area, this SEA is assessed as being **of moderate** significance.	**Moderate**
		Groundwater	The proposed project modification concerns interventions within the marine area, which do not interact with this SEA, which for this reason is excluded from the scope of this document.	**Out of scope**
	Atmospheric environment	Air quality	According to data from the National Air Pollution Monitoring Network (EDPAR) and the Annual Air Quality Report (2022), it is estimated that air pollutant concentrations in the wider area of the Project are low in relation to the established limits.	**Low**

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			As part of the Annual Monitoring Report for the Prinos Offshore Development Project (2021), continuous monitoring of H_2 S and explosive mixtures were continuously monitored by the installed sensors for the safety of the facility personnel. No exceedances of the concentrations of H_2 S and explosive mixtures were recorded. Potential air quality impacts in the wider area of the proposed project modification may arise from various industrial facilities in the wider area, from the industrial and mining activities of Energean (onshore and offshore facilities), Greek Fertilizers and Chemicals ELFE S.A., activity at the port of Philippos II, as well as at the ports of Kavala and Keramoti, and road traffic (Egnatia Road, secondary connecting roads, and the urban road network of Kavala). Furthermore, it should be noted that the dispersion conditions are satisfactory given the location of the study area (in a coastal area and offshore region) and the prevailing climatic conditions, and therefore no high concentrations of air pollutants are found in the area under consideration. Consequently, this SIA is assessed as being of **low** significance.	
	Acoustic environment and vibration and radiation emissions	Acoustic environment	The current state of the acoustic environment in the wider area of the proposed project modification is moderate, given the industrial nature of the land part of the study area. The main sources of noise in the area are industrial noise from the facilities operating in the area (Energean Oil and Gas, Hellenic Fertilizers and Chemicals ELFE S.A., quarries), noise from activity at the commercial port of Filippos B, vehicle traffic on the road network in the area, including heavy vehicles, due to industrial activity, noise from maritime traffic and typical urban activities in settlements in the area. The operation of existing offshore facilities included in the study area is continuous and therefore there are no significant fluctuations in the level of noise produced. As part of the Annual Monitoring Report for the Prinos	**Moderate**

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			Offshore Development Project, noise measurements were taken at seven (7) points within the Gulf of Kavala in accordance with Directive 2002/49/EC of the European Parliament in September 2021. At none of the sampling points did the Lden index exceed 50 dB. In addition, considering that the underwater noise in the offshore study area is mainly caused by ship traffic and existing offshore drilling, the frequency of noise sources is characterized as moderate. Therefore, this EIA is assessed as **being** of **moderate** significance (the assessment of the status of underwater noise in terms of its impact on underwater fauna is examined in a relevant subsequent EIA).	
		Vibrations	No significant vibration emissions are recorded in the study area due to the absence of relevant activities that could act as a significant source of vibration. Sensitive receptors (e.g., residential uses) are located in the area of influence of the proposed project modification, but at a very large distance from it. However, as the project does not cause significant vibration emissions, sensitive receptors are not expected to be affected. Therefore, this EIA is assessed as **being** of **moderate** significance (the assessment of the status of underwater noise in terms of its impact on underwater fauna is examined in a relevant subsequent EIA).	**Moderate**

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
		Electromagnetic radiation	No significant emissions of ionizing and non-ionizing radiation are recorded in the study area. As the proposed project is not related in any way to the emission of radiation, this EIA is assessed as **Low** significance.	**Low**
Biotic Natural Environment	**Terrestrial Habitat**	Terrestrial habitats	The proposed modification of the project concerns interventions within the marine area, which do not interact with this SEA, which for this reason is excluded from the scope of this document.	**Outside the scope**
		Terrestrial Mammals	The proposed modification of the project concerns interventions within the marine area, which do not interact with the SPA in question, which for this reason is excluded from the scope of this document.	**Out of Scope**
		Amphibians and Reptiles	The proposed modification of the project concerns interventions within the marine area, which do not interact with the SPA in question, which for this reason is excluded from the scope of this document.	**Out of Scope**
	Marine Habitat	Marine Habitats	According to fieldwork carried out in 2023, 2021, and 2015 in the wider project area, areas of soft sandy substrate with sporadic dense vegetation of the marine phanerogam *Cymodocea nodosa* were recorded, as well as areas without vegetation. No *Posidonia oceanica* meadows were observed in the eastern part of the onshore facilities, but assessment data (Panayiotidis et al. 2022, Topouzelis et al. 2018) indicate their possible presence in front of the onshore facilities. The substrate of the offshore facilities is estimated to be muddy. substrate Consequently, the ecosystems in the area are less diverse and rich. Taking the above into account, the SPP is assessed as being **of low** importance.	**Low**

Significant Environmental Parameter (SEP).		Assessment	SPI Significance
Marine Mammals		The study area of the proposed project modification falls within Zone 9 of ACCOBAMS in the Northeast Mediterranean (Thracian Sea) and the Important Area for Marine Mammals "North Coast and Islands of the Thracian Sea." It also falls within the protected area of the Natura 2000 Network, SPA & SAC GR1150014 "Marine Area of Kavala - Thasos". Species such as the bottlenose dolphin (*Tursiops truncatus)* and the common dolphin (*Delphinus delphis)*, harbour porpoises (*Phocoena phocoena)* and the Mediterranean monk seal (*Monachus monachus)* are found here. Considering that part of the proposed project modification is developed within the protected areas, the SEA is assessed as being **of high** importance.	High
Sea Turtles		Based on data from the NGO Archelon, which has been studying sea turtles in the study area for the last four years (2020-2023), 81 sea turtle nestings have been recorded within the SPA & SCI GR1150014, which includes the proposed project. According to the "National Action Plan for the loggerhead sea turtle (*Caretta caretta*) in Greece," the area is not included in the nesting zones. Although the presence of Posidonia meadows in the area is limited, the condition of the marine environment and the habitats found in the marine area appear to be suitable for feeding sea turtles, especially the loggerhead, which feeds mainly on animal organisms. Taking the above into account, the environmental parameter related to sea turtles and their habitats in the area of the proposed project modification is assessed as Moderate.	Moderate

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
		Fish fauna	The study area of the proposed project modification falls within the Natura 2000 protected area GR1150014 "Marine Area of Kavala - Thasos." This Natura site is home to fish populations, including the protected species of shad (*Alosa Fallax)*. However, on the one hand, the area of intervention within the marine area is relatively limited and, on the other hand, there are already offshore mining facilities in place. Furthermore, for the duration of the construction works, fish populations have the possibility to temporarily move to adjacent areas with similar ecological characteristics in the wider study area. Taking the above into account, this SIA is assessed as being **of moderate** significance.	Moderate
	Birdlife	Avifauna	The study area of the proposed amendment is located within the Natura 2000 protected area TKS & ZEP GR1150014 "Marine Area of Kavala Thasos". The wider area includes the Natura 2000 sites SAC GR1150010 "Nestos Delta and Keramotis Lagoons - Wider Area," SPA GR1150001 "Nestos Delta and Keramoti Lagoons and Thasopoula Island" and SPA GR1150012 "Thasos (Mount Ypsario and coastal zone)". The marine area of the proposed project modification is included in the Important Bird Area (IBA) with code GR250 and name "Gulf of Kavala and Thasos marine area," while the study area also includes the GR012 area named "Nestos Delta and Coastal Lagoons." GR1150014 is home to the protected species *Phalacrocorax aristotelis desmerastii* and *Puffinus yelkouan*.	High

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			Considering that part of the proposed project modification is developed within the aforementioned protected areas, the SPP is assessed as being **of high** importance.	
	National System of Protected Areas	Protected Areas	The proposed project modification is located within the Natura 2000 protected area GR1150014 "Marine Area of Kavala and Thasos." The wider area includes the Natura 2000 sites SAC GR1150010 "Nestos Delta and Keramotis Lagoons - Wider Area", SPA GR1150001 "Nestos Delta and Keramotis Lagoons and Thasopoula Island" and SPA GR1150012 "Thasos (Mount Ypsario and coastal zone)". Consequently, this SPA is assessed as being of **high** importance.	High
		Forests and forest areas	The proposed modification of the project concerns interventions within the marine area, which do not interact with the SCI in question, which for this reason is excluded from the scope of this document.	Out of scope
		Other important natural areas	The proposed modification of the project falls within the Important Bird Area (IBA) with code GR250 and name "Gulf of Kavala and Thasos marine area," while nearby is the area with code GR016 and name "Thasos Island and Xironisi." The study area falls within the boundaries of Accobams Zone 9 in the Northeast Mediterranean (Thracian Sea). The study area falls within the Important Area for Marine Mammals named "Northern Coast and Islands of the Thracian Sea" with a total area of 5441 km^2. Therefore, this SPA is assessed as being of **high** importance.	High
Anthropo	Spatial planning and land use	Spatial planning and land use	As documented in **Chapter** 5 of this document, the project under study does not conflict with the guidelines, priorities, and choices of Spatial Planning at the national, regional, and sectoral levels, while it is compatible and	Low

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			compliant with the established spatial and urban planning commitments, as reflected in the established land uses of the study area. Taking into account the fact that all offshore facilities of the proposed project modification will be developed near existing facilities or in locations where restrictions already apply due to the existence of the Prinos offshore offshore mining project, this SIA is assessed as being **of low** significance.	
	Structure and functions of the man-made environment	Structure and functions of the man-made environment	The facilities of the proposed project modification are located in the Region of Eastern Macedonia and Thrace, in the Prefecture of Kavala, which consists of the Regional Units (RU) of Kavala and Thasos, in the Municipal Unit of Kavala of the Municipality of Kavala. The municipalities of the RE of Kavala and Thasos have a coastline and the main settlements are coastal or close to the sea. The most populous municipality in the prefecture is Kavala. The main characteristics of the Municipality of Kavala are as follows: • It is a classic example of a municipality with a large urban center and its surrounding areas. • Most of its area is coastal, but it also has a significant mountainous part. • It consists of a radial settlement network with one center and six satellite settlements. • The city of Kavala is the administrative center that serves all the residents of the Prefecture of Kavala. • It is a center of academic education and research • It has a full range of services and urban and social infrastructure. Kavala is the capital of the Kavala Prefecture. It is an important port and commercial center in northern Greece. It is also the seat of the Holy Metropolis of Philippi, Neapolis, and Thasos and concentrates a significant part of the cultural resources of the prefecture. The population of Kavala includes a mix of urban and rural communities, with the city of Kavala being the main urban center, while the surrounding areas include smaller towns and villages. The region's economy is diversified and exhibits multifaceted growth, with the tertiary sector and administration playing an important role, while at the same time functioning as a center for the rural hinterland, with an international commercial port outside the	**Moderate**

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			urban area, with an adjacent industrial zone, while adjacent to the city center there is an urban port used for leisure and as a gateway for cruise passengers. Therefore, based on the above, this SPP is assessed as being **of moderate** importance.	
	Cultural heritage	Cultural heritage	No sites or findings of cultural or archaeological interest have been identified in the project area. The marine area of the Gulf of Kavala, where all offshore facilities (existing and new) are located, has been thoroughly explored and there are no indications of significant underwater archaeological finds. Over time, the shallow waters and the type of seabed do not allow for the preservation of any ruins. It should also be noted that all coastal and offshore facilities of the proposed project will be developed in locations with existing facilities. Therefore, this SEA is assessed as being **of low** significance.	**Low**
	Socio-economic environment	Socio-economic environment	According to the Hellenic Statistical Authority, the Region of Eastern Macedonia and Thrace has a permanent population of 562,201 inhabitants, making it the 6th largest region in the country in terms of population. The permanent population decreased by 7.6% between 2011 and 2021. At the regional level, a greater decrease is observed in the region of Kavala compared to the region of Thasos (-7% and -4.8% respectively). The population of the region tends to be older, and the ratio of elderly people who need support to people of working age shows a strong age dependency, as the corresponding dependency ratio reached 0.367 in 2019, which is higher than the corresponding figure for the country (0.346). Regional GDP and GDP per capita followed the national pattern of the Greek economic crisis. Regional GDP has recovered since the end of the pandemic, reaching €8.12 billion in 2022, which corresponds to 3.93% of national GDP (8thamong the regions). At the regional level, in 2018, the regions of Kavala and Thasos accounted for 27% of the region's GDP. The Region of Eastern Macedonia and Thrace has historically specialized in the agricultural	**High**

Significant Environmental Parameter (SEP).	Assessment	SPI Significance
	sector, with the share of GVA being almost double the national level, showing a significant interconnection between the primary sector and the other two productive sectors (manufacturing and tourism). The fisheries and aquaculture sector is also particularly dynamic, showing growth in all the Region's administrative units. Fish and shellfish farming units are mainly located in the wetlands of the sea front and to a lesser extent in inland waters. The coastal fishing sector is also an important productive sector for the region, with a presence in all the regional units that have a sea front. According to the results of the 2022 Motorized Boat Sea Fishing Survey, the largest quantities of fish in the country are found in the fishing area: Strymonikos and Kavala bays, the coast of Thasos island and the Thracian Sea, 16,299.2 tons and a percentage of 25.0%. The GVA of the secondary sector in the regional economy was approximately 19% in 2017. The sector is particularly dependent on the primary sector, as it mainly concerns the exploitation of agricultural production and quarrying and mining wealth, as well as the processing of other raw materials. The tertiary sector accounts for the largest share of employment. The tourism sector is showing an upward trend, and the revenue of the Region of Eastern Macedonia and Thrace from tourism in 2022 represented 2% (€508 million) of the country's total revenue, while the direct contribution of tourism to the Region's GDP amounted to 6%. The Region increased its human resources in the accommodation and catering sectors by 2.0% between 2010 and 2019, one of the highest rates in the country. In 2023, Kavala airport recorded a 19% increase in arrivals and on the island of Thasos the increase in ferry lines was 17%.	

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			With regard to the economically active population in the Region of Eastern Macedonia and Thrace, the rate for 2023 reaches 50.1%, ranking the Region 5th from the bottom among the 13 Regions. Successive crises have had a negative impact on unemployment levels in the Region of Eastern Macedonia and Thrace. Despite the recovery, unemployment levels in the Region remain higher than the national average and significantly higher than the EU average. Comparatively, the pattern of unemployment in the Kavala Region is similar to that of less rural areas. In other words, while regions with greater participation in agricultural production experienced a smaller increase in unemployment during the crisis, as the country emerged from the crisis after 2015-2016, the regions with greater participation in the secondary and tertiary sectors experienced a greater decline in unemployment. Given the importance of sectors such as fisheries and tourism to the regional and local economy and the recent pressures on the labor market due to successive crises, this SPP is considered to be of **high** importance.	
	Social Infrastructure	Health	The Kavala Health Unit has the following infrastructure: • The General Hospital (GH) of Kavala, which provides primary care (regular and afternoon outpatient clinics) and secondary care. • The General Hospital is responsible for the operation of the Center for Physical Medicine and Rehabilitation (KEFIAP) in Chrysoupoli and the Mental Health Center in Kavala. As part of the community operational program "Psyharagos Phase A" for the integration and reintegration of people with mental illnesses into the labor market, the hospital operates a hostel with ten residents. • The General Hospital of Kavala also administers the Prefecture's Health Centers, along with their regional clinics. Tertiary health care is provided mainly through the University Hospital of Alexandroupolis or the University and other specialised hospitals in Thessaloniki and the rest of Greece or abroad.	High

Significant Environmental Parameter (SEP).			Assessment	SPI Significance
			The National Emergency Aid Center (EKAV) is responsible for transporting patients or injured persons to healthcare facilities. EKAV is part of the National Health System. In case of emergencies, accidents, or incidents, first aid is provided by healthcare facilities until the injured have access to more specialized care from general hospitals or larger health centers, if needed. According to a recent report by the Foundation for Economic and Industrial Research (IOBE), Eastern Macedonia and Thrace are among the regions where self-reported problems of access to health services (unmet needs for medical care due to cost, geographical distance, or waiting lists) are particularly high, reaching 11.7% in 2022. Given the reported pressure on access to health services, this SPP is considered to be **of high** importance.	
	Technical Infrastructure	Technical infrastructure	No technical infrastructure vulnerable to potential impacts from the implementation and operation of the proposed project has been identified in the immediate study area. Furthermore, due to the scale and nature of the proposed project modification (no significant amounts of waste are produced, no significant amounts of energy are required, etc.), it does not appear that the networks and technical infrastructure of the wider study area will be significantly burdened. Therefore, this SIA is assessed as **Low** significance.	**Low**

9.2.2.2 Assessment of Environmental and Social Impacts

The final assessment of each potential impact results from the interaction between the nature of each impact (nature, significance, and magnitude) and the significance of each SIA (**Table 10-1**). Therefore, the overall assessment and evaluation of each potential impact depends on the inherent significance of the impact, the sensitivity and quality of the environment, as described in **the** following **Sections.**

9.2.2.2.1 Calculation of the Significance of Impacts

The calculation of the significance of each impact is based on **the Conesa method** (Conesa, 2010), which was processed and adapted by the LDK study team so that, on the one hand, it aligns with international guidelines [113][114] , the corresponding national and EU legislation, and internationally best available practices, and on the other hand, to respond to the best possible degree of functionality in accordance with the technical parameters of the proposed project modification under study and the environmental characteristics of the study area.

Based on this method, the assessment of the significance of the impact of a project or activity on an environmental parameter is derived from the assessment of the likelihood of the project/activity having an impact, in conjunction with specific variables, such as, among others, the intensity of the intervention, the extent and duration of the resulting impact.

The significance of the impacts is assessed on the basis of the qualitative result caused by each impact, which in turn is defined as the ratio by which the environmental impact is measured based on the degree of intensity of the change produced and the characterization of the impact. This characterization is based on qualitative criteria such as **intensity (IN), extent (EX), period of occurrence (MO), duration (PE), reversibility (RV), synergy (SI), accumulation (AC), effect type (EF), periodicity (PR)**, and **recovery (MC).**

In the context of this **Chapter**, the probability of occurrence is not included in the qualitative criteria for determining the significance of the impact, as the impacts from the normal activities of the project are considered to be certain or almost certain to occur. Impacts with a lower probability of occurrence relate to extraordinary events/accidents, which are assessed using a different methodology based on the probability of occurrence of potential risks and their consequences (see **Chapter 9.2.3**).

The following **table** presents the qualitative assessment criteria for calculating the significance of each impact.

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[113] International Finance Corporation (IFC). A Guide to Biodiversity for the Private Sector: The Social and Environmental Impact Assessment Process: https://www.ifc.org/wps/wcm/connect/9608497e-56e8-4074-bab6-45c61a36a4ad/ESIA.pdf?MOD=AJPERES&CVID=jkCYZ3G

[114] European Bank for Reconstruction and Development (EBRD). Guidance Note: EBRD Performance Requirement 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources: https://www.ebrd.com/downloads/about/sustainability/ESP_PR06_Eng.pd

Table9 –2 : Criteria for the Qualitative Assessment of the Environmental and Social Impacts of the Project

Nature: Defines the nature of the impact, which can be **Positive** or **Negative**.

Positive: An impact that is considered to represent an improvement on the baseline or introduce a positive change.

Negative: An impact that is considered to represent an adverse change from the baseline, or introduces an undesirable factor.

Intensity (IN):

Physical (Biotical and Abiotic) Environment: Intensity can be considered in terms of the sensitivity of the receptor (e.g., habitats, species or biocommunities, waters, soil, etc.). More specifically:

- **Negligible**: The impact on the environment is not detectable.
- Minor:
  - The impact affects the environment in such a way that natural functions and processes are not significantly adversely affected (in the case of a negative impact).
  - The impact affects the environment in such a way that natural functions are improved to a small extent (in the case of a positive impact).
- Medium:
  - In cases where the affected environmental parameter changes, but natural functions and processes continue, albeit modified (in the case of a negative impact).
  - In the case where, although the affected environmental parameter changes, natural functions and processes have improved significantly (in the case of a positive impact).
- High:
  - In cases where natural functions or environmental parameters change to such an extent that they may be temporarily or permanently halted or altered (in the case of a negative impact).
  - In cases where natural functions or environmental parameters are significantly upgraded in relation to their current status (in the case of a positive impact).
- Critical:
  - In cases where natural functions or environmental parameters change to such an extent that they may cease or be altered permanently and beyond restoration (in the case of a negative impact).
  - In cases where natural functions or environmental parameters are significantly upgraded in relation to their current status (in the case of a positive impact).

Where necessary, national and/or international standards are used as a measure of impact assessment. Specific studies should contribute to quantifying the magnitude of the impacts with the corresponding relevant documentation.

Human & Socio-economic Environment: Intensity can be examined in terms of the ability of individuals/communities affected by the project to cope with or adapt to the negative changes caused by the Project (in the case of a negative impact), or the extent to which their quality of life/well-being will be enhanced as a result of socio-economic benefits (in the case of a positive impact). More specifically:

- **Negligible:** No noticeable change in the quality of life of the affected individuals/communities is recorded.
- Minor:
  - The affected individuals/communities can cope with/adapt to the negative impacts with relative ease and maintain the quality of life/well-being they had before the impact (in the case of a negative impact).
  - The affected individuals/communities will benefit marginally from the proposed activity and experience a relatively small improvement in their quality of life/well-being (in the case of a positive impact).
- Medium:
  - Affected individuals/communities can cope with/adapt to the negative impacts with some difficulty and maintain their pre-impact livelihoods, but only with a degree of support to mitigate the impacts (in the case of a negative impact).
  - The quality of life/well-being of affected individuals/communities improves relatively as a result of positive impacts.
- High:
  - Affected individuals/communities can cope with/adapt to negative impacts with great difficulty and maintain their pre-impact livelihoods, but only with full support to mitigate the impacts (in case of negative impacts).
  - The quality of life/well-being of affected individuals/communities is significantly improved as a result of positive impacts.
- Critical:
  - Those affected will not be able to cope with/adapt to the negative changes and will not be able to maintain the quality of life/well-being they had before the impact (in the case of a negative impact).
  - The quality of life/well-being of individuals will improve significantly as a result of the positive impacts.

Extent (EX): The area of influence affected by the impact, including the Project's footprint and its immediate surroundings. More specifically:

- **Within the Project's land acquisition area**: The impact is limited to a specific location within the boundaries of the Project's land acquisition area.
- **Local**: The impact affects a limited geographical area around the boundaries of the Project.
- **Regional/National**: The impact affects important environmental resources at a regional or national level or is experienced on a regional/national scale (based on administrative boundaries, habitat/ecosystem type, etc.).
- **International/Transboundary**: The impact affects important environmental resources at the international/transboundary level or is experienced on an international/transboundary scale.
- **Critical** – the impact (local or otherwise) affects a critical area.

Occurrence period (MO): The time between the start of the Project implementation and the occurrence of the impact on the environmental receptor under consideration.

- **Immediate**: The impact occurs simultaneously with the start of Project implementation (or within a very short time thereafter).
- **Short-term**: The impact occurs within one year of the start of the Project implementation.
- **Medium-term**: The impact occurs between 2 and 10 years after the start of the Project.
- **Long-term**: The impact takes more than 10 years from the start of the Project implementation to manifest itself.

Duration (PE): The estimated duration of the impact, from the moment it manifests itself until the return to the situation prior to the intervention, by natural means or by the implementation of appropriate/targeted measures. In more detail:

- **Short**: The impact is expected to be of short duration and intermittent/occasional. The duration of the impact is almost zero.
- **Temporary**: The impact lasts less than 1 year.
- **Short-lived**: The impact lasts from 1 to 10 years.
- **Long-term**: The impact lasts from 11 to 25 years.
- **Permanent**: The impact lasts longer than 25 years.

Reversibility (RV): The ability to restore the receptor of the respective environmental parameter affected by the project/activity by natural means and without human intervention. Impacts are classified as **reversible** if the affected receptor can return to its original state in less than 25 years.

More specifically, reversibility can be:

- **Short-term**: When the reversal is recorded within 1 year.
- **Medium-term**: When the reversal is recorded within 2-10 years.
- **Long-term**: When the reversal is recorded within 11-15 years.

If the affected recipient cannot return to its pre-intervention state without human intervention within a period of 15 years, the impact is considered **irreversible by natural means**.

Synergy (SI): The phenomenon whereby the impact caused by one activity acts synergistically with the impacts of other activities if they are carried out simultaneously, leading to greater impacts (type, intensity, duration, extent, etc.) compared to the individual impact of each activity.

More specifically, the impact can be:

- **Non-synergistic**: The impact of an activity is isolated, without any synergistic action.
- **Synergistic**: The impact of the activity may act synergistically with the impacts of other activities, if these are implemented simultaneously, leading to greater impacts than the individual action of each activity.
- **Highly synergistic**: The impact of the activity may act synergistically with the impacts of other activities if they are implemented simultaneously, leading to significantly greater impacts than the individual action of each activity.

Accumulation (AC): The progressive increase in the scale of the impact on the receptor of the corresponding environmental parameter when the impact persists over time.

More specifically, the impact can be:

- **Independent (non-cumulative)**: The action of the impact is isolated and does not cause additional cumulative impacts.
- **Cumulative**: The impact of the effect increases progressively due to the lack of means of elimination/minimization when the activity causing the impact extends over a prolonged period of time. In addition, cumulative impacts also arise from the cumulative impact of the activity on a receptor when it is added to other past, present, and future activities, regardless of who is responsible for those activities.

Effect (EF): The cause-and-effect relationship, also known as the consequence of an activity.

More specifically, the effect of an impact can be:

- **Direct**: The impact resulting from a direct interaction between a planned project activity and the receptor of a corresponding environmental parameter (e.g., between the occupation of a site and pre-existing habitats or between wastewater discharge and the quality of the receiving water).

• **Indirect**: The impact resulting from other activities caused as a secondary consequence of the Project (e.g., internal migration for employment reasons causing demand for resources).
Periodicity (PR): The occurrence of an impact or the repetition of a phenomenon irregularly or according to a specific and defined pattern. More specifically, the impact may manifest itself as: • **Irregular and discontinuous**: The impact occurs in an unpredictable manner and recurs occasionally without following a specific and clear pattern. • **Continuous**: The impact manifests itself in a continuous and stable manner, which does not change significantly over time. • **Periodic**: The impact manifests itself according to a specific and defined pattern, in a cyclical and repetitive manner.
Restoration (MC): The possibility of total or partial restoration/recovery of the environmental parameter/receptor or process affected by the Project through the implementation of corrective measures. More specifically, the impact on the receptor may be: • **Immediately restorable**: The recovery/restoration of the receptor to its original state is achieved by implementing corrective measures during the implementation of the proposed interventions or immediately upon completion thereof. • **Restorable in the short term**: The recovery/restoration of the receptor to its original state is achieved by implementing corrective measures within 1 year. • **Restorable in the medium term**: The recovery/restoration of the receptor to its original state is achieved by implementing corrective measures within 2-10 years. • **Restorable in the long term**: The recovery/restoration of the receptor to its original state is achieved by implementing corrective measures within 11-15 years. • **Partially Restorable**: The impact is partially reversible through the implementation of corrective measures. • **Compensable/compensated**: The impact is irreversible with the implementation of corrective measures, but is subject to compensation/compensation. • **Irreversible**: The impact is irreversible with the implementation of corrective measures or the restoration time exceeds 15 years.

The significance of the impact is quantified by assigning the corresponding numerical values to the evaluation criteria in **the** above **Table**, in accordance with the Scoring Table (**Table 9-3**) provided below.

Table 9 -3 : Scoring of Qualitative Assessment Criteria

Quality Impact Criteria	Quality Assessment Criteria	Value
Nature (S)	Positive	+1
	Negative	-
Intensity (IN)	Negligible	1
	Small	2
	Medium	4
	High	8
	Critical	12
Area (EX)	Within the Project's area of occupation	1
	Local	2
	Regional/National	4
	International/Cross-border	8
	Critical	+4
Period of occurrence (MO)	Long-term	1
	Medium	2
	Short-term	3
	Immediate	4

Quality Impact Criteria	Quality Assessment Criteria	Value
Duration (PE)	Short	1
	Temporary	1
	Short-lived	2
	Long-term	3
	Permanent	4
Reversibility (RV)	Short-term	1
	Medium term	2
	Long term	3
	Irreversible	4
Synergy (SI)	Non-synergistic	1
	Synergistic	2
	Highly synergistic	4
Accumulation (AC)	Independent (non-cumulative)	1
	Cumulative	4
Effect (EF)	Indirect	1
	Direct	4
Periodicity (PR)	Irregular and inconsistent	1
	Periodic	2
	Continuous	4
Restoration (MC)	Immediately restorable	1
	Restorable in the short term	2
	Restorable in the medium term	3
	Restorable in the long term	4
	Offset / Partially recoverable	4
	Non-recoverable	8
*For impacts occurring in critical areas, a value of 4 is added to the corresponding impact area value.		

(Source: Conesa, 2010, as adapted by the LDK study team)

The following equation, which results from weighting the above criteria, is used to calculate the quantified value of the significance of the impact, Im:

$$Im = S * (3 * IN + 2 * EX + MO + PE + RV + SI + EF + PR + MC + AC)$$

Where, Im values range from 13 to 100.

As mentioned above, this methodology does not include the probability of occurrence in the criteria for determining the significance of the impact, as the impacts from the normal activities of the project are considered to be certain or almost certain to occur. Therefore, the probability of occurrence is not included as a factor in the above equation, as it is given a de facto value of 1.

The quantified value of the significance of each impact is an absolute value (Im), which constitutes the Magnitude of Impact.

9.2.2.2.2 Assessment of Environmental and Social Impacts

As already mentioned, the Magnitude of Impact is a quantified value of the significance of each impact and therefore indicates which of the potential impacts of the proposed project are relevant and potentially significant. However, since the absolute value of the impact magnitude (Im) alone can only be used for comparative consideration between potential impacts, based on the Conesa method, the assignment of Im values has been standardized into categories, which are separated by specific numerical limits and clearly define **classes for characterizing** the significance of impacts. The following are the classes for characterizing the significance of impacts, which are defined by the corresponding ranges of Im values, based on the Conesa method (as adapted by the LDK study team).

9 –4 : Classes characterizing the significance of each impact based on the value of the impact magnitude (Im)

Im Price Ranges	Impact Severity Classes
≤	Negligible
21≤ Im≤ 40	Minor
41≤ Im≤ 60	Moderate
61≤ Im≤ 85	High
Im > 85	Very high

(Source: Conesa, 2010, as adapted by the LDK study team)

The significance rating class for each impact is used in conjunction with the assessment of Significant Environmental Parameters (see **Section 9.2.2.1**) to produce the Final Assessment for each impact, which is classified as **Negligible, Minor, Moderate, Serious**, or **Critical** according to the Conesa method (Conesa, 2010), as adapted by the LDK study team (**Table 9-5**).

9 –5 : The matrix for determining the final assessment of each environmental and social impact

		Impact Significance Characterization Classes				
		Negligible	Minor	Moderate	High	Very High
Significance SPP	Low	Negligible	Negligible	Low	Moderate	Significant
	Moderate	Negligible	Small	Moderate	Significant	Critical
	High	Small	Moderate	Significant	Critical	Critical

(Source: Conesa, 2010, as adapted by the LDK study team)

The above categories of impact significance correspond to the definitions set out in **the** following **table**.

9 –6 : Definition of the Significance of Environmental and Social Impacts

Critical	Impacts above an acceptable threshold, which result in permanent loss of environmental quality that cannot be restored, regardless of the implementation of preventive or corrective measures. These impacts are irreversible. Therefore, this is an unacceptable impact, as it corresponds to a serious impact that cannot be mitigated. Environmentally and socially acceptable alternatives for the implementation of the project/activity should be identified, or otherwise its implementation should be suspended.
Significant	Impacts that require extensive and intensive preventive or corrective measures to return the receptor to its original state and, despite the implementation of the necessary preventive or corrective measures, the recovery period is medium-term or long-term.
Moderate	Impacts that do not require extensive and intensive preventive or corrective measures and the period required to return the receptor to its original state is not long, may be temporary, reversible and/or recoverable in the short or medium term. In the case of moderate impacts, these are subject to mitigation and corrective measures are required where feasible, but extensive and intensive measures are not required.
Minor	Impacts that cause detectable but insignificant changes to the existing condition of the receptors require very limited preventive or corrective measures, and the period required for the receptor to return to its original condition is short (may be temporary, reversible, and/or recoverable in the short term). In the case of minor impacts, these are subject to minimization or even avoidance through the implementation of very limited in scale and intensity measures.
Negligible	Impacts that can be reversed immediately once the activity ceases and do not require preventive or corrective measures. Negligible impacts are immediately reversible, short-lived, and do not require corrective measures.
Positive	Impacts that result in an improvement in the quality/condition of the receptor.

(Source: Conesa, 2010, as adapted by the LDK study team)

9.2.2.3 Residual Impacts

Residual impacts are those that remain after preventive and/or corrective measures have been implemented. If mitigation/remediation measures are proposed, the significance of these impacts is reassessed on the assumption that the proposed measures will eliminate or reduce their significance. This

reassessment is carried out for impacts that are categorized based on the above (see **Section 9.2.2.2.1)** as **Moderate, Significant**, and **Critical** before the implementation of countermeasures/mitigation measures.

9.2.3 Assessment of Potentially Significant Impacts Arising from the Project's Vulnerability to Project-Related Accident or Disaster Risks (Emergency Conditions/Unplanned Events)

9.2.3.1 Introduction

In accordance with paragraph 3 of Article 5 of Joint Ministerial Decision 48416/2037/E.103/2011 (Government Gazette 2516/B/7.11.2011) *"Measures and conditions for the storage of carbon dioxide in geological formations...–Amendment of Joint Ministerial Decision No. 29457/1511/2005 (B' 992), Presidential Decree 51/2007 (A' 54) and Presidential Decree 148/2009 (A 190), in compliance with the provisions of Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 "on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, Directives 200/60/EC, 2001/80/EC, 2004/35/EC and 2008/1/EC of the European Parliament and of the Council and Regulation (EC) No 1013/2006,"* a geological formation shall be selected as a storage site only if, under the proposed conditions of use, there is no significant risk of leakage or significant risk to the environment or health.

The risk assessment was carried out in the context of the application submitted by EnEarth to EDEYEP on 30.06.2024 (Ref. No. 22781/EDEYEP) in order to determine the suitability of the geological formation as a CO_2 , based on Article 173 of Law 4964/2022, and follows the content specified for Phase 3.3 of the assessment of the proposed storage complex in Annex I of Joint Ministerial Decision 48416/2037/E.103/2011.

The risk assessment includes, among other things, the following:

i. **Risk investigation** through the investigation of potential leakage events from the storage complex. In this context, the following are examined, among other things:

   a) possible leakage routes.

   b) the possible magnitude of leakage events for identical leakage routes (flow rates).

   c) critical parameters affecting potential leakage.

   d) the secondary effects of CO_2 storage, including displaced formation fluids and new substances that may be created by CO_2 storage.

   e) any other factors that may pose a risk to human health or the environment (such as natural structures associated with the project).

ii. **Exposure assessment** — based on the characteristics of the environment, the distribution and activities of the human population above the storage complex, and the behavior and fate of CO_2 leaking from potential pathways.

iii. **Effects assessment** — based on the sensitivity of specific species, communities, or habitats associated with potential leakage events (point i).

iv. **Risk characterization** — assessment of the safety and integrity of the site, in the short and long term, including an assessment of the risk of leakage under the proposed conditions of use and the environmental and health impacts in the worst-case scenario.

9.2.3.2 Methodology

In order to achieve a comprehensive overview of the risks posed by the proposed modification of the Project within the framework of this assessment, the risk level in each section (drilling, storage site) is evaluated. Deviations from standard operating procedures and conditions (pressure, temperature, flow rates) that could cause risks and affect the safety, integrity, and reliability of both the infrastructure and the hydrocarbons in the reservoir are thoroughly examined.

The risks associated with CO_2management facilities are no different from the risks faced on a daily basis at existing oil and gas production facilities in Prinos, which have many pipelines and equipment through which hazardous gases flow (e.g., H(2) S). The identified risks for both the Prinos facilities and the wells are examined using a **Qualitative Risk Assessment Method**, in accordance with the company's policy and procedures for identifying and assessing relevant risks, based on ISO 17776:2000 and in accordance with the guidelines of the competent authorities and the EU[115] .

Probability, on a scale of A-E (E-highest probability), and **severity**, on a scale of 1-5 (5-highest severity), are the assessment criteria that lead to the final overall risk level (**Table 9-7).**

For risks related to the subsoil, a comprehensive risk assessment was performed using the bowtie analysis method to estimate the probability and potential leakage quantities of various potential leakage routes. Based on the probability of failure for each means of protection, the bowtie analysis included a **semi-quantitative risk assessment (SQRA)** to estimate the probability of leakage for each different route. The estimation of leakage rates and rates as a percentage (%) of the total mass of CO(2)injected was determined in accordance with the guidelines of the UK Department of Energy and Climate Change report (2012), according to which leakage rates along escape pathways such as fractures or boreholes can be estimated based on the total CO(2)mass injected.

[115] Guidelines of the competent service DIP/YPEN (General guidelines and recommendations for assessing and evaluating the environmental impact of the vulnerability of Projects or Activities to the risk of major accidents and natural disasters).

Environmental Impact Assessment of Projects. Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by Directive 2014/52/EC. European Union, 2017.

Environmental Impact Assessment of Projects. Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EC). European Union, 2017.

Risk Assessment. Improving the Implementation of Environmental Impact Assessment, funded by EC Sixth Framework Program.

It is important to note that, although the semi-quantitative risk assessment (SQRA) produces numerical values, these are based entirely on the judgment of experts in the field, as there is limited data on the long-term geological storage of CO_2 . Therefore, the results of the SQRA should be considered only as indicative values for comparing relative risks rather than for deriving absolute values.

Taking into account the design stage of the proposed modification of the CO_2 Storage Project in Prinos, the risk assessment study also aims to propose mitigation or prevention measures to be implemented in future stages of the Project.

9 –7 : Risk assessment table according to ISO 17776:2000

Severity	Impact				Probability				
	People	Facility	Environment	Reputation	A	B	C	D	E
					Never happened in the Hydrocarbon Exploration & Production industry	It has happened in the Hydrocarbon Exploration & Production industry	It has happened at Energean and many times in the Hydrocarbon Exploration & Production industry	It has happened many times in the Hydrocarbon Exploration & Production industry or more than once a year at Energean or it has happened at the facility	It happens frequently in the Hydrocarbon Exploration & Production industry or more than once a year at the facility
					Increasing likelihood →				
1 Negligible	First aid	Negligible damage Production loss < 1 hour Repair/loss cost < $1 million	Negligible impact Recovery in < 15 days & cost < $1 million	Negligible impact Negligible interest from the local community					
2 Small	Provision of medical treatment Limited ability to work	Minor damage Loss of production 1 hour - 4 days Repair/loss cost $1 million - $6 million	Minor impact Recovery in 15 days - 1 month & cost $1 million - $6 million	Limited impact Little interest from the local community		LOW		MODERATE	
3 Moderate	Loss of working days	Local damage Loss of production 4–7 days	Local impact Recovery in 1–12 months & cost $6	Notable impacts Moderate public interest					

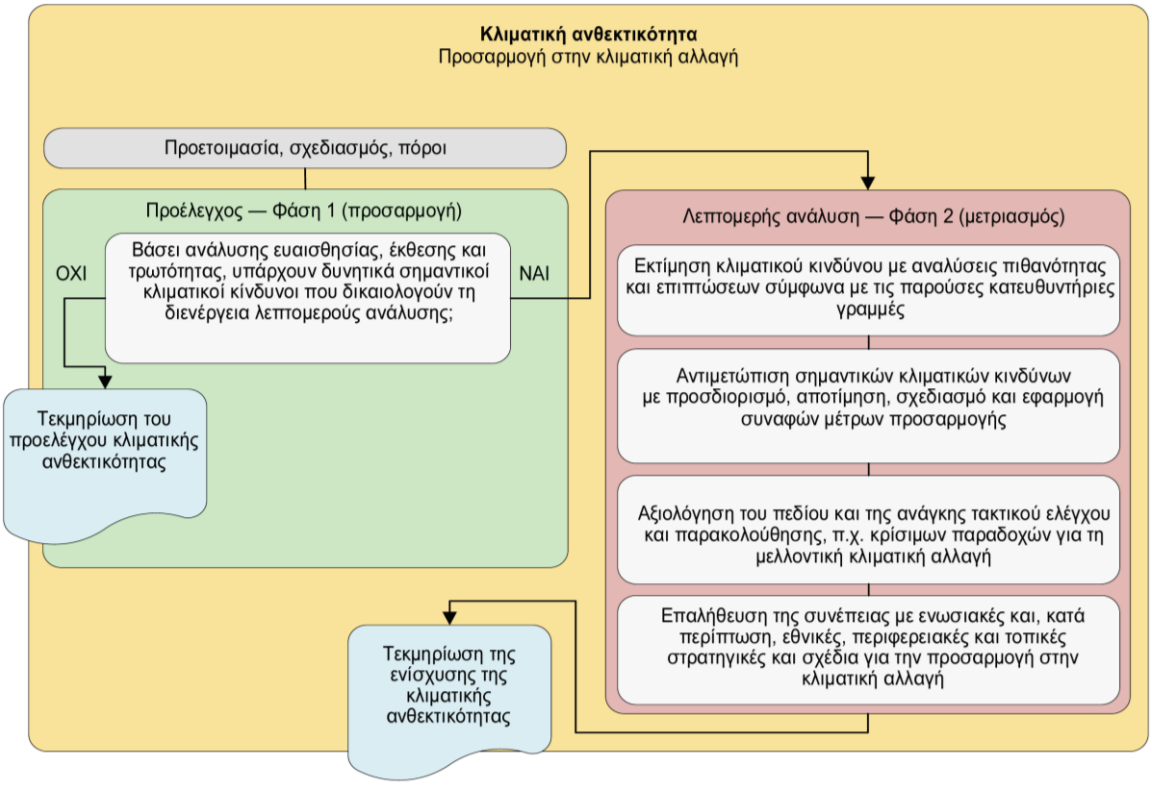
Severity	Impact				Probability				
	People	Facility	Environment	Reputation	A	B	C	D	E
					Never happened in the Hydrocarbon Exploration & Production industry	It has happened in the Hydrocarbon Exploration & Production industry	It has happened at Energean and many times in the Hydrocarbon Exploration & Production industry	It has happened many times in the Hydrocarbon Exploration & Production industry or more than once a year at Energean or it has happened at the facility	It happens frequently in the Hydrocarbon Exploration & Production industry or more than once a year at the facility
					Increasing likelihood →				
		Repair/loss cost $6 million – $12.5 million	million–$12.5 million	– Local TV/newspapers					
4 Critical	Loss of life Permanent or partial disability	Extensive damage Loss of production 7–28 days Repair/loss costs $12.5 million - $100 million	Major impact Recovery in 12–24 months & cost of $12.5 million–$100 million	Major impact at the national level National interest – State TV/newspapers				HIGH	
5 Catastrophic	Loss of life, multiple permanent disabilities	Extensive damage Loss of production > 28 days Repair/loss costs >$100 million	Extensive impact Recovery in >18 months & cost >$100 million	Major international impact International interest International TV/newspapers					

9.2.4 Assessment of Potential Significant Impacts Arising from Expected Climate Risks

9.2.4.1 Introduction

This **section** presents the methodology for documenting the **resilience of the proposed project modification to climate change**, i.e., its ability to cope with and adapt to expected climate risks.

In the context of this **Section**, the basis for the analysis of the resilience of the proposed project modification to climate change is the process specified in the European Commission document entitled *"Technical Guidelines on Enhancing the Resilience of Infrastructure to Climate Change for the Period 2021-2027"* (2021/C 373/01) hereinafter referred to as the "**Technical** Guidance," which is summarized in **the** following **diagram.**



(Source: "Technical guidance on enhancing the resilience of infrastructure to climate change for the period 2021-2027" (2021/C 373/01)

Figure9 –1 : Overview of the climate change adaptation process for enhancing climate change resilience

Overall, the assessment of the adaptation of infrastructure projects to climate change consists of two phases, the first of which is a preliminary **check** that may reveal the need for **a detailed analysis** (second phase).

During the preliminary review, a vulnerability analysis of the proposed project modification to climate change is performed. The vulnerability analysis determines whether a detailed analysis is required or not. If required, the detailed analysis includes a **risk analysis** of each **significant source of risk** identified in **the vulnerability analysis.** The risk analysis assesses each risk source, which now constitutes the **inherent risk,** in terms of its **level of significance**. For significant inherent risks, climate change **adaptation measures** need to be considered that reduce each significant inherent risk to **an acceptable level of residual risk.**

9.2.4.2 Preliminary check

9.2.4.2.1 General Information

The pre-assessment phase includes an **analysis of** the Project's **vulnerability** to climate change. The vulnerability analysis is divided into three steps and includes the following methodological steps:

1 Sensitivity analysis,

2 Analysis of current and future exposure,

3 A combination of these two for vulnerability analysis.

For the sensitivity, exposure, and vulnerability analysis, the National Coordination Authority of the Ministry of Development and Investment, in collaboration with the Jaspers (Joint Assistance to Support projects in European Regions) team and with the support of the Ministries of Environment and Energy (YPE) and Infrastructure and Transport (**YPEME)**, has developed a methodology for assessing the climate resilience of infrastructure projects with an expected lifetime of at least 5 years (paragraph 2.i of Article 73 of Regulation (EU) 2021/1060). This methodology, as well as the relevant adapted calculation tools (e.g. calculation tool in Excel software developed by the General Secretariat for Public Investment & ESPA and available on **the National Information Web Hub for Climate Change Adaptation – AdaptivGreece Hub**[116] developed within the framework of the LIFE-IP AdaptInGR project (www.adaptivegreece.gr)) are applied in **the** following **Sections** to **analyze the vulnerability** of the Project to climate change.

9.2.4.2.2 Sensitivity Analysis

The purpose of the sensitivity analysis is to identify the **sources of risk (hazards)** for the specific type of building infrastructure, based on its construction and operational characteristics, **regardless of its location**. In other words, sensitivity concerns the type of project and how it operates. Important elements for the

[116] Climate forecast visualization tool: https://geo.adaptivegreecehub.gr
Climate resilience check tool: https://adaptivegreecehub.gr/eleghos-klimatikis-anthektikotitas/

sensitivity analysis of an infrastructure are its design characteristics, as mentioned in the relevant technical studies of the infrastructure and the environmental impact study, where it is planned to be carried out.

A hazard is defined as the possible occurrence of a natural or man-made event or trend that could cause loss of life, injury, or other health effects, as well as damage to or loss of property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.

Lists of potential hazards are available in the relevant literature and methodological texts, with a common feature of all relevant lists being that they are non-exhaustive and their applicability to a specific project, infrastructure, or location should be checked each time. A relatively extensive list of hazards is published in the European Classification Regulation[117] . This list divides risk sources into chronic risks and extreme events (acute risks) and classifies them into four categories:

- Temperature-related sources of risk (heat stress, forest fires, etc.)
- Wind-related risk sources (storms, hurricanes, etc.)
- Water-related hazards (sea level, droughts, floods, etc.)
- Soil-related hazards (coastal erosion, landslides, etc.)

Another list of potential sources of risk is provided in the JASPERS working document[118] .

Many sources of risk are mentioned in both lists. In addition, some of the sources of risk may not apply to Greece due to its geographical location, such as those related to the melting of permanently frozen ground (permafrost).

In addition to the lists, the risk sources identified in the Regional Climate Change Adaptation Plans (PESPCA), which have been drawn up by the country's 13 regions on the basis of the National Strategy for Adaptation to Climate Change (ESPKA). This Study uses the **Table of Risk Sources** that has been compiled from all of the above sources (see **Table** below**).**

More specifically, the sensitivity analysis for the proposed modification of the project, according to the calculation tool of the General Secretariat for Public Investment & NSRF, is summarized in **the** following **Table,** where the relevant classification of (Low, Moderate, High) for each parameter of the project's implementation and operation (Construction, Operation, Products/Services, Integration into the region), the combination of which results in the overall sensitivity of the proposed project modification.

117 Regulation (EU) 2021/2139 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing technical screening criteria for determining the conditions under which an economic activity is considered to contribute significantly to climate change mitigation or adaptation and for determining whether that economic activity does not significantly harm any of the other environmental objectives (Annex IA)

118 JASPERS Guidance Note, the basics of climate change adaptation vulnerability and risk assessment, version 1, June 2017

9 –8 : Sensitivity analysis for the proposed project modification

Risk Source	Sensitivity				
	Construction	Operation	Products Services	Integration into the area	Total Sensitivity
Heatwave					
Cold Wave					
Frost (Number of Days with TN<0)					
Forest fire					
Cyclone, Severe Storms, Hurricane					
Storm (including snowstorms, dust storms)					
Tornado/Gale-force winds					
Drought					
Heavy precipitation (rain, hail, snow/ice)					
Flooding (in coastal areas, rivers, due to rain, groundwater)					
Landslides/Soil erosion					
Subsidence					
Change in average air temperature					
Urban heat island					
Thermal stress					
Temperature variability					
Change in solar radiation					
Change in wind characteristics					
Change in precipitation characteristics and types (rain, hail, snow/ice)					
Precipitation variability or hydrological variability					
Change in average water temperature in water bodies					
Acidification/salinity of seawater					
Saltwater intrusion, salinisation of surface and groundwater					
Sea level rise					
Availability and stress on water resources					
Coastal erosion					
Soil degradation, changes in salt content, desertification					

Risk Source	Sensitivity				
	Construction	Operation	Products Services	Integration into the area	Total Sensitivity
Changes in the length of growing seasons					

9.2.4.2.3 Survey analysis

The purpose of the exposure analysis is to identify the sources of risk (hazards) for the planned geographical location of the infrastructure (or for alternative locations), both in the immediate and distant future, regardless of its type.

The **Hazard Source Table** selected for the sensitivity analysis of the project will be used for the exposure analysis process.

More specifically, the exposure analysis for the proposed project modification, according to the data presented in **Chapter 6** of this document and the calculation tool of the General Secretariat for Public Investment & ESPA, is summarized in **the** following **Table**, where the relevant classification of (Low, Moderate, High) for current and future conditions (Current conditions, Future conditions), the combination of which results in the overall sensitivity of the proposed project modification.

Table9 –9 : Exposure analysis for the proposed project modification

Source of Risk	Exposure		
	Existing conditions	Future conditions	Total Exposure
Heatwave			
Cold wave			
Frost (Number of Days with TN<0)			
Forest fire			
Cyclone, severe storms, hurricane			
Storm (including snowstorms, dust storms)			
Tornado/Gale-force winds			
Drought			
Heavy precipitation (rain, hail, snow/ice)			
Flooding (in coastal areas, rivers, due to rain, groundwater)			
Landslides/Soil erosion			
Subsidence			
Change in average air temperature			

Source of Risk	Exposure		
	Existing conditions	Future conditions	Total Exposure
Urban heat island			
Thermal stress			
Temperature variability			
Change in solar radiation			
Change in wind characteristics			
Change in precipitation characteristics and types (rain, hail, snow/ice)			
Precipitation variability or hydrological variability			
Change in average water temperature in water bodies			
Acidification/salinity of seawater			
Saltwater intrusion, salinisation of surface and groundwater			
Sea level rise			
Availability and stress on water resources			
Coastal erosion			
Soil degradation, changes in salt content, desertification			
Changes in the length of growing seasons			

9.2.4.2.4 Vulnerability analysis

The vulnerability analysis combines the exposure and sensitivity analyses to determine which **hazards** are relevant to the infrastructure in question, **in terms of type and geographical location**. It forms the basis for determining whether the analysis will continue to the second stage of detailed analysis.

For the sensitivity and exposure analyses, a three-level assessment scale (Low, Moderate, High) has been established, which indicates the level of vulnerability for each climate hazard (Low, Moderate, High).

In cases where the same hazard is related to both sensitivity and exposure, the vulnerability of the infrastructure to that hazard is the combination of the two cases.

Vulnerability = Combination {Sensitivity, Exposure}

If the vulnerability analysis reasonably concludes that the infrastructure is not vulnerable to any hazard source, no further **risk analysis** is necessary and the examination of the infrastructure's adaptation to climate change is thus complete.

However, if moderate or high levels of vulnerability are identified for certain risk sources, a detailed **risk assessment** should be carried out for each of them.

More specifically, the vulnerability analysis for the project under consideration, according to the calculation tool of the General Secretariat for Public Investment & NSRF, is summarized in **the** following **Table,** where each field of sensitivity and exposure of the project under consideration is completed with the relevant classification according to the previous **Tables** (Low, Moderate, High) and the vulnerability classification for each hazard source is derived.

9 –10 : Vulnerability analysis for the project under consideration

Hazard Source	Sensitivity	Exposure	Vulnerability
Heatwave			
Cold wave			
Frost (Number of Days with TN<0)			
Forest fire			
Cyclone, severe storms, hurricane			
Storm (including snowstorms, dust storms)			
Tornado/Gale-force winds			
Drought			
Heavy precipitation (rain, hail, snow/ice)			
Flooding (in coastal areas, rivers, due to rain, groundwater)			
Landslides/Soil erosion			
Subsidence			
Change in average air temperature			
Urban heat island			
Thermal stress			
Temperature variability			
Change in solar radiation			
Change in wind characteristics			
Change in precipitation characteristics and types (rain, hail, snow/ice)			
Precipitation variability or hydrological variability			
Change in average water temperature in water bodies			
Acidification/salinity of seawater			
Saltwater intrusion, salinization of surface and groundwater			
Sea level rise			
Availability and stress on water resources			
Coastal erosion			
Soil degradation, changes in salt content, desertification			
Changes in the length of growing seasons			

The above analysis may reveal moderate or high levels of vulnerability for some sources of risk and, therefore, **a detailed risk assessment** will be carried out for each of them in the following **section.**

9.2.4.3 Detailed Analysis

9.2.4.3.1 General Information

The detailed analysis includes the following steps:

- Risk analysis.
- Measures to enhance adaptation to climate change/Monitoring program.

9.2.4.3.2 Risk Analysis

Risk analysis is performed for climate risks that have been identified as moderate or high by the vulnerability analysis.

Risk assessment is the combination of **the probability** of occurrence of each risk source identified in the vulnerability pre-assessment stage and the **expected intensity** of the impact of that risk source (hazard).

There are various approaches to describing the probability of occurrence of a hazard. However, it is important at the beginning of the analysis to define the scale to be used and to explain clearly how the probability of occurrence of a risk is assessed and what each rating corresponds to. The scale chosen should be relevant to the specific characteristics of the project, and the same scale should be used throughout the analysis. According to Technical Guideline[119] , the likelihood of any specific risk event occurring can be described in qualitative or quantitative terms. Each probability category should include a description; for example, if the term "likely" is used for a hazard source, it should be described what this means.

With regard to the analysis of the impacts of potential risk sources, the Technical Guidance emphasizes the need to consider not only direct impacts, but also any potential secondary, indirect, or synergistic impacts. The analysis may need to cover the adaptive capacity of a wider system within which the infrastructure operates. According to the Technical Guidance, adaptive capacity is the ability of systems, institutions, people, and other living organisms to adapt to potential damage, exploit opportunities, or cope with consequences.

The **severity** or **magnitude** of the impacts should be assessed on a scale and by risk source. Again, it is important that the methodology decided upon includes the scale to be used to determine severity or magnitude and clearly explains what each rating corresponds to. The scale chosen should be relevant to the specificities of the project. Each rating category should include a description; for example, if the term "catastrophic" is used, it should be explained what this means for the project.

Impacts may generally relate to physical assets and activities, health and safety, environmental and social impacts (including impacts on vulnerable populations), economic impacts, etc.

119 Commission Communication "Technical guidance on enhancing the resilience of infrastructure to climate change for the period 2021-2027" (2021/C 373/01) (hereinafter referred to as the Technical Guidance). This is the main guidance document setting out the guidelines for assessing climate resilience.

This Report uses a rating scale for the likelihood of occurrence and severity or magnitude of impacts, with a five-level analysis as presented in **the** relevant **Table** below. This **Table** clearly explains what each level of the scale means, and each level described is relevant to the specific characteristics of the infrastructure.

To conduct the risk analysis, a quantitative scale of probability of risk occurrence and a scale of magnitude/severity of impacts have been established, in accordance with the provisions of the Infrastructure Climate Resilience Assessment Framework[120] . The following **tables** present the calibration of the scale of probability of occurrence of risk sources in an infrastructure project and the calibration of the scale of magnitude/severity of impacts on an infrastructure project, respectively.

Table9 –11 : Calibration of the scale of probability of occurrence of risk sources in infrastructure projects

Scale	Score	Description
Unlikely	1	5% probability of occurrence over the estimated lifetime of the unit
Rare	2	20% probability of occurrence during the estimated lifetime of the unit
Moderate	3	50% probability of occurrence during the estimated lifetime of the unit
Probable	4	80% probability of occurrence during the estimated lifetime of the unit
Almost certain	5	95% probability of occurrence during the estimated lifetime of the unit

[120] *PROVISIONAL FRAMEWORK FOR ASSESSING THE CLIMATE RESILIENCE OF INFRASTRUCTURE PROJECTS SUBMITTED FOR CO-FINANCING BY THE NSRF 2021 – 2027, Ministry of Finance, General Secretariat for Public Investment & NSRF, National Coordination Authority, General Secretariat for Public Investment & NSRF, Ministry of Development & Investment, December 2022.*

9 –12 : Calibration of the scale of magnitude/severity of impacts on infrastructure project

Scale	Rating	Description
Negligible	1	Minimal impact that can be absorbed by normal activity
Minor	2	Adverse event that affects the normal functioning of the infrastructure and leads to local impacts
Moderate	3	A serious incident that requires additional management actions and results in moderate impacts
Significant	4	A critical event requiring emergency action, resulting in significant, widespread, or long-term impacts
Catastrophic	5	A catastrophic event that could lead to the shutdown or collapse of the asset/network, causing significant damage and widespread impact

Having assessed the likelihood of occurrence and the expected magnitude of the impact of each source of risk, the level of significance of each potential risk constitutes the **inherent risk** and can be determined through a combination of the above two factors.

Inherent risk = Probability of occurrence x Impact

Thus, the result of the risk analysis (risk assessment) can be summarized in a **table** showing the probability of occurrence and the severity or magnitude of the impact of the main sources of risk. The **table** shows the risk sources that have been examined and determines which of them, based on the combination of probability of occurrence and severity of impact, require action (adaptation measures) to be taken, as shown in **the** following **table.**

The risk/intrinsic risk scale is then determined for each rating in the form of a significance scale. The different levels of significance (negligible, low, moderate, significant, very significant) are identified by a color palette, where green indicates negligible significance and red indicates maximum significance, i.e., the greatest inherent risk.

9 –13 : Calibration of the inherent risk scale

Impact severity or magnitude	Probability	Rare	Unlikely	Moderate	Likely	Almost certain
		1	2	3	4	5
Negligible	1	1	2	3	4	5
Minor	2	2	4	6	8	10
Moderate	3	3	6	9	12	15
Significant	4	4	8	12	16	20
Disastrous	5	5	10	15	20	25

9 –14 : Interpretation of inherent risk scale

Score	Scale	Description
1	Negligible	No risk reduction measures required
4-6	Low	Risk mitigation measures depend on the circumstances of the Project
7	Moderate	Taking measures to reduce risk depends on the circumstances of the Project.
11	Significant	Risk reduction measures are recommended.
20-25	Very important	Risk reduction measures are required.

The above analysis may reveal moderate or high levels of vulnerability for some risk sources and, therefore, **a detailed risk assessment** will be carried out for each of them.

9.2.4.3.3 Measures to Enhance Adaptation to Climate Change and Residual Risk

For moderate and significant inherent risks, (additional) adaptation measures should be considered in order to achieve the maximum possible reduction in **residual risk**. Therefore, in this specific case, (additional) adaptation measures are considered for cases with at least moderate inherent risk, as smaller risks (negligible and low) are excluded from the risk analysis.

9.3 Assessment of Potential Impacts from Normal/Usual Project Activities

9.3.1 Impacts on Climate and Bioclimatic Characteristics

The following paragraphs examine the likelihood of potential adverse impacts on the climatic and bioclimatic characteristics of the area as a result of the construction, operation, and decommissioning/removal of the proposed modification to the licensed project.

9.3.1.1 Construction Phase

This **section** examines the possibility of potential adverse effects on the climatic and bioclimatic characteristics of the area as a result of the construction of the proposed modification of the project.

Due to the nature and extent of the implementation works, the construction of the proposed modification of the project cannot cause a change in the climatic and bioclimatic characteristics of the study area, a change in wind direction, upward or downward currents, changes in the temperature of the area, or changes in heat capacity.

With regard to greenhouse gas emissions, the construction of the project is not expected to have a significant impact on the environment. **Greenhouse gases (GHGs**) are mainly water vapor, carbon dioxide, methane, and hydrofluorocarbons. Consequently, the potential impacts on the climatic and bioclimatic characteristics of the study area from the proposed modification of the project include the following:

- AtTh from the installation of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and the power supply cable.
- AtTh from the operation of the drill during drilling operations.
- AtTh from the installation of the Omega offshore platform.

The quantities of GHG **emissions** as calculated in **the** relevant **section ' 3.4.2.8.6 Greenhouse Gas** Emissions' are summarised below and the relevant impacts are assessed.

GHG emissions from the installation of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and the power cable

The activities that cause impacts during the construction of the offshore pipelines and the power cable,based on the P&K content definition of the EIA (**Chapter 8**), are as follows:

- Phase 1: Geophysical Survey - A small vessel (15 m long) equipped with seabed scanning equipment will be used to provide basic data within the pipeline corridor.
- Phase 1: Geotechnical Survey - After processing the results of the geophysical survey, soil samples will be taken with a grab and a box corer, which will be sent to laboratories for analysis.
- Phase 3: Installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable from a special pipeline laying vessel, together with 2 support supply/tug vessels.
- Phase 5: Closing of trenches and protection of pipelines and cable, commissioning.
  After the installation of the pipelines, cable and related connections, these will be buried along their entire length.
- Marine traffic - Daily vessel traffic for the installation of pipelines and cable (including transport of workers and movements of support vessels).

Total greenhouse gas (GHG) and key air pollutant (COPC) emissions based on estimated fuel consumption during operations according to the indicative construction schedule (**Section 3.4.2.2)**, were calculated in **the Tables** in **Section '3.4.2.8.6 Greenhouse Gas Emissions'.** The standard emission factors for Marine Gas oil fuel from the European Environment Agency's air pollutant emission inventory guidebook (*EMEP/EEA 2023,*

EMEP/EEA air pollutant emission inventory guidebook, Technical guidance to prepare national emission inventories, https://www.eea.europa.eu/publications/emep-eea-guidebook-2023). For fuel consumption, total CO_2 emissions for the entire construction period of the offshore pipelines and power cable are estimated at **7,114.06 tn CO_2 e.** It should be noted that the above calculation includes emissions for the installation of all project pipelines (licensed project including the proposed modification) and was chosen to be presented in such a way as to convey the overall impact of the implementation of the entire project. As regards GHG emissions from the implementation of the additional section of the CO_2 transport pipeline,the produced water transport pipeline, and the power cable, these amount to approximately **647 tn CO_2 e.**

The expected quantities of GHG emissions from the construction of the additional section of the CO_2 transport pipeline, the produced water transport pipeline and the power cable are estimated to be relatively limited but quantifiable, and therefore, in terms of their significance, these impacts are assessed as negative, of medium intensity, localized, immediate in terms of their occurrence, temporary in duration, short-term reversibility, synergistic, cumulative, direct in terms of their impact, periodic, and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Air emissions from drilling operations

The activities that cause impacts during drilling operations,based on the P&K content definition of the EIA (**Chapter 8**), are as follows:

- Drilling
  - Drilling of four wells to a depth of approximately 4,200 m (two wells will be used as CO_2 injection wells and two as water production wells for the relative equalization of reservoir pressure).
  - All four new wells will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies.
- Completion of drilling
  - The protective casing of each well will be cemented with a 200 m cement column above the base of the previous protective casing and along the entire length of the open geological formation.
- Marine traffic
  - Emissions caused by the daily movement of ships during drilling operations (including the transport of workers and the movement of support vessels), which generate:
    - *Air pollutants (CO, VOC, and NOx) and GHG.*

Total greenhouse gas emissions (GHG) based on estimated fuel consumption during operations according to the indicative construction schedule (**Section 6.4.2)**, were calculated in the relevant Tables in Section 3**.4.2.2 Greenhouse gas emissions**.

The following **Table** summarises the calculation of CO_2emissions from the construction works of the entire project (licensed project including the proposed modification). It should be noted that the above calculation includes emissions for the installation of all the infrastructure of the overall project and was chosen to be presented in this way so that the overall impact of the implementation of the overall project can be understood.

Table9 –15 : Calculation of CO_2emissions from the construction works of the overall project (licensed project including the proposed amendment)

Construction activities	CO_2emissions (tn)
Transportation of workers and heavy vehicles to and from the project site, operation of construction machinery	61
Installation of new Omega Platform	2,520
Operation of drilling equipment[121]	69,626.1
Construction of pipelines and cable with construction vessel and support vessels	7,114
Total CO_2emissions during construction	79,321.1

The expected quantities of GHG emissions from the implementation of drilling operations are estimated to be relatively limited and, therefore, in terms of their significance, the specific impacts are assessed as negative, of medium intensity, focused at the local level, immediate in terms of their occurrence, temporary in duration, short-term reversibility, synergistic, cumulative, immediate in terms of their impact, continuous, and immediately remediable. In terms of their Final Assessment, these impacts are assessed as **Moderate**.

As these impacts are assessed as **Moderate** in their Final Assessment, prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 11** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Air emissions from the installation of the Omega platform

The activities that cause impacts during the installation of the Omega platform,based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Installation of the Omega offshore platform
  - Installation of guide and pillars. The conventional Omega platform will be supported by four (4) pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.
  - Installation of the support grid for the platform decks.
  - Installation of decks with the platform's surface equipment.
  - Maritime traffic - Daily movement of vessels for the implementation of construction works (including the transport of workers, materials, and support vessels).
  - Operation of a heavy-duty floating crane vessel and other support vessels (support vessel and tugboat, floating cargo barge).

[121] Drilling equipment is considered to operate 20 days per month over a period of 8.5 months in accordance with the Project construction schedule.

Total greenhouse gas (GHG) emissions and key air pollutants (COPC) based on estimated fuel consumption during the works according to the indicative construction schedule (**Section 3.4.2.2**), are calculated in **the Tables** in **Section '3.4.2.8.6 Greenhouse Gas Emissions'.** For fuel consumption, as calculated in the relevant **Sections,** total $CO_{(2)}$emissions for the entire installation period of the Omega platform are estimated at **2,520.0 tn $CO_{(2)\,e.}$**

The expected quantities of GHG emissions from the installation works of the Omega platform are estimated to be relatively limited but calculable and, therefore, in terms of their significance, the specific impacts are assessed as negative, of medium intensity, focused at the local level, immediate in terms of their occurrence, temporary in duration, short-term reversibility, synergistic, cumulative, immediate in terms of their impact, periodic, and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
GHG emissions from the construction of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and the power cable	Climate / Climate change	-	4	2	4	1	1	2	4	2	1	4	35	Small	High	Moderate	Low
GHG emissions from drilling operations	Climate / Climate change	-	4	2	4	1	1	2	4	4	1	4	37	Small	High	Moderate	Low
Emissions from the construction of the Omega platform	Climate / Climate change	-	4	2	4	1	1	2	4	2	1	4	35	Small	High	Moderate	Low

9.3.1.2 Operational Phase

This **section** examines the possibility of potential adverse effects on the climatic and bioclimatic characteristics of the area as a result of the operation of the proposed project modification.

The activities that cause impacts during the operation of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8**), are as follows:

Transport of CO_2 to the offshore storage facilities in Prinos

According to the calculations presented in **Section 3.4.3.4.3.2 Fuel Consumption**, fuel consumption for the supply vessel is estimated to be **1,300 t** for the total duration of the project's operation (including the proposed modification). For the above fuel consumption, total GHG emissions for the entire duration of the Project are estimated at 4**,504.7 tn** $CO_{(2)\ e}$(including emissions from employee transportation and support vessel movements).

The expected quantities of GHG emissions from CO_2 transport to the offshore storage facilities in Prinos are estimated to be relatively limited but calculable, and therefore, in terms of their significance, the specific impacts are assessed as negative, of medium intensity, focused at the local level, immediate in terms of their occurrence, long-lasting, short-term reversibility, synergistic, cumulative, immediate in terms of their impact, periodic, and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

CO_2injection and water pumping

The main processing equipment on the Omega platform will include a pumping and heating station for the required injection conditions, installed on the open deck of the platform.

The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. Two electric submersible pumps (ESPs) with a capacity of approximately 0.5 to 1 MW each are planned to pump the produced water from the water wells on the Omega platform.

According to the calculations presented in **Section 3.4.3.6.3 Greenhouse Gas Emissions**, the annual operation of the pumping and heating station requires a total energy of **9,344 MWh**, while the operation of the two pumps in the water production wells requires a total energy of **13,140 MWh.** According to the emission factor of the residual energy mix, as published by the DAEPEP, the annual GHG emissions from the operation of the above equipment will be approximately **9,823.0 tn** $CO_{(2)\ e}$.

The expected quantities of GHG emissions from CO_2 injection and water pumping are estimated to be relatively limited but calculable, and therefore, in terms of their significance, the specific impacts are assessed as negative, of medium intensity, focused at the local level, immediate in terms of their occurrence, long-lasting, short-term reversibility, synergistic, cumulative, immediate in terms of their impact, continuous,

and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Infrastructure and equipment maintenance and repair activities

Given the scale and nature of the project, the expected quantities of $CO_{(2)\ e}$emissions from infrastructure and equipment maintenance and repair activities are estimated to be particularly limited but calculable, and therefore, in terms of their significance, the specific impacts are assessed as negative, of low intensity, limited to the project area, immediate in terms of their occurrence, long-lasting, short-term reversibility, synergistic, cumulative, immediate in terms of their impact, periodic, and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Maritime traffic

The daily movement of ships due to the operation of the project, including the proposed modification (including the transport of workers and the movement of support vessels), results in emissions of air pollutants (CO, VOC, and NOx) and PM. Based on the fuel consumption predicted for ship movements, total $CO_{(2)\ e}$emissions for the entire duration of the Project are estimated at 4,504.7 tn $CO_{(2)\ e}$(including $CO_{(2)\ e}$emissions from supply vessels), as calculated in **Section 3.4.3.4.3.2 Fuel Consumption**.

Given the scale and nature of the project, the expected quantities of GHG emissions from the daily movement of ships due to its operation (including the transport of workers and the movement of support vessels) are estimated to be particularly limited but calculable and therefore, in terms of their significance, the specific impacts are assessed as negative, of low intensity, local, immediate in terms of their occurrence, long-lasting, short-term reversibility, synergistic, cumulative, immediate in terms of their impact, periodic, and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Moderate.** In terms of their Final Assessment, these impacts are assessed as **Moderate.** As their Final Assessment is **Moderate**, prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Physical presence and operation of the Project

The proposed Project is a CO_2storage facility.The operation of the overall Project (licensed project incorporating the proposed amendment) will **result in** significant **$CO_{(2)\ storage}$**, as the relevant CO_2 emissions are **negative** and are considered **constant** and equal to **869,175 tn CO2 eq per year, (**calculations in **Section 3.5)**, as the current phase of the project (1) provides for the storage of **1,000,000 tn $CO_{(2\ eq/')}$ per year** (from which the relevant COemissions resulting from the activities mentioned above are deducted).

The total CO_2 project in Prinos (licensed project incorporating the proposed amendment) is expected to play an important role in achieving national GHG emission reduction targets, as well as to contribute significantly to meeting the country's commitments/obligations under international conventions and agreements on GHG emission reduction and climate neutrality, as it is the first such initiative in Greece and the North-East Mediterranean for CO_2 storage. Consequently, the impact on the local socio-economic situation from the implementation of the proposed project is assessed as **strongly positive.**

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Emissions from CO_2transport to	Climate / Climate change	-	4	2	4	3	1	2	4	2	1	4	37	Small	High	Moderate	Low

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
offshore storage facilities in Prinos																	
Emissions from CO_2injection	Climate / Climate change	-	4	2	4	3	1	2	4	4	1	4	39	Small	High	Moderate	Low
GHG emissions from water pumping	Climate / Climate change	-	4	2	4	3	1	2	4	4	1	4	39	Small	High	Moderate	Small
Emissions from infrastructure and equipment maintenance and repair activities	Climate / Climate change	-	2	1	4	3	1	2	4	2	1	4	29	Small	High	Moderate	Low
Emissions from daily ship traffic due to the operation of the Project (including employee transportation and support ship movements)	Climate / Climate change	-	2	2	4	3	1	2	4	2	1	4	31	Small	High	Moderate	Low
CO_2storage from the operation of the Project	Climate / Climate change	+	12	8	4	4	3	2	4	4	4	4	81	Positive	High	Positive	Positive

9.3.1.3 Decommissioning/Dismantling Phase

This **section** examines the possibility of potential adverse effects on the climatic and bioclimatic characteristics of the area as a result of the cessation of operation and decommissioning of the proposed project modification.

The activities that cause impacts during the decommissioning and dismantling of the proposed project modification,based on the content definition of the EIA (**Chapter 8**), are as follows:

Shutdown/decommissioning of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable

As part of the decommissioning of the offshore pipelines and the power cable, the following activities with potential adverse effects are planned:

- The offshore pipelines and risers will be depressurized, cleaned using standard jetting operations, and then inerted with nitrogen. The pipelines will then be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with international standards.
- Marine traffic - Daily vessel traffic for the implementation of offshore pipeline decommissioning works (including employee transportation and support vessel movements).

The expected quantities of PM emissions during the decommissioning/removal of offshore pipelines and power cables are estimated to be limited in significance, therefore, the specific impacts are expected to be negative, of negligible intensity, localized, immediate in terms of their occurrence, temporary in duration, short-term in reversibility, synergistic, cumulative, direct in terms of their impact, periodic, and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Cessation of Operation/Decommissioning of Wells

In the context of the decommissioning of the boreholes, the following activities with potential adverse impacts are envisaged:

- Installation of barriers
  - Primary barrier - If cement is used as a barrier, a cement column of at least 30 m is required to form a permanent barrier. Where possible, 152 m cement plugs are installed to overlay these 30 m of cement.
  - Secondary barrier - A combined plug of at least 60 m of cement is required to form a secondary barrier. Where possible, 244 m of cement is placed to overlay these 60 m of cement.
- Maritime traffic - Emissions caused by the implementation of offshore facility decommissioning works (including employee transportation and support vessel movements), which generate air pollutants (CO, VOC, and NOx) and PM.

The expected quantities of PM emissions during the decommissioning/removal of the wells are estimated to be limited in significance. Therefore, the specific impacts are expected to be negative, of low intensity, localised, immediate in terms of their occurrence, temporary in duration, short-term in terms of reversibility, synergistic, cumulative, direct in terms of their impact, periodic and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Cessation of Operation/Decommissioning of the Offshore Platform

The following activities with potential adverse impacts are planned as part of the decommissioning of the Omega offshore platform:

- Removal: The lifting vessel will then be transported to the area to remove the platform. The surface equipment and bridges will be removed first in order to gain access to the interior of the pipelines. The loads will be transferred through the piles and unloaded. Once the piles have been cut, the jack-up vessel can lift and load the jackets onto barges.
- Deep water disposal
- Marine traffic - Daily vessel traffic for the implementation of offshore facility decommissioning works (including employee transport and support vessel movements).

The expected quantities of GHG emissions during the decommissioning phase of the Omega offshore platform are estimated to be limited in significance and the relevant impacts will in any case be similar to those predicted for the construction phase of the project (possibly even milder, as the decommissioning phase of the Omega offshore platform of the project generally lasts significantly less than the construction phase). Therefore, the specific impacts are expected to be negative, of low intensity, localized, immediate in terms of their occurrence, temporary in duration, short-term in terms of reversibility, synergistic, cumulative, direct in terms of their impact, periodic, and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
GHG emissions from the decommissioning/decommissioning of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable	Climate / Climate Change	-	1	2	4	1	1	2	4	2	1	4	26	Small	High	Moderate	Low
ATR emissions from the cessation of operation/decommissioning of offshore installations (drilling rigs)	Climate / Climate change	-	2	2	4	1	1	2	4	2	1	4	29	Small	High	Moderate	Low
ATR emissions from the decommissioning/dismantling of the Omega offshore platform	Climate / Climate change	-	2	2	4	1	1	2	4	2	1	4	29	Small	High	Moderate	Low

9.3.1.4 Differentiation of Estimated Impacts on Climate and Bioclimatic Characteristics from Project Modification

As documented in the above **Sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification are assessed as Low and cannot change

the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of impacts from new project elements, as introduced by the proposed project modification (such as the new Omega offshore platform), the estimated impacts are limited to minor impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification). It should be noted that the empty cells marked with the impact designation **NA** correspond to impacts that are either provided for in elements of the licensed project that are not relevant to this modification (e.g., onshore facilities), or to elements of the proposed amendment that were not included in the licensed project (e.g., new Omega platform).

Activity	Recipient	Final Impact Assessment[122]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
GHG emissions from the construction of land-based facilities	Climate / Climate Change	Low	NA	Low
GHG emissions from the construction of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable	Climate / Climate change	Small	Small	Small
GHG emissions from drilling operations	Climate / Climate change	Small	Small	Small
GHG emissions from the construction of the Omega platform	Climate / Climate change	NA	Small	Small
Operational phase				
Emissions from CO_2transport to offshore storage facilities in Prinos	Climate / Climate change	Small	Small	Small
GHG emissions from CO_2injection	Climate / Climate change	Small	Small	Small
GHG emissions from water pumping	Climate / Climate change	Small	Small	Small
GHG emissions from infrastructure and equipment maintenance and repair activities	Climate / Climate change	Small	Small	Small
GHG emissions from daily ship traffic due to project operations (including employee transportation and support ship movements)	Climate / Climate change	Small	Small	Small
CO_2storage from Project operation	Climate / Climate change	Positive	Positive	Positive
Shutdown/Decommissioning Phase				
Emissions from the dismantling of land-based facilities – Restoration of land area occupied by the project	Climate/Climate Change	Low	NA	Low
Emissions from the decommissioning/decommissioning of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable	Climate / Climate change	Small	Small	Small
GHG emissions from the decommissioning/removal of offshore facilities (wells)	Climate / Climate change	Small	Small	Small
GHG emissions from the decommissioning/dismantling of the Omega offshore platform	Climate / Climate change	NA	Small	Small

[122] In the event that, in the Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts" as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** herein. The same applies to the estimates of the approved EIA presented in this Table.

9.3.2 Impact on morphological and landscape characteristics

The following paragraphs will examine the possibility of potential adverse impacts on the morphological and landscape characteristics of the area as a result of the construction, operation, and decommissioning/removal of the proposed modification to the licensed project.

9.3.2.1 Construction Phase

This **section** examines the possibility of potential adverse effects on the morphological and landscape characteristics of the area as a result of the construction of the project under consideration.

Construction of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable

Seabed morphology

Activities that may have an impact on the morphology of the seabed during the construction of the additional section of the CO_2 , the produced water transfer pipeline and the power supply cable, based on the P&K content definition of the MT AEPO (**Chapter 8**) are as follows:

- Phase 3: Installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable by a special pipeline laying vessel, together with 2 support supply/tug vessels.
- Phase 5: Closing of trenches and protection of pipelines and cable, commissioning. After the installation of the pipelines, cable, and related connections, they will be buried along their entire length.

The additional section of the CO_2pipeline (1.6 km long in the worst-case scenario) and the water transfer pipeline (1.3 km long in the worst-case scenario) will be installed by a special pipe-laying and trenching vessel. Similarly, the power cable (1.3 km long in the worst-case scenario) will be laid on the seabed by a vessel with a reeling capability and then buried 1 m below the seabed.

After the installation of the pipelines, the cable, and the relevant connections, the pipelines and the cable will have to be buried along their entire length. The following tools can be used for burial:

- A pipe burial excavator (plow), driven by a support vessel, passes over the pipe axis and creates the trench.
- A launch sled, supported by a special boat, with high-pressure jets that pass over the axis of the pipe and form the trench as it is pulled along the pipe.
- A hydrofoil, supported by a special vessel, uses an underwater fan to remove the soil beneath the pipeline and form the trench.

Multiple passes may be required to achieve the desired burial depth for each pipeline (1.5 to 2 m TOP) and cable (approximately 1 m TOP), depending on soil conditions. Due to the nature of the soils and the very

strong bottom currents in the area, the trenches for the pipes and cable will be naturally backfilled without additional work. At points where backfilling after the installation of the pipes and cable is not possible due to accessibility or proximity to other structures or the platform, the exposed sections of the pipelines and cable will be covered with a layer of concrete for additional protection.

Based on the above, the expected impact on the seabed morphology from the construction of the pipelines and cable is estimated to be limited but quantifiable and therefore, in terms of its significance, this specific impact is assessed as negative, of medium intensity, within the pipeline occupation area, simultaneous with the construction works, temporary in duration, reversible in the medium term, non-synergistic, non-cumulative, immediate in its effect, continuous and short-term in its restoration. In terms of their Final Assessment, these impacts are assessed as **Negligible**.

Landscape

Activities that may have an impact on the landscape of the study area during the construction of the additional section of the CO_2 , the produced water transfer pipeline and the power supply cable, based on the P&K content delimitation of the MT AEPO (**Chapter 8**) are as follows:

- Phase 3: Installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable by a special pipeline laying vessel, together with 2 support supply vessels/tugs.
- Maritime traffic - Daily vessel traffic for the installation of pipelines and cable (including the transport of workers and the movement of support vessels).

The additional section of the CO_2pipeline (1.6 km long in the worst-case scenario) and the water transfer pipeline (1.3 km long in the worst-case scenario) will be installed by a special pipe-laying and trenching vessel. Similarly, the power cable (1.3 km long in the worst-case scenario) will be laid on the seabed by a vessel with a reeling capability and then buried 1 m below the seabed.

After the installation of the pipelines, the cable, and the relevant connections, the pipelines and the cable will have to be buried along their entire length. The following tools can be used for burial:

- A pipe burial excavator (plow), driven by a support vessel, passes over the pipe axis and creates the trench.
- A launch sled, supported by a special boat, with high-pressure jets that pass over the axis of the pipe and form the trench as it is pulled along the pipe.
- A hydrofoil, supported by a special vessel, uses an underwater fan to remove the soil beneath the pipeline and form the trench.

As many passes may be required to achieve the desired burial depth for each pipeline (from 1.5 to 2 m TOP) and cable (approximately 1 m TOP), depending on soil conditions. As is obvious, during the installation of the pipelines and cable, there will be an increase in suspended particle concentrations and ultimately turbidity as a result of the excavation of the seabed, with the associated negative impacts on the marine landscape of the area. In addition, the daily movement of vessels for the installation of the pipelines and cable is also expected to have a minor impact on the landscape of the area. However, given the small number of vessels

and the relatively limited time frame for the implementation of these works, it is estimated that this impact will not be significant.

Based on the design data for the project under consideration, as presented in **Section 6**, the expected impact on the landscape of the marine area of the project from the installation of the pipelines and cable is estimated to be relatively limited but calculable and, therefore, in terms of its significance, this impact is assessed as negative, of medium intensity, local, simultaneous with construction works, temporary, reversible in the medium term, synergistic, non-cumulative, immediate in terms of its effect, continuous and short-term reversible. In terms of their Final Assessment, these impacts are assessed as **Minor.**

Drilling Works

Seabed morphology

In the 26-inch (125-450 MD (m)) and 16 inches (450-2600 MD (m)), a drilling fluid based on seawater and lime will be used, which will be biodegradable and have no negative impact on the environment. The cuttings from this section, estimated at 1,300 $m^{(3)}$ will not contain any hazardous substances and will be deposited on the seabed. The potential impact of this activity is locally limited changes to the seabed characteristics in an area of ~ 650 $m^{(2)}$ The morphology of the seabed will change but is expected to gradually return to its previous state over the next 5-10 years.

The expected impact on the seabed morphology from drilling operations is reversible in the long term but calculable, and therefore, in terms of its significance, this specific impact is assessed as negative, of medium intensity, local, simultaneous with construction works, temporary, reversible in the long term, non-synergistic, immediate in terms of its effect, continuous, recoverable in the medium term, and non-cumulative. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Landscape

The activities that may have an impact on the landscape of the study area during drilling works,based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- **Drilling**
  - Drilling of 4 wells to a depth of approximately 4,200 m (2 wells will be used as CO_2injection wells and 2 as water production wells for the relevant pressure equalization of the reservoir).
  - All four new wells will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies.
- **Waste - Production, management, and disposal of mining waste (drilling mud and cuttings).**
  - In the 26-inch (125-450 MD (m)) and 16 inches (450-2600 MD (m)), a seawater- and lime-based drilling fluid will be used, which will be biodegradable and have no negative impact on the environment. The cuttings from this section will be deposited on the seabed. Below this depth, the drilling fluids return to the surface where the cuttings are removed and the mud is treated.

As mentioned, during drilling operations, there will be an increase in suspended particle concentrations and ultimately turbidity as a result of the excavation of the seabed, with the associated negative impacts on the marine landscape of the area.

Based on the design data for the project under consideration, as presented in **Section 3**, the expected impact on the landscape of the marine area of the project from the drilling works is estimated to be relatively limited but calculable and, therefore, in terms of its significance, this specific impact is assessed as negative, of medium intensity, local, simultaneous with construction works, temporary, reversible in the long term, non-synergistic, immediate in terms of its effect, continuous, recoverable in the medium term, and non-cumulative. In terms of their Final Assessment, these impacts are assessed as **Minor.**

Installation of the Omega offshore platform

Seabed morphology

The activities that may cause impacts on the seabed morphology during the installation of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Installation of guide and piles. The conventional Omega platform will be supported by four (4) piles. Each pile will penetrate the seabed by 30 m. The piles will be driven using a percussion or pulsed mechanism.

The driving of the Omega platform pillars will result in locally limited changes to the seabed characteristics in the limited area occupied by the platform. The seabed morphology will change locally but is expected to gradually return to its previous state over the next 5-10 years.

The expected impact on the seabed morphology from the installation of the Omega offshore platform is reversible in the long term but calculable, and therefore, in terms of its significance, this specific impact is assessed as negative, of medium intensity, local, simultaneous with construction works, temporary, reversible in the long term, non-synergistic, immediate in terms of its effect, continuous, restorable in the medium term, and non-cumulative. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Landscape

The activities that may have an impact on the landscape during the installation of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Installation of guide and pillars. The conventional Omega platform will be supported by four (4) pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.
- Installation of the support grid for the platform decks.
- Installation of decks with the platform's surface equipment.

During the installation of the Omega offshore platform, there will be an increase in suspended particle concentrations and ultimately turbidity, as a result of the excavation of the seabed, with the associated negative impacts on the marine landscape of the area.

In addition, the installation of the support network for the platform decks and the installation of decks with the platform's surface equipment are expected to have a negative impact on the landscape of the area. However, as has been demonstrated in the cases of installation of existing platforms in the wider area (where four platforms have been installed for the operation of the Prinos offshore mining complex), the extent and scope of these impacts are not significant.

Based on the design data for the project under consideration, as presented in **Section 3**, the expected impact on the landscape of the marine area of the project from the installation works of the Omega offshore platform is estimated to be relatively limited but calculable and, therefore, in terms of its significance, this specific impact is assessed as negative, of medium intensity, local, simultaneous with construction works, temporary, reversible in the long term, non-synergistic, direct in its effect, continuous, recoverable in the medium term, and non-cumulative. In terms of their Final Assessment, these impacts are assessed as **Minor.**

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Seabed morphology	-	4	1	4	1	2	1	4	4	1	1	32	Small	Low	Negligible
Construction of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable	Landscape	-	4	2	4	1	2	2	4	4	1	1	35	Small	Moderate	Small
Drilling operations	Seabed morphology	-	4	2	4	1	3	1	4	4	1	1	35	Small	Low	Negligible
Drilling operations	Landscape	-	4	2	4	1	2	2	4	4	1	1	35	Small	Moderate	Small
Installation works for the Omega offshore platform	Seabed morphology	-	4	2	4	1	3	1	4	4	1	1	35	Small	Low	Negligible
Installation work on the Omega offshore platform	Landscape	-	4	2	4	1	2	2	4	4	1	1	35	Small	Moderate	Small

9.3.2.2 Operational Phase

This **section** examines the possibility of potential adverse effects on the morphological and landscape characteristics of the area as a result of the operation of the proposed project modification.

Physical Presence – Operation of Offshore Facilities

Seabed morphology

After the completion of the construction period, the morphology of the seabed in the immediate vicinity of the additional section of the CO_2 , the produced water transfer pipeline and the power supply cable, and in the drilling area, it will return to its original state, as the pipeline trench will be naturally backfilled (without additional work as mentioned above), while in the drilling area the materials will be dispersed and the morphology of the seabed will return to its previous state over the next 5-10 years. Therefore, no further impact on the morphological characteristics of the seabed is expected from the physical presence and operation of the additional section of the CO_2pipeline, the produced water pipeline, the power cable, and the drilling operations, and therefore the potential impact on the morphology of the seabed from the operation of the proposed project is **neutral**.

Similarly, in the area of the Omega platform, the materials will be dispersed and the morphology of the seabed will return to its previous state within the next 5-10 years. Consequently, no further impact on the morphological characteristics of the seabed is expected from the physical presence and operation of the Omega platform and, therefore, the potential impact on the morphology of the seabed from the operation of the proposed project is **neutral.**

Landscape

After completion of the construction period, the landscape in the immediate vicinity of the additional section of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable will not be altered, as these facilities will not be visible. Consequently, no further impact on the landscape characteristics of the study area is expected from the physical presence and operation of the additional section of the CO_2pipeline, the produced water pipeline, and the power cable, and therefore the potential impact on the landscape of the area from their operation is **neutral**.

In contrast, the physical presence and operation of the Omega platform will be visible and will have an impact on the landscape of the area. However, based on the design data for the project under consideration (as presented in **Section 3)** and the fact that four platforms have been installed in the wider area for the operation of the Prinos subsea mining complex, which have been operating in the area for many years and have essentially been integrated into the landscape, it is estimated that the impact on the landscape of the area will be limited.

Consequently, the impact on the morphology of the area from the operation of the Omega platform will be negative, negligible in intensity, local, permanent, reversible in the medium term, synergistic, non-cumulative, immediate in terms of its effect, continuous, and restorable in the short term. Therefore, in terms of their Final Assessment, these impacts are assessed as **Minor**.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Physical presence – Omega platform operation	Landscape	-	2	2	4	4	2	2	4	4	1	1	32	Small	Moderate	Small

9.3.2.3 Decommissioning/Dismantling Phase

This **section** examines the possibility of potential adverse effects on the morphological and landscape characteristics of the area as a result of the cessation of operation and decommissioning of the proposed project modification.

Decommissioning/Dismantling of Offshore Facilities

Seabed morphology

The offshore pipelines and the riser will be depressurized, cleaned using standard jetting operations, and inerted with nitrogen. The pipelines will then be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with international standards. A similar procedure will be followed for the power cable.

The dismantling of the equipment and the removal of the CO_2 injection and water production facilities will not affect the morphology of the seabed in the area.

Therefore, the implementation of the decommissioning works for the additional section of the CO_2pipeline, the produced water pipeline, the power cable, and the wells, no further impact on the morphological characteristics of the seabed in the area is expected.

On the contrary, the decommissioning/removal of the Omega offshore platform is expected to have an impact on the morphological characteristics of the seabed in the area. The activities that may cause impacts on the morphological characteristics of the seabed in the area during the decommissioning of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Dispersion of drilling cuttings: The accumulated drilling cuttings must be removed from the platform piles. The cuttings will be removed from the jacket platform to prevent obstruction of the platform removal operations.
- Rig removal: The jack-up vessel will then be moved to the area to remove the rig. The surface equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the lift boat can lift and load the jackets onto barges.

- Platform disposal: Deep-water disposal of the platform (if chosen over onshore dismantling and material recycling).

Based on the above, the dismantling of the Omega platform will have negative impacts on the morphological characteristics of the seabed in the area, which are estimated to be limited in significance and the relevant impacts will in any case be similar to those predicted for the construction phase of the project (possibly even milder, as the dismantling phase of the offshore platform generally takes significantly less time than the construction phase). Therefore, the impact on the morphological characteristics of the seabed in the area from the dismantling of the Omega platform is estimated to be negative, of medium intensity, local, simultaneous with the works, temporary, reversible in the long term, non-synergistic, direct in terms of its impact, continuous, recoverable in the medium term, and non-cumulative. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Landscape

The offshore pipelines and the riser will be depressurized, cleaned using standard jetting operations, and inerted with nitrogen. The pipelines will then be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with international standards. A similar procedure will be followed for the power cable.

The dismantling of the equipment and the removal of the CO_2injection and water production facilities will not affect the morphology of the seabed in the area.

Therefore, the dismantling of the additional section of the $_{CO_2}$ transfer pipeline, the produced water transfer pipeline, the power cable, and the wells is not expected to have any further impact on the landscape of the area.

On the contrary, the decommissioning/removal of the Omega offshore platform is expected to have an impact on the landscape of the area. The activities that may have an impact on the landscape of the area during the decommissioning of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8)**, are as follows:

- Platform removal: The lifting vessel will then be moved to the area to remove the platform. The surface equipment and bridges will be removed first to gain access to the interior of the pipelines. The loads will be transferred through the piles and released. Once the piles are cut, the lifting vessel can lift and load the jackets onto barges.

Based on the above, the dismantling of the Omega platform will have a negative impact on the landscape of the area, which is estimated to be limited in significance and the relevant impacts will in any case be similar to those predicted for the construction phase of the project (possibly even milder, as the dismantling phase of the offshore platform generally takes significantly less time than the construction phase). Therefore, the impact on the landscape of the area from the dismantling of the Omega platform is estimated to be negative, negligible in intensity, localised at the time of the works, temporary in duration, reversible in the medium

term, synergistic, non-cumulative, immediate in terms of its effect, continuous and reversible in the short term. Therefore, in terms of their Final Assessment, these impacts are assessed as **Minor.**

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Dismantling of the Omega platform	Seabed morphology	-	4	2	4	1	3	1	4	4	1	1	35	Small	Low	Negligible
Dismantling of Omega platform	Landscape	-	4	2	4	1	3	1	4	4	1	1	35	Small	Moderate	Small

9.3.2.4 Differentiation of Estimated Impacts on Morphological and Landscape Characteristics from Project Modification

As documented in the above **Sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification are assessed as Minor and Negligible and cannot alter the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of impacts from new project elements, as introduced by the proposed project amendment (such as the new Omega offshore platform), the estimated impacts are limited to minor and negligible impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification). It should be noted that the cells that are empty with an impact rating **of NA** correspond to impacts that are either provided for in elements of the licensed project that are not relevant to this modification (e.g., onshore facilities), or to elements of the proposed amendment that were not included in the licensed project (e.g., new Omega platform).

Activity	Recipient	Final Impact Assessment [123]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
Construction of land facilities	Morphology of land area	Negligible	NA	Negligible
Construction of land facilities	Landscape	Small	NA	Small
Construction of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable	Seabed morphology	Negligible	Negligible	Negligible
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Landscape	Minor	Minor	Minor
Drilling	Seabed morphology	Negligible	Negligible	Negligible
Drilling operations	Landscape	Small	Small	Small
Installation work on the Omega offshore platform	Seabed morphology	NA	Negligible	Negligible
Installation works for the Omega offshore platform	Landscape	NA	Small	Small
Operational phase				
Physical presence – Operation of land facilities	Morphology of land area	Negligible	NA	Negligible
Physical presence – Operation of land-based facilities	Landscape	Small	NA	Small
Physical presence – Operation of Omega platform	Landscape	NA	Small	Small
Phase of Cessation of Operation/Dismantling				
Dismantling of Land Installations	Morphology of land area	Negligible	NA	Negligible
Restoration of Land Area of Project Facility	Land morphology	Positive	NA	Positive
Dismantling of Land Facilities	Landscape	Small	NA	Small
Restoration of Land Area of Project Facility	Landscape	Positive	NA	Positive
Dismantling of the Omega platform	Seabed morphology	NA	Small	Small

[123] In the event that, in terms of its Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts," as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** of this document. The same applies to the estimates of the approved EIA presented in this Table.

Activity	Recipient	Final Impact Assessment [123]		
		Licensed Project	Proposed Amendment	Total Modified Project
Dismantling of Omega platform	Landscape	NA	Small	Minor

9.3.3 Impact on Geological, Tectonic, and Soil Characteristics

The following paragraphs examine the possibility of potential adverse impacts on the geological, tectonic, and soil characteristics of the area as a result of the construction, operation, and decommissioning/removal of the proposed project modification.

9.3.3.1 Construction Phase

This **section** examines the possibility of potential adverse effects on the geological, tectonic and soil characteristics of the area as a result of the construction of the proposed project modification.

Construction of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable

Seabed quality characteristics and structure

Activities that may have an impact on the quality characteristics and structure of the seabed during the construction of the additional section of the CO_2 , the produced water pipeline and the power cable, based on the P&K content definition of the MT AEPO (**Chapter 8**) are as follows:

- Phase 1 - Geotechnical Investigation: After processing the results of the geophysical survey, soil samples will be taken with a grab and a box corer, which will be sent to laboratories for analysis.
- Phase 3: Installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable by a special pipeline laying vessel, together with 2 support supply/tug vessels.
- Phase 5: Closing of trenches and protection of pipelines and cable, commissioning. After the installation of the pipelines, cable, and related connections, they will be buried along their entire length.

The additional section of the CO_2pipeline (1.6 km long in the worst-case scenario) and the water transfer pipeline (1.3 km long in the worst-case scenario) will be installed by a special pipe-laying and trenching vessel. Similarly, the power cable (1.3 km long in the worst-case scenario) will be laid on the seabed by a vessel with a reeling capability and then buried 1 m below the seabed.

After the installation of the pipelines, the cable, and the relevant connections, the pipelines and the cable will have to be buried along their entire length. The following tools can be used for burial:

- A pipe burial excavator (plow), driven by a support vessel, passes over the pipe axis and creates the trench.
- A launch sled, supported by a special boat, with high-pressure jets that pass over the pipe axis and form the trench as it is pulled along the pipe.
- A hydrofoil, supported by a special vessel, uses an underwater fan to remove the soil beneath the pipeline and form the trench.

Multiple passes may be required to achieve the desired burial depth for each pipeline (1.5 to 2 m TOP) and cable (approximately 1 m TOP), depending on soil conditions. Due to the nature of the soils and the very strong bottom currents in the area, the trenches for the pipes and cable will be naturally backfilled without additional work. At points where backfilling after the installation of the pipes and cable is not possible due to accessibility or proximity to other structures or the platform, the exposed sections of the pipelines and cable will be covered with a layer of concrete for additional protection.

Therefore, in terms of the characteristics of the seabed, adverse effects arise from the disturbance of the seabed surface and the dispersion of sediments caused by the installation of the additional section of the CO_2 , the produced water pipeline and the power cable. However, due to the limited volume of excavations and their limited duration, the expected negative impacts are not significant. Therefore, the impacts on the structure and quality of the bottom sediments from the construction of the additional section of the CO_2 transport pipeline,the produced water transport pipeline and the power supply cable will be negative, moderate in intensity, local, simultaneous with construction works, temporary, reversible in the medium term, non-synergistic, non-cumulative, continuous, and immediately remediable. Therefore, in terms of their Final Assessment, these impacts on the geological characteristics of the area are assessed as **Minor.**

During the installation of the additional section of the CO_2 , the produced water transfer pipeline, and the power supply cable, no impacts on the geological characteristics or any kind of geological hazards are expected, as the works are carried out at a shallow depth within the seabed (burial depth of each pipeline from 1.5 to 2 m TOP and of the cable approximately 1 m TOP) and locations with potential geological hazards are avoided (passage through areas with unstable submarine slopes, intersections with liquefied soils, passage through rocky steep terrain or saline tectonic formations).

In addition, the tectonic characteristics of the study area are not expected to be affected in any way, as the interventions are superficial in nature (indicatively, in the offshore section, the burial depth of each pipeline is 1.5 to 2 m TOP and of the cable approximately 1 m TOP) and, by definition, cannot alter the tectonic characteristics of the study area

Drilling Works

Quality characteristics and structure of the seabed

The activities that may have an impact on the qualitative characteristics and structure of the seabed in the study area during drilling works (based on the P&K content delimitation of the MT AEPO (**Chapter 8)** are as follows:

- **Drilling**
  - Drilling of four wells to a depth of approximately 4,200 m (two wells will be used as CO_2 injection wells and two as water production wells for the relative equalization of reservoir pressure).
  - All four new wells will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies.
- **Waste - Production, management, and disposal of mining waste (drilling mud and cuttings).**
  - In the 26-inch (125-450 MD (m)) and 16 inches (450-2600 MD (m)), a seawater- and lime-based drilling fluid will be used, which will be biodegradable and have no negative impact on the environment. The cuttings from this section will be deposited on the seabed. Below this depth, the drilling fluids return to the surface where the cuttings are removed and the mud is treated.

In the 26-inch (125-450 MD (m)) and 16 inches (450-2600 MD (m)), a seawater- and lime-based drilling fluid will be used, which will be biodegradable and have no negative impact on the environment. The cuttings from this section, estimated at 1,300 $m^{(3)}$ will not contain any hazardous substances and will be deposited on the seabed. The potential impact of this activity is locally limited changes in the quality characteristics and structure of the seabed in an area of ~ 650 $m^{(2)}$ The potential impact of this activity is a locally limited change in the quality and structure of the seabed sediments.

Therefore, the impacts on the structure and quality of the bottom sediments from the implementation of the drilling works will be negative, moderate in intensity, local, simultaneous with the construction works, temporary, reversible in the medium term, non-synergistic, non-cumulative, continuous, and immediately remediable. Therefore, in terms of their Final Assessment, these impacts on the quality characteristics and structure of the seabed in the area are assessed as **Minor.**

Submarine geological formations

The activities that may have an impact on the underwater geological formations of the study area during drilling operations,based on the P&K content definition of the MT AEPO (**Chapter 8**), are as follows:

- **Drilling**
  - Drilling of 4 wells to a depth of approximately 4,200 m (2 wells will be used as CO_2injection wells and 2 as water production wells for the relative pressure equalization of the reservoir).
  - All four new wells will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies.

The drilling work within the scope of the project under consideration includes the drilling of two new CO_2injection wells and two water wells, which are expected to have adverse effects on the geological formations they will penetrate. Technical studies carried out to investigate the suitability of the area for the location of the project under consideration and to determine its technical characteristics show that the geology of the area is suitable for the implementation of the project under consideration. It has also been documented that there are no significant geological formations in the area of the proposed project modification that will be significantly adversely affected by the implementation of the proposed drilling works.

A typical drilling operation for the CO_2 storage project produces approximately 920 m^3 of cuttings, so the four (4) drilling operations will produce approximately 3,700 m^3 of solid waste. Drilling operations in the Project produce small volumes of residues, as all planned wells are small diameter and side-drilled.

Consequently, the impact of drilling operations on underwater geological formations will be negative, moderate in intensity, local, simultaneous with construction works, temporary, reversible in the medium term, non-synergistic, non-cumulative, continuous, and immediately remediable. Therefore, in terms of their Final Assessment, these impacts on the qualitative characteristics and structure of the seabed in the area are assessed as **Negligible.**

Tectonics

As documented by the company's mining activity in the study area to date, the implementation of the proposed drilling (which have similar characteristics to those existing in the company's existing mining project) are not expected to have any impact on the tectonics of the study area, which for this reason are assessed as **Neutral**.

Installation of the Omega offshore platform

Seabed quality characteristics and structure

The activities that may have an impact on the quality characteristics and structure of the seabed during the installation of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8)** are as follows:

- Installation of guide and piles. The conventional Omega platform will be supported by four (4) piles. Each pile will penetrate the seabed by 30 m. The piles will be driven using a percussion or pulsed mechanism.

The driving of the Omega platform pillars will have locally limited impacts on the quality characteristics and structure of the seabed in the limited area occupied by the platform. The expected impact on the quality characteristics and structure of the seabed from the installation of the Omega offshore platform is reversible in the long term but calculable, and therefore, in terms of its significance, this specific impact is assessed as negative, of moderate intensity, local, simultaneous with construction works, temporary, reversible in the medium term, non-synergistic, non-cumulative, continuous, and immediately restorable. Therefore, in terms of their Final Assessment, these impacts on the qualitative characteristics and structure of the seabed in the area are assessed as **Minor.**

Submarine geological formations

The activities that may cause impacts on the underwater geological formations of the study area during the installation of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Installation of guide and pillars. The conventional Omega platform will be supported by four (4) pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.

The driving of the Omega platform pillars will have locally limited impacts on the submarine geological formations of the study area and, more specifically, on the limited area occupied by the platform, as each pile will penetrate the seabed to a depth of 30 m. The expected impact on the submarine geological formations of the study area from the installation of the Omega offshore platform is reversible but calculable and, therefore, in terms of its significance, this specific impact is assessed as negative, of moderate intensity, local, simultaneous with construction works, temporary, reversible in the medium term, non-synergistic, non-cumulative, continuous, and immediately remediable. Therefore, in terms of their Final Assessment, these impacts on the quality characteristics and structure of the seabed in the area are assessed as **Negligible.**

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Quality characteristics and structure of the seabed	-	4	2	4	1	2	1	4	4	1	1	34	Small	Moderate	Small
Drilling operations	Quality characteristics and structure of the seabed	-	4	2	4	1	2	1	4	4	1	1	34	Small	Moderate	Small
Drilling operations	Geological characteristics and submarine geological formations	-	4	2	4	1	2	1	4	4	1	1	34	Small	Low	Negligible
Omega platform installation works	Quality characteristics and structure of the seabed	-	4	2	4	1	2	1	4	4	1	1	34	Small	Moderate	Small
Omega platform installation works	Geological characteristics and submarine geological formations	-	4	2	4	1	2	1	4	4	1	1	34	Small	Low	Negligible

9.3.3.2 Operational Phase

The following paragraphs will examine the possibility of potential adverse effects on the geological, tectonic, and soil characteristics of the area as a result of the operation of the proposed project modification.

Qualitative and quantitative soil characteristics

The activities that may have an impact on the qualitative and quantitative characteristics of the soil in the study area during the operation of the offshore facilities of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8),** are as follows:

- Waste. Production, management, and disposal of waste from the operation of the project facilities.

The activities of the operational phase of the proposed project modification generally result in the production of relatively limited quantities of waste, as a consequence of the relatively limited scale of the project. More specifically, as mentioned above, the proposed project is expected to generate:

- Solid waste of an urban nature

It is estimated that the facilities of the proposed project modification will produce non-hazardous and hazardous municipal waste (MW) as well as certain other waste streams that fall under alternative management (AM).

The categories of waste that are estimated to be produced during the operation of the proposed project modification based on the European Waste Catalogue (ECW) (Decision 2001/118/EC, as amended and in force), are presented in **Table 3-53 (Section 3.4.3.5.1.1 Municipal Waste).** The estimated annual quantity of MSW during the operation of the Project and the average daily quantities of MSW produced are presented in **Table 3-54.** The method of managing municipal waste streams in accordance with the requirements of current legislation is included in **the** overall **Waste Management Plan** for the Project, as presented in **Appendix 12-6.**

- The water produced from the planned Omega platform wells will be transported to the Delta platform in Prinos, where it will be separated and treated in the existing systems and then discharged into the sea. Rainwater on the platforms, which may potentially contain hydrocarbons, enters the closed drainage system through the bunded areas. To minimize these quantities, the size of the enclosed areas has been minimized and protected from rain where possible.
- It is estimated that during the operation and maintenance of the underground CO_2storage facility and the Omega platform, non-hazardous and hazardous waste will be produced. Given the early stage of the Project study, it is not possible to accurately estimate the types and quantities of hazardous and non-hazardous waste that may be produced. As an indication, the corresponding types and quantities of waste produced at the existing Lambda platform, whose characteristics are similar to those of the new Omega platform, can be used. This is waste produced during general maintenance of the facilities, which lasts 15 days every 30 months. The hazardous waste produced from the cleaning of tanks V-101 A/B, V-107, and V-102 containers from water treatment at the Delta platform consists of petroleum sludge (mixtures of heavy hydrocarbons containing mainly asphaltenes), rags, absorbent materials, etc. Hazardous and non-hazardous waste may be generated from $CO_{(2)}$treatment.The categories of waste that are estimated to be produced from the operation and maintenance of the underground storage facility based on the European Waste Catalogue (EWC) are presented in **Table 3-56** (**Section 3.4.3.5.1.3 Facility Operation/Maintenance Waste).**

With regard to the impact of the waste produced on the soil in the area, it should be noted that the quantity is relatively limited. Beyond their relatively limited quantity, it is important to note that their management will be carried out in accordance with best available practices for soil protection and the requirements of current legislation, as included in **the** overall **Waste Management Plan** of the proposed project modification, which is presented in **Annex 12.6**.

In addition, it should be noted that all waste expected to be generated from the operation of the proposed project modification is already produced by the company's existing facilities in the area (in different quantities and percentages of the total fraction). These quantities have been managed effectively for several decades without any significant impact on the quality characteristics of the soil in the study area, which demonstrates the adequacy and effectiveness of **the** Waste **Management Plan** implemented at the existing facilities, which has been taken into account in the design of the corresponding Plan for the proposed project modification.

Therefore, given that the collection, storage, removal, and disposal of waste will be carried out in accordance with the best available practices for soil protection and the requirements of current legislation, as included in **the** overall **Waste Management Plan** for the Project, it is estimated that the relevant impacts on the soil quality characteristics of the study area during the operation of the offshore facilities of the proposed project modification will be **Neutral.**

Seabed quality characteristics

The activities that may cause impacts on the quality characteristics of the seabed in the study area during the operation of the offshore facilities of the proposed project modification,based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Waste. Production, management, and disposal of waste from the operation of the project facilities.

Similar to the case of the impacts on the soil quality characteristics of the study area and based on what was analyzed in **the** previous **section**, given that the collection, storage, removal, and disposal of waste will be carried out based on the best available practices for soil protection and the requirements of current legislation, as included in **the** overall **Waste Management Plan** of the Project, it is estimated that the relevant impacts on the quality characteristics of the seabed in the study area during the operation of the proposed project modification will be **Neutral.**

Geological formations

The activities that may have an impact on the geological formations of the study area during the operation of the offshore facilities of the proposed project modification,based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- CO_2injection
  - The main processing equipment on the Omega platform will include a pumping and heating station for the required injection conditions, installed on the open deck of the platform.
  - CO_2injection will target reservoirs B and C with two injection wells during the period 2025-2035 and will then be extended to the entire reservoir by the end of the project.

From a technical point of view, in order to investigate the viability of the Project and its proposed modification, the company has carried out a series of studies and analyses. Among other things, **a Geochemical Study** has been prepared to assess the geochemical reaction of CO_2 with the minerals of the rocks and fluids of the geological formation, which showed that the expected geochemical changes will be minimal as a result of the characteristics of the geological formations in the study area. Therefore, it is estimated that $CO_{(2)}$injection will not cause any impact on the minerals of the rocks and fluids of the geological formation and, therefore, the relevant impact on the geological formations of the study area during the operation of the offshore facilities of the proposed modification will be **Neutral**.

Tectonics

With regard to **drilling operations** and CO_2storage, it should be noted that, in theory, CO_2injection into geological formations may increase the pressure within the rock formations, potentially causing seismic events. A higher injection rate may increase pore pressure and the risk of seismicity. In the case of the Project under study, the risk of induced seismicity is minimal, provided that the Project operates at the planned injection rate and within the framework of safe operation.

From a technical point of view, the company has carried out a series of studies and analyses to investigate the sustainability of the Project. Specifically, to date, the following studies have been carried out, among others:

- **Subsurface studies** aimed at investigating and simulating the subsurface in relation to the Prinos storage field. These studies examined the following issues: $CO_{(2)}$storage and permanent sequestration,storage constraints, injection strategies, water production, profiles (water, $CO_{(2)}$,water and hydrocarbon transport, etc.). The first Subsurface Studies, completed in December 2022, were carried out in three stages, assessing different aspects of the Project:
  - **Stage I** - Preliminary risk: The storage field was evaluated based on modeling of CO_2 plume migration in the basin. In addition, an analysis of potential CO_2 leaks$_2$ through faults and the relative risk of CO_2 leaks was assessed. Preliminary leak scenarios were also examined and evaluated, total CO_2 storage volumes were calculated, and an initial risk inventory was created.
  - **Stage II** – Characterization of storage site & storage complex: Static models were applied to the CO_2 storage site and the CO_2 storage complex.
  - **Stage III** – Three-dimensional simulation models were developed and different CO_2storage development scenarios were designed. 3D and 4D geomechanical models were simulated and the maximum injection pressure was determined to avoid CO2 leakage risks. A complete Project risk assessment was prepared for the subsoil and the storage field.
- **A geochemical study was conducted to assess the geochemical reaction of CO_2** with the minerals of the rocks and fluids of the geological formation, which showed that the expected geochemical changes will be minimal as a result of the characteristics of the geological formations in the study area.
  In addition, a study was completed to assess existing old boreholes to determine the likelihood that they could provide CO_2leakage pathways.
- Energean's technical team has conducted a series of **specialized studies and 3D subsurface simulations** to evaluate CO_2 in the geological structures beneath the Prinos reservoir, including the underlying aquifer . These simulations also demonstrate the impermeable cap rock, the boundaries of the structure consisting of boundary faults and geological wedges, and the volume of the aquifer.
- Energean's technical team is developing and implementing scenarios with estimated $CO_2$to be stored, potential CO_2 sources, the CO_2 transport network, and related synergies.
- During the first half of 2025, a series of additional subsurface studies were conducted that matured the project by identifying and mitigating project risks.

The above studies included simulations of the tectonic conditions in the area and the suitability (and safety) of the area in terms of the location of the boreholes for the proposed project modification. These simulations

documented that the Prinos basin is a tectonically stable area, as required for CO_2 in terms of tectonic (seismic) activity, and that the potential impact of the project on the tectonics of the area is negligible, given that the project operates at the planned injection rate and within the framework of safe operation.

Although the impact on the tectonic characteristics of the area during the operation of the new injection wells is less likely and essentially negligible, provided that the project operates safely, it is nevertheless real and therefore, in terms of its significance, this impact is assessed as negative, moderate in intensity, local, immediate in terms of the period of occurrence, long-term, reversible in the short term, non-synergistic, non-cumulative, immediate in terms of its effect, discontinuous, and immediately reversible. Consequently, in terms of the Final Assessment, this impact is assessed as **Minor**.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Physical presence – Operation of land-based facilities	Soil characteristics	-	2	1	4	3	2	2	4	4	1	1	29	Small	Low	Negligible
Physical presence and operation of facilities - CO_2injection into geological formations	Tectonics	-	4	2	4	3	2	2	4	1	1	1	34	Small	Moderate	Small

9.3.3.3 Decommissioning/Dismantling Phase

The following paragraphs will examine the possibility of potential adverse effects on the geological, tectonic, and soil characteristics of the area as a result of the cessation of operation and decommissioning of the proposed project modification.

Shutdown/Decommissioning of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable

Seabed quality characteristics

Activities that may have an impact on the quality characteristics of the seabed in the study area during the decommissioning of the additional section of the CO_2pipeline, the produced water pipeline, and the power cable,based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- The offshore pipeline and riser will be depressurized, cleaned using standard jetting operations, and then inerted with nitrogen. The pipeline will then be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with international standards.
- Production of solid and liquid waste.

The additional section of the CO2 pipeline (1.6 km long in the worst-case scenario) and the water transfer pipeline (1.3 km long in the worst-case scenario) will be installed by a special pipe-laying and trenching vessel. Similarly, the power cable (1.3 km long in the worst-case scenario) will be installed on the seabed by a vessel with a winding capability and then buried 1 m below the seabed. Given that, on the one hand, the offshore pipelines and cable are underground (burial depth of each pipeline from 1.5 to 2 m TOP and of the cable (approximately 1 m TOP) and, on the other hand, that the seabed surface has been restored to its previous form (due to the presence of strong sea currents that have refilled the trenches of the pipelines and restored the existing condition of the seabed surface), the choice (in accordance with international standards) to seal and leave in place the above elements of the proposed project modification is the best option, as it will not cause any significant impact on the seabed. However, the presence of the additional section of the CO(2)transfer pipeline,the produced water transfer pipeline, and the power supply cable on the seabed does have a limited impact. Consequently, the impacts will be negative, of negligible intensity, within the Project's area of occupation, permanent, irreversible, non-synergistic, non-cumulative, direct in terms of their effect, continuous, and non-reversible. Therefore, in terms of their Final Assessment, these impacts are assessed as **Minor.**

Given that the collection, storage, removal, and disposal of waste (the quantities of which are estimated to be relatively limited) will be carried out in accordance with best available practices for soil protection and the requirements of current legislation, as included in **the** overall **Waste Management Plan** for the Project, it is estimated that the relevant impacts on the quality characteristics of the seabed in the study area during the decommissioning of the additional section of the CO_2 , the produced water transfer pipeline and the power supply cable, will be **neutral**.

Cessation of operation / Dismantling of the Omega platform

Seabed quality characteristics

The activities that may cause impacts on the seabed quality characteristics of the study area during the decommissioning of the Omega platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Dispersion of drilling cuttings: Accumulated drilling cuttings must be removed from the platform piles. The cuttings will be removed from the jacket platform to prevent obstruction of the platform removal operations.
- Rig removal: The jack-up vessel will then be moved to the area to remove the rig. The surface equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the lift boat can lift and load the jackets onto barges.

- Platform disposal: Deep-water disposal of the platform (if chosen over onshore dismantling and material recycling)
- Production of solid and liquid waste.

The activities of dispersing the drill cuttings and dismantling the Omega platform are estimated to have an impact on the quality characteristics and structure of the seabed in an area of ~ 650 m^2. The potential impact of these activities is locally limited changes in the quality characteristics and structure of the seabed, which are estimated to be reversed in a relatively short period of time, at which point the characteristics of the area will return to their pre-intervention state.

Similarly, the deep-water disposal of the platform (if chosen over onshore dismantling and recycling of the material) is estimated to have a limited impact on the qualitative characteristics and structure of the seabed in a very limited area. This is conditional on the correct choice of the platform disposal site, based on the applicable legislation and BAT.

The activities during the dismantling of the Omega platform will generally result in the production of relatively limited quantities of waste, as a consequence of the relatively limited scale of the project. During the dismantling of the offshore facilities of the Omega platform, quantities of surplus materials, carbon steel pipe materials, steel protective casings, and other metal equipment will be generated. These materials will be managed in accordance with best available practices, with priority given to reuse, followed by recycling and, finally, the safe disposal of non-reusable and non-recyclable materials.

Beyond their relatively limited quantity, it is important to note that their management will be carried out in accordance with best available practices for soil protection and the requirements of current legislation, as included in the overall **Waste Management Plan** for the Project, which is presented in **Annex 12.6**.

Therefore, given that the collection, storage, removal, and disposal of waste will be carried out in accordance with best available practices for the protection of the seabed and the requirements of current legislation, as included in the overall Project **Waste Management Plan**, it is estimated that the relevant impacts will not be significant.

Based on the above, the dismantling of the Omega platform will have negative impacts on the quality characteristics of the seabed in the study area, which are estimated to be limited in significance and the relevant impacts will in any case be similar to those predicted for the construction phase of the project (possibly even milder, as the offshore platform dismantling phase generally takes significantly less time than the construction phase).

Consequently, the impact on the qualitative characteristics of the seabed in the study area during the decommissioning of the Omega platform will be negative, of medium intensity, local, simultaneous with the works, temporary, reversible in the long term, non-synergistic, direct in terms of its impact, continuous, recoverable in the medium term, and non-cumulative. Therefore, in terms of their Final Assessment, these impacts are assessed as **Minor.**

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Cessation of Operation / Removal of Offshore Pipelines and Cable	Quality characteristics and structure of the seabed	-	1	2	4	4	4	1	4	4	8	1	37	Small	Moderate	Small
Decommissioning/removal of offshore installations (excluding subsea pipelines and cables)	Quality characteristics and structure of the seabed	-	4	2	4	1	3	1	4	4	1	1	35	Small	Moderate	Small

9.3.3.4 Variation in the Estimated Impacts on Geological, Tectonic, and Soil Characteristics from the Project Modification

As documented in the above **Sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification are assessed as Minor and Negligible and cannot alter the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of impacts from new project elements, as introduced by the proposed project amendment (such as the new Omega offshore platform), the estimated impacts are limited to minor and negligible impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification). It should be noted that the cells that are empty with an impact rating **of NA** correspond to impacts that are either provided for in elements of the licensed project that are not relevant to this modification (e.g., onshore facilities), or to elements of the proposed amendment that were not included in the licensed project (e.g., new Omega platform).

Activity	Recipient	Final Impact Assessment[124]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
Construction of onshore facilities	Geological characteristics	Negligible	NA	Negligible
Construction of land facilities	Soil characteristics	Negligible	NA	Negligible
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Qualitative characteristics and structure of the seabed	Small	Small	Small
Drilling operations	Quality characteristics and structure of the seabed	Small	Small	Small
Drilling operations	Geological characteristics and submarine geological formations	Negligible	Negligible	Negligible
Omega platform installation works	Quality characteristics and structure of the seabed	NA	Small	Small
Omega platform installation works	Geological characteristics and submarine geological formations	NA	Negligible	Negligible
Operational phase				
Natural presence – Operation of land facilities	Terrain characteristics	Negligible	NA	Negligible
Physical presence and operation of facilities – CO_2injection into geological formations	Tectonics	Small	Minor	Small
Shutdown/decommissioning phase				
Production of solid and liquid waste during decommissioning	Soil characteristics	Negligible	NA	Negligible
Restoration of the land area of the Project site.	Soil characteristics	Positive	NA	Positive
Cessation of operation/decommissioning of offshore pipelines and cable	Quality characteristics and structure of the seabed	Small	Small	Minor

[124] In the event that, in terms of its Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts," as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** of this document. The same applies to the estimates of the approved EIA presented in this Table.

Activity	Recipient	Final Impact Assessment[124]		
		Licensed Project	Proposed Amendment	Total Modified Project
Decommissioning/Removal of offshore installations (excluding submarine pipelines and cable)	Seabed quality characteristics and structure	Small	Small	Minor

9.3.4 Impact on water

The following paragraphs examine the possibility of potential adverse impacts on water resources as a result of the construction, operation, and decommissioning/removal of the proposed project modification.

9.3.4.1 Construction Phase

The following paragraphs examine the possibility of potential adverse impacts on water resources in the area as a result of the construction phase of the proposed project modification.

Quality characteristics of marine & coastal waters

The activities that cause impacts on the quality characteristics of marine & coastal waters in the area during the construction phase of the proposed project modification,based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- **Offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable**
  - Phase 3. Installation of pipelines (CO2 transport pipeline and produced water transport pipeline) and power cable from a special pipeline laying vessel, together with 2 support supply vessels/tugs.
  - Phase 5. Closing of trenches and protection of pipelines and cable, commissioning.
  - After the installation of the pipelines, cable, and related connections, they will be buried along their entire length.
  - After completion of the construction work, the pipelines will be drained of water using a series of pumps from land and the remaining moisture will be removed using chemicals (monoethylene glycol – MEG) so that they are completely dry and ready for operation.
  - Marine traffic - Daily vessel traffic for the installation of pipelines and cable (including the transport of workers and support vessels).
- **Drilling**
  - Drilling

    Drilling of four wells to a depth of approximately 4,200 m (two wells will be used as CO2 injection wells and two as water production wells for the relative equalization of reservoir pressure).

    All four new wells will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies.
  - Waste - Production, management, and disposal of mining waste (drilling mud and cuttings).

    During the drilling of the 26-inch (125-450 MD (m)) and 16 inches (450-2600 MD (m)), a seawater/lime-based mud will be used as the drilling fluid. Cuttings from this section will be deposited on the seabed. Below this depth, the drilling fluids return to the surface where the cuttings are removed and the mud is treated.
- **Omega Platform Installation**

- Installation of guide and pillars. The conventional Omega platform will be supported by four (4) pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.
- Operation of a heavy-duty floating crane vessel and other support vessels (support vessel and tugboat, floating cargo barge). Waste/sewage production.

Offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable

The additional section of the CO_2pipeline (1.6 km long in the worst-case scenario) and the water transport pipeline (1.3 km long in the worst-case scenario) will be installed by a special pipeline laying vessel (pipelay and trenching vessel). Similarly, the power cable (1.3 km long in the worst-case scenario) will be installed on the seabed by a vessel with a winding capability and then buried 1 m below the seabed. Based on the description of the construction activities of the proposed project modification, as detailed in **Chapter 3** of this document, the following conclusions can be drawn:

- **In Phase 3 of the Project**, installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable by a special pipeline laying vessel, together with 2 support supply/tug vessels . During installation, water turbidity levels will increase, which may affect water quality and transparency, negatively impacting marine ecosystems and the species that depend on them. In addition, physical disturbance of the seabed from dredging is expected to affect benthic communities in the Project area.
- Sediment pollution levels in the area are not expected to be significant, so there will be no dispersion of pollution in the water column and therefore no dispersion on the seabed.
- In **Phase 5 of the Project**, trenches will be closed and pipelines and cables will be protected and put into operation. After the pipelines, cables, and related connections have been installed, they will be buried along their entire length.
- After completion of the construction work, the pipes will be emptied of water using a series of pumps from land, and the remaining moisture will be removed using chemicals (monoethylene glycol – MEG) so that they are completely dry and suitable for commissioning.
- **Hydrotest of CO_2transfer pipeline**. Once the pipeline is in place, it will be filled with chemically treated water and subjected to a hydrotest. The volume of chemically treated water in the pipeline will range between 1400 $m^3$and 2500 $m^3$for a pipeline length of approximately 19-19.5 kilometers, with a possible ID of 12-14. This volume of water will remain in the pipeline until it undergoes a hydrostatic test. Water-friendly chemicals will be used. Specifically, these are approved biocides and corrosion inhibitors that meet the requirements of applicable national and EU legislation and comply with international marine protection conventions (e.g., the Barcelona Convention). The substances to be used for the above purposes should be selected from the current version of the "OSPAR List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment (PLONOR)". However, it should be noted that substances included in the "OSPAR List of Substances of Possible Concern (LSPC)" may not be used.
- During the construction phase of the pipelines (CO_2transport pipeline and produced water transport pipeline) and the power cable, **domestic wastewater will be generated on the ship from the workers'**

living quarters. It is estimated that the supply of domestic wastewater will be equal to the water consumption for the workers' living conditions ~ 30 m(3) /day, which will be treated in a biological treatment system on board the ship. Other watery waste expected to be produced on board during the construction of the CO_2 pipeline is bilge water and ballast water. The management of bilge water that may contain grease and/or oil will be carried out in accordance with Annex I of MARPOL 73/78 (Regulations for the Prevention of Pollution by Oil) and its relevant amendments. The treatment equipment (bilge water separator) shall comply with the specifications of the IMO Guidelines (Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships, IMO Resolution MEP. 107(49)). The discharge of ballast water used to stabilize ships at sea is subject to the requirements of Annex I of MARPOL 73/78 and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management – BWM). The ballast water treatment system on board the ship shall comply with standard D-2, which concerns the treatment of ballast water. In general, in order to prevent pollution from ships, all measures provided for in the relevant Directives (**Chapter 10)** should be taken in consultation with the competent Port Authority.

Drilling of boreholes

- Waste - Production, management, and disposal of mining waste (drilling mud and cuttings). In the 26-inch (125-450 MD (m)) and 16-inch (450-2600 MD (m)) sections of the drilling, a seawater-based mud will be used as the drilling fluid. (m)) and 16 inches (450-2600 MD (m)), a seawater- and lime-based drilling fluid will be used, which will be biodegradable and have no negative impact on the environment. The cuttings from this section, estimated at 1,300 m(3) ,will not contain any hazardous substances. Given that no traces of hydrocarbons have ever been observed at these depths in the area in question, the cuttings from this section will be deposited on the seabed, while below a depth of approximately 2,600 m, the drilling fluids will return to the surface where they will be removed and the mud will be treated. Given the quality of the cuttings, their disposal on the seabed will not cause water pollution. However, this activity will cause increased turbidity. As mentioned above, however, the sediments are clean, containing no hydrocarbons and low in heavy metals and trace elements. Therefore, any pollutants present will be dispersed over a wide area but are unlikely to be noticeable compared to the current state of the aquatic environment due to the already low (below any limit) concentration levels. Furthermore, the amount of bottom sediment is not considered significant.
- During the drilling phase, domestic wastewater will be produced from the workers' living quarters. It is estimated that the supply of domestic wastewater will be equal to the water consumption for the workers' living conditions, as calculated in **Chapter 3.** Domestic wastewater will be transported and stored in special tanks located on the platform. The tanks are periodically emptied into the barge or the support vessel's tank. The contents of the tank are transported via the barge to the onshore facilities for biological treatment. Therefore, as already mentioned, the waste produced will be managed in accordance with the applicable legislation and the project's Environmental Management Plan and will have no impact on the surface and groundwater in the study area.

- Finally, it should be noted that small amounts of water may be produced during drilling and testing operations prior to the completion of the Omega platform and its infrastructure. In this case, the produced water will be temporarily transported by a suitably equipped and licensed marine vessel either to the DELTA platform or to a suitably licensed facility for treatment and disposal in accordance with the applicable conditions and restrictions. Transportation to the vessel will be via a closed connection (e.g., flexible hose) to prevent leaks and related environmental risks. Therefore, as already mentioned, the waste produced will be managed in accordance with the applicable legislation and the project's EIA and will have no impact on the surface and groundwater in the study area.

Installation of the Omega Platform

- During the installation of the guide and the pillars, water turbidity levels will increase, which may affect water quality and transparency, negatively impacting marine ecosystems and the species that depend on them. In addition, the physical disturbance of the seabed from dredging is expected to affect the benthic communities in the Project area.
- Sediment pollution levels in the area are not expected to be significant, so there will be no dispersion of pollution in the water column and therefore no dispersion on the seabed.
- During the installation phase of the Omega platform, domestic wastewater will be produced on the ship from the workers' living quarters. It is estimated that the supply of domestic wastewater will be equal to the water consumption for the workers' living quarters ~ 30 m^3 /day, which will be treated in a biological treatment system on board the ship. Other liquid waste expected to be produced on board the ship during the installation phase of the Omega platform is bilge water and ballast water. Bilge water that may contain grease and/or oil will be managed in accordance with Annex I of MARPOL 73/78 (Regulations for the Prevention of Pollution by Oil) and its relevant amendments. The treatment equipment (bilge water separator) shall comply with the specifications of the IMO Guidelines (Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships, IMO Resolution MEP. 107(49)). The discharge of ballast water used to stabilize ships at sea is subject to the requirements of Annex I of MARPOL 73/78 and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management – BWM). The ballast water treatment system on board the ship shall comply with standard D-2, which concerns the treatment of ballast water. In general, in order to prevent pollution from ships, all measures provided for in the relevant Directives (**Chapter 10)** should be taken in consultation with the competent Port Authority.

Therefore, based on the above, it is estimated that the following adverse effects on the quality characteristics of marine and coastal waters in the area will occur:

- The construction of the pipelines (CO_2transport pipeline and produced water transport pipeline) and the power supply cable is expected to have negative impacts, which are estimated to be negative, of medium intensity, local, simultaneous with construction works, temporary, reversible in

the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

- Negative impacts are expected from the drilling of boreholes, which are assessed as negative, of medium intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately reversible, and non-cumulative. In terms of their final assessment, these impacts are evaluated as **Minor.**
- The installation of the new Omega offshore platform is expected to have negative impacts, which are assessed as negative, of medium intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered to be **minor.**

Qualitative and quantitative characteristics of surface and groundwater

Activities that cause impacts on the qualitative & quantitative characteristics of surface and groundwater in the area during the construction phase of the proposed project modification,based on the scope of the EIA (**Chapter 9),** are as follows:

- Offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable
  - Maritime traffic - Daily vessel traffic for the installation of CO_2transport pipelines (including the transport of workers and support vessels).
- Drilling
  - Maritime traffic - Daily boat traffic for drilling operations (including transport of workers and support vessels).
- Omega platform
  - Maritime traffic - Daily vessel traffic for construction work (including transport of workers, materials, and support vessels).
  - Operation of heavy-duty floating crane vessels and other support vessels (support vessels and tugs, floating cargo barges).

Based on the description of the construction activities of the project under consideration, as described in detail in **Chapter 3** of this document, the following conclusions can be drawn:

- Use of water resources during construction:
  - A total of **1,350 m^3**is required during the construction phase to meet the water needs of the workers involved in the implementation of the offshore CO_2 transport pipeline (based on approximately 45 working days during which 200 workers will stay on the ship daily). Drinking water and water for domestic use will be covered by a seawater treatment system (Vacuum Vapor Compression) with an estimated capacity of 50 m^3/day, which will be available on the ship, and by the supply of bottled water.
  - The water needs of the personnel for the drilling operations are estimated at ~ **4,000 m^3**(of which approximately 200 m^3will be drinking water). Commercially bottled water will be used

as drinking water for workers, so this activity will not result in an increase in the amount of water extracted from surface or underground water resources.

- Water consumption for drilling a well is estimated at approximately 4,500 m^3 , so water use for all 4 wells is estimated at **18,000 m^3** . Seawater will be used for this purpose.
- During the installation phase of the Omega platform, it is estimated that the crews of the relevant construction vessels will average 50 workers per day. The daily consumption for each worker is estimated at 150 liters and refers to the consumption of drinking water and the use of water for personal hygiene. Therefore, during the installation of the Omega platform, approximately 15 m^{33} /day for the workers' living conditions and a total of **1,500 m^3** during the construction phase (based on approximately 100 working days during which 50 workers will be working on the vessels daily).
- In addition, during the installation phase of the Omega platform, 10 land-based personnel (supply chain support, coordination, and operational teams) will also be employed. The daily consumption for each employee is estimated at 20 liters and concerns drinking water consumption (5 liters) and water use for personal hygiene (15 liters). Therefore, during the construction of the project, approximately 200 liters of drinking water per day will be required for the workers' living needs and a total of **20 m^3**during the construction phase (based on approximately 100 working days during which 10 workers will work daily). These needs will be covered by the Sigma facilities' water supply network and the supply of bottled water.

Therefore, based on the above, it is estimated that there will be no adverse effects on the qualitative characteristics of surface and groundwater in the study area, while the following adverse effects on the quantitative characteristics of water resources in the area are expected:

- The construction of the pipelines (CO_2transport pipeline and produced water transport pipeline) and the power supply cable is expected to have negative impacts, which are estimated to be negative, of low intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are rated as **Minor.**
- The drilling of boreholes is expected to have negative, medium-intensity, localised, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate impact, continuous, immediately reversible and non-cumulative effects. In terms of their final assessment, these impacts are considered to be **Minor.**
- The installation of the new Omega offshore platform is expected to have negative, moderate, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately reversible, and non-cumulative. In terms of their final assessment, these impacts are evaluated as **Minor.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Construction work for the installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and the power supply cable	Quality characteristics of marine & coastal waters	-	4	2	4	1	1	2	4	4	1	1	34	Small	Moderate	Small
Drilling operations	Quality characteristics of marine and coastal waters	-	4	2	4	1	1	2	4	4	1	1	34	Small	Moderate	Small
Construction work for the installation of the Omega offshore platform	Quality characteristics of marine and coastal waters	-	4	2	4	1	1	2	4	4	1	1	34	Small	Moderate	Small
Construction work for the installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and the power supply cable	Quantitative characteristics of the region's water resources	-	2	2	4	1	1	2	4	4	1	1	28	Small	Moderate	Small
Drilling	Quantitative characteristics of water resources in the area	-	4	2	4	1	1	2	4	4	1	1	34	Small	Moderate	Small
Construction work for the installation of the Omega offshore platform	Quantitative characteristics of water resources in the area	-	4	2	4	1	1	2	4	4	1	1	34	Small	Moderate	Small

9.3.4.2 Operational Phase

The following paragraphs examine the possibility of potential adverse effects on the water resources of the area as a result of the operational phase of the proposed project modification.

Quality characteristics of marine & coastal waters

The activities that cause impacts on the quality characteristics of marine & coastal waters in the area during the operation phase of the proposed project modification, based on the P&K content definition of the MT AEPO (**Chapter 8),** are as follows:

- CO_2injection The main processing equipment on the Omega platform will include a pumping and heating station for the required injection conditions, installed on the open deck of the platform.
  - CO_2injection will target reservoirs B and C with two injection wells during the period 2025-2035 and will then be extended to the entire reservoir by the end of the project.

- Water pumping. The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and by the end of the project.
- Infrastructure and equipment maintenance and repair activities
  - Maintenance and repair activities for offshore infrastructure and equipment.
- Waste. Production, management, and disposal of waste from the operation of offshore facilities under the proposed project modification.
- Maritime traffic. Daily vessel traffic due to the operation of the proposed project modification (including employee transportation and support vessel movements).

Based on the description of the operational activities of the project under consideration, as detailed in **Chapter 3** of this document, the following conclusions can be drawn:

Offshore pipelines (CO_2transport pipeline and produced water transport pipeline), power cable, and Omega platform

From the maintenance and repair activities of offshore infrastructure and equipment, and more specifically from the periodic inspection of pipelines (every 5 years) and the corresponding maintenance of the Omega platform, no significant impact on the aquatic environment is expected, given that best available practices will be followed (for example: ensuring that the materials used in the construction and maintenance of the project (paints, insulation, coatings, etc.) do not contain the substances referred to in the decision of the Supreme Chemical Council 1100/91/91 (Government Gazette B 1008/12-12-1991) and in Ministerial Decisions 475/2002/03 (B 208/2003) and 121/2003/03 (B 1045/2003), as applicable, i.e. mercury compounds, arsenic and organotin compounds, as well as other chemicals considered hazardous under the relevant legislation on hazardous substances and for which restrictions on their circulation and use in the marine and aquatic environment in general apply), as well as the relevant provisions of the Project's Environmental Management Plan and the corresponding Environmental Monitoring Program.

Omega offshore platform

- Production, management, and disposal of waste from the operation of the offshore facilities of the proposed project modification:
  - The **two water production wells** on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and until the end of the project. The water produced from these wells will be transported to the Delta platform in Prinos (via the produced water transfer pipeline), where it will be separated and treated in the existing systems and then discharged into the sea. The treated seawater will meet quality and salinity limits, as uncontrolled discharge may be associated with (a) temperature

changes: if the treated water has a different temperature from the seawater, it may create temperature zones that can affect the behavior and distribution of fish (b) changes in the ecosystem: The discharge of large quantities of water may affect the structure and functioning of marine ecosystems, affecting the habitats of fish and other marine organisms. However, these activities are not expected to have a significant impact on the aquatic environment, provided that best available practices are followed, as well as the relevant provisions of the Project's Environmental Management Plan and the corresponding Environmental Monitoring Program.

- The **hazardous waste produced from the cleaning of tanks** V-101 A/B, V-107, and V-102 from water treatment at the Delta platform (also used for the treatment of water produced from the Omega platform) consists of petroleum sludge (mixtures of heavy hydrocarbons containing mainly asphaltenes), rags, absorbent materials, etc. The waste produced will be collected separately by type in containers suitable for its safe temporary storage at the Project in accordance with safety and environmental protection regulations, and its management will be carried out by licensed waste collection, transport, and waste management. However, this is already included in the existing operation of the Delta platform, so no impact on water quality is expected from this activity. In any case, the **Waste Management Plan** will be implemented in conjunction with the measures proposed in **Chapter 10**.
- **Water from the surfaces of the Omega platform** (cleaning and rainwater) will be directed to the closed drainage system through the enclosed areas and then discharged in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL). To minimize these quantities, the size of the enclosed areas has been minimized and protected from rain where possible. Similarly to the above, these activities are not expected to have a significant impact on the aquatic environment, given that best available practices will be followed, as well as the relevant provisions of the Project Environmental Management Plan and the corresponding Environmental Monitoring Program.
- Daily vessel traffic due to the operation of the proposed project modification. (including the transport of workers and the movement of support vessels) is not expected to have a significant impact on the quality characteristics of marine and coastal waters, given their small transport volume and limited number, especially following the implementation of best available practices, as well as the relevant provisions of the Project Environmental Management Plan and the corresponding Environmental Monitoring Program.

Therefore, based on the above, it is estimated that the following adverse effects will arise in terms of the quality characteristics of the marine and coastal waters of the area:

- The operation of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and the power supply cable is expected to have negative impacts of negligible intensity, local, immediate, long-term, reversible in the short term, synergistic, direct, periodic, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered to be **minor.**

- The operation of the Omega platform and related equipment is expected to have negative impacts, which are assessed as minor in intensity, local, immediate, long-lasting, reversible in the short term, synergistic, immediate, continuous, immediately reversible, and non-cumulative. In terms of their final assessment, these impacts are evaluated as **Minor.**

Qualitative and quantitative characteristics of surface and groundwater

The activities that cause impacts on the qualitative & quantitative characteristics of surface & groundwater in the area during the operational phase of the proposed project modification., based on the P&K content definition of the MT AEPO (**Chapter 8**) are as follows:

- Human, material, and natural resources
  - Consumption of energy, fuels, and materials
- Waste. Production, management, and disposal of waste from the operation of the project's onshore and offshore facilities.

During the operational phase of the CO_2storage facilities, no fresh water will be required, except for the accommodation of personnel, which will be at levels similar to those currently required for the operation of the existing facilities at the Prinos oil and gas complex. Similarly, during the operation phase of the CO(2)storage facilities, wastewater will be produced, which will also be at levels similar to those currently produced by the existing facilities.

Therefore, during the operation phase of the proposed project modification, limited impacts on the quantity of water resources are expected, as limited quantities of water will be required for the livelihood of the personnel. On the contrary, no negative impacts on the quality of water resources are expected, given the application of best available practices for the collection and disposal of liquid waste, as provided for in the project's WMP. Therefore, in terms of their significance, the impacts on the quantitative characteristics of water resources are assessed as negative, low intensity, immediate, localised, immediate, long-lasting, short-term reversibility, synergistic, non-cumulative, continuous and immediately reversible. In terms of their final assessment, these impacts are assessed as **Minor.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Maintenance of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Quality characteristics of marine and coastal waters	-	1	2	4	3	1	2	4	2	1	1	25	Small	Moderate	Small

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Operation of offshore facilities (Omega platform and related equipment)	Quality characteristics of marine and coastal waters	-	2	2	4	3	1	2	4	4	1	1	30	Small	Moderate	Small
Project operation	Quantitative characteristics of water resources	-	2	2	4	3	1	2	4	4	1	1	30	Small	Moderate	Small

9.3.4.3 Decommissioning/Dismantling Phase

The following paragraphs examine the possibility of potential adverse effects on the water resources of the area as a result of the decommissioning/removal phase of the proposed project modification.

Qualitative characteristics of marine and coastal waters

The activities that have an impact on the quality characteristics of marine and coastal waters in the area during the decommissioning/removal phase of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8)** are as follows:

- Shutdown/Dismantling of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable and Omega platform
  - The offshore pipelines and lifters will be depressurised, cleaned using standard jetting operations and then inerted by introducing nitrogen. The pipelines will then be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with international standards.
  - The pipes from the top of the jack-up to the wellheads will be depressurized and filled with nitrogen to inert the system. The pipes will be disconnected from the wellheads, capped, and left in place.
  - Marine traffic - Daily vessel traffic for the implementation of offshore pipeline decommissioning works (including employee transportation and support vessel movements).
- Cessation of Operations / Removal of Drilling Rigs
  - Production of solid and liquid waste.
  - Marine traffic - Daily vessel traffic for the implementation of offshore pipeline decommissioning works (including the transport of workers and support vessels).
- Shutdown/decommissioning of the Omega offshore platform

- Dispersion of drilling cuttings: Accumulated drilling cuttings must be removed from the platform piles. The cuttings will be removed from the jacket platform to prevent obstruction of the platform removal operations.
- Removal: The jack-up vessel will then be moved into position to remove the platform. The topside equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the lift vessel can lift and load the jackets onto barges.
- Deep-water disposal of the platform (if this option is chosen).
- Production of solid and liquid waste.
- Maritime traffic - Daily movement of vessels for the implementation of offshore facility decommissioning works (including the transport of workers and the movement of support vessels).

Based on the description of the construction activities of the project under consideration, as detailed in **Chapter 3** of this document, the following results arise:

Offshore pipelines (CO_2transport pipeline and produced water transport pipeline), power cable, and Omega platform

The offshore pipelines and lifters will be depressurized, cleaned using standard blasting operations, and then inerted by introducing nitrogen. The pipelines will then be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with international standards.

The pipes from the top of the jack-up to the wellheads will be depressurized and filled with nitrogen to inert the system. The pipes will be disconnected from the wellheads, covered, and left in place.

As can be seen from the above, the volume of work required is particularly limited and, therefore, the use of equipment and vessels for the decommissioning work will be limited, as will the subsequent production of waste with possible adverse effects on the quality characteristics of marine & coastal waters in the area.

Drilling

- Activities during the decommissioning of the wells generally result in the production of relatively limited quantities of waste, as a consequence of the relatively limited scale of the work. In addition, waste will also be generated from the operation of the vessels and equipment necessary for the suspension of drilling operations. The above materials will be managed in accordance with best available practices, with priority given to reuse, followed by recycling and finally the safe disposal of non-reusable and non-recyclable materials.
- Beyond their relatively limited quantity, it is important to note that their management will be carried out in accordance with best available practices for the protection of water resources and the requirements of current legislation, as included in **the** overall **Waste Management Plan** for the Project.

- During the dismantling phase of the offshore equipment, domestic wastewater will be generated from the living quarters of the workers. It is estimated that the supply of domestic wastewater will be equal to the water consumption for the living quarters of the workers, as calculated in **Chapter 3.** Domestic wastewater will be transported and stored in special tanks located on the platform. The tanks are periodically emptied into the barge or the support vessel's tank. The contents of the tank are transported via the barge to the onshore facilities for biological treatment.

Omega offshore platform

- The activities during the dismantling of the Omega platform generally result in the production of relatively limited quantities of waste, as a consequence of the relatively limited scale of the project. The dismantling of the Omega platform will result in relatively limited quantities of surplus materials, carbon steel piping materials, steel protective casings, and other metal equipment. In addition, waste will also be generated from the operation of the vessels and equipment necessary for the decommissioning of the Omega platform. The above materials will be managed in accordance with best available practices, with priority given to reuse, followed by recycling and finally the safe disposal of non-reusable and non-recyclable materials.
- Beyond their relatively limited quantity, it is important to note that their management will be carried out in accordance with best available practices for soil protection and the requirements of current legislation, as included in **the** overall Project **Waste Management Plan**.
- If deep-water disposal of the platform is chosen, this will result in limited impacts in a very limited geographical area, given that the disposal site will be selected in accordance with best available practices for water protection and the requirements of current legislation, as included in the relevant sections of this document.
- During the removal of the pillars (on the platform piles, the accumulated drilling debris must be removed), water turbidity levels will increase, which may affect water quality and transparency, negatively impacting marine ecosystems and the species that depend on them. In addition, the physical disturbance of the seabed from dredging is expected to affect the benthic communities in the Project area. Sediment pollution levels in the area are not expected to be significant, so there will be no dispersion of pollution in the water column and therefore no dispersion on the seabed.
- During the platform decommissioning phase, domestic wastewater will be generated from the workers' living quarters. It is estimated that the supply of domestic wastewater will be equal to the water consumption for the workers' living conditions, as calculated in **Chapter 3.** Domestic wastewater is transported and stored in special tanks located on the platform. The tanks are periodically emptied into the barge or the support vessel's tank. The contents of the tank are transported via the barge to the onshore facilities for biological treatment.

Therefore, based on the above, it is estimated that the following impacts will occur in terms of the quality characteristics of marine and coastal waters in the area:

- The decommissioning and removal of the pipelines (CO_2transport pipeline and produced water transport pipeline) and the power cable are expected to have negative impacts, which are estimated

to be negative, negligible in intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

- Negative impacts are expected from the cessation of drilling operations, which are assessed as minor in intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately reversible, and non-cumulative. In terms of their final assessment, these impacts are considered to be **Minor.**
- The decommissioning and dismantling of the new Omega offshore platform is expected to have negative impacts, which are assessed as negative, of medium intensity, local, simultaneous with the works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately reversible, and non-cumulative. In terms of their final assessment, these impacts are considered to be **Minor.**

Qualitative & quantitative characteristics of surface & groundwater

The activities that cause impacts on the qualitative & quantitative characteristics of surface & groundwater in the area during the decommissioning/removal phase of the proposed modification, based on the P&K content definition of the MT AEPO (**Chapter 8)** are as follows:

- Human, material, and natural resources
  - Consumption of energy, fuels, and materials

With regard to **the use of water resources** during the decommissioning/dismantling phase of the proposed modification, this is very limited, as the quantities required are even lower than those for the construction phase (as described in the corresponding paragraph above), due to the smaller volume and shorter duration of the work required.

In addition, depending on the construction phase of the proposed modification, the infrastructure of the existing facilities of the Prinos complex will be used to serve the staff, while alternatively, chemical toilets may be used within the construction site, which will be emptied and maintained regularly by a licensed company under the responsibility of the contractor.

Therefore, during the shutdown/decommissioning phase of the proposed modification, limited impacts on water resources are expected, as limited amounts of water will be required for the livelihood of project personnel. On the contrary, no negative impacts on the quality of water resources are expected, given the application of best available practices for the collection and disposal of liquid waste, as provided for in the project's WMP. Therefore, in terms of their significance, the impacts on the quantitative characteristics of water resources are assessed as negative, low intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Shutdown of pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable	Quality characteristics of marine & coastal waters	-	1	1	4	1	1	2	4	4	1	1	23	Small	Moderate	Small
Cessation of drilling operations	Quality characteristics of marine and coastal waters	-	2	2	4	1	1	2	4	4	1	1	26	Small	Moderate	Small
Decommissioning and dismantling of the Omega offshore platform	Quality characteristics of marine and coastal waters	-	4	2	4	1	1	2	4	4	1	1	34	Small	Moderate	Small

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Shutdown and dismantling of project facilities	Quantitative characteristics of water resources in the area	-	2	2	4	1	1	2	4	4	1	1	26	Small	Moderate	Small

9.3.4.4 Differentiation of Estimated Impacts on Water from the Project Modification

As documented in the above **Sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification are assessed as Minor and cannot change the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of impacts from new project elements, as introduced by the proposed project modification (such as the new Omega offshore platform), the estimated impacts are limited to minor impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification). It should be noted that the empty cells marked with the impact designation **NA** correspond to impacts that are either provided for in elements of the licensed project that are not relevant to this modification (e.g., onshore facilities), or to elements of the proposed amendment that were not included in the licensed project (e.g., new Omega platform).

Activity	Recipient	Final Impact Assessment[125]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
Construction works for land facilities	Quality characteristics of marine and coastal waters	Small	NA	Low
Construction works for the installation of pipelines (CO_2transport pipeline	Quality characteristics of	Small	Small	Small

[125] In the event that, in terms of its Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts," as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** of this document. The same applies to the assessments of the approved EIA presented in this Table.

Activity	Recipient	Final Impact Assessment[125]		
		Licensed Project	Proposed Amendment	Total Modified Project
and produced water transport pipeline) and the power supply cable	marine and coastal waters			
Drilling works	Quality characteristics of marine and coastal waters	Small	Small	Small
Construction work for the installation of the Omega offshore platform	Quality characteristics of marine and coastal waters	NA	Small	Small
Construction works for land facilities	Quantitative characteristics of water resources in the area	Small	NA	Small
Construction work on pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Quantitative characteristics of water resources in the area	Small	Small	Small
Drilling works	Quantitative characteristics of water resources in the area	Small	Small	Small
Construction work for the installation of the Omega offshore platform	Quantitative characteristics of water resources in the area	NA	Small	Small
Operational phase				
Maintenance of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Quality characteristics of marine and coastal waters	Small	Small	Low
Operation of offshore facilities (Omega platform and related equipment)	Quality characteristics of marine and coastal waters	Small	Small	Small
Project operation	Quantitative characteristics of water resources	Small	Small	Small
Shutdown/decommissioning phase				
Cessation of operation and decommissioning of the project's land-based facilities	Quality characteristics of marine and coastal waters	Minor	NA	Low
Dismantling of the project's land facilities and restoration of the area where they were located	Quality characteristics of marine & coastal, surface and groundwater	Positive	NA	Positive
Cessation of operation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Quality characteristics of marine & coastal waters	Low	Low	Minor
Cessation of drilling operations	Quality characteristics of marine and coastal waters	Small	Small	Minor

Activity	Recipient	Final Impact Assessment[125]		
		Licensed Project	Proposed Amendment	Total Modified Project
Cessation of operations and decommissioning of the Omega offshore platform	Quality characteristics of marine and coastal waters	NA	Minor	Minor
Decommissioning and dismantling of project facilities	Quantitative characteristics of water resources in the area	Small	Small	Small

9.3.5 Impacts on the atmospheric environment

The following paragraphs examine the possibility of potential adverse effects on air quality in the area as a result of the construction, operation, and decommissioning/removal of the proposed project modification.

9.3.5.1 Construction Phase

The following paragraphs examine the possibility of potential adverse effects on air quality in the area as a result of the implementation of the proposed project modification.

Air pollutant emissions from the construction of offshore pipelines (CO2 transport pipeline and produced water transport pipeline) and power cable

The activities that will impact air quality in the area during the construction of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 9**), are as follows:

- Phase 3: Installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable from a special pipeline laying vessel, together with 2 support supply vessels/tugs.
- Maritime traffic - Emissions caused by the daily movement of ships for the installation of CO_2transport pipelines (including the transport of workers and the movement of support ships), which generate:
  - Air pollutants (CO, VOC, and NOx).

Total air pollutant emissions based on estimated fuel consumption during operations according to the indicative construction schedule (**Section 3.4.2.2**) are calculated in **the Tables** in **Section 3.4.2.8.5 Atmospheric Emissions from the Construction of the CO_2Pipeline, the Produced Water Transfer Pipeline, and the Submarine Cable**. The standard emission factors for Marine Gas oil fuel from the European Environment Agency's air pollutant emission inventory guidebook (*EMEP/EEA 2023, EMEP/EEA air pollutant emission inventory guidebook, Technical guidance to prepare national emission inventories, https:// www.a. europa. eu// emep-a--2023*).

The expected quantities of air pollutant emissions from the construction of the pipelines (CO_2 and produced water transport pipeline) and the power cable are estimated to be relatively limited but quantifiable (**Table 3 43 Estimated air pollutant emissions during the construction of the CO_2 pipeline, the produced water transfer pipeline, and the subsea cable**) without substantially altering the corresponding values that had been predicted in the approved EIA for the licensed project. Therefore, in terms of their significance, these impacts are assessed as negative, of medium intensity, direct, localised, simultaneous with the construction works, temporary, short-term, reversible, synergistic, cumulative, periodic and immediately remediable. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Air pollutant emissions from drilling operations

The activities that cause impacts on the air quality of the area during drilling operations,based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Drilling
  - Drilling of four boreholes to a depth of approximately 4,200 m (two boreholes will be used as CO_2 injection wells and two as water production wells for the relative equalization of reservoir pressure).
  - All four new wells will be constructed using a TDS drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies.
- Completion of drilling
  - The protective casing of each well will be cemented with a 200 m cement column above the base of the previous protective casing and along the entire length of the open geological formation.
- Marine traffic
  - Emissions caused by the daily movement of ships during drilling operations (including the transport of workers and the movement of support vessels), which generate air pollutants (CO, VOC, and NOx) and PM.

Emissions to the atmosphere will be generated by the jack-up drilling rig and support vessels during drilling operations. Given the relatively limited emissions (the relevant calculations are presented in **Section 3.4.2.8.4)** and the distance from the receptors, these emissions are not considered to contribute significantly to air quality degradation.

Air pollutant emissions based on estimated fuel consumption during operations according to the indicative construction schedule (**Section 3.4.2.2**) are calculated in **the Tables** in **Section 3.4.2.8.4 Atmospheric Emissions from Drilling Operations**.

The expected quantities of air pollutant emissions from the implementation of drilling operations are estimated to be relatively limited and, therefore, in terms of their significance, the specific impacts are assessed as negative, of medium intensity, direct, localized, simultaneous with construction works, temporary, short-term reversibility, synergistic, cumulative, continuous, and immediately remediable. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Air pollutant emissions from the offshore platform installation

The activities that cause impacts on the air quality of the area during the installation of the offshore platform , based on the P&K content delimitation of the MT AEPO (**Chapter 8**) are the following:

- Installation of the Omega offshore platform
  - Installation of guide and pillars. The conventional Omega platform will be supported by four (4) pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.
  - Installation of the support grid for the platform decks.
  - Installation of decks with the platform's surface equipment.

- Maritime traffic - Daily movement of vessels for the implementation of construction works (including the transport of workers, materials, and support vessels).
- Operation of a heavy-duty floating crane vessel and other support vessels (support vessel and tugboat, floating cargo barge). Waste/sewage production.

Emissions to the atmosphere will be generated by the jack-up drilling rig and support vessels during drilling operations. Given the relatively limited emissions (the relevant calculations are presented in **Section 3.4.2.8.4)** and the distance from the receptors, these emissions are not considered to contribute significantly to air quality degradation. The standard emission factors for Marine Gas oil fuel from the European Environment Agency's air pollutant emission inventory guidebook were used to calculate emissions (*EMEP/EEA 2023, EMEP/EEA air pollutant emission inventory guidebook, Technical guidance to prepare national emission inventories,* https:// www.a. europa. eu// emep-a--2023).

Air pollutant emissions based on estimated fuel consumption during operations according to the indicative construction schedule (**Section 3.4.2.2**) are calculated in **Tables 3.4.2.8.3 Atmospheric Emissions from the Offshore Platform Installation**.

The expected quantities of air pollutant emissions from the offshore platform installation are estimated to be relatively limited and, therefore, in terms of their significance, the specific impacts are assessed as negative, of medium intensity, direct, localised, simultaneous with construction works, temporary, short-term, reversible, synergistic, cumulative, continuous and immediately remediable. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Activity	Recipient	Impact Size												Impact Significance	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Air pollutant emissions from the construction of land-based facilities	Atmospheric environment	-	1	2	4	1	1	2	4	2	1	4	26	Small	Low	Negligible
Air pollutant emissions from the construction of pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Atmospheric environment	-	4	2	4	1	1	2	4	2	1	4	35	Small	Low	Negligible
Air pollutant emissions from drilling operations	Atmospheric environment	-	4	2	4	1	1	2	4	4	1	4	37	Small	Low	Negligible
Air pollutant emissions from the offshore platform installation	Atmospheric environment	-	4	2	4	1	1	2	4	4	1	4	37	Small	Low	Negligible

9.3.5.2 Operational Phase

The following paragraphs examine the possibility of potential adverse effects on air quality in the area as a result of the operation of the proposed project modification.

Emissions into the atmosphere during the operation of the proposed project modification will mainly come from the operation of trucks transporting CO_2 , the operation of cranes, the operation of supply vessels, and the processing of CO_2 loads and bulk flow (heating and pumping).

The activities that will have an impact on air quality in the area during the operation of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8**), are as follows:

- **Transport of CO_2 to the Prinos storage facilities**
  - Receipt of CO_2 in containers (CO_2 parcels) CO_2 loads from pilot projects will be transported to the Sigma facility dock in ISO container trucks with pressure vessels, insulated to minimize losses.
  - The CO_2 is supplied under suitable conditions for injection and routed to the head, from where it is extracted to the Prinos complex via a 12-16" pipeline.
- **CO_2injection**
  - The main processing equipment on the Omega platform will include a pumping and heating station for the required injection conditions, installed on the open deck of the platform.
  - CO_2injection will target reservoirs B and C with two injection wells during the period 2025-2035 and will then be extended to the entire reservoir by the end of the project.
- **Water pumping**
  - The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and until the end of the project.
- **Infrastructure and equipment maintenance and repair activities**
  - Maintenance and repair activities for offshore infrastructure and equipment.
- **Maritime traffic**
  - Daily vessel traffic due to project operations (including employee transportation and support vessel movements).

Atmospheric emissions during CO_2 reception and CO_2 transport to the offshore storage facilities in Prinos

Typical air pollutant emissions from transport trucks include pollutants such as carbon dioxide (CO_2), nitrogen oxides (NOx), particulate matter (PM), volatile organic compounds (VOCs), sulfur dioxide (SO_2) and carbon monoxide (CO). These emissions result from the use of fuel in truck engines. Air pollutant emissions from crane operation result from the use of fuel in their engines, similar to trucks.

The above pollutant emissions were calculated in **Section 3.4.3.6.1 Atmospheric emissions during CO_2 receipt.**

The expected amounts of pollutant emissions from CO_2reception are estimated to be relatively limited but calculable, and therefore, in terms of their significance, the specific impacts are assessed as negative, of medium intensity, direct, localized, long-term, short-term reversibility, synergistic, cumulative, periodic, and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Atmospheric emissions during handling – processing for CO_2injection and water pumping

The main processing equipment on the Omega platform will include a pumping and heating station for the required injection conditions, installed on the open deck of the platform. The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. Two electric submersible pumps (ESPs) with a capacity of approximately 0.5 to 1 MW each are planned to pump the produced water from the water wells on the Omega platform.

A power of 1.6 MW is required for CO_2processing in order to achieve the appropriate injection conditions (P, T). This power demand includes the requirements for compressing/pumping CO_2 loads,as well as heating bulk CO_2during start-up. This power demand is mainly due to the operation of the electric heater required during start-up as a means of preventing low temperatures in the piping and the formation of hydrates/salts in the area near the well. The daily energy required for 16 hours of operation (2 shifts) amounts to 1.6 MW x 16h/d = 25.6 MWh, while the annual energy requirement amounts to 9**,344 MWh**.

In addition, two Electric Submersible Pumps (ESP) with a capacity of approximately 0.5 to 1 MW each are planned for pumping the water produced from the water wells on the Omega platform. Power will be supplied to the pumps via power cables fed by variable speed drives (VSDs) from the Delta platform. Assuming 24-hour operation of the pumps, taking into account an average power rating of 0.75 MW, the annual energy requirement for each pump is equal to 0.75 MW x 24hr/d x 365 d = 6,570 MWh. Therefore, a total energy of **13,140 MWh** is required to operate the two pumps**.**

Emissions during transport and processing for CO_2injection and water pumping are presented in **Section 3.4.3.6.2 Atmospheric emissions during transport and processing for CO_2injection.**

The expected quantities of pollutant emissions from handling and processing for CO_2 injection are estimated to be relatively limited but calculable, and therefore, in terms of their significance, the specific impacts are assessed as negative, of medium intensity, direct, localised, long-term, short-term reversibility, synergistic, cumulative, continuous and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Infrastructure and equipment maintenance and repair activities

Given the scale and nature of the proposed project modification, the expected quantities of air pollutant emissions from infrastructure and equipment maintenance and repair activities are estimated to be very limited but quantifiable, and therefore, in terms of their significance, these impacts are assessed as negative, low intensity, direct, localized, temporary, short-term, reversible, synergistic, cumulative, discontinuous, and immediately remediable. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Maritime traffic

The daily movement of ships due to the operation of the proposed project modification (including the transport of workers and the movement of support vessels) results in emissions of air pollutants (CO, VOC, and NOx) and PM.

Given the scale and nature of the proposed modification to the project , the expected quantities of $CO_{(2)}$emissions from the daily movement of ships due to the operation of the project (including the transport of workers and the movement of support ships) are estimated to be particularly limited but calculable and therefore, in terms of their significance, the specific impacts are assessed as negative, low intensity, direct, localized, long-term, short-term reversibility, synergistic, cumulative, periodic, and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Negligible**.

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Atmospheric emissions during CO_2 reception and CO_2 transport to offshore storage facilities in Prinos	Atmospheric environment	-	4	2	4	3	1	2	4	2	1	4	37	Small	Low	Negligible
Gaseous pollutants from CO_2injection	Atmospheric environment	-	4	2	4	3	1	2	4	4	1	4	39	Small	Low	Negligible
Gaseous pollutants from water pumping	Atmospheric environment	-	4	2	4	3	1	2	4	4	1	4	39	Small	Low	Negligible
Gaseous pollutants from infrastructure and equipment maintenance and repair activities	Atmospheric environment	-	2	2	4	1	1	2	4	1	1	4	28	Small	Low	Negligible
Gaseous pollutants from daily ship traffic due to the operation of the Project (including employee transportation and support ship movements)	Atmospheric environment	-	4	2	4	3	1	2	4	2	1	4	37	Small	Low	Negligible

9.3.5.3 Shutdown/Decommissioning Phase

The following paragraphs examine the possibility of potential adverse effects on air quality in the area as a result of the shutdown phase and decommissioning of the proposed project modification.

The activities that cause impacts on the air quality of the area during the decommissioning and dismantling phase of the proposed project modification,based on the P&K content definition of the EIA (**Chapter 8**), are as follows:

- **Shutdown/Dismantling of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable**
  - Maritime traffic - Daily vessel traffic for the implementation of offshore pipeline decommissioning works (including the transport of workers and support vessels).
- **Cessation of operations / Decommissioning of wells**
  - Marine traffic - Daily vessel traffic for the implementation of offshore pipeline decommissioning works (including the transport of workers and support vessels).
- **Cessation of Operations / Decommissioning of the Omega offshore platform**
  - Marine traffic - Daily vessel traffic for the implementation of offshore facility decommissioning works (including employee transportation and support vessel movements).

Decommissioning/dismantling of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable

The expected quantities of air pollutant emissions during the decommissioning/removal of offshore pipelines (CO2 transport pipeline and produced water transport pipeline) and the power cable are estimated to be limited in significance, therefore the specific impacts are expected to be negative, of negligible intensity, immediate, localised, simultaneous with construction works, temporary, short-term, reversible, synergistic, cumulative, periodic and immediately remediable. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Cessation of operation/decommissioning of wells

The expected quantities of air pollutant emissions during the decommissioning/removal of wells phase are estimated to be limited in significance, therefore these impacts are expected to be negative, of medium intensity, immediate, localised, simultaneous with construction works, temporary, short-term, reversible, synergistic, cumulative, continuous and immediately reversible. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Decommissioning/dismantling of the Omega offshore platform

The expected quantities of air pollutant emissions during the decommissioning/dismantling phase of the Omega offshore platform are estimated to be limited in significance, therefore the specific impacts are expected to be negative, of negligible intensity, immediate, localised, simultaneous with the construction works, temporary, short-term, reversible, synergistic, cumulative, periodic and immediately remediable. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Activity	Recipient	Impact Size												Impact Significance	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Shutdown/decommissioning of offshore transport pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Atmospheric environment	-	1	2	4	1	1	2	4	2	1	4	26	Small	Low	Negligible
Cessation of operation/decommissioning of boreholes	Atmospheric environment	-	4	2	4	1	1	2	4	2	1	4	35	Small	Low	Negligible
Cessation of operation/decommissioning of the Omega offshore platform	Atmospheric environment	-	4	2	4	1	1	2	4	2	1	4	35	Small	Low	Negligible

9.3.5.4 Variation in the Estimated Impacts on the Atmospheric Environment from the Project Modification

As documented in the above **Sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification are assessed as Negligible and cannot alter the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of impacts from new project elements, as introduced by the proposed project modification (such as the new Omega offshore platform), the estimated impacts are limited to negligible impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification). It should be noted that the empty cells marked with the impact designation **NA** correspond to impacts that are either provided for in elements of the licensed project that are not relevant to this modification (e.g., onshore facilities), or to elements of the proposed amendment that were not included in the licensed project (e.g., new Omega platform).

Activity	Recipient	Final Impact Assessment[126]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
Air pollutant emissions from the construction of land-based facilities	Atmospheric environment	Negligible	NA	Negligible
Air pollutant emissions from the construction of pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Atmospheric environment	Negligible	Negligible	Negligible
Air pollutant emissions from drilling operations	Atmospheric environment	Negligible	Negligible	Negligible
Air pollutant emissions from the offshore platform installation	Atmospheric environment	NA	Negligible	Negligible
Operational phase				
Atmospheric emissions during CO_2 reception and CO_2 transport to offshore storage facilities in Prinos	Atmospheric environment	Negligible	Negligible	Negligible
Gaseous pollutants from CO_2injection	Atmospheric environment	Negligible	Negligible	Negligible
Gaseous pollutants from water pumping	Atmospheric environment	Negligible	Negligible	Negligible
Gaseous pollutants from infrastructure and equipment maintenance and repair activities	Atmospheric environment	Negligible	Negligible	Negligible
Gaseous pollutants from daily ship traffic due to the operation of the Project (including employee transportation and support ship movements)	Atmospheric environment	Negligible	Negligible	Negligible
Shutdown/Decommissioning Phase				
Gaseous pollutants from the dismantling of land-based facilities – Restoration of the land area of the Project facility	Atmospheric environment	Negligible	NA	Negligible
Cessation of Operation / Decommissioning of offshore transport pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Atmospheric environment	Negligible	Negligible	Negligible
Cessation of operation / dismantling of boreholes	Atmospheric environment	Negligible	Negligible	Negligible
Cessation of Operation / Decommissioning of the Omega offshore platform	Seabed quality characteristics and structure	Negligible	Negligible	Negligible

[126] In the event that, in terms of its Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts" as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** herein. The same applies to the estimates of the approved EIA presented in this Table.

9.3.6 Impact on the acoustic environment

The following paragraphs examine the possibility of potential adverse impacts from noise and vibration emissions as a result of the construction, operation, and decommissioning/removal of the proposed project modification.

It is important to note that the assessment of the status of underwater noise in terms of its impact on underwater fauna is examined in the relevant paragraphs of **Section 9.3.8.**

9.3.6.1 Construction Phase

The following paragraphs examine noise emissions from the construction works of the proposed project modification.

Underwater Noise and Vibrations

Noise emissions and vibrations from the construction of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable

Activities causing impacts during the construction of offshore pipelines (CO_2 and produced water transfer pipeline) and the power cable, based on the P&K content definition of the MT AEPO (**Chapter 8**) are as follows:

- Phase 3. Installation of pipelines (CO2 transport pipeline and produced water transport pipeline) and power cable by a special pipeline laying vessel, together with 2 support supply/tug vessels.
- Maritime traffic - Daily vessel traffic for the installation of pipelines and cable (including the transport of workers and the movement of support vessels).

During the offshore pipeline construction phase (CO_2 and produced water transfer pipeline) and the power cable, the construction vessel and escort/support vessels will generate underwater noise. The main sources of underwater noise are categorized as follows:

- Propellers and thrusters: Noise from propellers and thrusters is mainly caused by cavitation around the propellers when the vessel is moving or when the thrusters are operating to maintain/stabilize the position of the support vessel during refueling of the research vessel (OSPAR 2009, Richardson et al., 1995). The underwater noise generated by propellers and thrusters includes:
  - Relatively broadband acoustic signals with free-field source levels of approximately 160-175 dB (re 1 μPa), generated by small boats and ships (up to 50 m in length), although these emissions depend heavily on the speed of the vessel and other operational characteristics.
  - Typical broadband source levels ranging between 165-180 dB (re 1 μPa) from more complex propulsion systems typically involving submersible thrusters on tug boats, crew boats, supply vessels, and many research vessels (50 to 100 m in length).

- Relatively strong and mainly low-frequency noise (the strongest energy is usually concentrated at frequencies lower than several hundred Hz), with broadband source levels of approximately 180-190 dB (re 1 μPa) from large vessels (length > 100 m).

- Engines and E/M equipment: Noise from engines often dominates when vessels are stationary or moving at low speeds. The main sources of mechanical noise include large mechanical equipment such as large power generation units (diesel engines or gas turbines), compressors, and pumps. Mechanical noise is usually low-frequency and tonal in nature.

However, on the one hand, the limited duration of implementation of the proposed project modification (based on the indicative construction schedule - **Section 3.4.2.2)** and the relatively limited volume of construction work on the pipelines and cable (the extension of the $CO_{(2)}$transport pipeline is 1.3–1.6 km long, the length of the submarine pipeline for transporting the produced water is 1.0–1.3 km, and the length of the submarine power cable is 1.0–1.3 km, while their installation depth is 1–1.5 m), the expected noise emissions from the construction of the pipelines and cable are relatively limited. Therefore, in terms of their significance, these specific impacts are assessed as negative, low intensity, localised, simultaneous with the construction works, temporary, short-term, reversible, synergistic, non-cumulative, periodic and immediately remediable. In terms of their final assessment, these impacts are considered to be **Minor.**

Noise emissions and vibrations from drilling operations

The activities that cause impacts during the drilling of boreholes,based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Drilling
  - Drilling of 4 wells to a depth of approximately 4200 m (2 wells will be used as CO_2injection wells and 2 as water production wells for the relative equalization of reservoir pressure).
  - the four wells , will be constructed using a TDS (Top Drive System) drilling unit and will be directed using a combination of mud motors and rotary drilling assemblies.
  - Marine traffic - Daily vessel traffic for drilling operations (including transport of workers and support vessels).

Natural noise levels at sea as a result of wind and waves can range from 90 dBA at 1 mPa in very calm conditions with low winds to 110 dB at 1 mPa in windy conditions. Certain phases of drilling operations could generate noise exceeding the above-mentioned natural conditions. Shell Australia conducted a detailed study in 1998, comparing noise levels for a platform under static conditions with a platform under drilling conditions. Noise levels from a supply vessel servicing the drill ship were also measured and compared with noise from the drill ship (*R. McCauley, 1998, Underwater noise emitted by the Ocean General drill ship, tugs, fishing vessels, and natural sources in the Timor Sea, Australia)*. Noise levels during drilling and non-drilling periods (generator operation, human activity) were similar. A noise level of 117 dB was recorded 125 m from the drilling rig. During unloading activities from support vessels, noise levels reached 134 dB.

Therefore, although the jack-up drilling rig will introduce an increased noise level above the natural background, this level is not expected to be significantly higher than the noise levels produced by other marine vessels in the area, including those serving existing platforms.

Consequently, the following impacts are expected from the implementation of the drilling operations:

- The expected underwater noise emissions are estimated to be relatively limited and, therefore, in terms of their significance, the specific impacts are assessed as negative, of medium intensity, direct, localised, simultaneous with construction works, temporary, short-term, reversible, synergistic, non-cumulative, periodic and immediately remediable. In terms of their final assessment, these impacts are considered to be **minor**.
- The expected vibrations are estimated to be relatively limited and, therefore, in terms of their significance, these impacts are assessed as negative, low intensity, simultaneous with construction works, localized, temporary, short-term, reversible, synergistic, non-cumulative, periodic, and immediately reversible. In terms of their final assessment, these impacts are considered **Minor**.

Noise emissions and vibrations from the installation of the Omega platform

The activities that cause impacts during the installation of the Omega platform , based on the P&K content delimitation of MT AEPO (**Chapter 8**) are as follows:

- Installation of the Omega platform
  - Installation of guide and pillars. The conventional Omega platform will be supported by four (4) pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.
  - Maritime traffic - Daily movement of vessels for the implementation of construction works (including the transport of workers, materials, and support vessels).
  - Operation of a heavy-duty floating crane vessel and other support vessels (support vessel and tugboat, floating cargo barge).

During the installation phase of the Omega platform, the heavy-duty floating crane and escort/support vessels will generate underwater noise. The main sources of underwater noise are categorized as follows:

- Propellers and thrusters: Noise from propellers and thrusters is mainly caused by cavitation around the propellers when the vessel is moving or when the thrusters are operating to maintain/stabilize the position of the support vessel during refueling of the research vessel (OSPAR 2009, Richardson et al., 1995). The underwater noise generated by propellers and thrusters includes:
  - Relatively broadband acoustic signals with free field source levels of approximately 160-175 dB (re 1 μPa), produced by small boats and ships (up to 50 m in length), although these emissions depend largely on the speed of the vessel and other operational characteristics.
  - Typical broadband source levels ranging from 165-180 dB (re 1 μPa) from more complex propulsion systems typically involving submersible thrusters on tugboats, crew boats, supply vessels, and many research vessels (50 to 100 m in length).

  - Relatively strong and mainly low-frequency noise (the strongest energy is usually concentrated at frequencies lower than several hundred Hz), with broadband source levels of approximately 180-190 dB (re 1 μPa) from large vessels (length > 100 m).
- Engines and E/M equipment: Noise from engines often dominates when vessels are stationary or moving at low speeds. The main sources of mechanical noise include large mechanical equipment such as large power generation units (diesel engines or gas turbines), compressors, and pumps. Mechanical noise is usually low frequency and tonal in nature.

In addition, underwater noise will be caused by the pile driving of the platform piles using a percussion or pulsed mechanism. Specifically, the noise levels of the driving hammers that will be used to install the piles can reach up to 180 dB at the source. For comparison, the natural noise levels in the ocean, as a result of wind and wave action, can range from 90 dBA re 1μPa under mild wind conditions to 110 dB re 1μPa under severe weather conditions.

In this particular case, the corresponding values resulting from the measurements and estimates of the Dieseko Group for a pulsed mechanism are SELss 112-135 dB re 1 $\mu Pa^2 \cdot s$ and SPL peak-to-peak 132-161 dB re 1 μPa at a distance of 750 m from the source, while the SPL in the case of the impact mechanism is 180 dB re 1 μPa at a distance of 3-10 m from the source.

Therefore, the following impacts are expected from the installation of the Omega platform:

- The expected underwater noise emissions are estimated to be relatively limited and, therefore, in terms of their significance, the specific impacts are assessed as negative, high intensity, direct, regional in scope, simultaneous with construction works, temporary in duration, short-term reversibility, synergistic, non-cumulative, periodic, and immediately reversible. As for their final assessment. As for their final assessment, these impacts are assessed as **Moderate.** As for their final assessment, these impacts are assessed as **Moderate, and** within the framework of this document, prevention/mitigation/countermeasures are proposed so that these impacts become at least Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.
- The expected vibrations are estimated to be relatively limited and, therefore, in terms of their significance, the specific impacts are assessed as negative, of medium intensity, simultaneous with the construction works, focused at the local level, temporary in duration, short-term reversibility, synergistic, non-cumulative, periodic, and immediately remediable. In terms of their final assessment, these impacts are assessed as **Minor.**

Airborne noise and vibrations

Noise emissions and vibrations from the construction of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and the power supply cable

Activities causing impacts during the construction of offshore pipelines (CO_2 and produced water transfer pipeline) and the power cable, based on the P&K content definition of the MT AEPO (**Chapter 8**) are as follows:

- Phase 3. Installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable by a special pipeline laying vessel, together with 2 support supply/tug vessels.
- Maritime traffic - Daily vessel traffic for the installation of pipelines and cable (including the transport of workers and the movement of support vessels).
- Operation of the pipe-laying vessel (which accommodates 200 people).

However, on the one hand, the limited duration of implementation of the proposed project modification (based on the indicative construction schedule - **Section 3.4.2.2)** and, on the other hand, the relatively limited volume of construction work for the pipelines and cable (the extension of the $CO_{(2)}$transport pipeline is 1.3–1.6 km long, the length of the submarine pipeline for transporting the produced water is 1.0–1.3 km, and the length of the submarine power cable is 1.0–1.3 km, while their installation depth is 1–1.5 m), the expected airborne noise emissions from the construction of the pipelines and cable are relatively limited. Therefore, in terms of their significance, these impacts are assessed as negative, of medium intensity, focused at the local level, simultaneous with the construction works, temporary in duration, short-term reversibility, synergistic, non-cumulative, periodic, and immediately remediable. In terms of their final assessment, these impacts are considered to be **minor.**

Noise emissions and vibrations from drilling operations

The activities that cause impacts during drilling operations,based on the P&K content definition of the MT AEPO (**Chapter 8**), are as follows:

- Drilling
  - Drilling of four wells to a depth of approximately 4,200 m (two wells will be used as CO_2 injection wells and two as water production wells for the relative equalization of reservoir pressure). the four new wells, will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies.
  - Maritime traffic - Daily vessel traffic for drilling operations (including the transport of workers and support vessels).

However, on the one hand, the limited duration of the project under consideration (based on the indicative construction schedule - **Section 3.4.2.2)** and the relatively limited volume of drilling operations, the expected airborne noise emissions from drilling operations are relatively limited. Therefore, in terms of their significance, these specific impacts are assessed as negative, of medium intensity, focused at the local level, simultaneous with the construction works, temporary in duration, short-term reversibility, synergistic, non-cumulative, periodic, and immediately remediable.

In terms of their final assessment, these impacts are considered to be **minor**.

Noise emissions and vibrations from the installation of the Omega platform

The activities that cause impacts during the installation of the Omega platform,based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Installation of the Omega platform
  - Installation of guide and pillars. The conventional Omega platform will be supported by four (4) pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.
  - Installation of the support grid for the platform decks.
  - Installation of decks with the platform's surface equipment.
  - Maritime traffic - Daily movement of vessels for the implementation of construction works (including the transport of workers, materials, and support vessels).
  - Operation of a heavy-duty floating crane vessel and other support vessels (support vessel and tugboat, floating cargo barge).

However, on the one hand, the limited duration of the project under consideration (based on the indicative construction schedule - **Section 3.4.2.2)** and the relatively limited volume of installation work, the expected airborne noise emissions from the installation of the new platform are relatively limited. Therefore, in terms of their significance, these specific impacts are assessed as negative, of medium intensity, localized,

simultaneous with the construction works, temporary, short-term, reversible, synergistic, non-cumulative, periodic, and immediately remediable.

In terms of their final assessment, these impacts are considered to be **minor**.

Activity	Recipient	Impact Size												Impact Significance	SPP Significance	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Construction of pipelines (CO2 transport pipeline and produced water transport pipeline) and power cable	Underwater Noise	-	2	2	4	1	1	2	4	2	1	1	26	Small	Moderate	Small	Small
Drilling operations	Underwater noise	-	4	2	4	1	1	2	4	2	1	1	32	Small	Moderate	Small	Small
Drilling operations	Vibrations	-	2	2	4	1	1	2	4	2	1	1	26	Small	Moderate	Small	Small
Installation of the Omega platform	Underwater Noise	-	8	4	4	1	1	2	4	2	1	1	48	Moderate	Moderate	Moderate	Small
Installation of the Omega platform	Vibrations	-	4	2	4	1	1	2	4	2	1	1	32	Small	Moderate	Small	Small
Construction of pipelines (CO2 transport pipeline and produced water transport pipeline) and power supply cable	Acoustic environment	-	4	2	4	1	1	2	4	2	1	1	32	Small	Moderate	Small	Small
Drilling operations	Acoustic environment	-	4	2	4	1	1	2	4	2	1	1	32	Small	Moderate	Small	Small
Installation of the Omega platform	Acoustic environment	-	4	2	4	1	1	2	4	2	1	1	32	Small	Moderate	Small	Small

9.3.6.2 Operational Phase

The following paragraphs examine the possibility of potential adverse effects from noise or vibration emissions as a result of the operation of the proposed project modification.

Underwater noise and vibrations

The activities that cause impacts from the emission of underwater noise and vibrations during the operation of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8**), are as follows:

- **Receipt of CO_2 in containers (CO_2 parcels):**
  - CO_2 loads from pilot projects will be transported to the Sigma facility dock by ISO container trucks with pressure vessels, insulated to minimize losses.

- **Transport of CO_2 to the offshore storage facilities at Prinos:**
  - For CO_2 loads, the transport vessel will be connected to the pipeline on the platform via a system of flexible hoses. From there, the $CO_{(2)}$ loads will undergo further processing to ensure they meet the correct specifications/conditions for injection into the well.
- **CO_2injection:**
  - The main processing equipment on the Omega platform will include a pumping and heating station for the required injection conditions, installed on the open deck of the platform.
  - CO_2injection will target reservoirs B and C with two injection wells during the period 2025-2035 and will then be extended to the entire reservoir by the end of the project.
- **Water pumping:**
  - The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and by the end of the project.
- **Maritime traffic:**
  - Daily vessel traffic due to project operations (including employee transportation and support vessel movements).

During the operational phase, there may be limited vibrations or tremors. Vibrations may result from the operation of rotating machinery such as pumps. While operational vibrations are generally less intense than those caused by construction activities, they may nevertheless pose risks to surrounding infrastructure or sensitive equipment. However, due to the operating characteristics and equipment of the proposed project modification, the potential emission of vibrations is expected to be extremely limited and in any case below the perception threshold. Therefore, the relevant impacts are assessed as **Neutral.**

Operational noise emissions arise mainly from the continuous operation of machinery and equipment on the platforms (pumps, electric heaters) and, to a lesser extent, from the operation of CO_2cargo and personnel transport vessels. Although noise emissions from operation are continuous, they can be prevented and mitigated through modifications to the design of the equipment, the installation of soundproofing in noisy areas of the facilities, and regular equipment maintenance practices.

Therefore, in terms of underwater noise emissions, the following impacts are expected from the operation of the proposed project modification:

- The expected underwater noise emissions during the operational phase of the proposed project modification (receipt of CO_2 in containers (CO_2 parcels), transport of CO_2 to the offshore storage facilities at Prinos, injection of CO_2 and pumping of water) are estimated to be relatively limited in significance, and therefore the specific impacts are expected to be negative, of low intensity, localised, immediate, permanent, short-term reversibility, synergistic, direct impact, periodic, immediately remediable and non-cumulative. In terms of their final assessment, these impacts are rated as **Minor.**

- Similarly, the expected underwater noise emissions from maritime traffic during the operational phase of the proposed project modification are estimated to be limited in significance, and therefore the specific impacts are expected to be negative, of moderate intensity, localized, immediate, permanent, short-term reversible, synergistic, direct, periodic, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are rated as **Minor.**

Airborne noise

The activities that cause impacts from airborne noise and vibration emissions during the operation of the proposed project modification,based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- **Receipt of CO_2 in containers (CO_2 parcels):**
  - CO_2 loads from pilot projects will be transported to the Sigma facility dock by ISO container trucks with pressure vessels, insulated to minimize losses.
- **Transport of CO_2 to the offshore storage facilities at Prinos:**
  - For CO_2 loads, the transport vessel will be connected to the pipeline on the platform via a system of flexible hoses. From there, the $CO_{(2)}$ loads will undergo further processing to ensure they meet the correct specifications/conditions for injection into the well.
- **CO_2injection:**
  - The main processing equipment on the Omega platform will include a pumping and heating station for the required injection conditions, installed on the open deck of the platform.
  - CO_2injection will target reservoirs B and C with two injection wells during the period 2025-2035 and will then be extended to the entire reservoir by the end of the project.
- **Water pumping:**
  - The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and by the end of the project.
- **Marine traffic:**
  - Daily vessel traffic due to project operations (including employee transportation and support vessel movements).

As mentioned above, operational noise emissions arise mainly from the continuous operation of machinery and equipment on the platforms (pumps, electric heaters) and secondarily from the operation of CO_2cargo and personnel transport vessels. Although noise emissions from operation are continuous, they can be prevented and mitigated through modifications to equipment design, installation of soundproofing in noisy areas of the facilities, and regular equipment maintenance practices.

Therefore, in terms of airborne noise emissions, the following impacts are expected from the operation of the proposed project:

- The expected airborne noise emissions during the operational phase of the proposed project modification (receipt of CO_2 in containers (CO_2 parcels), transport of CO_2 to the offshore storage facilities in Prinos, injection of CO_2 and pumping of water) are estimated to be relatively limited in terms of their significance, and therefore the specific impacts are expected to be negative, of low intensity, localised, immediate, permanent, short-term reversibility, synergistic, direct impact, periodic, immediately remediable and non-cumulative. In terms of their final assessment, these impacts are rated as **Minor.**
- Similarly, the expected emissions of airborne noise from maritime traffic during the operational phase of the proposed project are estimated to be limited in significance, and therefore the specific impacts are expected to be negative, of moderate intensity, localized, immediate, permanent, short-term reversible, synergistic, direct, periodic, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are rated as **Minor.**

Activity	Recipient	Impact Size												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
• Receipt of CO_2 in containers (CO_2 parcels) • Transport of CO_2 to offshore storage facilities in Prinos • CO_2injection • Water pumping	Underwater noise	-	2	2	4	4	1	2	4	2	1	1	29	Small	Moderate	Small
Marine traffic	Underwater noise	-	4	2	4	4	1	2	4	2	1	1	35	Small	Moderate	Small
• Receipt of CO_2 in containers (CO_2 parcels) • Transport of CO_2 to offshore storage facilities in Prinos • CO_2injection • Water pumping	Acoustic environment	-	2	2	4	4	1	2	4	2	1	1	29	Small	Moderate	Small
Maritime traffic	Acoustic environment	-	4	2	4	4	1	2	4	2	1	1	35	Small	Moderate	Small

9.3.6.3 Shutdown/Decommissioning Phase

The following paragraphs examine the possibility of potential adverse effects from noise or vibration emissions as a result of the decommissioning/removal phase of the proposed project modification.

Underwater noise and vibrations

The activities that cause impacts due to the emission of underwater noise and vibrations during the decommissioning/removal phase of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8),** are as follows:

- Decommissioning/Dismantling of offshore pipelines (CO2 transport pipeline and produced water transport pipeline) and power cable
  - The offshore pipelines and lifters will be depressurized, cleaned with standard jetting operations, and then inerted with nitrogen. The pipelines will then be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with international standards.
  - The pipes from the top of the jack-up to the wellheads will be depressurized and filled with nitrogen to inert the system. The pipes will be disconnected from the wellheads, capped, and left in place.
  - Marine traffic - Daily vessel traffic for the implementation of offshore pipeline decommissioning works (including the transport of workers and support vessels).
- Cessation of Operations / Removal of Drilling Rigs
  - Marine traffic - Daily vessel traffic for the implementation of offshore pipeline decommissioning works (including the transport of workers and support vessels).
- Shutdown/Dismantling of the Omega offshore platform
  - Removal: The jack-up vessel will then be moved to the area to remove the platform. The surface equipment and bridges will be removed first to gain access to the interior of the pipelines. The loads will be transferred through the piles and unloaded. Once the piles have been cut, the lifting vessel can lift and load the jackets onto barges.
  - Marine traffic - Daily vessel traffic for the decommissioning of offshore installations (including the transport of workers and support vessels).

During the construction phase, **vibrations** are likely to occur during the decommissioning of the platform. In the case of the proposed project modification, due to the absence of extensive (in depth and extent) works, the vibration levels and their duration are not expected to be significant and in any case will be outside the limits of perception. Therefore, the relevant impacts are assessed as **Neutral.**

In addition, on the one hand, the limited duration of the decommissioning/dismantling of the offshore facilities of the Project and, on the other hand, the fact that a large part of the facilities will remain in the area after the operation of the project (indicatively, the CO_2transfer pipeline and the produced water transfer pipeline will be isolated and remain on the seabed), the expected underwater noise emissions from the decommissioning/dismantling of the offshore facilities are relatively limited. Therefore, in terms of their significance, these impacts are assessed as negative, of negligible intensity, localized, simultaneous with the decommissioning operations, temporary, short-term, reversible, synergistic, non-cumulative, periodic, and immediately remediable. In terms of their final assessment, these impacts are considered **minor.**

Similarly, the limited duration of the decommissioning/removal of the offshore facilities of the Project and the fact that a large part of the facilities will remain in the area after the operation of the project make the expected underwater noise emissions from marine transport (of personnel and decommissioning materials) to be relatively limited. Therefore, in terms of their significance, these impacts are assessed as negative, of low intensity, localised, simultaneous with the decommissioning works, temporary, short-term, reversible, synergistic, non-cumulative, periodic and immediately remediable. In terms of their final assessment, these impacts are considered to be **Minor.**

Airborne noise

The activities that cause impacts due to noise emissions during the shutdown/decommissioning phase of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8),** are as follows:

- **Shutdown/decommissioning of offshore pipelines (CO2 transport pipeline and produced water transport pipeline) and power cable**
  - The offshore pipelines and lifters will be depressurized, cleaned with standard jetting operations, and then inerted with nitrogen. The pipelines will then be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with international standards.
  - The pipes from the top of the jack-up to the wellheads will be depressurized and filled with nitrogen to inert the system. The pipes will be disconnected from the wellheads, capped, and left in place.
  - Marine traffic - Daily vessel traffic for the implementation of offshore pipeline decommissioning works (including the transport of workers and support vessels).
- **Cessation of Operations / Removal of Drilling Rigs**
  - Marine traffic - Daily vessel traffic for the implementation of offshore pipeline decommissioning works (including the transport of workers and support vessels).
- **Shutdown / Decommissioning of the Omega offshore platform**
  - Removal: The jack-up vessel will then be moved to the area to remove the platform. The surface equipment and bridges will be removed first to gain access to the interior of the pipelines. The loads will be transferred through the piles and unloaded. Once the piles have been cut, the lifting vessel can lift and load the jackets onto barges.
  - Onshore dismantling and recycling of material
  - Maritime traffic - Daily boat traffic for the implementation of offshore facility decommissioning works (including employee transport and support boat movements).

Overall, on the one hand, the limited duration of the decommissioning/decommissioning of the facilities under the proposed project modification and, on the other hand, the relatively limited volume of materials that will need to be removed from the project area after the dismantling of the facilities and equipment, by land transport, make the expected airborne noise emissions from road transport (of personnel and

dismantling materials) relatively limited. Therefore, in terms of their significance, these specific impacts are assessed as negative, negligible in intensity, focused at the local level, simultaneous with the removal work, temporary in duration, short-term reversibility, synergistic, non-cumulative, periodic, and immediately remediable. In terms of their final assessment, these impacts are considered **Minor**.

Accordingly, on the one hand, the limited duration of the decommissioning/removal of the offshore facilities of the Project and, on the other hand, the fact that a large part of the facilities will remain in the area after the operation of the project (indicatively, the CO_2 will be isolated and remain on the seabed), make the expected airborne noise emissions from the decommissioning/dismantling of the offshore facilities relatively limited. Therefore, in terms of their significance, these impacts are assessed as negative, of low intensity, localized, simultaneous with the decommissioning operations, temporary, short-term, reversible, synergistic, non-cumulative, periodic, and immediately remediable. In terms of their final assessment, these impacts are assessed as **Minor.**

In addition, on the one hand, the limited duration of the decommissioning/removal of the offshore facilities of the Project and, on the other hand, the fact that a large part of the facilities will remain in the area after the operation of the project (indicatively, the CO_2 will be isolated and remain on the seabed), the expected airborne noise emissions from maritime transport (of personnel and decommissioning materials) are relatively limited. Therefore, in terms of their significance, these impacts are assessed as negative, negligible in intensity, localized, simultaneous with the decommissioning works, temporary, short-term, reversible, synergistic, non-cumulative, periodic, and immediately remediable. In terms of their final assessment, these impacts are considered to be **Minor.**

Activity	Recipient	Impact Size												Impact Significance	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Dismantling of equipment and decommissioning of offshore installations	Underwater noise	-	1	2	4	1	1	2	4	2	1	1	23	Small	Moderate	Small
Maritime transport and transportation (of personnel, equipment, and materials) in the context of offshore facility decommissioning.	Underwater noise	-	2	2	4	1	1	2	4	2	1	1	26	Small	Moderate	Small
Onshore dismantling of parts of the offshore platform and recycling of the material	Acoustic environment	-	2	2	4	1	1	2	4	2	1	1	26	Small	Moderate	Small
Dismantling of equipment and offshore installations	Acoustic environment	-	2	2	4	1	1	2	4	2	1	1	26	Small	Moderate	Small
Maritime transport and transportation (of personnel, equipment, and materials) in the context of offshore facility decommissioning	Acoustic environment	-	1	2	4	1	1	2	4	2	1	1	23	Small	Moderate	Small

9.3.6.4 Variation in Estimated Impacts on the Acoustic Environment from Project Modification

As documented in the above **sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification are assessed as Minor and cannot alter the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of impacts from new project elements, as introduced by the proposed project modification (such as the new Omega offshore platform), the estimated impacts are limited to minor impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification). It should be noted that the cells that are empty with an impact rating **of NA** correspond to impacts that are either provided for in elements of the licensed project that are not relevant to this modification (e.g., onshore facilities), or to elements of the proposed amendment that were not included in the licensed project (e.g., new Omega platform).

Activity	Recipient	Final Impact Assessment[127]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
Construction of pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Underwater Noise	**Small**	**NA**	**Small**
Drilling operations	Underwater Noise	**Small**	**Small**	**Small**
Drilling operations	Vibrations	**Minor**	**Small**	**Small**
Installation of the Omega platform	Underwater Noise	**NA**	**Small**	**Small**
Installation of the Omega platform	Vibrations	**NA**	**Small**	**Small**
Construction of land facilities	Acoustic environment		**NA**	**Small**
Construction of pipelines (CO2 transport pipeline and produced water transport pipeline) and power supply cable	Acoustic environment	**Small**	**Small**	**Minimal**

[127] In the event that, in terms of its Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts," as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** of this document. The same applies to the estimates of the approved EIA presented in this Table.

Activity	Recipient	Final Impact Assessment[127]		
		Licensed Project	Proposed Amendment	Total Modified Project
Drilling works	Acoustic environment	Small	Small	Small
Installation of the Omega platform	Acoustic environment	NA	Small	Small
Operational phase				
• Receipt of CO_2 in containers (CO_2 parcels) • Transport of CO_2 to offshore storage facilities in Prinos • CO_2injection • Water pumping	Underwater noise	Small	Low	Low
Marine traffic	Underwater Noise	Low	Small	Small
• Receipt of CO_2 in containers (CO_2 parcels) • Transport of CO_2 to offshore storage facilities in Prinos • CO_2injection • Water pumping	Acoustic environment	Low	Low	Small
Maritime traffic	Acoustic environment	Low	Low	Low
Shutdown/decommissioning phase				
Dismantling of equipment and removal of land-based installations	Acoustic environment	Minor	NA	Low
Onshore decommissioning of parts of the offshore platform and recycling of material	Acoustic environment	NA	Minor	Minor
Road transport (of personnel, equipment, and materials) in the context of the decommissioning of the Project under consideration and restoration of the onshore intervention area	Acoustic environment	Small	NA	Minor
Dismantling of equipment and removal of offshore installations	Acoustic environment	Small	Small	Small
Maritime transport (of personnel, equipment, and materials) in the context of the decommissioning of offshore installations	Acoustic environment	Small	Small	Minor
Dismantling of the Project under consideration and restoration of the land area affected	Acoustic environment	Positive	NA	Positive

9.3.7 Electromagnetic Field Emissions

During the construction of the interventions of the proposed project modification, no electromagnetic radiation emissions are expected, as no fixed installations or machines that continuously emit radiation will be used.

Regarding Naturally Occurring Radioactive Material (NORM) associated with the Prinos formations, most of the drill cuttings historically produced from the Prinos wells have radioactivity levels comparable to background levels.

9.3.7.1 Operational Phase

No electromagnetic radiation or radioactivity emissions are expected during the operational phase of the proposed project modification.

9.3.7.2 Decommissioning/Decontamination Phase

No electromagnetic radiation or radioactivity emissions are expected during the decommissioning phase of the proposed project modification.

9.3.8 Impacts on the Natural Environment

The following paragraphs will examine the possibility of potential adverse impacts on the living environment of the area as a result of the construction, operation, and decommissioning/dismantling of the proposed modification of the licensed project.

9.3.8.1 Construction Phase

This section examines the possibility of potential adverse impacts on the living environment of the area as a result of the construction of the proposed modification of the project.

9.3.8.1.1 Marine Habitats

Construction of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable

Activities that may have an impact on marine habitats during the construction of the additional section of the CO_2 , the produced water transfer pipeline and the power supply cable, based on the P&K content definition of the EIA (**Chapter 8**), are as follows:

- Phase 3: Installation of pipelines (CO_2 transport pipeline and produced water transport pipeline) and power cable from a special pipeline laying vessel, together with 2 support supply vessels/tugs.
- Phase 5: Closing of trenches and protection of pipelines and cable, commissioning. After the installation of the pipelines, cable, and related connections, they will be buried along their entire length.

The construction of the additional section of the CO_2transfer pipeline and the water transfer pipeline (1.3 km long in the worst case scenario) will be installed by a special pipe-laying vessel (pipelay and trenching vessel). Similarly, the power cable (1.3 km long in the worst-case scenario) will be laid on the seabed by a vessel with a reeling capability and then buried 1 m below the seabed.

After the installation of the pipelines, cable, and associated connections, the pipelines and cable will need to be buried along their entire length. Multiple passes may be required to achieve the desired burial depth for each pipe (1.5 to 2 m TOP) and cable (approximately 1 m TOP), depending on ground conditions. Due to the nature of the soil and the very strong bottom currents in the area, the trenches for the pipes and cable will be naturally backfilled without additional work. At points where backfilling after the installation of the pipes and cable is not possible due to accessibility or proximity to other structures or the platform, the exposed sections of the pipelines and cable will be covered with a layer of concrete for additional protection.

Based on the above, the expected impact on marine habitats and benthic organisms in the area is assessed as negative, due to the permanent – albeit spatially limited – occupation of the seabed by the individual installations of the proposed project modification. It should be noted that there are no protected habitat types listed in Annex I of Directive 92/43/EEC in the study area, nor are there any other habitats of high ecological value, given that the substrate is characterized as muddy. The sections of the additional CO_2

transfer pipeline, the produced water pipeline, and the power supply cable are located approximately 1 km from the nearest protected area GR1150010.

Therefore, this impact is assessed as negative, of medium intensity, local, simultaneous with the construction works, permanent, short-term reversible, non-synergistic, non-cumulative, direct in terms of its effect, continuous, and short-term reversible. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Drilling Works

The activities that may cause impacts on marine habitats during drilling operations, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Drilling:
  - Drilling of 4 wells to a depth of approximately 4,200 m (2 wells will be used as CO_2injection wells and 2 wells for water production to balance the pressure of the reservoir). All 4 new wells will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies
  - Completion of each well: The protective casing will be cemented with a 200 m cement column above the base of the previous protective casing and along the entire length of the open geological formation.
  - Waste – Production, management, and disposal of mining waste (drilling mud and cuttings).

In the 26-inch (125-450 MD (m)) and 16 inches (450-2600 MD (m)), a seawater- and lime-based drilling fluid will be used, which will be biodegradable and have no negative impact on the environment. The cuttings from this section, estimated at 1,300 $m^{(3)}$ will not contain any hazardous substances and will be deposited on the seabed.

During the drilling operations, the expected increase in water column turbidity due to suspended particles is estimated to have a negative impact on marine habitats found in the project area, as well as on benthic species. After settling, the suspended particles will be deposited on the seabed, causing physical coverage and possible temporary or long-term degradation of benthic habitats.

At the same time, mechanical disturbance of the seabed during the construction phase may lead to loss of the natural substrate, directly affecting benthic communities. In addition, the disposal of mining waste may cause extensive seabed coverage, resulting in the alteration of the structure and function of existing habitats and the disturbance of benthic ecosystems.

Furthermore, part of the seabed area will be permanently occupied by the technical installations of the proposed modification, leading to local habitat loss. However, the area under consideration does not contain any protected habitat types listed in Annex I to Directive 92/43/EEC, nor any habitats of high ecological value, as the substrate is mainly muddy and without any particular natural structures.

Therefore, this impact is assessed as negative, of medium intensity, local, simultaneous with the construction works, temporary, short-term reversible, synergistic, cumulative, direct in terms of its effect, continuous and medium-term reversible. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Installation of the Omega offshore platform

The activities that may cause impacts on marine habitats during the installation of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Installation of guide and pillars. The conventional Omega platform will be supported by four pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.

The installation of the offshore Omega platform, and in particular the placement of the four support pillars at a depth of approximately 30 meters on the seabed, is expected to have negative impacts on the benthic habitats of the area. The piles will be driven using a percussion or pulsed mechanism, methods which cause intense disturbance of the substrate and an increase in suspended matter in the water.

Sediment suspension leads to increased turbidity and seabed coverage, phenomena that have been shown to negatively affect water permeability and the quality of benthic habitats. Mechanical disturbance of the seabed can lead to habitat degradation or destruction and loss of biodiversity, particularly in sensitive and immobile benthic species. In addition, the vibrations and noise generated during pile driving can affect the behavior or even the survival of certain organisms, resulting in declines in populations of sensitive species.

It should be noted, however, that no habitat types listed in Annex I of Directive 92/43/EEC have been recorded in the study area, nor have any other marine habitats of particular ecological value. After completion of the works and in parts of the area not permanently occupied by the support pillars, natural changes, such as the settling of suspended particles and natural recolonization, are expected to lead to a gradual restoration of water quality and the reestablishment of benthic communities. Therefore, the impact is assessed as negative, of medium intensity, local, simultaneous with construction works, temporary, short-term reversible, synergistic, cumulative, direct in terms of its effect, continuous, and long-term reversible. In terms of their Final Assessment, these impacts are assessed as **Negligible.**

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Construction of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable	Marine habitats	-	4	2	4	4	1	1	1	4	4	2	27	Small	Low	Negligible
Drilling operations	Marine habitats	-	4	2	4	4	1	1	1	4	4	3	28	Small	Low	Negligible
Installation works for the Omega offshore platform	Marine habitats	-	4	2	4	4	1	1	1	4	4	3	28	Small	Low	Negligible

9.3.8.1.2 Marine mammals

Construction of the additional section of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable

Activities that may have an impact on marine mammals during the construction of the additional section of the CO_2 , the produced water pipeline and the power cable, based on the P&K content delineation of the EIA (**Chapter 8**), are as follows:

- Phase 1: Geophysical Survey - A small vessel (15 m long) equipped with seabed scanning equipment will be used to provide basic data within the pipeline corridor.
- Phase 1: Geotechnical Survey - After processing the results of the geophysical survey, soil samples will be taken with a grab and a box corer, which will be sent to laboratories for analysis.
- Phase 3: Installation of pipelines (CO_2transfer pipeline and produced water transfer pipeline) and power cable from a special pipeline laying vessel, together with 2 support supply vessels/tugs.
- Phase 4: Installation of a riser pipe on the Omega platform and diving operations to connect the riser to the end of the subsea pipeline. Installation of water transfer pipeline connections on each platform and electrical connections on each platform.
- Phase 5: Closing of trenches and protection of pipelines and cable, commissioning. After installation of the pipelines, cable, and related connections, they will be buried along their entire length.
- Marine traffic – Daily boat traffic for the installation of pipelines and cable (including transport of workers and movements of support vessels).
- Marine traffic – Definition of exclusion zones due to pipeline and cable installation works (and related works/activities).

As mentioned in **Chapter 6.8** of this document, the study area of the proposed amendment falls within the Natura 2000 protected area GR1150014 "Kavala-Thasos Marine Area," within the boundaries of Accobams Zone 9 in the Northeast Mediterranean (Thracian Sea) and within the Important Area for Marine Mammals named "Northern Coast and Islands of the Thracian Sea". The impacts of the construction works for the additional section of the CO_2 , the produced water transfer pipeline and the power supply cable on the protected species in the above-mentioned areas are detailed in **Section 2** of **the EIA** of the proposed amendment to the Project.

The construction of the additional section of the CO_2 transfer pipeline and the water transfer pipeline (1.3 km long in the worst-case scenario) will be carried out by a special pipe-laying and trenching vessel. Similarly, the power cable (1.3 km long in the worst-case scenario) will be installed on the seabed by a vessel with a winding capability and then buried 1 m below the seabed. After the installation of the pipelines, cable, and associated connections, the pipelines and cable will need to be buried along their entire length. Multiple passes may be required to achieve the desired burial depth for each pipe (1.5 to 2 m TOP) and cable (approximately 1 m TOP), depending on ground conditions. Due to the nature of the soil and the very strong bottom currents in the area, the trenches for the pipes and cable will be naturally backfilled without additional work.

The construction of the additional section of the CO_2transfer pipeline, the produced water pipeline, and the

power cable may cause disturbance to marine mammals in the area, mainly due to increased local turbidity, underwater noise, and increased marine traffic. Suspended particles generated during construction work temporarily reduce the amount of light reaching primary producers, affecting the food chain and, consequently, the availability of food resources for marine mammals. However, given the duration of the construction works, these impacts are expected to be localized and have a negligible effect on species.

In addition to the above, vessel movements during the installation of the submarine pipeline are also expected to affect marine mammals, as collisions may occur in some cases. Unlike other species (e.g., sea turtles), mammals are highly mobile animals with acute sensory perception. Thus, cetaceans should be able to avoid a ship by moving away from its path, provided that it is detected in time. Considering that the special pipe-laying vessel, together with the supporting supply/tug vessels, moves very slowly to ensure the accurate placement of the pipeline on the seabed, marine mammals can detect the vessels in time and can avoid and move away from the area until the work is completed.

In conclusion, the installation of subsea pipelines and cables will increase underwater noise levels, turbidity, and marine traffic, causing temporary behavioral and physiological disturbances in marine mammals, leading them to avoid the area during construction. Therefore, the impacts are expected to be negative, of low intensity, local in extent, immediate in occurrence, temporary, short-term reversible, synergistic, direct in effect, periodic, immediately remediable, and non-cumulative. In terms of their Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Drilling Operations

The activities that may have an impact on marine mammals during drilling operations, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Drilling:
  - Drilling of 4 wells to a depth of approximately 4,200 m (2 wells will be used as CO_2injection wells and 2 wells for water production to balance the pressure in the reservoir). All 4 new wells will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies
  - Completion of each well: The protective casing will be cemented with a 200 m cement column above the base of the previous protective casing and along the entire length of the open geological formation.
  - Waste – Production, management, and disposal of mining waste (drilling mud and cuttings).
- Marine traffic – Daily vessel traffic for the installation of pipelines and cable (including transport of workers and movements of support vessels).
- Marine traffic – Establishment of exclusion zones due to pipeline and cable installation works (and related works/activities).

The cuttings from this section, estimated at 1,300 m^3, will not contain any hazardous substances and will be deposited on the seabed. The detailed impacts that may be caused by drilling operations and maritime traffic on protected marine mammal species are set out in detail in **Section 2** of **the EIA** for the proposed amendment to the Project.

According to the detailed description of the proposed amendment (**Chapter 3**), natural noise levels at sea as a result of wind and waves can range from 90 dB at 1 mPa in very calm conditions with low winds to 110 dB at 1 mPa in windy conditions. The anthropogenic underwater noise that will be caused during the drilling operations is higher than the natural noise levels in the sea.

Increased noise levels may cause alterations in the behavior of marine mammals, interfere with their acoustic communication, cause temporary or permanent hearing loss, and damage their tissue. Mammals are likely to move away from the work areas, temporarily affecting their migration routes and feeding areas. However, none of the marine mammal species present in the area reproduce within the project area, and the temporary disturbance from noise is not expected to have a significant impact.

In addition to the above, daily vessel traffic for drilling operations, including the transport of workers and support vessels, may also cause temporary disturbance to marine mammals. In some cases, collisions may occur, leading to injuries to mammals. Although marine mammals in the area are likely to be accustomed to heavy marine traffic in the Gulf of Kavala, it is necessary to implement measures regarding vessel speed to minimize disturbance and risks.

The production, management, and disposal of extractive waste, such as drilling mud and cuttings, may affect the marine environment and indirectly marine mammals. However, due to the small diameter and lateral opening of the four wells, small volumes of residues will be produced, which may have an impact on marine mammals locally and in the short term, as species are expected to temporarily avoid the area.

Therefore, the impacts are expected to be negative, of low intensity, local in scope, immediate, temporary, short-term reversible, synergistic, direct, periodic, immediately remediable, and non-cumulative. In terms of their Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Installation of the Omega offshore platform

The activities that may have an impact on marine mammals during the installation of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Installation of guide and pillars. The conventional Omega platform will be supported by 4 pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.
- Installation of the support network for the platform decks.
- Installation of decks with the platform's surface equipment.

- Maritime traffic – daily movement of vessels for the implementation of construction works (including the transport of workers, materials, and support vessels).
- Operation of heavy-duty floating crane vessels and other support vessels (support vessels and tugs, floating cargo barges). Waste/sewage production.

The detailed impacts that may be caused by the installation of the Omega offshore platform and maritime traffic on protected marine mammal species are set out in detail in **Section 2** of **the EIA** of the proposed amendment to the Project.

The impact on marine mammals from the installation of the Omega offshore platform stems mainly from the intense underwater noise that will be generated during the driving of the four (4) 30m-deep support pillars using a percussion or pulsed mechanism.

The potential impact on protected marine mammal species from the installation of the Omega offshore platform and the associated marine traffic is mainly related to the generation of intense underwater noise during the installation of the four (4) support pillars, 30 m deep, using either an impact or pulse mechanism.

According to international literature, pile driving is one of the strongest sources of anthropogenic underwater noise, capable of propagating over distances exceeding 750 m. In the case of impact pile driving, sound pressure levels (SPL) can reach 220 dB re 1 μPa (peak) at distances of up to 100 m from the source, while at distances of 125 m levels of up to 197 dB re 1 μPa have been recorded. Similarly, the vibratory pile driving mechanism produces lower SPL values but with a continuous waveform, which intensifies the phenomenon of acoustic masking, i.e., the obstruction of the perception of sounds that are critical to the behavior and survival of organisms.

According to data from the technical description of the proposed modification, the pulsed mechanism records SELss values of 112–135 dB re 1 $\mu Pa^2 \cdot s$ and SPLpp values of 132–161 dB re 1 μPa at a distance of 750 m, while for the percussive mechanism, the SPL reaches 180 dB re 1 μPa at distances of 3–10 m from the source. For comparative reference, natural underwater noise levels, originating from natural phenomena such as wind and waves, range from 90 to 110 dB re 1 μPa. Therefore, the noise intensity from the operations can exceed natural levels by up to 100 dB, which may have serious consequences for marine mammals.

Exposure to such high noise levels can lead to intense behavioral responses (such as moving away from the area, stopping feeding or reproductive activities, increased stress and communication disruption) but also to acoustic damage, such as temporary (TTS) or even permanent hearing loss (PTS), especially in cases of repeated exposure or close proximity to the source. The continuous nature of noise from pulsed mechanisms can reduce the acoustic alertness of species, limiting their ability to locate prey or communicate. Therefore, it is necessary to implement appropriate mitigation measures, such as, for example, a gradual increase in intensity (soft-start), the use of exclusion zones, the timing of interventions, and the use of noise reduction techniques such as bubble curtains.

Increased maritime traffic in the context of the works (floating cranes, support vessels, tugs, barge) may contribute to a continuous acoustic load, as noise levels from engines and propellers reach 160-190 dB re 1μPa, depending on the size and operation of the vessels. Although marine mammals in the area have

probably developed a degree of familiarity with commercial shipping, the intense and often prolonged disturbance of the installation phase may increase stress and reinforce behavioral avoidance of the area, while also increasing the risk of collision with ships. Therefore, it is essential to implement measures regarding vessel speed to minimize disturbance and risks.

The impacts are therefore expected to be negative, high intensity, localised, immediate, temporary, short-term reversible, synergistic, direct, continuous, short-term reversible and cumulative.

Activity	Recipient	Impact magnitude												Significance of Impact	SPP Significance	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Construction of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable	Marine mammals	-	2	2	4	1	1	2	4	2	1	1	26	Small	High	Moderate	Low
Drilling operations	Marine mammals	-	2	2	4	1	1	2	4	2	1	1	26	Small	High	Moderate	Low
Installation work on the Omega offshore platform	Marine mammals	-	8	2	4	1	2	2	4	4	2	4	33	Small	High	Moderate	Low

9.3.8.1.3 Sea turtles

Construction of the additional section of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable

Activities that may have an impact on sea turtles during the construction of the additional section of the CO_2 pipeline, the produced water pipeline and the power cable, based on the P&K content definition of the EIA (**Chapter 8**), are as follows:

- Phase 1 - Geotechnical Survey: After processing the results of the geophysical survey, soil samples will be taken with a grab and a box corer, which will be sent to laboratories for analysis.
- Phase 1 - Geophysical Survey: A small boat (15 m long) equipped with seabed scanning equipment will be used to provide basic data within the pipeline corridor.
- Phase 3: Installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable from a special pipeline laying vessel, together with 2 support supply vessels/tugs.

- Phase 4: Installation of a riser pipe on the Omega platform and diving operations to connect the riser to the end of the subsea pipeline. Installation of water transfer pipeline connections on each platform and electrical connections on each platform.
- Phase 5: Closing of trenches and protection of pipelines and cable, commissioning. After installation of the pipelines, cable, and related connections, they will be buried along their entire length.
- Marine traffic – Daily boat traffic for the installation of pipelines and cable (including transport of workers and movements of support vessels).
- Marine traffic – Definition of exclusion zones due to pipeline and cable installation works (and related works/activities).

The construction of the additional section of the CO_2transfer pipeline and the water transfer pipeline (1.3 km in length in the worst-case scenario) will be installed by a special pipe-laying and trenching vessel. The additional section of the $CO_{(2)}$pipeline (1.6 km in the worst-case scenario) and the water transfer pipeline (1.3 km in the worst-case scenario) will be installed by a special pipe-laying and trenching vessel. Similarly, the power cable (1.3 km long in the worst-case scenario) will be laid on the seabed by a vessel with a reeling capability and then buried 1 m below the seabed.

After the installation of the pipelines, cable, and associated connections, the pipelines and cable will need to be buried along their entire length. Multiple passes may be required to achieve the desired burial depth for each pipe (1.5 to 2 m TOP) and cable (approximately 1 m TOP), depending on ground conditions. Due to the nature of the soil and the very strong bottom currents in the area, the trenches for the pipelines and cable will be naturally backfilled without additional work. At points where backfilling after the installation of the pipelines and cable is not possible for reasons.

The potential impacts during the construction of the additional section of the CO_2 , the produced water transfer pipeline and the power supply cable, on sea turtles are detailed in **Section 2** of **the EIA** of the proposed modification of the Project.

Specifically, during the works, there may be temporary impacts on sea turtles in the study area, mainly related to noise disturbance, temporary disruption of their behavior, and short-term alteration of feeding habitats.

Specifically, exposure of sea turtles to underwater noise generated during Phases 1, 3, 4, and 5 may cause avoidance behaviors, such as moving away from the work area, or disrupt basic biological functions, such as feeding and resting. In cases of intense and prolonged noise, temporary loss of hearing sensitivity (Temporary Threshold Shift – TTS), but no permanent damage is expected due to the relatively low intensity and limited duration of the interventions. It is worth noting that no evidence of egg-laying or other reproductive activities has been recorded in the area under consideration, but only the presence of individuals in the context of feeding activity. Given that sea turtles use wider areas for foraging, the locally and temporally limited disturbance that may be caused is not expected to have a significant impact on their populations.

In addition, the works and changes that may occur on the seabed as a result of the pipeline installation may affect local ecosystems, marine vegetation, and benthic species, leading to a temporary reduction in food

availability for sea turtles. As a result, a temporary displacement of turtles from the affected sites may be observed until normal seabed conditions are restored.

Daily boat and ship traffic during construction may also disturb sea turtles, as they are often injured or killed by boat propellers. Due to their size and inability to move away quickly enough, sea turtles are at greater risk of entanglement, which can cause suffocation. Considering that the special pipe-laying vessel, along with the supporting supply/tug vessels, will be moving very slowly to ensure accurate placement of the pipeline on the seabed, sea turtles should be able to detect the vessels in time and avoid the area until the work is completed.

Based on the above and the limited duration of the work, the impact on sea turtles is assessed as negative, low intensity, local in scope, immediate, temporary, short-term reversible, synergistic, direct, continuous, immediately remediable, and non-cumulative. In terms of their Final Assessment, these impacts are assessed as **Minor.**

Drilling Operations

The activities that may have an impact on sea turtles during drilling operations, based on the P&K content definition of the MT AEPO (**Chapter 8**), are as follows:

- Drilling:
  - Drilling of 4 wells to a depth of approximately 4,200 m (2 wells will be used as CO_2injection wells and 2 wells for water production to balance the pressure in the reservoir). All 4 new wells will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies
  - Waste – Production, management, and disposal of mining waste (drilling mud and cuttings).
- Marine traffic – Daily vessel traffic for the installation of pipelines and cable (including the transport of workers and the movement of support vessels).
- Marine traffic – Establishment of exclusion zones due to pipeline and cable installation works (and related works/activities).

The potential impacts of drilling operations and maritime traffic on sea turtles are detailed in **Section 2** of **the EIA** for the proposed Project modification.

According to the detailed description of the proposed modification (**Chapter 3**), natural noise levels at sea as a result of wind and waves can range from 90 dB at 1 mPa in very calm conditions with low winds to 110 dB at 1 mPa in windy conditions. The anthropogenic underwater noise that will be caused during the drilling operations is higher than the natural noise levels at sea.

Noise during drilling operations, as well as during the construction of the CO_2transport pipeline, may cause disturbance to sea turtles recorded in the Gulf of Kavala area. Specifically, the increased noise levels are expected to disrupt their natural behavior, such as foraging and reproduction. It should be noted, however, that no reproduction has been recorded in the project study area. They use a wide area for feeding and, therefore, a very small area of increased noise for a specific period of time will not lead to any significant impact on sea turtles.

Daily boat traffic for the installation of pipelines creates an increased risk of collision with sea turtles, which may be injured or killed by boat propellers. However, given that maritime traffic in the wider area of the Gulf of Kavala is intense, the sea turtles in the area are probably already accustomed to the presence and activity of boats.

The production, management, and disposal of extractive waste, such as drilling mud and cuttings, may affect the marine environment and, consequently, sea turtles. The disposal of this waste may cause pollution that could affect the feeding areas of the turtles. However, due to the small diameter and lateral opening of the four wells, small volumes of residues will be produced, which may have an impact on sea turtles locally and in the short term, as the species are expected to temporarily avoid the area.

In conclusion, the impacts are expected to be negative, of low intensity, local in scope, immediate, temporary, short-term reversible, synergistic, direct, continuous, immediately remediable, and non-cumulative. In terms of their Final Assessment, these impacts are assessed as **Minor.**

Installation of the Omega offshore platform

The activities that may cause impacts on sea turtles during the installation of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Installation of guide rails and pillars. The conventional Omega platform will be supported by four pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.
- Installation of the support grid for the platform decks.
- Installation of decks with the platform's surface equipment.
- Maritime traffic – daily movement of vessels for the implementation of construction works (including the transport of workers, materials, and support vessels).
- Operation of heavy-duty floating crane vessels and other support vessels (support vessels and tugs, floating cargo barges). Waste/sewage production.

The impact on sea turtles from the installation of the Omega offshore platform comes mainly from the intense underwater noise that will be generated during the driving of the four (4) 30 m deep support pillars using a percussive or pulsed mechanism. According to available scientific data, pile driving is one of the most powerful sources of man-made underwater noise and can spread over a large radius, affecting marine organisms that are sensitive to sound.

In particular, in the case of the percussive mechanism, sound pressure levels can reach 220 dB re 1 μPa (peak) at distances of up to 100 m from the source, while at a distance of 125 m, values of up to 197 dB re 1 μPa have been recorded. In contrast, the pulsed (or vibratory) mechanism produces lower-intensity sound, but in a continuous form, enhancing the phenomenon of acoustic masking, i.e., the obstruction of the detection of biologically important sounds. The frequency spectrum of the pile driving process ranges mainly between 100–500 Hz, an area that largely overlaps with the acoustic sensitivity spectrum of sea turtles (100–1000 Hz), with maximum response between 100–400 Hz.

According to the technical description of the proposed modification, the noise levels generated during pile driving may reach up to 180 dB re 1 μPa at the source. Measurements by the Dieseko Group report: for the pulsed mechanism, SELss 112–135 dB re 1 $\mu Pa^2 \cdot s$ and SPL peak-to-peak 132–161 dB re 1 μPa (at a distance of 750 m from the source), while for the percussion mechanism, the SPL reaches 180 dB re 1 μPa at distances of 3–10 m. In comparison, natural underwater noise levels range between 90–110 dB re 1 μPa, depending on wind intensity and wave action. Therefore, acoustic emissions from the installation of the pylons may cause an increase in acoustic intensity of up to 100 dB compared to natural levels, with possible effects on the behavior and physiology of sea turtles.

Turtles are able to detect such disturbances in their acoustic environment and may exhibit avoidance behaviors, such as moving away from the intervention zone, stopping feeding, or suspending other biologically critical activities. In cases of prolonged or intense exposure, mild physiological effects such as temporary hearing loss (TTS) or increased stress hormone levels are possible. However, the likelihood of permanent damage is considered to be very low, provided that appropriate preventive measures are taken, such as temporarily suspending operations in the event of turtles being present in the area, using exclusion zones, the timing of interventions, and the use of noise reduction techniques such as bubble curtains.

Daily traffic for platform installation work (including the transport of workers and support vessels) entails an increased risk of collision or injury to sea turtles from ship propellers. However, given that maritime traffic in the wider area of the Gulf of Kavala is intense, the sea turtles in the area are probably already familiar with the presence and activity of boats.

In conclusion, the impacts are expected to be negative, of medium intensity, local in scope, immediate, temporary, short-term reversible, synergistic, direct, continuous, immediately remediable, and cumulative. In terms of their Final Assessment, these impacts are assessed as **Minor.**

Activity	Recipient	Impact Size												Impact Significance	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Sea turtles	-	2	2	4	2	1	2	4	4	1	1	23	Small	Moderate	Small
Drilling operations	Sea turtles	-	2	2	4	2	1	2	4	4	2	1	24	Small	Moderate	Small
Installation work on the Omega offshore platform	Sea turtles	-	4	2	4	2	1	2	4	4	2	4	29	Small	Moderate	Small

9.3.8.1.4 Fish fauna

Construction of the additional section of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable

Activities that may have an impact on fish fauna during the construction of the additional section of the CO_2 , the produced water transfer pipeline and the power supply cable, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Phase 1 - Geotechnical Survey: After processing the results of the geophysical survey, soil samples will be taken with a grab and a box corer, which will be sent to laboratories for analysis.
- Phase 1 - Geophysical Survey: A small boat (15 m long) equipped with seabed scanning equipment will be used to provide basic data within the pipeline corridor.
- Phase 3: Installation of pipelines (CO2 transport pipeline and produced water transport pipeline) and power cable from a special pipeline laying vessel, together with 2 support supply/tug vessels.
- Phase 5: Trench closure and pipeline and cable protection, commissioning. After the installation of the pipelines, cable, and associated connections, these will be buried along their entire length.
- Marine traffic – Daily vessel traffic for the installation of pipelines and cable (including transport of workers and movements of support vessels).
- Marine traffic – Definition of exclusion zones due to pipeline and cable installation works (and related works/activities).

The construction of the additional section of the CO_2transfer pipeline and the water transfer pipeline (1.3 km in length in the worst-case scenario) will be installed by a special pipe-laying and trenching vessel.

The additional section of the CO_2pipeline (1.6 km in the worst-case scenario) and the water transfer pipeline (1.3 km in the worst-case scenario) will be installed by a special pipe-laying and trenching vessel. Similarly, the power cable (1.3 km long in the worst-case scenario) will be laid on the seabed by a vessel with a reeling capability and then buried 1 m below the seabed.

After the installation of the pipelines, cable, and associated connections, the pipelines and cable will need to be buried along their entire length. Multiple passes may be required to achieve the desired burial depth for each pipeline (1.5 to 2 m TOP) and cable (approximately 1 m TOP), depending on ground conditions.

As discussed in Chapter 6.8, the study area falls within the Natura 2000 protected area GR1150014 "Kavala-Thasos Marine Area." The detailed impacts that may be caused by the construction of the $CO_{(2)}$transfer pipeline on the protected species *Alosa fallax* in the GR1150014 area are set out in detail in **Section 2** of **the EIA** of the proposed amendment to the Project. It should be noted, however, that according to the distribution maps of the 4th national report on the implementation of Directive 92/43/EEC (10 x 10 km grid areas), the distribution of the protected species in question (*Alosa fallax)* does not fall within the project study area.

Based on the above, the activities are expected to temporarily increase particle suspension and, consequently, water turbidity. This may temporarily make it difficult for fish species to locate food, as many fish rely on sight to locate their prey. In addition, it may also affect breeding areas, especially for species that

lay their eggs in specific areas of the seabed, and make it difficult for them to breathe due to damage to their gills.

During the works, noise levels in the area are expected to increase. Continuous noise can cause stress to fish, affecting their growth, health, and behavior. Fish, cephalopods, and other mobile marine invertebrates use underwater sounds to communicate, avoid predators, navigate, and search for food (Carroll et al., 2016[128]).

However, considering that the works for the construction of the additional section of the CO_2transfer pipeline and the water transfer pipeline and power cables are limited in time and space, the impact on fish fauna is assessed as negative, of low intensity, and short-term. the impact on fish fauna is assessed as negative, of low intensity, localized, immediate and simultaneous with the construction works, temporary, short-term, reversible, synergistic, direct, continuous, short-term reversible and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

Drilling Works

The activities that may cause impacts on marine mammals during drilling operations, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Drilling:
  - Drilling of 4 wells to a depth of approximately 4,200 m (2 wells will be used as CO_2injection wells and 2 wells for water production to balance the pressure in the reservoir). the 4 new wells , will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies
  - Waste – Production, management, and disposal of mining waste (mud drilling and cuttings).
- Marine traffic – Daily vessel traffic for the installation of pipelines and cable (including transport of workers and movements of support vessels).
- Marine traffic – Establishment of exclusion zones due to pipeline and cable installation works (and related works/activities).

The detailed impacts that may be caused by drilling works and maritime traffic on the protected fish species of GR1150014 are set out in detail in **Section 2** of **the EIA** of the proposed amendment to the Project. It should be noted, however, that according to the distribution maps of the 4th national report on the implementation of Directive 92/43/EEC (10 x 10 km grid areas), the distribution of the species does not fall within the project area.

In the 26-inch (125-450 MD (m)) and 16 inches (450-2600 MD (m)), a seawater- and lime-based drilling fluid will be used, which will be biodegradable and have no negative impact on the environment. The cuttings

[128] Carroll, A. G., Przeslawski, R., Duncan, A., Gunning, M., & Bruce, B. (2016). A critical review of the potential impacts of marine seismic surveys on fish & invertebrates. Marine Pollution Bulletin, 114(1), 9-24.

from this section, estimated at 1,300 m^3, will not contain any hazardous substances and will be deposited on the seabed.

Similar to the impacts expected during the construction of the pipelines (CO_2 and water) and the power cable, drilling operations may cause disturbance to the fish fauna in the area. The continuous underwater noise generated by the drill may cause behavioral changes in fish populations, including avoidance reactions, increased stress, as well as effects on the growth, physiology, and overall presence of fish in the area.

During drilling operations, the discharge of drilling mud and drill cuttings (which, according to the design, do not contain toxic or hazardous substances) is expected to cause a local increase in turbidity in the water column. This temporary increase may reduce the effectiveness of visual foraging by fish (especially for species that depend on vision), negatively affect breeding areas, especially for species that spawn or protect eggs on the bottom, and burden gill function, causing breathing difficulties or increasing the energy cost of survival.

Considering the short duration of the works and the fact that the study area is not included in the distribution maps of the protected species *Alosa Fallax,* the impact is assessed as negative, low intensity, local in extent, immediate, temporary, short-term reversible, synergistic, direct effect, continuous, immediately restorable, and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

Installation of the Omega offshore platform

The activities that may cause impacts on fish fauna during the installation of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Installation of guide and pillars. The conventional Omega platform will be supported by four pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.

The impact on fish fauna from the installation of the Omega offshore platform will mainly come from the intense underwater noise that will be produced during the driving of the four (4) 30 m deep support piles using a percussive or pulsed mechanism. According to available scientific data, pile driving is one of the most powerful sources of anthropogenic underwater noise and can propagate over a large radius, affecting marine organisms that are sensitive to sound.

In particular, in the case of the percussive mechanism, sound pressure levels can reach 220 dB re 1 μPa (peak) at distances of up to 100 m from the source, while at a distance of 125 m, values of up to 197 dB re 1 μPa have been recorded. In contrast, the pulsed (or vibratory) mechanism produces lower-intensity sound, but in a continuous form, enhancing the phenomenon of acoustic masking, i.e., the obstruction of the detection of biologically important sounds.

According to the technical description of the proposed modification, the noise levels produced during pile driving may reach up to 180 dB re 1 μPa at the source. Measurements by the Dieseko Group report: for the pulsed mechanism, SELss 112–135 dB re 1 $\mu Pa^2 \cdot s$ and SPL peak-to-peak 132–161 dB re 1 μPa (at a distance of 750 m from the source), while for the percussion mechanism, the SPL reaches 180 dB re 1 μPa at distances of 3–10 m. In comparison, natural underwater noise levels range between 90–110 dB re 1 μPa,

depending on wind intensity and wave action. Therefore, sound emissions from the installation of the pylons may cause an increase in acoustic intensity of up to 100 dB compared to natural levels, with possible effects on the behavior and physiology of fish fauna.

More specifically, high levels of underwater noise can cause damage to auditory organs, as well as severe physiological stress in individuals close to the source. Even at greater distances, noise can cause behavioral disturbances, such as mass migration from the area, interruption of feeding or reproduction, reduction in schooling behavior, and changes in movement patterns. The continuous, lower-intensity noise of the pulsating/vibrating mechanism, although milder, causes acoustic masking, limiting the ability to detect, transmission, and reception of biologically critical signals related to communication and reproduction in fish populations.

However, considering that the time period is limited and that the study area is not included in the distribution maps of the protected species *Alosa Fallax*, the impacts on fish fauna are assessed as negative, of medium intensity, local in scope, immediate, temporary, short-term reversible, synergistic, direct, continuous, short-term restorable, and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

Activity	Recipient	Impact Size												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Fish fauna	-	2	2	4	1	1	2	4	4	2	1	23	Small	Moderate	Small
Drilling operations	Fish fauna	-	2	2	4	1	1	2	4	4	2	1	23	Small	Moderate	Small
Installation work on the Omega offshore platform	Fish fauna	-	4	2	4	1	1	2	4	4	2	1	25	Small	Moderate	Small

9.3.8.1.5 Avifauna

With regard to the impact of the Project construction works on bird species, a detailed description is provided in Section 2 of the EIA for the proposed modification of the Project.

Construction of the additional section of the CO2 transport pipeline, the produced water transport pipeline, and the power supply cable

Activities that may have an impact on bird species during the construction of the additional section of the CO_2 , the produced water transfer pipeline and the power supply cable, based on the P&K content delimitation of the EIA (**Chapter 8**), are as follows:

- Phase 3: Installation of pipelines (CO_2 transport pipeline and produced water transport pipeline) and power cable from a special pipeline laying vessel, together with 2 support supply vessels/tugs.
- Phase 5: Closing of trenches and protection of pipelines and cable, commissioning. After the installation of the pipelines, cable, and related connections, they will be buried along their entire length.
- Marine traffic – Daily vessel traffic for the installation of CO_2transfer pipelines (including the transport of workers and the movement of support vessels).

As mentioned in **Chapter 8**, the study area falls within the SPA & SAC GR1150014 "Marine Area of Kavala Thasos". The wider area includes the Natura 2000 sites GR1150010 "Nestos Delta and Keramotis Lagoons - Wider Area," SPA GR1150001 "Nestos Delta and Keramoti Lagoons and Thasopoula Island" and SPA GR1150012 "Thasos (Mount Ypsario and coastal zone)". The study area is also included in the Important Bird Area (IBA) with code GR250 and name "Kavala Gulf and Thasos marine area", while the wider area GR012 is also included with the name "Nestos Delta and Coastal Lagoons."

The activities included in the construction of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable, and the project activities are expected to cause short-term and spatially limited impacts on the species populations due to temporary disturbance and habitat degradation. the project activities are expected to cause short-term and spatially limited impacts on species populations due to temporary disturbance and degradation of their habitats during construction works.

In particular, the European shag *(Phalacrocorax aristotelis desmarestii*) and the *Yelkouan* shearwater (*Puffinus yelkouan*) are expected to be disturbed by boat traffic and pipeline installation activities. The European shag, which shows a high level of displacement from areas with intense shipping activity, will temporarily avoid the area until the works are completed, while the degradation of its feeding habitat due to increased turbidity and sediment resuspension may affect food availability in the short term. Similar impacts are expected for the Mediterranean monk seal, although to a lesser extent, as it feeds in the upper layer of the water column and avoids human activities.

Although all project activities are carried out outside GR1150012, the marine area of the Gulf of Kavala, together with the coastal zone south of Thasos, constitute the feeding habitat of the species. Consequently, the impacts on the Gulf of Kavala are also expected to affect the population in the Study Area. It should be noted that most gulls use the Gulf of Kavala during migration, so their stay in the area is estimated to be of limited duration, while some gulls are found in particularly small populations (D). Exceptions are: *Larus audouinii, Larus ridibundus, Thalasseus sandvicensis,* which winter in the area. Gulls and terns show a low level of displacement from areas where there is boat traffic. The species are accustomed to boat traffic, but are expected to be disturbed in the short term due to the movement of the installation vessel and support vessels and activities, and to avoid the area until the work is completed. Given the short duration of the pipeline installation works and the continuous movement of the work site, the impact is expected to be limited.

Crane and heron species that use feeding habitats outside the boundaries of GR1150001 will experience negligible indirect temporary impacts. These impacts include temporary degradation of feeding habitats due to construction works and disturbance from human presence. The temporary loss or degradation of feeding habitats will be limited to the duration of the works and the restoration of the area. Species such as storks that feed at the mouths of drainage ditches and small artificial ponds will be temporarily displaced from the work area.

In conclusion, during the construction of the pipelines and cable, the impacts are expected to be negative, of medium significance, local, immediate, temporary, short-term reversible, synergistic, direct, continuous, short-term reversible, and cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment, prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Drilling Operations

The activities that may have an impact on marine mammals during drilling operations, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Drilling:
  - Drilling of 4 wells to a depth of approximately 4,200 m (2 wells will be used as CO_2injection wells and 2 wells for water production to balance the pressure in the reservoir). All 4 new wells will be constructed using a TDS (Top Drive System) drilling rig and will be directed using a combination of mud motors and rotary drilling assemblies
  - Waste – Production, management, and disposal of mining waste (drilling mud and cuttings).
- Marine traffic – Daily vessel traffic for the installation of pipelines and cable (including the transport of workers and the movement of support vessels).
- Marine traffic – Establishment of exclusion zones due to pipeline and cable installation works (and related works/activities).

Similar to what was discussed in **the** previous **section**, similar and proportional impacts are expected during drilling operations.

Installation of the Omega offshore platform

The activities that may have an impact on birdlife during the installation of the Omega offshore platform, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Installation of guide and pillars. The conventional Omega platform will be supported by 4 pillars. Each pillar will penetrate the seabed by 30 m. The piling will be carried out using a percussion or pulsed mechanism.
- Installation of the support network for the platform decks.
- Installation of decks with the platform's surface equipment.

- Maritime traffic – daily movement of vessels for the implementation of construction works (including the transport of workers, materials, and support vessels).
- Operation of heavy-duty floating crane vessels and other support vessels (support vessels and tugs, floating cargo barges). Waste/sewage production.

Similar to what was discussed in **the** previous **section**, during the installation of the Omega platform, similar and proportional impacts are expected.

Activity	Recipient	Impact magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Birdlife		4	2	4	1	1	2	4	4	2	4	28	Small	High	Moderate	Low
Drilling operations	Birdlife	-	4	2	4	1	1	2	4	4	2	4	28	Small	High	Moderate	Low
Installation work on the Omega offshore platform	Birdlife	-	4	2	4	1	1	2	4	4	2	4	28	Small	High	Moderate	Low

9.3.8.1.6 Areas of the national system of protected areas

The proposed modification of the project is located within the Natura 2000 protected area TKS & ZEP GR1150014 "Marine Area of Kavala Thasos". The wider area includes the Natura 2000 sites SAC GR1150010 "Nestos Delta and Keramotis Lagoons - Wider Area," SPA GR1150001 "Nestos Delta and Keramoti Lagoons and Thasopoula Island" and SPA GR1150012 "Thasos (Mount Ypsario and coastal zone)".

The potential impacts arising from aspects of the project during the construction phase are described in detail in **Section 2** of **the EIA** for the proposed amendment to the Project. Based on the EIA analysis, as well as on the above-mentioned parameters of the living environment that constitute the protected objects of these Protected Areas, the following impacts on them arise:

- During the construction of the pipelines and cable, the impacts on the National System of Protected Areas are expected to be negative, of medium significance, local, immediate, temporary, short-term reversible, synergistic, direct, continuous, short-term restorable, and cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as Moderate

in their Final Assessment, prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in Chapter 10 of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

- Similarly, during drilling operations, the impacts on the National System of Protected Areas are expected to be negative, of medium significance, local, immediate, temporary, short-term reversible, synergistic, direct, continuous, short-term reversible, and cumulative. In terms of their final assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as Moderate in their Final Assessment, prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in Chapter 10 of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.
- During the installation of the Omega platform, the impacts on the National System of Protected Areas are expected to be negative, of medium significance, local, immediate, temporary, reversible in the medium term, synergistic, direct, continuous, reversible in the short term, and cumulative. As for their Final Assessment, these impacts are assessed as **Moderate, and** within the framework of this document, prevention/mitigation/countermeasures are proposed so that these impacts become at least minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extension)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Construction of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable	Areas of the National System of Protected Areas	-	4	2	4	1	1	2	4	4	2	1	25	Small	High	Moderate	Low
Drilling operations	Areas of the National System of Protected Areas	-	4	2	4	1	1	2	4	4	2	1	25	Small	High	Moderate	Low

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extension)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Installation works for the Omega offshore platform	Areas of the National System of Protected Areas	-	4	2	4	1	2	2	4	4	2	4	29	Small	High	Moderate	Low

9.3.8.1.7 Other Important Natural Areas

The proposed modification of the Project falls within the Important Bird Area (IBA) with code GR250 and name "Gulf of Kavala and Thasos marine area," while nearby is the area with code GR016 and name "Thasos Island and Xironisi".

The study area falls within the boundaries of Accobams Zone 9 in the Northeast Mediterranean (Thracian Sea).

The study area falls within the Important Area for Marine Mammals named "Northern Coast and Islands of the Thracian Sea" with a total area of 5441 km².

The activities that may have an impact on these Important Natural Areas during the construction of the project, based on the P&K content delimitation of the MT AEPO (**Chapter 8**), are as follows:

- Construction of the additional section of the CO_2 transport pipeline, the produced water transport pipeline, and the power supply cable
- Drilling works
- Installation of the Omega offshore platform

Based on the **MEEA** analysis of the proposed modification of the Project, as well as on the above-mentioned parameters of the living environment that constitute the protected objects of these Important Natural Areas, the following impacts on them arise:

- During the construction of the pipelines and cable, the impact on Significant Natural Areas is expected to be negative, of medium significance, local, immediate, temporary, short-term reversible, synergistic, direct, continuous, short-term restorable, and independent. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment, prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed

as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

- Similarly, during drilling operations, the impacts on Significant Natural Areas are expected to be negative, of medium significance, local, immediate, temporary, short-term reversible, synergistic, direct, continuous, short-term reversible, and independent. In terms of their final assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.
- During the installation of the Omega platform, the impacts on Significant Natural Areas are expected to be negative, of medium significance, local, immediate, temporary, short-term reversible, synergistic, direct, continuous, short-term reversible, and cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Other Important Natural Areas	-	4	2	4	1	1	2	4	4	2	1	25	Small	High	Moderate	Low
Drilling operations	Other Significant Natural Areas	-	4	2	4	1	1	2	4	4	2	1	25	Small	High	Moderate	Low
Installation works for the Omega offshore platform	Other Significant Natural Areas	-	4	2	4	1	1	2	4	4	2	4	28	Small	High	Moderate	Low

9.3.8.2 Operational Phase

This **section** examines the possibility of potential adverse effects on the living environment of the area as a result of the operation of the proposed project modification.

9.3.8.2.1 Marine Habitats

The activities that may have an impact on the marine habitats of the study area during the operation of the offshore facilities of the proposed project modification,based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Water pumping. The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and until the end of the project.
- Waste. Production, management, and disposal of waste from the operation of the project's offshore facilities.
- Maritime traffic. Definition of exclusion zones due to the operation of the project.

Pumping water from the reservoir and discharging treated water into the marine environment

The water produced from the two water production wells (the water wells on the new Omega platform will be equipped with electric submersible pumps (Electrical Submersible Pumps ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) will be transported from the new Omega platform to the existing Delta platform, so that it can be treated by the existing water treatment facilities and disposed of in accordance with the project's environmental permit. Specifically, the water extracted from the reservoir to provide a means of actively managing reservoir pressure will be treated at the Delta platform and discharged into the sea via a disposal caisson.

The pumping of water from the two boreholes and the discharge of treated water into the sea may locally degrade marine habitats. The treated water is expected to meet quality standards prior to its discharge into the environment, however, differences in the temperature of the discharged water compared to that of the marine environment and a large local discharge flow may locally degrade the quality of the marine habitat. It is estimated that the substrate in the wider area of the proposed modification of the Project is muddy with no vegetation.

Therefore, the impact on the marine habitats in the area is assessed as negative, of low intensity, local in extent, immediate in appearance, permanent, short-term reversible, non-synergistic, direct in effect, continuous, recoverable in the medium term, and independent. In terms of their final assessment, these impacts are considered **negligible.**

Definition of exclusion zones due to the operation of the project

The maintenance of the no-anchoring and no-fishing zone and its limited extension during the operation of the Project will have positive impacts on marine habitats. The reduction in fishing pressure will allow fish stocks to recover and marine invertebrates to be protected. In addition, protection from boat anchors will ensure the structure and functioning of sensitive marine ecosystems, enhancing the environmental health and sustainability of the area.

Consequently, during the operational phase of the proposed project modification, **positive** impacts on the marine habitats of the area are also expected.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Pumping water from the reservoir and discharging the treated water into the marine environment during the operation of the project	Marine habitats	-	2	2	4	4	1	1	4	4	3	1	26	Small	Low	Negligible
Definition/maintenance of a no-anchoring and no-fishing zone during the operation of the Project.	Marine habitats	+	4	4	4	4	1	2	4	4	4	1	32	Positive	Low	Positive

9.3.8.2.2 Marine mammals

The activities that may have an impact on marine mammals in the study area during the operation of the offshore facilities of the proposed project modification , based on the P&K content definition of the MT AEPO (**Chapter 8),** are as follows:

- Water pumping. The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and until the end of the project.
- Waste. Production, management, and disposal of waste from the operation of the project's offshore facilities.
- Maritime traffic. Daily vessel traffic due to project operations (including employee transportation and support vessel movements).
- Marine traffic. Definition of exclusion zones due to project operations.

Pumping water from the reservoir and discharging treated water into the marine environment

The water produced from the two water production wells (the water wells on the new Omega platform will be equipped with electrical submersible pumps (Electrical Submersible Pumps ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) will be transported from the new Omega platform to the existing Delta platform, so that it can be treated by the existing water treatment facilities and disposed of in accordance with the project's environmental permit. Specifically, the water extracted from the reservoir to provide a means of actively managing reservoir pressure will be treated at the Delta platform and discharged into the sea via a disposal caisson.

The pumping of water from the two boreholes and the discharge of treated water into the sea may cause disturbance to marine mammals. In particular, the underwater noise generated by the continuous operation of the pumps may cause temporary behavioral disturbances, possibly leading to avoidance of the immediate zone where the maximum noise intensity is recorded. At the same time, although the discharged water will meet the required quality and salinity standards, local variations in temperature or hydraulic flow may affect the behavior and distribution of fish populations. In the event of a significant local change, marine mammals may experience an indirect reduction in available prey or changes in foraging behavior, with possible implications for their spatial distribution.

Therefore, the impacts are assessed as low intensity, local in extent, immediate in onset, permanent, short-term reversible, synergistic, direct effect, periodic, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are assessed as **Moderate.** As for their Final Assessment, these impacts are assessed as **Moderate, and** within the framework of this document, prevention/mitigation/countermeasures are proposed so that these impacts become at least minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Definition of exclusion zones due to the operation of the project

The existing no-anchoring and no-fishing zone, which is being slightly extended, has a positive impact on marine mammals. Specifically, the reduction in fishing pressure and the restoration of fish stocks will create safer and more food-rich habitats for marine mammals, thus contributing to the improvement of their health and well-being in the area.

Therefore, during the project's operational phase, **positive** impacts on marine mammals in the area are also expected.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Restoration)	AC (Accumulation)	Im (Impact Magnitude)				
mping water from the servoir and discharging e treated water into the arine environment during e operation of the project	Marine mammals	-	2	2	4	4	1	2	4	2	1	1	23	Small	High	Moderate	Low
tablishment/maintenance a no-anchoring and no-hing zone during the eration of the Project.	Marine mammals	+	4	4	4	4	1	2	4	4	4	1	32	Positive	High	Positive	Positi

9.3.8.2.3 Sea turtles

The activities that may have an impact on sea turtles in the study area during the operation of the offshore facilities of the proposed project modification , based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Water pumping. The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and until the end of the project.
- Waste. Production, management, and disposal of waste from the operation of the project's offshore facilities.
- Maritime traffic. Daily vessel traffic due to project operations (including employee transportation and support vessel movements).
- Marine traffic. Definition of exclusion zones due to project operations.

Pumping water from the reservoir and discharging the treated water into the marine environment

Pumping water from the two boreholes and discharging the treated water into the sea may cause disturbance to sea turtles, which detect low-frequency sounds. The continuous underwater noise generated by the operation of the electric pumps may cause temporary behavioral effects, such as moving away from the project area or limiting the use of specific areas. At the same time, although the discharged water will meet the required quality and salinity standards, local variations in temperature or hydraulic flow may affect the behavior and distribution of fish populations. In the event of a significant local change, sea turtles may face an indirect reduction in available prey or changes in foraging behavior, with possible implications for their spatial distribution.

It should be noted that the area is extensive and no reproduction has been observed, only the presence of individuals for feeding. It is estimated that sea turtles are likely to avoid the immediate area where

underwater noise from water pumping from the reservoir is most intense. Therefore, the impacts are expected to be negligible in intensity, local in extent, immediate in occurrence, permanent, short-term reversible, synergistic, direct in effect, periodic, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are rated as **Minor**.

Daily vessel traffic due to the operation of the project (including the transport of workers and the movement of support vessels)

Daily boat traffic due to project operations (including worker transport and support boat movements) may cause disturbance to sea turtles found in the area. The noise from the vessels' engines may affect them, causing them to move away from feeding areas and disrupting their migration routes. In addition, due to their size and inability to move away quickly, turtles are at greater risk of becoming entangled in boats, which can cause suffocation. However, considering that maritime traffic in the wider area of the Gulf of Kavala is intense and that the speed of all vessels will not exceed 20 knots, the risk of collision and entanglement of sea turtles with vessels is minimized. Therefore, the impacts are assessed as minor, localised, immediate, permanent, short-term reversible, synergistic, direct, periodic, immediately remediable and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

Definition of exclusion zones due to the operation of the project

Maintaining the existing no-anchorage and no-fishing zone and its limited extension during the operation of the proposed project modification has positive effects on sea turtles. Specifically, the reduction in fishing pressure and the restoration of fish stocks will create safer and more food-rich habitats for sea turtles, thereby contributing to the improvement of their health and well-being in the area. The exclusion zone already exists due to the presence and operation of existing subsea pipelines and platforms. Consequently, the positive impact is expected to be maintained and increased to a limited extent due to the restriction of fishing and maritime traffic in the zone.

Therefore, during the operational phase of the proposed project modification, **positive** impacts on sea turtles in the area are also expected.

Activity	Recipient	Impact magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Pumping water from the reservoir and discharging the treated water into the marine environment during project operation	Sea turtles	-	2	2	4	4	1	2	4	2	2	1	24	Small	Moderate	Low

Activity	Recipient	Impact magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Daily boat traffic due to project operations (including employee transportation and support boat movements)	Sea turtles	-	2	2	4	4	1	2	4	2	2	1	24	Small	Moderate	Small
Definition/maintenance of a no-anchoring and no-fishing zone during the operation of the Project.	Sea turtles	+	4	4	4	4	1	2	4	4	4	1	32	Positive	Moderate	Positive

9.3.8.2.4 Fish fauna

The activities that may have an impact on the fish fauna of the study area during the operation of the offshore facilities of the proposed project modification , based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Water pumping. The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and until the end of the project.
- Waste. Production, management, and disposal of waste from the operation of the project's offshore facilities.
- Maritime traffic. Definition of exclusion zones due to the operation of the project.

Pumping water from the reservoir and discharging treated water into the marine environment.

The water produced from the two water production wells (the water wells on the new Omega platform will be equipped with electric submersible pumps (Electrical Submersible Pumps ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) will be transported from the new Omega platform to the existing Delta platform, so that it can be treated by the existing water treatment facilities and disposed of in accordance with the project's environmental permit. Specifically, the water extracted from the reservoir to provide a means of actively managing the reservoir pressure will be treated at the Delta platform and discharged into the sea via a disposal caisson. It should be noted that the treatment required will be further investigated after water samples from the aquifer at the storage complex have been taken and analyzed.

Pumping water from the two wells and discharging the treated water into the sea may cause disturbance to the fish fauna in the area, mainly due to the continuous underwater noise that will be generated by the operation of the electric submersible pumps (ESP). This noise may cause fish to move away from the immediate area of influence, as it alters their acoustic environment and creates unfavorable conditions for feeding or staying in the area. At the same time, the disruption of acoustic communication may negatively affect their reproductive behavior, especially for species that rely on sound signals to attract mates or synchronize spawning. In addition, prolonged exposure to noise can have physiological effects, such as increased stress levels, suppression of the immune response, and reduced growth or survival capacity.

The discharge of treated water into the sea is expected to affect the fish fauna of the area, mainly due to possible local changes in temperature and flow. Specifically, temperature differences between treated and natural seawater may create temperature zones that could affect the behavior, spatial distribution, or even physiology of fish. At the same time, the discharge of significant quantities of water into the marine environment may cause changes in the structure and functioning of local ecosystems, resulting in the temporary degradation of habitats that support fish or other marine organisms. However, the impacts during the operational phase are considered to be local in nature and therefore of minor importance, given that fish will move to areas with lower disturbance. According to the distribution maps of the 4th national report on the implementation of Directive 92/43/EEC (10 x 10 km grid areas), the distribution of the species *Allosa fallax,* which is a protected species in the SPA & SCI GR115014, does not fall within the area of the proposed project modification. In conclusion, the impacts are expected to be negative, of low intensity, local in scope, short-term in duration, permanent in duration, short-term in reversibility, synergistic, direct in effect, continuous in frequency, immediately reversible, and non-cumulative. In terms of their final assessment, these impacts are rated as **Minor.**

Definition of exclusion zones due to the operation of the project

The definition of exclusion zones for the operation of the proposed project modification is expected to have a positive impact on marine fish fauna. Specifically, these areas will be protected from fishing and other human activities, providing safe havens for reproduction and growth, as well as reducing stress on fish species.

Consequently, during the project's operational phase, **positive** impacts on the fish fauna of the area are also expected.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Pumping water from the reservoir and discharging the treated	Fish fauna	-	2	2	3	4	1	2	4	4	1	1	24	Small	Moderate	Small

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
water into the marine environment during the operation of the project																
Definition/maintenance of a no-anchoring and no-fishing zone during the operation of the Project.	Fish fauna	+	4	4	4	4	1	2	4	4	4	1	32	Positive	Moderate	Positive

9.3.8.2.5 Avifauna

The activities that may have an impact on the avifauna of the study area during the operation of the offshore facilities of the proposed project modification , based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Water pumping. The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and until the end of the project.
- Waste. Production, management, and disposal of waste from the operation of the project's offshore facilities.
- Maritime traffic. Definition of exclusion zones due to the operation of the project.

The detailed impacts that may be caused by the operation of the Project on protected bird species are set out in detail in **Section 2** of **the EIA** of the proposed amendment to the Project.

Pumping water from the reservoir and discharging the treated water into the marine environment

The water produced from the two water production wells (the water wells on the new Omega platform will be equipped with electrical submersible pumps (Electrical Submersible Pumps ESP) and will extract water from the reservoir to provide a means of actively managing the reservoir pressure) will be transported from the new Omega platform to the existing Delta platform, so that it can be treated by the existing water treatment facilities and disposed of in accordance with the project's environmental permit. Specifically, the water extracted from the reservoir to provide a means of actively managing the reservoir pressure will be treated at the Delta platform and discharged into the sea via a disposal caisson. It should be noted that the treatment required will be further investigated after water samples from the aquifer in the storage complex have been taken and analyzed.

The discharge of treated water is likely to be associated with (a) temperature changes: if the treated water has a different temperature from the seawater, it may create temperature zones that can affect the behavior and distribution of fish (b) changes in the ecosystem: The discharge of large quantities of water may affect the structure and functioning of marine ecosystems, affecting the habitats of fish and other marine organisms.

Considering that the bird species found in the area use the area for feeding, disturbance and degradation of their feeding area is expected during the operation of the project. However, the works are spatially localized to a very small part of the species' habitat in the area, and therefore the overall impact is expected to be negligible. Consequently, the overall impacts are negative, of low intensity, local in extent, short-term in duration, permanent in duration, short-term in reversibility, synergistic, direct in effect, continuous in frequency, immediately restorable, and non-cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are reduced to at least Minor. Following the implementation of the relevant measures proposed in Chapter **10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Definition of exclusion zones due to the operation of the project

The definition of exclusion zones for project operation is expected to have a positive impact on birdlife. Specifically, these areas will be protected from fishing and other human activities, providing safe havens for the reproduction and development of fish species and consequently leading to an increase in local fish stocks.

Consequently, during the operational phase of the proposed project modification, **positive** impacts on the birdlife of the area are also expected.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Pumping water from the reservoir and discharging the treated water into the marine environment during the operation of the project	Birdlife	-	2	2	3	4	1	2	4	2	1	1	22	Small	High	Moderate	Low

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Marine traffic: Definition of exclusion zones due to the operation of the project.	Birdlife	+	4	4	3	4	1	2	4	4	4	1	31	Positive	High	Positive	Positive

9.3.8.2.6 National system of protected areas

Activities that may have an impact on the areas of the national system of protected areas in the study area during the operation of the offshore facilities of the proposed project modification , based on the P&K content delimitation of the MT AEPO (**Chapter 8)** are as follows:

- Water pumping. The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and until the end of the project.
- Waste. Production, management, and disposal of waste from the operation of the project's offshore facilities.
- Maritime traffic. Daily vessel traffic due to project operations (including employee transportation and support vessel movements).
- Marine traffic. Definition of exclusion zones due to project operation.

The impacts that may arise from aspects of the project during the operational phase are described in detail in **Section 2** of **the EIA** of the proposed amendment to the Project.

Based on the EIA analysis, as well as on the above-mentioned parameters of the living environment that constitute the protected objects of these Protected Areas, the following impacts on them arise:

- The activities of pumping water from the reservoir and discharging treated water into the marine environment are expected to have negative, low-intensity, localised, immediate, permanent, short-term, reversible, synergistic, direct, continuous, immediately remediable and non-cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are reduced to at least Minor. Following the

implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

- Similarly, the daily movement of vessels due to the operation of the proposed modification of the project (including the transport of workers and the movement of support vessels), the impacts on the Areas of the National System of Protected Areas are expected to be negative, of low intensity, local in scope, immediate in appearance, permanent in duration, short-term in reversibility, synergistic, direct in effect, continuous in frequency, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are reduced to at least Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.
- The designation of exclusion zones due to the operation of the proposed project modification is expected to have a **Positive** Impact on the Areas of the National System of Protected Areas.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Activities involving the pumping of water from the reservoir and the discharge of treated water into the marine environment	Areas of the National System of Protected Areas	-	2	2	4	4	1	2	4	4	1	1	25	Small	High	Moderate	Low
Daily boat traffic due to project operations (including employee transportation and support boat movements)	Areas of the National System of Protected Areas	-	2	2	4	4	1	2	4	4	1	1	25	Small	High	Moderate	Low
Maritime traffic: Definition of exclusion zones due to the operation of the project.	Areas of the National System of Protected Areas	+	4	4	4	4	1	2	4	4	4	1	32	Positive	High	Positive	Positive

9.3.8.2.7 Other Important Natural Areas

The proposed modification of the Project falls within the Important Bird Area (IBA) with code GR250 and name "Gulf of Kavala and Thasos marine area," while nearby is the area with code GR016 and name "Thasos Island and Xironisi."

The study area falls within the boundaries of Accobams Zone 9 in the Northeast Mediterranean (Thracian Sea).

The study area falls within the Important Area for Marine Mammals named "Northern Coast and Islands of the Thracian Sea" with a total area of 5441 km^2.

The activities that may have an impact on these Important Natural Areas during the operation of the offshore facilities of the proposed project modification,based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Water pumping. The two water production wells on the Omega platform will be equipped with electric submersible pumps (ESP) and will extract water from the reservoir. They will operate at a production rate of up to 7,500 bwpd each during the period 2025-2031, and water production will gradually increase to 97,000 bwpd per well in 2031 and until the end of the project.
- Waste. Production, management, and disposal of waste from the operation of the project's offshore facilities.
- Maritime traffic. Daily vessel traffic due to project operations (including employee transportation and support vessel movements).
- Maritime traffic. Definition of exclusion zones due to the operation of the project.

Based on the **SEA** analysis of the proposed modification of the Project, as well as on the above-mentioned parameters of the living environment that constitute the protected objects of these Protected Areas, the following impacts on them arise:

The activities of pumping water from the reservoir and discharging treated water into the marine environment are expected to have negative, low-intensity, localised, immediate, permanent, short-term, reversible, synergistic, direct, continuous, immediately remediable and non-cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are reduced to at least Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Similarly, due to the daily movement of vessels resulting from the operation of the proposed project modification (including the transport of workers and the movement of support vessels), the impact on Significant Natural Areas is expected to be negative, of low intensity, local in scope, immediate in appearance, permanent in duration, short-term in reversibility, synergistic, direct in effect, continuous in frequency, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are reduced

to at least Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

The designation of exclusion zones due to the operation of the proposed project modification is expected to have a **Positive** Impact on Significant Natural Areas.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Activities involving the pumping of water from the reservoir and the discharge of treated water into the marine environment	Other Significant Natural Areas	-	2	2	4	4	1	2	4	4	1	1	25	Small	High	Moderate	Low
Daily boat traffic due to project operations (including employee transportation and support boat movements)	Other Significant Natural Areas	-	2	2	4	4	1	2	4	4	1	1	25	Small	High	Moderate	Low
Maritime traffic: Definition of exclusion zones due to the operation of the project.	Other Significant Natural Areas	+	4	4	4	4	1	2	4	4	4	1	32	Positive	High	Positive	Positive

9.3.8.3 Decommissioning/Dismantling Phase

This **section** examines the possibility of potential adverse effects on the living environment of the area as a result of the cessation of operation and decommissioning of the proposed project modification.

9.3.8.3.1 Marine Habitats

Marine Habitats

The activities that may have an impact on marine mammals in the study area during the shutdown/decommissioning of the offshore facilities of the proposed project modification, based on the P&K content definition of the MT AEPO (**Chapter 8),** are as follows:

- Shutdown/decommissioning of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable.
- Cessation of operation / dismantling of the Omega offshore platform
  - Dispersion of drilling debris: Accumulated drilling debris must be removed from the platform piles. The debris will be removed from the jacket platform to prevent obstruction of the platform removal operations.
  - Removal: The jack-up vessel will then be moved into position to remove the platform. The topside equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the lift vessel can lift and load the jackets onto barges.
  - Disposal: After the platform is removed, the preferred disposal methods are considered to be: Deep sea disposal.
  - Production of solid and liquid waste.

Cessation of operation/decommissioning of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable

The offshore pipelines and the hoist will be depressurized, cleaned with standard jetting operations, and inerted with nitrogen. The pipelines will then be isolated from the offshore platform, sealed with welded caps or flanges, and remain in place in accordance with international standards. A similar procedure will be followed for the power cable.

The dismantling of equipment and the removal of CO_2 injection and water production facilities are not expected to affect marine habitats. There are no protected habitat types listed in Annex I of Directive 92/43/EEC or habitats of high ecological value in the study area. The substrate in this area is characterized as muddy and vegetation-free. The direct impact is estimated to be limited in geographical extent.

Therefore, the impact on the marine habitats in the area is assessed as negative, negligible in intensity, local in scope, immediate in appearance, permanent, reversible in the short term, non-synergistic, direct in effect, continuous, recoverable in the medium term, and independent. In terms of their final assessment, these impacts are considered **negligible.**

Cessation of operation/decommissioning of offshore installations

The activities of dispersing drilling cuttings and dismantling the Omega platform are expected to have an impact on marine habitats. The increase in water turbidity as a result of particle suspension during the works is expected to negatively affect both the marine habitats located in the area of the proposed project modification and the benthic species that are unable to move. After settling, the suspended particles will be deposited on the seabed, causing physical coverage of habitats and possible temporary or even long-term

degradation of the benthic structure and function. In addition, the removal or alteration of the natural substrate may lead to direct losses of available colonisation surface for benthic communities.

However, based on available scientific data (Burd et al. 2000[129] ; Hinz et al. 2019[130]), the effects of temporary increases in turbidity and the deposition of non-toxic debris are usually short-lived, and natural restoration of the seabed occurs within a period ranging from a few months to a few years, depending on the characteristics of the substrate.

With regard to the deep-water disposal of the platform – if this option is chosen instead of onshore dismantling and recycling of the material – it is estimated that this will have a limited impact on marine habitats, exclusively in a spatially limited area. This impact is due to the permanent, albeit small-scale, coverage of the substrate by the discarded offshore installation. A prerequisite for this is the correct choice of the platform disposal site, based on applicable legislation and BAT.

The activities during the dismantling of the Omega platform generally result in the production of relatively limited quantities of waste, as a consequence of the relatively limited scale of the project. During the dismantling of the offshore facilities of the Omega platform, quantities of surplus materials, carbon steel pipe materials, steel protective casings, and other metal equipment will be generated. These materials will be managed in accordance with best available techniques, with priority given to reuse, followed by recycling and finally the safe disposal of non-reusable and non-recyclable materials.

Beyond their relatively limited quantity, it is important to note that their management will be carried out in accordance with best available practices for soil protection and the requirements of current legislation, as included in **the** overall **Waste Management Plan** for the Project, which is presented in **Annex 12.6**.

Therefore, given that the collection, storage, removal, and disposal of waste will be carried out in accordance with best available practices for the protection of the seabed and the requirements of current legislation, as included in the overall Project Waste Management Plan, it is estimated that the relevant impacts will not be significant.

Based on the above, the dismantling of the Omega platform will have negative impacts on the marine habitats of the study area, which are estimated to be limited in significance and the relevant impacts will in any case be similar to those predicted for the construction phase of the project.

Consequently, the impact on the qualitative characteristics of the seabed in the study area during the decommissioning of the Omega platform will be negative, of medium intensity, local, immediate, temporary, reversible in the long term, non-synergistic, direct in terms of its effect, continuous, recoverable in the medium term, and non-cumulative. Therefore, in terms of their Final Assessment, these impacts are assessed as **Negligible**

[129] B. Burd, R. Macdonald, J. Boyd (2000). Punctuated recovery of sediments and benthic infauna: a 19-year study of tailings deposition in a British Columbia fjord.

[130] Hilmar Hinz, Anna Törnroos, Silvia de Juan (2019). Trait-based indices to assess benthic vulnerability to trawling and model loss of ecosystem functions.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Cessation of Operation / Removal of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Marine habitats	-	1	2	4	1	2	1	4	4	1	1	21	Small	Low	Negligible
Dismantling of Omega platform	Marine habitats	-	4	1	4	1	3	1	4	4	2	1	25	Small	Low	Negligible

9.3.8.3.2 Marine mammals

The activities that may have an impact on marine mammals in the study area during the shutdown/decommissioning of the offshore facilities of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8),** are as follows:

- Shutdown/decommissioning of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable.
- Cessation of Operation / Dismantling of the Omega offshore platform
  - Dispersion of drilling debris: Accumulated drilling debris must be removed from the platform piles. The debris will be removed from the jacket platform to prevent obstruction of the platform removal operations.
  - Removal: The jack-up vessel will then be moved into position to remove the platform. The topside equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the lift vessel can lift and load the jackets onto barges.
  - Disposal: After the platform is removed, the preferred disposal methods are considered to be: Deep-water disposal.
- Maritime traffic - Daily boat traffic for the implementation of the decommissioning of the offshore facilities of the proposed modification (including the transport of workers and the movement of support vessels).
- Maritime traffic. Definition of exclusion zones due to the cessation of operation/decommissioning of the project.

The impacts that may arise from aspects of the proposed project modification during the decommissioning and dismantling phase are described in **Section 2** of **the EIA** for the proposed project modification.

Cessation of operation/decommissioning of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable

The decommissioning of offshore facilities, excluding offshore pipelines that remain in place, may cause increased noise levels near the work site, which may disturb marine mammal species found in the area. As mentioned in the impacts during the construction and operation phase, marine mammals are sensitive to noise, which may temporarily alter their behavior, such as temporarily moving away from the area and affecting their communication. They may be indirectly affected due to the possible displacement of fish species that are a food source for the species. However, it is worth noting that noise levels are not expected to exceed those of marine activities in the area.

Therefore, the impacts are expected to be negative, negligible in intensity, local in extent, immediate in occurrence, temporary in duration, short-term in reversibility, synergistic, direct in effect, periodic, recoverable in the short term, and non-cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as **Moderate** in their Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Decommissioning/Dismantling of the Omega offshore platform

The activities of dispersing the drilling cuttings and dismantling the Omega platform are expected to have an impact on marine mammals in the area. The dispersal and removal of drilling debris may cause a local increase in water turbidity, with temporary increases in suspended particles, which may locally reduce light availability and primary productivity (e.g., phytoplankton). However, as marine mammals in the area do not depend directly on phytoplankton but on higher trophic levels, and use a wide range of marine areas for feeding, these effects are considered to be of limited significance.

During the removal process, the operation of heavy machinery, the cutting of piles, and the lifting of the platform with cranes and vessels generate underwater noise and vibrations. These noise sources may lead to temporary avoidance behavior, i.e., mammals may move away from the immediate work area until calm conditions are restored. However, such noise is of lower intensity and duration than that of the construction phase, so disturbance levels are considered to be lower and of limited duration.

In the case of deep-water platform disposal, the impact on marine mammals is very small, as the process involves the occupation of a minimal area of seabed and is not accompanied by continuous noise emissions, pollution, or continuous disturbance of the water column.

Therefore, the impacts are expected to be negative, of medium intensity, local in extent, immediate in occurrence, temporary in duration, short-term in reversibility, synergistic, direct in effect, continuous, recoverable in the short term, and non-cumulative. As for their Final Assessment, these impacts are assessed as **Moderate, and** within the framework of this study, prevention/mitigation/countermeasures are proposed so that these impacts become at least minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and,

therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Assessment of Residual Impact
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Shutdown / Removal of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Marine Mammals	-	1	2	4	1	1	2	4	2	2	1	24	Small	High	Moderate	Low
Dismantling of the Omega platform	Marine habitats	-	4	2	4	1	1	2	4	4	2	1	26	Small	High	Moderate	Low

9.3.8.3.3 Sea turtles

The activities that may have an impact on sea turtles in the study area during the shutdown/decommissioning of the offshore facilities of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8)** are as follows:

- Shutdown/Dismantling of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable.
- Cessation of Operation / Dismantling of the Omega offshore platform
  - Dispersion of drilling debris: Accumulated drilling debris must be removed from the platform piles. The debris will be removed from the jacket platform to prevent obstruction of the platform removal operations.
  - Removal: The jack-up vessel will then be moved into position to remove the platform. The topside equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the lift vessel can lift and load the jackets onto barges.
  - Disposal: After the platform is removed, the preferred disposal methods are considered to be: Deep-water disposal.

- Maritime traffic - Daily boat traffic for the implementation of the decommissioning of the offshore facilities of the proposed modification (including the transport of workers and the movement of support vessels).
- Maritime traffic. Definition of exclusion zones due to the cessation of operation/decommissioning of the project.

The impacts that may arise from aspects of the proposed project modification during the decommissioning and dismantling phase are described in detail in **Section 2** of **the EIA** for the proposed project modification.

Decommissioning/Dismantling of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable

The offshore pipelines and the hoist will be depressurised, cleaned using standard jetting operations and inerted with nitrogen. Subsequently, the pipelines will be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with applicable international standards. A similar procedure will be applied to the power cable.

During the decommissioning works, increased levels of underwater noise may be generated in the immediate vicinity of the interventions, which could potentially cause temporary disturbance to sea turtles. As mentioned in the impacts during the construction and operation phases, turtles have acoustic abilities and are known to react to sound stimuli, with possible behavioral changes, such as moving away from the intervention zone. However, the expected noise levels are not expected to exceed those produced by other existing marine activities in the wider area.

The daily movement of boats and ships during decommissioning operations may also disturb sea turtles, as they are often injured or killed by boat propellers. Due to their size and inability to move away quickly enough, sea turtles are at greater risk of entanglement, which can cause suffocation. Considering that the special pipe-laying vessel, together with the two support supply/tug vessels, move very slowly to ensure the accurate placement of the pipeline on the seabed, sea turtles can detect the vessels in time and avoid the area until the work is completed.

Therefore, the impacts are expected to be negative, of low intensity, local in scope, immediate in occurrence, temporary in duration, short-term in reversibility, synergistic, direct in effect, periodic, recoverable in the short term, and non-cumulative. In terms of their final assessment, these impacts are rated as **Minor.**

Cessation of operation/decommissioning of the Omega offshore platform

The activities of dispersing the drilling cuttings and dismantling the Omega platform are expected to have an impact on sea turtles. During the dispersal and removal of drilling cuttings, the local increase in turbidity and suspended particles may temporarily affect sea turtles, mainly in terms of their ability to find and feed in surface habitats. Although reduced light availability and temporary substrate coverage may create unfavorable conditions for benthic prey species, sea turtles in the area utilize a wide range of food resources and are highly mobile. Therefore, such impacts are considered to be local, temporary, and limited, especially when the duration of the works is short and the phenomenon is not prolonged.

The removal of the platform, using heavy machinery, cutting piles, and lifting with cranes, causes underwater noise and vibrations that may disturb sea turtles. However, this noise is short-lived and clearly lower in intensity and duration than the noise of the corresponding construction phase (e.g., pile driving), resulting in any avoidance behaviors (such as moving outside the work zone) being short-lived and reversible, with no permanent or escalating effects on the local turtle population.

In the event of the platform being dumped in deep sea areas, the overall impact on sea turtles is estimated to be practically negligible, both because it affects a minimal part of the seabed and because it is not accompanied by prolonged noise emissions, pollution, or disruption of broader ecological processes that would affect the turtles.

Therefore, the impacts are assessed as negative, low intensity, local in scope, immediate in occurrence, temporary in duration, short-term reversibility, synergistic, direct effect, periodic, recoverable in the short term, and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

Activity	Recipient	Impact Size												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Cessation of Operation / Removal of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Sea turtles	-	2	2	4	1	2	2	4	2	2	1	22	Small	Moderate	Small
Dismantling of the Omega platform	Sea turtles	-	2	2	4	1	2	2	4	2	2	1	22	Small	Moderate	Small

9.3.8.3.4 Fish fauna

The activities that may have an impact on the fish fauna of the study area during the shutdown/decommissioning of the offshore facilities of the proposed project modification, based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Shutdown/Dismantling of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable.
- Cessation of Operation / Dismantling of the Omega offshore platform
  - Dispersion of drilling cuttings: Accumulated drilling cuttings must be removed from the platform piles. The cuttings will be removed from the jacket platform to prevent obstruction of platform removal operations.
  - Removal: The jack-up vessel will then be moved to the area to remove the platform. The surface equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the lift vessel can lift and load the jackets onto barges.
  - Disposal: After removal of the platform, the preferred disposal methods are considered to be: Deep sea disposal.

The impacts that may arise from aspects of the proposed project modification during decommissioning and removal are described in detail in **Section 2** of **the EIA** for the proposed project modification.

Decommissioning/Dismantling of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable

The offshore pipelines and the hoist will be depressurized, cleaned with standard jetting operations, and inerted with nitrogen. Subsequently, the pipelines will be isolated from the offshore platform, sealed with welded caps or flanges, and left in place in accordance with applicable international standards. A similar procedure will be applied to the power cable.

During the decommissioning works, increased levels of underwater noise may be generated in the immediate vicinity of the interventions, which could potentially cause temporary disturbance to fish fauna. As mentioned in the relevant sections on impacts during the construction and operation phases, fish species are sensitive to noise, which may lead to temporary behavioral changes, such as moving away from the area, impaired communication, or even slowed growth. However, it should be noted that the expected noise levels are not expected to exceed those associated with other marine activities in the area.

In addition, during the shutdown and removal of the additional section of the CO_2 , the produced water pipeline and the power cable, there may be a temporary increase in seawater turbidity. Increased turbidity may affect the ability of fish to find food, particularly for species that rely on sight to locate prey, but also the functioning of the gills, making breathing more difficult. Nevertheless, the impact is estimated to be local and short-term, as complete removal of the submarine pipeline is not planned and decommissioning work will be limited in time.

Therefore, the impacts are expected to be negative, of low intensity, local in scope, immediate in occurrence, temporary in duration, reversible in the short term, synergistic, of direct effect, periodic, recoverable in the short term, and non-cumulative. In terms of their final assessment, these impacts are rated as **Minor.**

Cessation of operation/decommissioning of the Omega offshore platform

The activities of dispersing drilling cuttings and dismantling the Omega platform are expected to have an impact on fish fauna. The dispersal and removal of drilling debris may cause a temporary increase in the turbidity of the water column due to the rise of suspended particles. Increased turbidity may affect the visual ability of certain fish species, temporarily limiting their ability to search for food, hunt, or locate predators. In addition, the settling of particles on the seabed may lead to temporary coverage of the habitats of benthic species, mainly affecting sedentary or egg-laying fish species. However, given the limited spatial and temporal extent of the works, these effects are expected to be temporary and local in nature.

During the lifting and removal of the platform, the operation of heavy machinery, the cutting of piles and other metal elements, as well as crane and vessel operations, will generate underwater noise and vibrations. These acoustic stimuli may cause temporary behavioral responses in fish fauna, such as moving away from the intervention zone, changing feeding patterns, or disrupting schooling (group) behavior. However, given the limited spatial and temporal extent of the works, these effects are expected to be transient and local in nature.

If the platform is discarded in deep water, the impact on fish populations is considered negligible, as it involves a limited and permanent occupation of a very small area of the seabed, without accompanying disturbance of the water column, emission of pollutants, or other long-term burdens.

Based on the above, the impacts are assessed as negative, low intensity, local in extent, immediate in occurrence, temporary in duration, short-term reversibility, synergistic, direct effect, periodic, recoverable in the short term, and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

Activity	Recipient	Impact Size												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Cessation of Operation / Removal of the additional section of the CO_2transfer pipe, the produced water transfer pipe, and the power supply cable	Fish fauna	-	2	2	4	1	2	2	4	2	2	1	22	Small	Moderate	Small

Activity	Recipient	Impact Size												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Dismantling of the Omega platform	Marine habitats	-	2	2	4	1	2	2	4	2	2	1	22	Small	Moderate	Small

9.3.8.3.5 Birdlife

The activities that may have an impact on the avifauna of the study area during the decommissioning/removal of the offshore facilities of the proposed project modification, based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Shutdown/decommissioning of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable.
- Cessation of Operation / Dismantling of the Omega offshore platform
  - Dispersion of drilling debris: Accumulated drilling debris must be removed from the platform piles. The debris will be removed from the jacket platform to prevent obstruction of the platform removal operations.
  - Removal: The jack-up vessel will then be moved into position to remove the platform. The topside equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the lift vessel can lift and load the jackets onto barges.
  - Disposal: After the platform is removed, the preferred disposal methods are considered to be: Deep-water disposal.

The potential impacts arising from aspects of the proposed project modification relating to decommissioning and removal are described in detail in **Section 2** of **the EIA** for the proposed project modification.

Decommissioning/Dismantling of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable

During the decommissioning and dismantling of the additional section of the CO_2pipeline, the produced water pipeline, and the power cable, there are expected to be impacts on bird species in the area, such as *Phalacrocorax aristotelis desmarestii* and *Puffinus yelkouan*. The impacts will be highly localised and limited, as they will not affect bird habitats on a wide scale. They may cause local changes to habitat structure, but these impacts will be temporary. Marine traffic associated with the decommissioning and dismantling of offshore installations may cause additional disturbance to bird species. The presence of vessels and related activities may cause bird species to temporarily leave the area. However, these impacts are expected to be

short-term and limited to the duration of the works, and bird species will return to the area once the activities are completed and the disturbance ceases.

In conclusion, the impacts on bird species are expected to be negative, of low intensity, local in scope, immediate in occurrence, temporary in duration, short-term in reversibility, synergistic, direct in effect, periodic, recoverable in the short term, and non-cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** In terms of their final assessment, these impacts are rated as **Moderate.** As their final assessment is **Moderate**, this document proposes prevention/mitigation/countermeasures so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Decommissioning/Dismantling of the Omega offshore platform

The activities of dispersing drilling cuttings and dismantling the Omega platform are expected to have an impact on the birdlife of the area. Specifically, the removal of cuttings may cause a temporary increase in the turbidity of the water column due to the rise of suspended particles. This temporary degradation of the water column may reduce food availability, either due to the removal of fish populations from the immediate area or due to reduced visibility and the effectiveness of visual hunting.

In addition, during the lifting and dismantling phase of the platform, the use of heavy machinery, the cutting of piles and metal elements, as well as the accompanying work with cranes and boats, will cause increased underwater noise and vibrations. Although birds are not directly affected by underwater noise, there may be indirect impacts on birdlife due to the expected disturbance of fish populations. The removal of fish from the intervention zone or changes in the behavior of fish populations may temporarily reduce the availability of food for birds that depend on the fish stock.

However, given the small scale and short duration of these interventions, the effects on birdlife are assessed as temporary, local in nature, and of limited significance. Birds are expected to return to the intervention zone once natural conditions are restored, without causing long-term or significant impacts on the structure or function of bird populations in the wider area.

In conclusion, the impacts on birdlife are expected to be negative, of low intensity, local in scope, immediate in appearance, temporary in duration, short-term in reversibility, synergistic, direct in effect, periodic, recoverable in the short term, and non-cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** In terms of their final assessment, these impacts are rated as **Moderate.** As their final assessment is **Moderate**, this document proposes prevention/mitigation/countermeasures so that these impacts are at least reduced to Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Cessation of Operation / Removal of the additional section of the CO_2transfer pipe, the produced water transfer pipe, and the power supply cable	Birdlife	-	2	2	4	1	1	2	4	2	4	1	23	Small	High	Moderate	Low
Dismantling of the Omega platform	Birdlife	-	2	2	4	1	1	2	4	2	4	1	23	Small	Moderate	Small	Small

9.3.8.3.6 National system of protected areas

The activities that may have an impact on the areas of the national system of protected areas in the study area during the decommissioning/removal of the offshore facilities of the proposed project modification, based on the P&Content delimitation of the EIA (**Chapter 8**), are as follows:

- Cessation of operation/decommissioning of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable.
- Cessation of operation / dismantling of the Omega offshore platform
  - Dispersion of drilling debris: Accumulated drilling debris must be removed from the platform piles. The debris will be removed from the jacket platform to prevent obstruction of the platform removal operations.
  - Removal: The jack-up vessel will then be moved into position to remove the platform. The topside equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the lift vessel can lift and load the jackets onto barges.
  - Disposal: After the platform is removed, the preferred disposal methods are considered to be: Deep sea disposal.
  - Production of solid and liquid waste.

- Maritime traffic - Daily boat traffic for the implementation of the decommissioning of the offshore facilities of the proposed modification (including the transport of workers and the movement of support vessels).
- Maritime traffic. Definition of exclusion zones due to the cessation of operation/decommissioning of the project.

The impacts that may arise from aspects of the proposed project modification during the cessation of operation and decommissioning phase are described in **Section 2** of **the EIA** of the proposed project modification.

As mentioned above, the proposed project modification is located within the Natura 2000 protected area TKS & ZEP GR1150014 "Marine Area of Kavala Thasos". The wider area includes the Natura 2000 sites SAC GR1150010 "Nestos Delta and Keramotis Lagoons - Wider Area," SPA GR1150001 "Nestos Delta and Keramoti Lagoons and Thasopoula Island" and SPA GR1150012 "Thasos (Mount Ypsario and coastal zone)".

Based on the EIA analysis of the proposed project modification, as well as on the above-mentioned parameters of the living environment that constitute the protected objects of these Protected Areas, it appears that the impact on the Areas of the National System of Protected Areas during the decommissioning/removal of offshore pipelines (CO_2 and produced water transfer pipeline) and power cable and the decommissioning/removal of the offshore Omega platform are expected to be negative, of low intensity, local in scope, immediate in occurrence, temporary in duration, short-term in reversibility, synergistic, direct in effect, periodic, reversible in the short term, and cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as Moderate in their Final Assessment, prevention/mitigation/countermeasures are proposed in this document so that these impacts are reduced to at least Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Cessation of Operation / Removal of the additional section of the CO_2transfer pipeline, the produced	Areas of the National System of Protected Areas	-	2	2	4	1	1	2	4	2	4	1	24	Small	High	Moderate	Low

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
water transfer pipeline, and the power supply cable																	
Dismantling of the Omega platform	Areas of the National System of Protected Areas	-	2	2	4	1	1	2	4	2	4	1	24	Small	High	Moderate	Low

9.3.8.3.7 Other Significant Natural Areas

Other Significant Natural Areas

The activities that may have an impact on the important natural areas of the study area during the decommissioning/removal of the offshore facilities of the proposed project modification, based on the P&K content delimitation of the MT AEPO (**Chapter 8),** are as follows:

- Decommissioning/Dismantling of Offshore Pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable.
- Cessation of Operation / Dismantling of the Omega offshore platform
  - Dispersion of drilling debris: Accumulated drilling debris must be removed from the platform piles. The debris will be removed from the jacket platform to prevent obstruction of the platform removal operations.
  - Removal: The jack-up vessel will then be moved into position to remove the platform. The topside equipment and bridges will be removed first to gain access to the interior of the pipes. The loads will be transferred through the piles and released. Once the piles are cut, the lift vessel can lift and load the jackets onto barges.
  - Disposal: After removal of the platform, the preferred disposal methods are considered to be: Deep sea disposal.
  - Production of solid and liquid waste.
- Maritime traffic - Daily boat traffic for the implementation of the decommissioning of the offshore facilities of the proposed modification (including the transport of workers and the movement of support vessels).
- Maritime traffic. Definition of exclusion zones due to the cessation of operation/decommissioning of the project.

Based on the SEA analysis of the proposed project modification, as well as on the above-mentioned parameters of the living environment that constitute the protected objects of these Protected Areas, it appears that the impacts during the cessation of operation/decommissioning of offshore pipelines (CO_2 and produced water transfer pipeline) and power cable and the decommissioning/removal of the offshore Omega platform are expected to be negative, of low intensity, local in scope, immediate in occurrence, temporary in duration, short-term in reversibility, synergistic, direct in effect, periodic, recoverable in the short term, and cumulative. In terms of their final assessment, these impacts are rated as **Moderate.** As these impacts are assessed as Moderate in their Final Assessment, prevention/mitigation/countermeasures are proposed in this document so that these impacts are reduced to at least Minor. Following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment	Final Residual Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
Shutdown/Dismantling of the additional section of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Other Important Natural Areas	-	2	2	4	1	1	2	4	2	2	4	24	Small	High	Moderate	Low
Dismantling of the Omega platform	Other Significant Natural Areas	-	2	2	4	1	1	2	4	2	2	4	24	Small	High	Moderate	Low

9.3.8.4 Differentiation of the Estimated Impacts on the Natural Living Environment from the Modification of the Project

As documented in the above **Sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification are assessed as Low and Negligible and cannot change the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of impacts from new project elements, as introduced by the proposed project amendment (such as the new Omega offshore platform), the estimated impacts are limited to minor and negligible impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification). It should be

noted that the cells that are empty with an impact rating **of NA** correspond to impacts that are either provided for in elements of the licensed project that are not relevant to this modification (e.g., onshore facilities), or to elements of the proposed amendment that were not included in the licensed project (e.g., new Omega platform).

Activity	Recipient	Final Impact Assessment[131]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
Construction of the onshore section of the CO_2transfer pipeline	Land Habitats	Small	NA	Small
	Terrestrial Mammals	Negligible	NA	Negligible
	Amphibians and Reptiles	Small	NA	Small
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable.	Marine habitats	Negligible	Negligible	Negligible
	Marine mammals	Small	Small	Small
	Sea turtles	Small	Small	Small
	Fish	Small	Small	Small
	Birdlife	Small	Small	Small
	Areas of the National System of Protected Areas	Small	Small	Small
	Other Important Natural Areas	Small	Small	Small
Drilling operations	Marine habitats	Negligible	Negligible	Negligible
	Marine mammals	Small	Small	Small
	Sea turtles	Small	Small	Small
	Fish	Small	Small	Small
	Bird fauna	Small	Small	Small

[131] In the event that, in the Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts" as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** of this document. The same applies to the estimates of the approved EIA presented in this Table.

Activity	Recipient	Final Impact Assessment[131]		
		Licensed Project	Proposed Amendment	Total Modified Project
	Areas of the National System of Protected Areas	Small	Small	Small
	Other Important Natural Areas	Small	Small	Small
Installation works for the Omega offshore platform	Marine habitats	NA	Negligible	Negligible
	Marine mammals	NA	Small	Small
	Sea turtles	NA	Small	Small
	Fish	NA	Small	Small
	Bird fauna	NA	Small	Small
	Areas of the National System of Protected Areas	NA	Small	Small
	Other Important Natural Areas	NA	Small	Small
Operational Phase				
Transport of CO_2 to the offshore storage facilities in Prinos (*section of pipeline to be laid on the coast*)	Terrestrial habitats	Small	NA	Small
Pumping water from the reservoir and discharging treated water into the marine environment during project operation	Marine habitats	Negligible	Negligible	Negligible
	Marine mammals	Small	Small	Small
	Sea turtles	Small	Small	Small
	Fish	Small	Small	Small
	Bird fauna	Small	Small	Small
	Areas of the National System of Protected Areas	Small	Small	Small
	Other Important Natural Areas	Small	Small	Small
Daily boat traffic due to project operations (including employee transportation and support boat movements)	Marine habitats	NA	NA	NA
	Marine mammals	NA	NA	NA
	Sea turtles	Small	Small	Small

Activity	Recipient	Final Impact Assessment[131]		
		Licensed Project	Proposed Amendment	Total Modified Project
	Fish	NA	NA	NA
	Bird fauna	NA	NA	NA
	Areas of the National System of Protected Areas	Small	Small	Small
	Other Important Natural Areas	Small	Small	Small
Definition/maintenance of a no-anchoring and no-fishing zone during the operation of the Project.	Marine habitats	Positive	Positive	Positive
	Marine mammals	Positive	Positive	Positive
	Sea turtles	Positive	Positive	Positive
	Fish Fauna	Positive	Positive	Positive
	Bird fauna	Positive	Positive	Positive
	Areas of the National System of Protected Areas	Positive	Positive	Positive
	Other Important Natural Areas	Positive	Positive	Positive
Shutdown/Decommissioning Phase				
Shutdown/decommissioning of the additional section of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable	Marine habitats	Negligible	Negligible	Negligible
	Marine mammals	Small	Small	Small
	Sea turtles	Small	Small	Small
	Fish	Small	Small	Small
	Birdlife	Small	Small	Small
	Areas of the National System of Protected Areas	Small	Small	Small
	Other Important Natural Areas	Small	Small	Small
Dismantling of the Omega platform	Marine habitats	NA	Negligible	Negligible
	Marine mammals	NA	Small	Small

Activity	Recipient	Final Impact Assessment[131]		
		Licensed Project	Proposed Amendment	Total Modified Project
	Sea turtles	NA	Small	Small
	Fish	NA	Small	Small
	Bird fauna	NA	Small	Small
	Areas of the National System of Protected Areas	NA	Small	Small
	Other Important Natural Areas	NA	Small	Small

9.3.9 Impacts on the Human Environment

9.3.9.1 Spatial Planning – Land Use – Marine Uses

9.3.9.1.1 Construction Phase

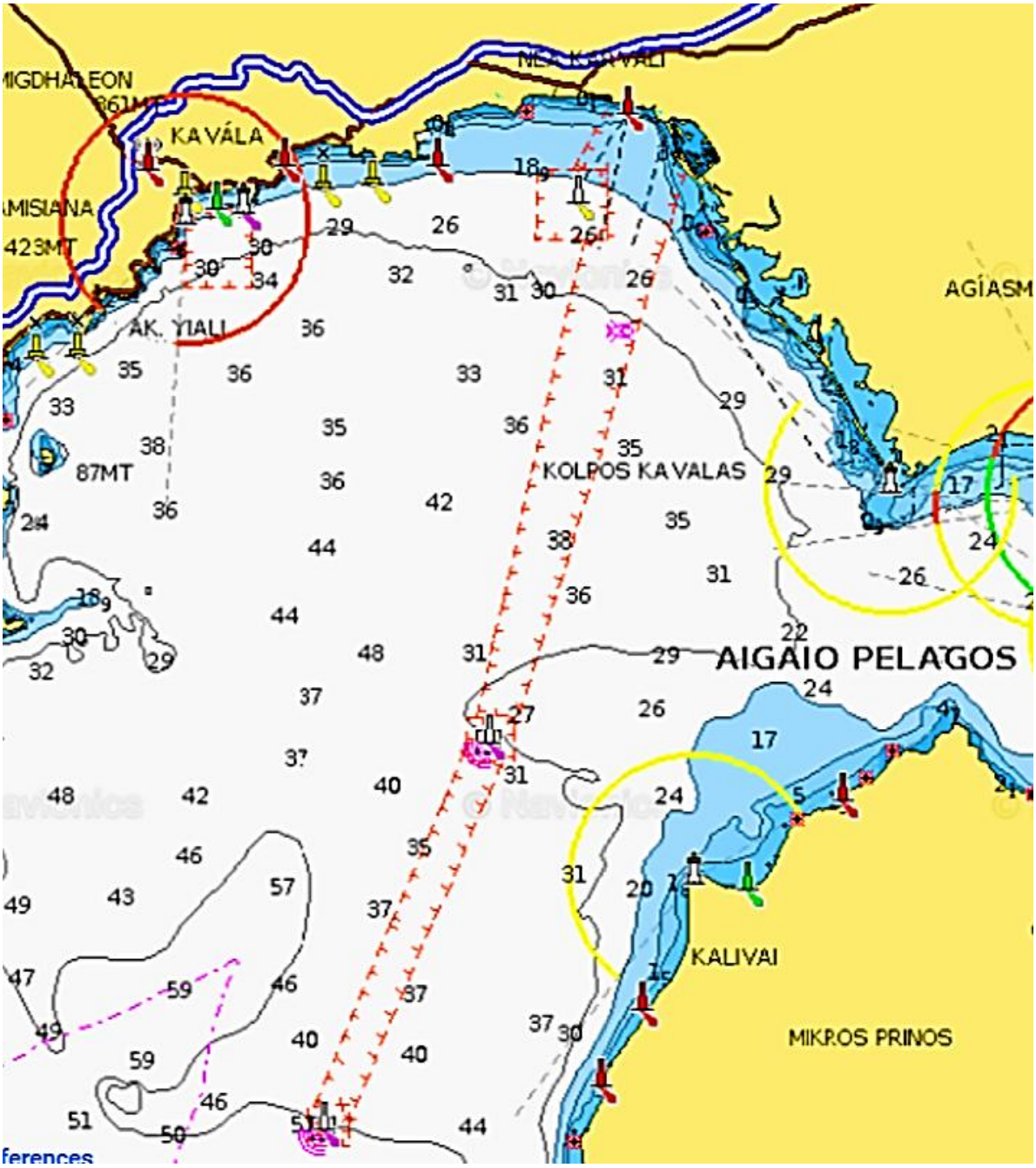
As mentioned in **Chapter 5** of this document, the proposed modification of the project does not conflict with the guidelines, priorities, and choices of Spatial Planning at the national, regional, and sectoral levels, while being compatible and compliant with the established spatial and urban planning commitments, as reflected in the established land uses of the study area.

More specifically, the proposed modification of the project (as well as the overall modified project) aims to mitigate the effects of climate change through carbon dioxide storage and does not conflict with the objectives set by the General Framework for Spatial Planning and Sustainable Development (GFSDA) for the same purpose.

With regard to the provisions and guidelines of the Special Frameworks for Spatial Planning and Sustainable Development (EPCHSDA) that have been established to date and may be relevant to the activities and facilities of the proposed project modification, as noted in **Chapter 5,** the Project does not conflict with the guidelines of the EPRSD for Industry and, although it is not directly related to the EPRSD - RES (as it does not concern a RES project), it indirectly contributes to the achievement of the objectives of this EPRSD (e.g., addressing climate change) and, on the other hand, does not adversely affect its forecasts and planning in any way.

With regard to the Special Framework for Spatial Planning and Sustainable Development for Aquaculture (EPCHSAU), which identifies and categorizes areas suitable for aquaculture development (PAY), part of the licensed project falls within PAU B14 "Agiasma-Keramoti-Erasmio" (fish farming, shellfish farming, other aquatic organisms), while it is 10.6 km away from area B13 "Iraklitsa-Nea Peramos." These PAUs are classified as B, i.e. areas for the development of aquaculture with potential for further development. **The proposed modification of the project is located outside and at a significant distance from the PAUs of the EPCHSAU.**

According to the following **diagram** for the existing project of the Prinos offshore mining complex, which has already been environmentally licensed (AP ref. 8413/24-04-18, ADA: ΨΓΛ14653Π8-Ζ79 on the subject of *"Approval of environmental terms for the Prinos Offshore Development project"),* a zone has been designated within the PAU (between the red lines) through which pipelines pass, where mooring and all forms of fishing are prohibited. Given that the $CO_{(2)}$transport pipeline under study in this section will pass through the established zone, it is not expected to further affect the uses of the PAU. However, as mentioned above, **the proposed modification of the project is outside and at a significant distance from the PAUs of the EPCHSAU.**



(Source: Navionics, https://webapp.navionics.com/#boating@9&key=wzlxFqnitC)

Figure9 –2 : Existing mooring and fishing prohibition zone in the project area

With regard to marine facilities, no marine uses have been established at the national level, with the exception of the EPCHSAU. Given the establishment of the ECHSA for the marine area and the absence of the corresponding THP, spatial planning in the marine area of the proposed project amendment is determined by the existing marine spatial planning, i.e. the corresponding Special and Regional Spatial Planning Frameworks in force, which concern specific economic sectors, including aquaculture.

The main uses that may be developed in the marine area are as follows:

- Fishing
- Aquaculture
- Shipping and maritime transport
- Military uses and activities
- Research and protection of the marine ecosystem and underwater antiquities
- Energy production from renewable energy sources
- Extraction of hydrocarbons and aggregates
- Tourism / Recreation

As mentioned above, for the existing Prinos hydrocarbon extraction project, which has already been granted an environmental permit (AP 8413/24-04-18, ADA: ΨΓΛ14653Π8-Ζ79 on the subject of "Approval of environmental terms for the Prinos Offshore Development project"), a marine zone is defined within which pipelines pass and in which mooring and all forms of fishing are prohibited. The licensed pipeline for the project will pass through this zone, which has already been established, and the definition of the planned new prohibition zone is offset by the existing one, which is slightly extended. In contrast, the additional section of the CO(2)pipeline (1.6 km in the worst-case scenario), the water transfer pipeline (1.3 km long in the worst-case scenario) and the power supply cable (1.3 km long in the worst-case scenario) will be installed in areas where a new exclusion zone will have to be defined. Given the very limited intensity of the new infrastructure compared to the corresponding area of licensed infrastructure in the study area, it is estimated that the additional new exclusion zone will be very limited and therefore the existing balance with other marine uses that has been achieved is not expected to be disrupted.

Taking into account the fact that all offshore facilities of the proposed project modification will be developed in locations close to existing facilities in locations where restrictions already apply due to the existence of the Prinos offshore gas extraction project, it is not expected that the patterns of marine uses and activities will change, or that the proposed project modification will lead to the displacement of users of the area. With regard to marine uses, the exclusion zone constitutes a small part of the total marine area, does not obstruct key shipping routes, does not restrict access to ports, popular coastal areas, or areas used for tourist activities (e.g., diving), and does not restrict the sustainable use of marine resources.

In conclusion, the impact on existing marine uses during the construction phase of the proposed project modification is expected to remain limited. Therefore, the potential impacts are assessed as negative, negligible in intensity, within the project area, immediate, temporary (construction phase), short-term reversibility, non-synergistic, non-cumulative, continuous, and immediately remediable.

Consequently, in terms of their Final Assessment, the impacts on spatial planning and marine uses are assessed as **Negligible**.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Offshore pipelines and submarine CO_2transport cable: Definition of exclusion zones due to pipeline and cable installation works (and related works/activities).	Marine uses	-	1	1	4	1	1	1	4	4	1	1	22	Small	Low	Negligible
Offshore installations (excluding offshore pipelines and submarine cables): Definition of exclusion zones due to drilling operations.	Marine uses	-	1	1	4	1	1	1	4	4	1	1	22	Small	Low	Negligible

9.3.9.1.2 Operation Phase

Similar to the construction phase, the proposed modification of the project does not conflict with the guidelines, priorities, and choices of Spatial Planning at the national, regional, local, and sectoral levels, while being compatible and compliant with the established spatial and urban planning commitments, as reflected in the established land and marine uses of the study area. Taking into account the fact that all offshore facilities of the proposed project modification will be developed in locations close to existing facilities in locations where restrictions already apply due to the existence of the Prinos offshore oil and gas extraction project, it is not expected that the standards for marine uses and activities will change, or that the proposed project modification will lead to the displacement of users of the area. With regard to marine uses, the exclusion zone constitutes a small part of the total marine area, does not obstruct key shipping routes, does not restrict access to ports, popular coastal areas, or areas used for tourist activities (e.g., diving), and does not restrict the sustainable use of marine resources.

In conclusion, the impact on existing marine uses during the operational phase is expected to remain limited. Therefore, the potential impacts are assessed as negative, negligible in intensity, within the Project's footprint, immediate, long-term (operational phase), short-term reversibility, non-synergistic, non-cumulative, continuous, and immediately remediable.

Consequently, in terms of their Final Assessment, the impacts on spatial planning and land use are assessed as **Negligible**.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Physical presence and location of offshore infrastructure	Marine uses	-	1	1	4	3	1	1	4	4	1	1	24	Small	Low	Negligible
Maritime traffic: Definition of exclusion zones due to the operation of the project	Marine uses	-	1	1	4	3	1	1	4	4	1	1	24	Small	Low	Negligible

9.3.9.1.3 Decommissioning/Dismantling Phase

During the decommissioning/removal phase, no changes are expected in marine use and activity patterns, nor is the proposed project modification expected to lead to the displacement of users of the area. In terms of marine uses, the exclusion zone constitutes a small part of the total marine area and is mostly located in areas where restrictions already apply due to the existence of the Prinos offshore gas extraction project. it does not obstruct key shipping routes, restrict access to ports, popular coastal areas, or areas used for tourist activities (e.g., diving), and does not restrict the sustainable use of marine resources.

In conclusion, the impact on existing marine uses during the decommissioning/removal phase is expected to remain limited. Therefore, the potential impacts are assessed as negative, negligible in intensity, within the Project's footprint, immediate, temporary (decommissioning phase), short-term reversibility, non-synergistic, non-cumulative, continuous, and immediately remediable.

Consequently, in terms of their Final Assessment, the impacts on spatial planning and land use are assessed as **Negligible.**

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Cessation of Operation / Removal of Offshore Pipelines and Cable: Definition of exclusion zones due to the implementation	Marine uses	-	1	1	4	1	1	1	4	4	1	1	22	Small	Low	Negligible

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
of offshore pipeline and cable removal works.																
Cessation of operation/decommissioning of offshore installations (excluding offshore pipelines and submarine cables): Definition of exclusion zones due to the implementation of offshore installation decommissioning works.	Marine uses	-	1	1	4	1	1	1	4	4	1	1	22	Small	Low	Negligible

9.3.9.1.4 Differentiation of Estimated Impacts on Spatial Planning, Land Use, and Marine Use from the Project Modification

As documented in the above **Sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification are assessed as Negligible and cannot alter the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of impacts from new project elements, as introduced by the proposed project modification (such as the new Omega offshore platform), the estimated impacts are limited to negligible impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification). It should be noted that the empty cells marked with the impact designation **NA** correspond to impacts that are either provided for in elements of the licensed project that are not relevant to this modification (e.g., onshore facilities), or to elements of the proposed amendment that were not included in the licensed project (e.g., new Omega platform).

Activity	Recipient	Final Impact Assessment[132]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
Offshore pipelines and subsea CO_2transport cable: Definition of exclusion zones due to pipeline and cable installation works (and related works/activities).	Marine uses	**Negligible**	**Negligible**	**Negligible**
Offshore installations (excluding offshore pipelines and submarine cables): Definition of exclusion zones due to drilling operations.	Marine uses	**Negligible**	**Negligible**	**Negligible**
Cessation of operation/decommissioning of offshore pipelines and cable: Definition of exclusion zones due to the implementation of offshore pipeline and cable decommissioning works.	Marine uses	**Negligible**	**Negligible**	**Negligible**
Cessation of operation/decommissioning of offshore facilities (excluding offshore pipelines and submarine cable): Definition of exclusion zones due to the implementation of offshore facility decommissioning works.	Marine uses	**Negligible**	**Negligible**	**Negligible**
Operation phase				
Physical presence and location of offshore infrastructure	Marine uses	**Negligible**	**Negligible**	**Negligible**
Maritime traffic: Definition of exclusion zones due to project operation	Marine uses	**Negligible**	**Negligible**	**Negligible**
Shutdown/decommissioning phase				
Decommissioning/Removal of offshore pipelines and cable: Definition of exclusion zones due to the implementation of offshore pipeline and cable removal works.	Marine uses	**Negligible**	**Negligible**	**Negligible**
Cessation of operation/decommissioning of offshore facilities (excluding offshore pipelines and submarine cable): Definition of exclusion zones due to the implementation of offshore facility decommissioning works.	Marine uses	**Negligible**	**Negligible**	**Negligible**

[132] In the event that, in terms of its Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts," as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** of this document. The same applies to the estimates of the approved EIA presented in this Table.

9.3.9.2 Structure and Functions of the Man-made Environment

9.3.9.2.1 Construction Phase

CO_2storage projects can create divisions within communities, especially when there are differing views on the potential benefits and risks. Some community members may view carbon storage as a positive step toward addressing climate change and creating jobs, while others may be concerned about environmental or other risks. Given the industrial tradition of the region and the long-standing presence of the project operator in the area, combined with transparent information and participation processes for local communities, it is expected that the public trust that is vital for social cohesion will be maintained . In any case, the implementation of **the Stakeholder Engagement Plan,** including the creation of a **Grievance Mechanism (CMM),** will play a key role in creating strong, constructive, and flexible relationships with stakeholders and building understanding through the active participation of individuals, groups, and organizations in the project. **In any case, as the implementation of the CO(2)storage project in the area has already been licensed(,) following all the public consultation procedures provided for by environmental licensing legislation, it is estimated that the proposed amendment will not be a subject of disagreement and a threat to social cohesion.**

The designation of exclusion zones is not expected to disrupt social cohesion, as they are offset by existing zones and are mainly located in areas where restrictions already apply due to the existence of the Prinos offshore gas extraction project.

Furthermore, during the construction phase of the project, the Project is not expected to change the identity of the community. The jobs of the maritime workforce, which is a traditionally well-known sector in the region, will be maintained, and the workforce is expected to come from the wider study area or not differ significantly from the residents of the surrounding area and, as such, the risk of reduced cohesion and conflicts is low . In addition to maintaining the existing structure and established functions of the human environment, positive impacts are also expected in areas such as employment and the local economy, which will be analysed in detail in the relevant section on impacts on the socio-economic environment.

Ensuring that the social benefits of CO_2storage projects, such as employment opportunities and economic development, are distributed fairly within the community, taking into account the needs of vulnerable groups, can also strengthen social cohesion.

The construction work for the proposed modification of the project may raise some objections due to the minor disturbances that will be caused by noise, maritime traffic, and the presence of construction equipment. However, these are expected to be limited in intensity and scope, relatively short-lived and temporary in nature, and will cease once the works are completed. Therefore, in terms of their Final Assessment, these impacts are considered **Negligible.**

Finally, the implementation of the proposed project modification will trigger the implementation of Corporate Social Responsibility Actions in consultation with local authorities and with an assessment of local needs (investment in education, health, etc.) which are expected to generate positive secondary effects, enhancing overall community well-being and cohesion. Therefore, these impacts are assessed as **Positive.**

In conclusion, during the construction phase, the proposed modification of the project is not expected to cause any significant changes to the functions of the man-made environment in the area. Taking into account the results of the environmental impact assessment in this **section** of the EIA, it is estimated that the proposed project **will not cause any significant adverse changes** to the functions of the man-made environment and social cohesion in the area, but rather that it will contribute **positively** to them.

Activity	Recipient	Impact Magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Movement of boats, heavy vehicles, construction machinery, transport vehicles and trucks, as well as support vehicles during construction, emitting: • Dust (PM10, PM2.5). • Air pollutants (CO, VOC, and NOx). • Noise.	Structure and Functions of the Human Environment	-	1	1	4	1	1	1	4	2	1	1	20	Negligible	Moderate	Negligible
Mobilization (recruitment, employment, engagement) of the workforce	Structure and Functions of the Human Environment	+	4	2	4	2	1	1	1	4	2	1	32	Positive	Moderate	Positive
Implementation of Corporate Social Responsibility Actions	Structure and Functions of the Human Environment	+	4	4	4	3	1	2	4	4	1	4	43	Positive	Moderate	Positive

9.3.9.2.2 Operational phase

During the operational phase of the proposed project modification, transparent information and participation procedures for local communities are expected to continue to ensure the maintenance of public trust, which is of paramount importance for social cohesion.

The designation of exclusion zones is not expected to disrupt social cohesion, as they largely overlap with existing zones and are mainly located in areas where restrictions already apply due to the offshore oil and gas extraction project in the Ionian Sea.. In any case, the implementation of **the Stakeholder Engagement**

Plan, including the creation of a **Grievance Mechanism (CMM)** will play a key role in creating strong, constructive, and flexible relationships with stakeholders and building understanding through the active participation of individuals, groups, and organizations in the Project.

Furthermore, as in the construction phase, during the operation phase of the proposed project modification, it is not expected to change the identity of the community. The jobs of the maritime workforce, which is a traditionally well-known sector in the region, will be maintained, and the workforce is expected to come from the wider study area or not differ significantly from the residents of the surrounding area and, as such, the risk of reduced cohesion and conflicts is low.

Positive impacts on the functions of the human environment in areas such as employment and the local economy will continue to exist and will be analyzed in detail in the relevant section on impacts on the socio-economic environment.

The implementation of Corporate Social Responsibility Actions in consultation with local authorities and with an assessment of local needs (investment in education, health, etc.) is also expected to generate positive secondary effects, enhancing overall community well-being and cohesion.

In conclusion, the operation of the proposed project modification is **not** expected **to cause adverse changes** to the functions of the human environment and social cohesion in the area; on the contrary, it is expected to contribute **positively** to them.

Activity	Recipient	Impact Size												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Size)			
Mobilization (recruitment, employment, engagement) of the workforce	Structure and Functions of the Human Environment	+	4	2	4	3	3	1	1	4	1	1	34	Positive	Moderate	Positive
Implementation of Corporate Social Responsibility Actions	Structure and Functions of the Human Environment	+	4	4	4	3	1	2	4	4	1	4	43	Positive	Moderate	Positive

9.3.9.2.3 Shutdown/Decommissioning Phase

During the decommissioning phase of the proposed project modification, the identity of the community is not expected to change. The jobs of the workforce operating in the marine part of the area will be maintained, and the workforce is expected to be from the wider study area or not to differ significantly from the residents of the surrounding area and, as such, the risk of reduced cohesion and conflicts is low.

Positive impacts on the functions of the human environment in areas such as employment and the local economy, which will be analyzed in detail in the relevant section on impacts on the socio-economic environment, are expected during the decommissioning phase.

However, after the completion of the decommissioning phase, the existing workforce will need to find alternative employment, potentially causing **secondary negative impacts on social cohesion**. The significance of the impact is assessed as negative, medium intensity, local, direct, short-term reversibility and restoration, indirect and non-synergistic. Therefore, in terms of its Final Assessment, this impact is assessed as **Minor**.

The proposed measures for the workforce described in **Chapter 10**, in conjunction with the implementation of **the Stakeholder Engagement Plan**, including the establishment of a **Grievance Mechanism (CMM)** where complaints or grievances can be addressed, will ensure the prevention and mitigation of potential impacts related to the above impact during the decommissioning phase.

The project decommissioning works may raise some complaints about the minor disturbances that will be caused by noise, boat traffic, and the presence of machinery, but these are expected to be limited in intensity and scope, relatively short in duration, and temporary in nature, and will cease once the work is completed. Therefore, in terms of their Final Assessment, these impacts are considered **Negligible.**

The designation of exclusion zones is not expected to disrupt social cohesion, as they largely offset existing ones and are mainly located in areas where restrictions already apply due to the offshore mining project of Pr.

Taking into account the results of the environmental impact assessment in this section of the EIA, it is estimated that the proposed modification of the project in the **decommissioning** phase **will not cause any significant adverse changes** to the functions of the man-made environment and social cohesion in the area; on the contrary, it is estimated that it will contribute **positively** to them.

However, after the proposed modification of the project ceases to operate, there may be **secondary adverse effects** which, in terms of their final assessment, are considered to be **minor**.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Movement of boats, heavy vehicles, construction machinery, transport vehicles and trucks, as well as support vehicles during construction, emitting: • Dust (PM10, PM2.5).	Structure and Functions of the Human Environment	-	1	1	4	1	1	1	4	2	1	1	20	Negligible	Moderate	Negligible

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
• Air pollutants (CO, VOC, and NOx). • Noise.																
Disengagement: Mobilization (recruitment, employment, engagement) of the workforce	Structure and Functions of the Human Environment	+	4	2	4	2	1	1	1	4	2	1	32	Positive	Moderate	Positive
Cessation of Operations: Discontinuation of workforce activities	Structure and Functions of the Human Environment	-	4	2	4	2	1	1	1	4	2	1	32	Small	Moderate	Small

9.3.9.2.4 Variation in the Estimated Impacts on the Structure and Functions of the Human Environment from the Modification of the Project

As documented in the above **Sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed amendment are assessed as Minor and Negligible and cannot alter the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of the impacts from the new elements of the project, as introduced by the proposed amendment to the project (such as the new Omega offshore platform), the estimated impacts are limited to minor and negligible impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification). It should be noted that the empty cells marked with the impact designation **NA** correspond to impacts that are either provided for in elements of the licensed project that are not relevant to this modification (e.g., onshore facilities), or to elements of the proposed amendment that were not included in the licensed project (e.g., new Omega platform).

Activity	Recipient	Final Impact Assessment		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				

Activity	Recipient	Final Impact Assessment		
		Licensed Project	Proposed Amendment	Total Modified Project
Movement of boats, heavy vehicles, construction machinery, transport vehicles and trucks, as well as support vehicles during construction, emitting: • Dust (PM10, PM2.5). • Air pollutants (CO, VOC, and NOx). • Noise.	Structure and Functions of the Human Environment	Negligible	Negligible	Negligible
Mobilization (recruitment, employment, engagement) of the workforce	Structure and Functions of the Human Environment	Negligible	Negligible	Negligible
Implementation of Corporate Social Responsibility Actions	Structure and Functions of the Human Environment	Positive	Positive	Positive
Operational Phase				
Mobilization (recruitment, employment, engagement) of the workforce	Structure and Functions of the Human Environment	Positive	Positive	Positive
Implementation of Corporate Social Responsibility Actions	Structure and Functions of the Human Environment	Positive	Positive	Positive
Cessation of Operations/Decommissioning Phase				
Movement of boats, heavy vehicles, construction machinery, transport vehicles and trucks, as well as support vehicles during construction, emitting: • Dust (PM10, PM2.5). • Air pollutants (CO, VOC, and NOx). • Noise.	Structure and Functions of the Human Environment	Negligible	Negligible	Negligible
Disengagement: Mobilization (recruitment, employment, engagement) of the workforce	Structure and Functions of the Human Environment	Positive	Positive	Positive
Cessation of Operations: Discontinuation of workforce activities	Structure and Functions of the Human Environment	Small	Small	Small

9.3.9.3 Cultural Heritage – Underwater Cultural Heritage

9.3.9.3.1 Construction Phase

As mentioned in **the** relevant **section** of **Chapter 6,** the marine area of the Gulf of Kavala, where all offshore facilities of the proposed project modification are located, has been thoroughly explored and there are no

indications of significant underwater archaeological finds. Over time, the shallow waters and the type of seabed do not allow for the preservation of any ruins.

Within the study area of the proposed project modification (2 km around the location of the interventions of the proposed project modification), no archaeological sites, monuments, or sites of cultural interest have been identified.

Therefore, the construction works are not expected to affect the cultural and archaeological environment of the area in any way and are therefore classified as **Neutral**.

In any case, the construction works will be carried out in accordance with the national regulatory framework (Law 3028/2002 as amended and in force, Law 4858/2021 as amended and in force) and the opinions of the competent authorities. The competent Archaeological Authorities of the Region will be notified and the construction works will be carried out in the presence of specialized staff from the competent archaeological services, thus ensuring the integrity of the cultural heritage. In the event of finds that are defined as possible cultural heritage (or paleontological) objects, features, or sites, construction activities will be suspended and the procedure for accidental finds required by Greek and EU legislation and in accordance with best practices such as ETAA PR8 (Cultural Heritage) will be implemented. Construction activities will only continue after the implementation of approved avoidance, minimisation or mitigation measures and protection measures.

9.3.9.3.2 Operation Phase

No impacts are expected.

9.3.9.3.3 Decommissioning/Dismantling Phase

No impacts are expected.

9.3.9.3.4 Differentiation of the Estimated Impacts on the Structure and Functions of the Human Environment from the Project Modification

From the implementation, operation, and decommissioning of the proposed modification, no adverse impacts on the cultural heritage of the study area are expected and, therefore, they cannot alter the final assessment of potential impacts as included in the approved EIAEIA for the project (which also estimated that no adverse impacts are expected).

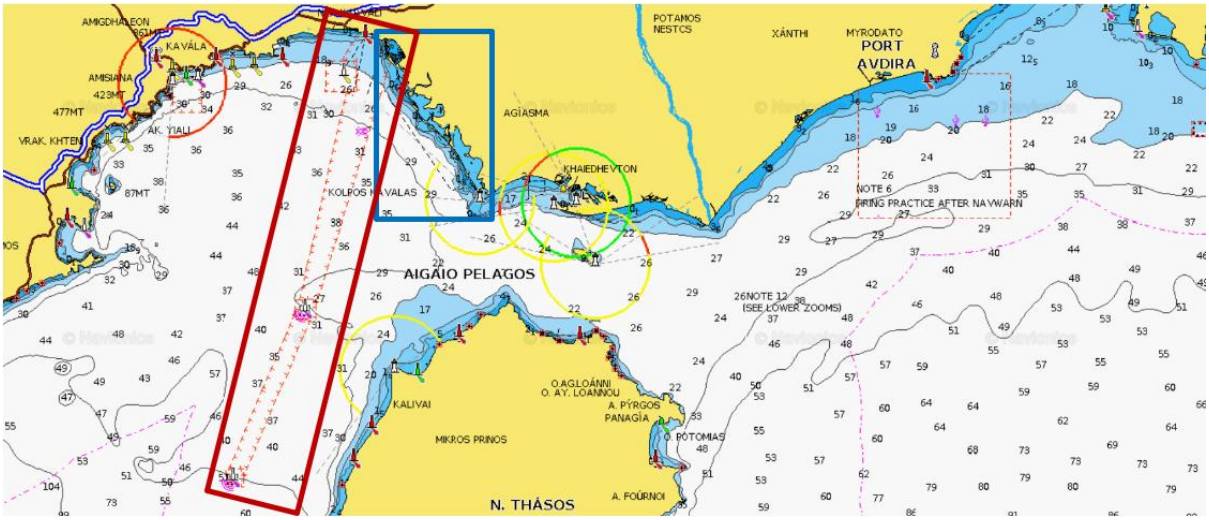
9.3.9.4 Socio-economic environment

9.3.9.4.1 Construction Phase

9.3.9.4.1.1 Fishing / Aquaculture

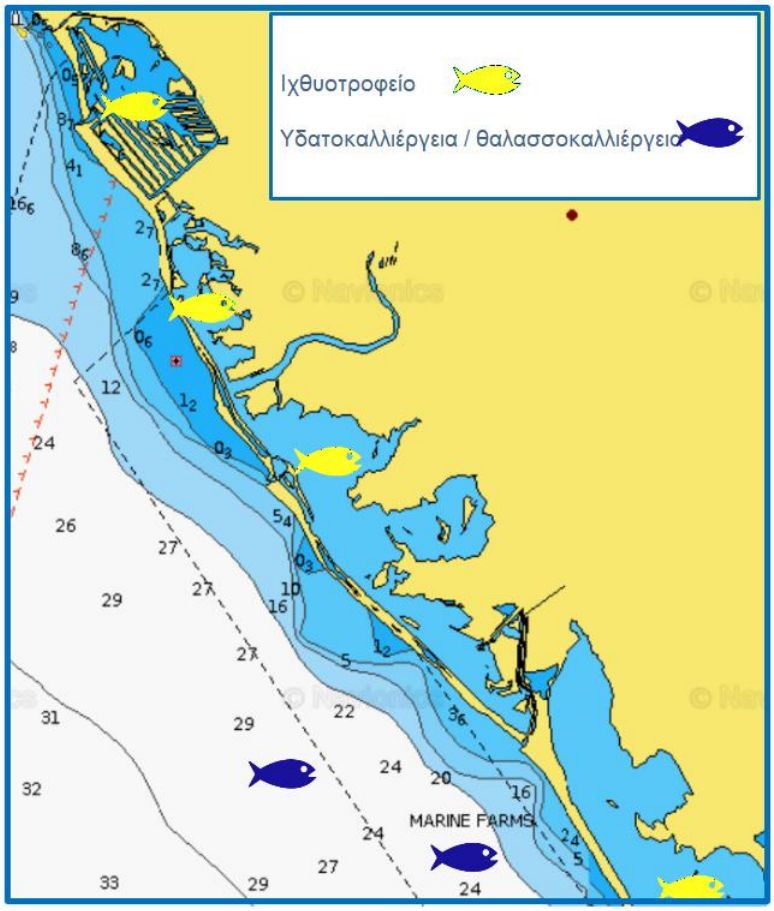
As mentioned in **Chapter 6,** the fishing and aquaculture sector is particularly dynamic in the area.

The following **figures** show the existing zone with specific restrictions on fishing and/or mooring of vessels and/or transit, as well as fish farms and aquaculture included in the study area. The proposed zone with special restrictions is offset by the existing one, providing for a small extension.



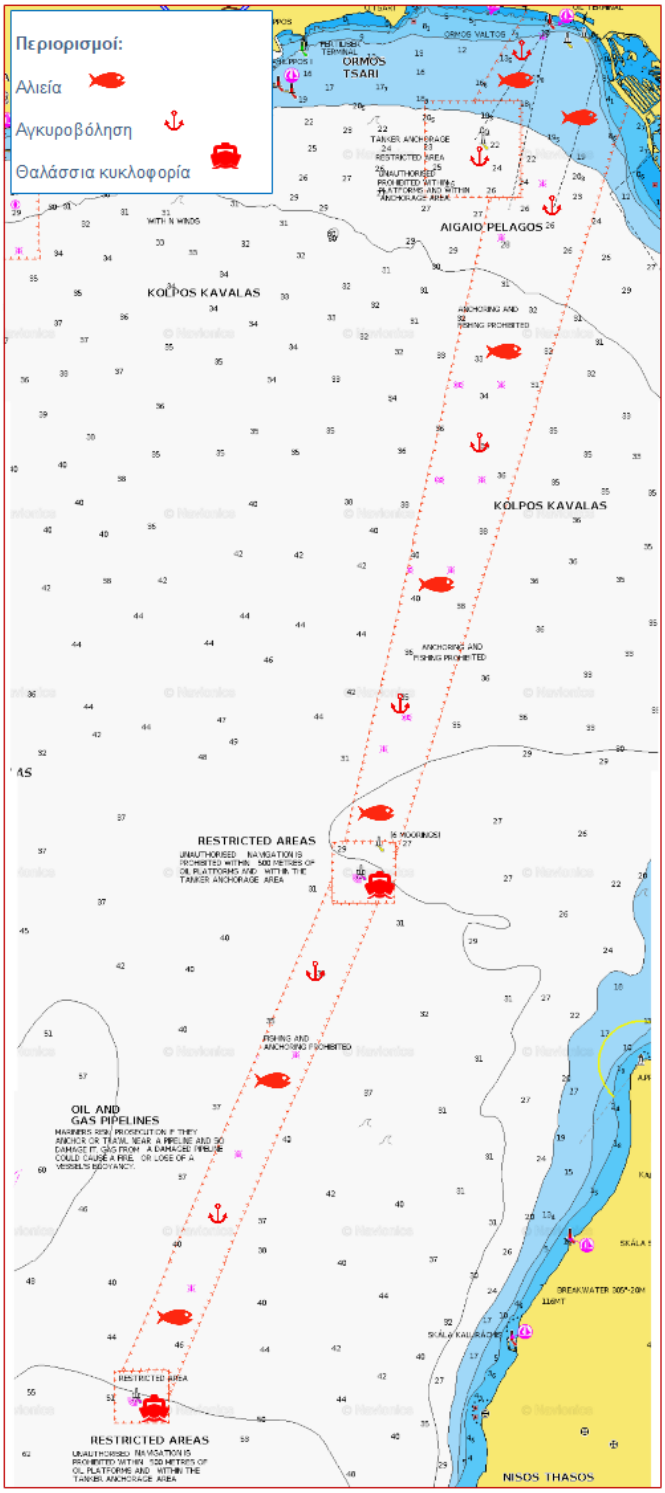
(Source: Navionics, https://webapp.navionics.com/#boating@9&key=wzlxFqnitC , own processing by the study team)

Figure9 –3 : Exclusion zone and locations of fish farms and aquaculture facilities



(Source: Navionics, https://webapp.navionics.com/#boating@9&key=wzlxFqnitC , own processing by study team)

Figure9 –4 : Fish farms and aquaculture facilities near the Project area and the proposed amendment thereto



(Source: Navionics, https://webapp.navionics.com/#boating@9&key=wzlxFqnitC , own processing by the study team)

Figure9 –5 : Zone with special restrictions on fishing and/or passage and/or anchoring of vessels

As analysed in **Chapter 9.2.5.1 Spatial Planning – Land Use – Marine Use,** for the existing project of the Prinos submarine mining complex, which has been granted an environmental permit (AP 8413/24-04-18, ADA: ΨΓΛ14653Π8-Ζ79 on the subject of "Approval of environmental terms for the Prinos Offshore

Development project"), a no-access zone is defined within PAU areas classified as B, i.e., aquaculture development areas with potential for further development, in which mooring and all forms of fishing are prohibited. The licensed CO(2)transport pipeline project passes through this established zone and does not significantly affect the uses of the PAU . The interventions included in the proposed amendment are outside the PAU and do not affect it directly or indirectly.

The planned exclusion zones are offset by the existing ones, which are slightly extended and limited to a small part of the total marine area. Given that the proposed exclusion zone under this proposed amendment to the project occupies, at most, areas that are already subject to restrictions due to the existence of the Prinos offshore gas extraction project, it is not expected to significantly reduce the fishing areas available to fishermen.

Potential negative impacts from the construction phase on fish fauna could lead to indirect negative impacts on fisheries. However, according to the **Special Ecological Assessment Study (SEAS)** and **Chapter 9.2.4** of the EIA Report, **no changes are expected that could affect fishing.** The impact on fish fauna is limited to the 500 m zone on either side of the existing infrastructure (where specific restrictions on fishing already apply) and the new infrastructure, due to water turbidity and noise during the construction phase. As the impact is local, at a short distance from the pipeline installation works, there is no impact on fishing that may develop at a distance greater than 500 m from the works.

In conclusion, during the construction phase, taking into account the results of the environmental impact assessment in this section of the EIA and the SEA, it is estimated that the impacts of the construction phase of the proposed Project on the sustainability of the fisheries and aquaculture sectors and, consequently, on the sustainability of the communities in the area that depend on these sectors will be **neutral.**

9.3.9.4.1.2 Tourism

The Prefectures of Kavala and Thasos are among the most popular tourist destinations in the Region of Eastern Macedonia and Thrace.

Given that all offshore facilities under the proposed project modification will be developed in locations with existing facilities or close to them, which constitute an already established productive area with long-term use, it is not expected to bring about changes to the natural landscape of the tourist destinations in the area.

The additional exclusion zones, are limited to a small part of the total marine area and are located in areas where restrictions already apply due to the existence of the Prinos offshore gas extraction project and the licensed project, and therefore are not expected to restrict existing tourist activities (e.g., water sports, diving, underwater tours, yachting, etc.).

The quality of bathing water also affects the attractiveness of a tourist destination. As shown in the Greek Bathing Water Identity Register (https://bathingwaterprofiles.gr/map) and mentioned in Chapter 6**.5.4 Bathing Water,** the quality of bathing water for bathing beaches located near the area is rated as "excellent" with the exception of Rapsani 1 and Rapsani 2, which are rated as "sufficient."

The "BLUE FLAGS" program is an initiative of the international organization Fee (Foundation for Environmental Education), which is represented in Greece by the Hellenic Society for the Protection of Nature (EEPF). The Hellenic Society for the Protection of Nature collaborates with the Ministry of Environment and

Energy to involve interested coastal management bodies in the international voluntary "BLUE FLAGS" program. In 2024, 15 beaches in the regional units of Kavala and Thasos were awarded Blue Flags.

The Blue Flag-awarded beaches are shown in **the figure** below.

Municipality of Paggaio: 10. Nea Iraklitsa, 11. Nea Peramos, 12. Ammolofoi, 13. Sarakina, 14. Ofrinio/Touzla
Municipality of Kavala: 15. Perigiali, 16. Batis, 17. Tosca/Tosca Beach
Municipality of Nestos: 18. Ammoglossa Keramoti/Ammos beach, 19. Ammoglossa Keramoti/Paralia Beach
Municipality of Thasos: 20. Thasos Town/Limanaki, 21. Makryammos, 22. Golden Beach Camping, 23. Pefkari 2/Alexandra Beach, 24. Prinos Dasilio 2/Ilio Mare Beach Thasos Town/Limanaki

(Source: https://www.blueflag.gr/)

9 –6 : List of award-winning beaches 2024 for the regions of Kavala and Thasos

As mentioned in **Section 9.3.4 Impacts on water,** the potential impacts from the construction phase on water quality that could lead to a reduction in the attractiveness of bathing beaches are assessed as reversible in the short term, immediately remediable and overall **minor,** therefore no significant negative secondary effects on tourism or reduced income in this productive sector are expected.

Construction activities may cause noise and air pollution, affecting the overall experience of tourists. As mentioned in **Chapter 9.3.5 Impacts on air quality** of this Study, the impacts from the expected air pollutant emissions during the construction phase of the proposed project modification are assessed as being localised and of limited duration, and overall as minor. Similarly, according to the assessment of the impacts from **noise and vibrations** presented in **Chapter 9.3.6,** the expected noise emissions during the construction

phase of the interventions of the proposed project modification are estimated to be localised and of limited duration and, overall, **minor**.

Taking into account the distance from the locations of the interventions of the proposed project modification (the nearest tourist facilities are located more than 7 km from the interventions of the proposed project modification) and the impact assessment for atmospheric emissions and noise, the secondary potential impacts from the construction works are assessed as negative, negligible in intensity, focused at the local level, short-term, temporary, reversible in the short term, non-synergistic, indirect, discontinuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

However, given the extremely limited number of businesses in close proximity, the above impacts are not expected to have a significant negative impact on the region's tourism sector.

In any case, the proposed measures described in **Chapter 10,** which will ensure the mitigation of the expected negative impacts from noise and air pollutant emissions, combined with the implementation of **the Stakeholder Engagement Plan,** including the creation of a Complaints Mechanism (CMM) where complaints or reports can be addressed, will ensure the prevention and mitigation of potential impacts during the construction phase.

In conclusion, during the construction phase, taking into account the results of the environmental impact assessment in this section of the EIA, it is estimated that the proposed modification of the project **will not cause any significant adverse changes** to the sustainability of the tourism sector and, consequently, to the communities in the area that depend on this sector.

9.3.9.4.1.3 Other Economic Activities

The construction phase of the proposed project modification is expected to lead to increased demand and economic activity in related sectors of the supply chain, such as construction material supply companies, construction companies, equipment suppliers, and service providers, stimulating the local economy.

Increased employment during the construction phase has a knock-on effect on local businesses. The supply of goods and services for the livelihood of workers from the local market is expected to lead to increased economic activity and higher revenues for local businesses.

Among other things, the implementation of the proposed project modification will require building and construction materials from the local market (e.g., concrete, construction materials, etc.), construction equipment (e.g., cranes, support vessels, etc.), as well as goods and services for the livelihood of workers (e.g., foodstuffs, hospitality services, etc.).

Therefore, the impact on economic activities in the region other than fishing/aquaculture and tourism from the construction phase of the proposed project modification is assessed as **Positive**.

9.3.9.4.1.4 Employment and Labor Force

During the construction phase, employment is expected to increase as local contractors will be hired to contribute to the construction work, thus supporting the local economy. More specifically, the professions

that are expected to be employed during the construction of the proposed Project are engineers, geologists – geophysicists, surveyors, designers, machine operators, technicians, drivers, material transporters, security personnel, laborers, etc. It is also worth noting that workers involved in the construction of the proposed project modification may acquire valuable skills and experience that can be transferred to other projects or sectors, potentially leading to long-term employment opportunities. Based on the above, the impact on employment and the workforce is assessed as Positive.

In addition, as mentioned above, the construction phase stimulates demand in related sectors of the supply chain, such as manufacturing, transport, and services. Suppliers of building and construction materials, machinery, and other necessary equipment see increased activity, contributing positively to employment and the overall economic development of the Regional Unit of Kavala.

The need for legal, financial, and consulting services during the design and construction phases of the proposed project modification also contributes to employment in these sectors.

Overall, during the construction of the entire project (including the proposed modification), it is estimated that more than 200 people (indirect and direct jobs) will be employed to carry out the construction work (engineers, HSE consultants, logistics supervisors, coordinators, base port crew, drilling unit crew, personnel for monitoring procedures, etc.). It is also expected that personnel will be employed through local subcontractors (general laborers, welders, machinists, ground crew, etc.), additional jobs related to the rental of facilities and construction equipment (cranes, bulldozers, scaffolding, etc.), logistics services, port and transport services, etc.

Increased employment and economic activity during the construction phase have a knock-on effect on local businesses, such as retail trade, hospitality services, etc. The employment and income generated in the region's economy as a result of the consumption of the income of direct and indirect employees can therefore lead to more jobs in related sectors.

Depending on the needs and orientation of the local community, additional sources of growth, employment, and income are expected to be created. Based on international experience and the company's experience to date in Kavala, for every direct job created, approximately three more are created in a local community that hosts facilities similar to those in the proposed project modification, which includes the operation of offshore infrastructure.

Based on the above, the overall impact on employment and the workforce from the construction phase of the proposed project modification is assessed as **Positive**.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Restoration)	AC (Accumulation)	Im (Impact Magnitude)			
Construction of offshore facilities - Emissions, air pollutants, and noise	Tourism	-	1	2	3	1	1	1	1	1	1	1	17	Negligible	High	Low
Mobilization (recruitment, employment, engagement) of the workforce	Other economic activities	+	4	2	4	2	2	1	1	4	3	1	34	Positive	High	Positive
Issues relating to the supply chain and procurement of the necessary construction materials, resources, and services for the implementation of the project.	Other economic activities	+	8	2	4	2	2	1	4	4	3	1	49	Positive	High	Positive
Mobilization (recruitment, employment, engagement) of the workforce	Employment and workforce	+	8	2	4	2	2	1	4	4	3	1	49	Positive	High	Positive
Issues relating to the supply chain and procurement of the necessary construction materials, resources, and services for the implementation of the project.	Employment and workforce	+	8	2	4	2	2	1	4	4	3	1	49	Positive	High	Positive

9.3.9.4.2 Operational phase

9.3.9.4.2.1 Fishing/Aquaculture

With regard to the exclusion zone due to the interventions of the proposed project modification, similar to the construction phase, it is offset by the existing one, as it is mainly located in areas where restrictions already apply due to the existence of the offshore Prinos gas extraction project and constitutes a small part of the total marine area. Therefore, it is not expected to significantly affect the uses of the PAU or to limit the sustainable use of marine resources in fishing areas for fishermen.

According to the **Special Ecological Assessment Study (SEAS)** and **Chapter 9.3.8** of the EIA, the impact on fish fauna is expected to be local, in the area of the Beta and Omega platforms (most of which are already subject to special fishing restrictions) and is therefore considered to be of minor significance, given that the fish will move to areas with less disturbance. Consequently, fishing is not expected to be negatively affected. On the contrary, the designation of exclusion zones is expected to have a positive impact on marine fish fauna. Specifically, these areas, which are protected from fishing and other human activities, provide safe

havens for reproduction and growth, as well as reducing stress on fish species, increasing fish stocks in the sea and creating secondary **positive** effects for fishing.

In conclusion, it is estimated that during the operational phase, the proposed modification of the project **will not cause adverse changes in the fisheries and aquaculture sectors** and, consequently, in the communities of the region that depend on these sectors. On the contrary, positive secondary effects are expected to be created in terms of the availability of fish for commercial fishing. Therefore, in terms of their Final Assessment, the impacts are assessed as **Positive**.

9.3.9.4.2.2 Tourism

The exclusion zones are limited to a small part of the total marine area and are offset by existing ones, are mainly located in areas where restrictions already apply due to the existence of the offshore Prinos gas extraction project and the licensed project, and constitute a small part of the total marine area. Therefore, **they are not expected to restrict tourist activities** (e.g., water sports, diving, underwater tours, yachting, etc.).

As mentioned in **Chapter 9.3.4 Impacts on water,** the potential impacts from the operational phase on water are exclusively related to offshore facilities (excluding offshore pipelines and submarine cables) and are assessed as local, short-term, immediately remediable, and overall **Minor.**

Taking into account the assessment of impacts on water and the distance of the facilities of the proposed project modification from bathing beaches, the secondary potential impacts on tourism are assessed as negative, negligible in intensity, focused at the local level, short-term, temporary, short-term reversibility, non-synergistic, indirect, discontinuous, immediately reversible, and non-cumulative. In terms of their final assessment, these impacts are assessed as **Minor.**

The Waste Management Plan, the proposed measures described in **Chapter 10**, which will ensure the mitigation of the expected negative impacts, in combination with the implementation of **the Stakeholder Engagement Plan,** including the creation of a **Complaints Mechanism (CMM)** where complaints or reports can be addressed, will ensure the prevention and mitigation of potential impacts during the operational phase.

Similar to the construction phase, the operation of the proposed project modification may cause noise and air pollution, affecting the overall experience of tourists. Considering the location of the nearest accommodations, secondary impacts may be caused by air pollutant and noise emissions during CO_2 reception.As mentioned in **Chapter 9.3.5 Impacts on air quality** of this Study, the expected amounts of pollutant emissions from CO_2 are estimated to be relatively limited but quantifiable, and in terms of their final assessment, these impacts are assessed as Minor. According to the assessment of **noise and vibration** impacts presented in **Chapter 9.3.6,** the expected noise emissions from CO_2 are estimated to be relatively limited and, in terms of their final assessment, these impacts are assessed as **Minor**.

However, given the extremely limited number of businesses in close proximity, **the above impacts are not expected to have a significant negative impact on** the region's **tourism sector**.

In any case, the proposed measures described in **Chapter 10**, which will ensure the mitigation of the expected negative impacts from noise and air pollutant emissions, combined with the implementation of **the Stakeholder Engagement Plan,** including the creation of a **Complaints Mechanism (CM)** where complaints or

reports can be addressed, will ensure the prevention and mitigation of potential impacts during the operational phase.

In conclusion, during the operational phase, taking into account the results of the environmental impact assessment in this section of the EIA, it is estimated that the proposed modification of the project **will not cause any significant adverse changes** to the sustainability of the tourism sector and, consequently, to the communities in the area that depend on this sector.

9.3.9.4.2.3 Other Economic Activities

The operational phase will continue to support demand in various sectors of the supply chain, such as manufacturing, transport, and services.

The presence of a permanent workforce is also expected to contribute to the local economy through spending on housing, food, transport, and other services.

Therefore, the impact on economic activities in the area other than fishing/aquaculture and tourism from the operational phase of the proposed project modification is assessed as **Positive.**

9.3.9.4.2.4 Employment and Workforce

The operation of the proposed project modification requires a permanent workforce to manage day-to-day operations, including facility operators, maintenance technicians, engineers, specialized security personnel, administrative staff, etc. The operational phase jobs involving EnEarth technical and administrative staff exceed 45, are stable and long-term, and often require specialized skills. In addition, Energean will provide technical support to EnEarth through its human resources, which will continue to be employed at the existing facilities.

The operational phase will continue to support employment in various areas of the supply chain such as manufacturing, transportation, and services.

The contribution to the local economy of the permanent workforce through spending on housing, food, transport, and other services may lead to the creation of additional jobs in local businesses.

Overall, the impact on employment and the workforce from the operational phase of the proposed project modification is assessed as **Positive**.

Activity	Recipient	Impact Size												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Maritime traffic - Definition of exclusion zones due to project operation.	Fishing/aquaculture - local fish populations	+	2	2	2	3	3	2	1	4	2	4	31	Positive	High	Positive
Project operation - Offshore facilities (excluding offshore pipelines and submarine cable)	Tourism	-	1	2	3	1	1	1	1	1	1	1	17	Negligible	High	Low
Emissions of atmospheric pollutants and noise during CO_2collection	Tourism	-	1	2	3	1	1	1	1	1	1	1	17	Negligible	High	Low
Mobilization (recruitment, employment, engagement) of the workforce	Other economic activities	+	4	2	4	3	3	1	1	4	4	1	37	Positive	High	Positive
Issues related to the supply chain and procurement of necessary materials, resources, and services related to the operation of the project.	Other economic activities	+	8	2	4	3	3	1	4	4	4	1	52	Positive	High	Positive
Mobilization (recruitment, employment, engagement) of the workforce	Employment and workforce	+	8	2	4	3	3	1	4	4	4	1	52	Positive	High	Positive
Issues relating to the supply chain and procurement of the necessary construction materials, resources, and services for the implementation of the project.	Employment and workforce	+	4	2	4	3	3	1	4	4	4	1	40	Positive	High	Positive

9.3.9.4.3 Shutdown/Decommissioning Phase

9.3.9.4.3.1 Fishing/Aquaculture

As with the construction phase, the exclusion zone constitutes a small part of the total marine area and **does not restrict the sustainable use of marine resources**.

According to the **Special Ecological Assessment Study (SEAS)** and **Chapter 9.3.8** of this document, **no changes are expected that could negatively affect fishing**. The impact on fish fauna is limited to the 500 m zone around existing and licensed infrastructure (special restrictions on fishing already apply to most of this zone due to the existing prohibition zone), as well as at the locations of the new infrastructure of the proposed project modification, due to water turbidity and noise during the decommissioning and removal of offshore facilities. As the impact is local, at a short distance from the offshore facility decommissioning works, there is no impact on fishing that may develop at a distance greater than 500 m from the works.

In addition, the establishment of exclusion zones during the decommissioning of offshore pipelines, in particular through the exclusion of fishing vessels and the cessation of fishing in these zones, is expected to have **a positive impact** on the fish fauna in the area. Specifically, the cessation of fishing activity in the exclusion zones may lead to a local increase in fish stocks and thus have a positive impact on fisheries.

Reducing fishing pressure will allow fish populations to recover, boosting their reproduction and growth. In addition, the creation of these protected zones will promote increased biodiversity and improve the structure of marine ecosystems.

In conclusion, the impact on fishing and aquaculture during the cessation/decommissioning phase is expected to be **positive** overall.

9.3.9.4.3.2 Tourism

The exclusion zones are offset by existing ones, as they are mainly located in areas where restrictions already apply due to the existence of the offshore Prinos gas extraction project and the licensed project, and are limited to a small part of the total marine area. Therefore, **they are not expected to restrict tourist activities** (e.g., water sports, diving, underwater tours, yachting, etc.).

As mentioned in **Chapter 9.3.4 Impacts on water,** the potential impacts of the decommissioning phase on water quality, which could lead to a reduction in the attractiveness of bathing beaches, are assessed as reversible in the short term, immediately remediable, and overall **compatible.** therefore no significant negative secondary effects on tourism or reduced income in this productive sector are expected.

The decommissioning of the proposed project modification may cause noise and air pollution, affecting the overall experience of tourists. Considering the location of the nearest accommodations, secondary impacts may be caused by air pollutant and noise emissions during the dismantling of offshore facilities. As mentioned in **Chapter 9.3.5 Impacts** and **Chapter 9.3.6** of this Study, the expected quantities of pollutant and noise emissions during the decommissioning phase of the proposed project modification will be limited and Minor in terms of their Final Assessment.

Taking into account the impact assessment for atmospheric emissions and noise, the secondary potential impacts are assessed as negative, negligible in intensity, focused at the local level, short-term, temporary, reversible in the short term, non-synergistic, indirect, discontinuous, immediately reversible, and non-cumulative. In terms of their final assessment, these impacts are considered to be **minor**.

However, given the extremely limited number of businesses located in relative proximity, **the above impacts are not expected to have a significant negative impact on** the region's **tourism sector**.

In any case, the proposed measures described in **Chapter 10**, which will ensure the mitigation of the expected negative impacts from noise and air pollutant emissions, in combination with the implementation of **the Stakeholder Engagement Plan,** including the creation of a **Complaints Mechanism (CM)** where complaints or reports can be addressed, will ensure the prevention and mitigation of potential impacts during the decommissioning phase.

In conclusion, during the decommissioning/shutdown phase, taking into account the results of the environmental impact assessment in this section of the MT AEPO, it is estimated that the decommissioning works of the proposed project modification **will not cause any significant adverse changes** to the sustainability of the tourism sector and, consequently, to the communities in the area that depend on this sector.

9.3.9.4.3.3 Other Economic Activities

The decommissioning phase of the proposed project modification is expected to lead to increased economic activity similar to the construction phase. An economic boost is expected in related sectors of the supply chain, such as construction companies, equipment suppliers, logistics service providers, companies carrying out underwater works, waste management and recycling companies, etc.

Increased employment has a consequential short-term impact on local businesses. The supply of goods and services for the livelihood of workers from the local market is expected to lead to increased economic activity and higher revenues for local businesses.

Therefore, the impact on economic activities in the region other than fishing/aquaculture and tourism from the decommissioning phase of the proposed project modification is assessed as **Positive**.

9.3.9.4.3.4 Employment and Workforce

During the decommissioning phase, specialized personnel such as engineers, machine operators, technicians, drivers, safety personnel, laborers, etc. will be required.

The decommissioning phase is also expected to stimulate demand for businesses providing support services, such as waste management, transportation, etc.

Increased activity during the decommissioning phase may also stimulate local businesses that provide goods and services to workers, such as housing, catering, and retail.

Therefore, **positive** effects are expected on employment and the local economy during the decommissioning phase of the proposed project modification.

However, after the completion of the decommissioning phase, the existing workforce will need to find alternative employment. The significance of the impact is assessed as negative, moderate in intensity, local, direct, short-lived, short-term reversibility, irregular, non-cumulative, and non-synergistic. In terms of the Final Assessment, these impacts are assessed as **Moderate.** As these impacts are assessed as **Moderate** in the Final Assessment**,** prevention/mitigation/countermeasures are proposed in this document so that these impacts are at least reduced to a minor level. Following the implementation of the relevant measures proposed in **Chapter 11** of this document, the residual impacts are ultimately assessed as **Minor** and, therefore, the project is compatible with the environmental protection objectives that are prerequisites of this study.

Mitigation measures to address this impact include internal relocation (identifying other projects within the company where the skills of affected employees can be utilized), cross-training (providing a training program that equips employees with the skills needed for other jobs within the company or industry), outplacement services (providing support in finding employment in cooperation with recruitment agencies, providing training on CV writing and interview techniques to improve the employability of the workforce). A key mitigation measure is the implementation of a Stakeholder Engagement Plan to enhance open and transparent communication with stakeholders about the closure and relocation process, timelines, and potential impacts. Regular updates and meetings with employees and members of the local community can help manage expectations, build trust, and mitigate potential negative impacts.

Activity	Recipient	Impact Size												Impact Significance	SPP Significance	Final Impact Assessment	
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
ation of Operation / mmissioning of offshore lations (excluding ore pipelines and arine cables): Maritime - Definition of sion zones due to the mentation of offshore y decommissioning .	Fishing / aquaculture	+	2	2	2	2	1	2	1	2	1	4	25	Positive	High	Positive	Pos
sions of atmospheric ants and noise during smantling of land- d facilities – restoration d-based facility area	Tourism	-	1	2	3	1	1	1	1	1	1	1	17	Negligible	High	Low	Sr
ization (recruitment, oyment, engagement) e workforce	Other economic activities	+	4	2	4	1	1	1	1	4	2	1	31	Positive	High	Positive	Pos
y chain and rement issues relating e cessation of tions/decommissioning e project.	Other economic activities	+	8	4	4	1	1	1	4	4	2	1	50	Positive	High	Positive	Pos

Activity	Recipient	Impact Size											Impact Significance	SPP Significance	Final Impact Assessment	
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)				
ation: Mobilization uitment, employment, gement) of the orce	Employment and workforce	+	4	2	4	1	1	1	4	4	2	1	34	Positive	High	Positive	Pos
ation: Issues relating to upply chain and rement of the ssary construction rials, resources, and ces for the mentation of the ct.	Employment and workforce	+	8	2	4	1	1	1	4	4	2	1	46	Positive	High	Positive	Pos
ation of Operations: ntinuation of workforce ties	Employment and workforce	-	4	2	4	2	1	1	4	1	2	1	32	Small	High	Moderate	L

9.3.9.4.4 Variation in the Estimated Impacts on the Socio-Economic Environment from the Project Modification

As documented in the above **sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed amendment are assessed as Minor or even Positive and therefore cannot change the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of the impacts from the new elements of the project, as introduced by the proposed amendment to the project (such as the new Omega offshore platform), the estimated impacts are limited to minor impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification). It should be noted that the cells that are empty with an impact rating **of NA** correspond to impacts that are either provided for in elements of the licensed project that are not relevant to this modification (e.g., onshore facilities), or to elements of the proposed amendment that were not included in the licensed project (e.g., new Omega platform).

Activity	Recipient	Final Impact Assessment[133]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
Construction of land facilities - Emissions, air pollutants, and noise	Tourism	Small	NA	Low
Construction of offshore facilities - Emissions, air pollutants, and noise	Tourism	NA	Small	Small
Mobilization (recruitment, employment, engagement) of labor force	Other economic activities	Positive	Positive	Positive
Supply chain and procurement issues relating to the construction materials, resources, and services required for the implementation of the project.	Other economic activities	Positive	Positive	Positive
Mobilization (recruitment, employment, engagement) of the workforce	Employment and workforce	Positive	Positive	Positive
Supply chain and procurement issues relating to the construction materials, resources, and services required for the implementation of the project.	Employment and workforce	Positive	Positive	Positive
Operation phase				
Maritime traffic - Definition of exclusion zones due to project operation.	Fishing/aquaculture - local fish populations	Positive	Positive	Positive
Project operation - Offshore facilities (excluding offshore pipelines and submarine cable)	Tourism	Minor	Small	Small
Emissions of atmospheric pollutants and noise during CO_2collection	Tourism	Small	Small	Low
Mobilization (recruitment, employment, engagement) of labor force	Other economic activities	Positive	Positive	Positive
Supply chain and procurement issues relating to the operation of the project.	Other economic activities	Positive	Positive	Positive
Mobilization (recruitment, employment, engagement) of the workforce	Employment and workforce	Positive	Positive	Positive
Supply chain and procurement issues relating to the construction materials, resources, and services required for the implementation of the project.	Employment and workforce	Positive	Positive	Positive
Decommissioning/Dismantling Phase				
Shutdown/Dismantling of offshore facilities (excluding offshore pipelines and submarine cable): Maritime	Fishing/aquaculture	Positive	NA	Positive

[133] In the event that, in terms of its Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts," as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** of this document. The same applies to the assessments of the approved EIA presented in this Table.

Activity	Recipient	Final Impact Assessment[133]		
		Licensed Project	Proposed Amendment	Total Modified Project
traffic - Definition of exclusion zones due to the decommissioning of offshore installations.				
Emissions of atmospheric pollutants and noise during the dismantling of land-based facilities – restoration of land-based facility area	Tourism	Low	NA	Low
Emissions of air pollutants and noise during the decommissioning of offshore facilities (excluding offshore pipelines and submarine cables)	Tourism	NA	Low	Small
Mobilization (recruitment, employment, engagement) of labor force	Other economic activities	Positive	Positive	Positive
Supply chain and procurement issues relating to the cessation of operations/decommissioning of the project.	Other economic activities	Positive	Positive	Positive
Decommissioning: Mobilization (recruitment, employment, engagement) of workforce	Employment and workforce	Positive	Positive	Positive
Relocation: Supply chain and procurement issues for construction materials, resources, and services needed to carry out the project.	Employment and workforce	Low	Positive	Positive
Cessation of operations: Discontinuation of workforce activities	Employment and workforce	Small	Small	Minor

9.3.9.5 Health and Safety

9.3.9.5.1 Construction Phase

9.3.9.5.1.1 Health and Safety at Work (HSW)

Achieving a safe and healthy working environment is a key feature of socio-economic prosperity and progress in a modern and well-governed society, while also contributing significantly to the promotion of economic growth and employment by ensuring quality and productivity at work.

The risk of injury during construction activities is possible and arises, among other things, from the presence of construction machinery and equipment (e.g., cranes, bulldozers, scaffolding, etc.), working at heights, dust emissions, potentially high noise levels, etc.

Greek legislation on OSH is fully harmonized with the corresponding EU legislation, through the transposition of both Framework Directive 89/391/EEC and the specific Directives derived from it. The core of the relevant legislative framework in Greece, which includes a multitude of individual pieces of legislation (particularly in the form of Presidential Decrees) on general and specific occupational hazards or workplaces, is the Code of Laws on Health & Safety at Work (KNYAE), which was ratified by Article 1 of Law 3850/2010 (Government Gazette A' 84) and which, among other things, sets out the legal principle of the employer's

exclusive responsibility and describes the basic requirements for employers and employees, as well as the relevant institutions providing protection and prevention services (safety technician, occupational physician, Employee Health & Safety Committee, etc.)

The project operator must, among other things, have a Health and Safety Plan (HSP) in place, which is a legal requirement (Presidential Decree 305/1996, Article 3) and covers all construction activities. The H&S Plan is a comprehensive study that includes the measures to be taken and any other information that must be implemented in order to improve working conditions and prevent accidents at work and occupational diseases. Among other things, the HSE describes and clarifies the rules to be applied in the workplace, as well as specific measures for tasks that pose particular risks to the safety and health of workers, in accordance with Annex II of Article 12 of Presidential Decree 305/1996. The H&S Plan also incorporates the prevention of occupational hazards in all phases of the Project and includes the Occupational Risk Assessment (PRA), the potential risks of each task, and the proposed measures for the prevention or control of these risks.

The ORR is carried out by a suitably qualified person, such as a safety technician, and should include:

- Identification and recording of existing risks to the safety and health of workers, as well as those that may arise. (Indicative examples include: risks from machinery and equipment, risks from fire, electric shock, explosion, falls, risks from exposure to harmful agents [physical, chemical, biological], from the organization of work, from violence and harassment at work, psychosocial risks).
- Qualitative and, where necessary, quantitative identification of harmful agents (physical, chemical, biological).
- Preventive measures already in place and/or proposed to be taken to control risks and protect workers.

A Health and Safety File (HSF) should also be prepared in accordance with national legislation (Presidential Decree 305/1996, Article 3) and in accordance with best practices such as PR4 of the ETAA, which brings together all the elements of the HSE. It includes the Project Register, guidelines, and useful information on OHS issues that should be taken into account in any subsequent work throughout the life of the project.

The HSE and FSE should be adjusted in line with the progress of the work and, in any case, contain accurate and up-to-date information. The employment of a Health and Safety Coordinator is a legal obligation (Presidential Decree 305/1996, Article 3) for any technical project site where several teams are working simultaneously. The Health and Safety Coordinator coordinates the activities of the Project contributors with the aim of incorporating the General Principles of Accident Prevention in all phases of the project, and provides his services in accordance with the applicable requirements of the law, specifically Presidential Decree 305/1996. During the execution of the project, the Health and Safety Coordinator is responsible for the adjustment of the Health and Safety Plan and the Fire Safety Plan.

The employment of a Safety Technician is also a legal obligation (Law 3850/2010, Article 8) for all companies involved in technical/construction projects. The Safety Technician is one of the most essential instruments for improving working conditions on the project and provides his/her services in accordance with the provisions of the legislation in force, specifically Presidential Decrees 17/1996 and Presidential Decree 294/1988, as codified by Law 3850/2010.

In the context of supervising and improving working conditions:

- The safety technician regularly inspects workplaces in terms of employee health and safety and reports any health and safety omissions to the employer. When they notice any omissions, they propose measures to address them and supervise the implementation of the measures they have proposed.
- The safety technician must supervise the proper use of personal protective equipment.
- He is obliged to investigate the causes of accidents at work, analyze and evaluate the results of his investigations, and propose measures to prevent similar accidents, which he records in the special safety technician's logbook kept by the company.
- The safety technician supervises fire safety and alarm drills carried out at the company to assess its readiness to deal with accidents.
- He informs and guides employees on how to prevent occupational hazards associated with their work and ensures that they comply with health and safety rules in the company.
- The safety technician participates in the development and implementation of employee training programs on health and safety issues.
- The safety technician is required to cooperate with the occupational physician by conducting joint inspections of the workplace.
- The safety technician is obliged to maintain operational confidentiality.

The Occupational Physician is another institutional body provided for by the legislation on Health and Safety at Work to supervise the health of employees (Law 3850/2010 as amended by Law 4808/2021). Their responsibilities are advisory, and they provide guidance and advice to employers, employees, and their representatives on the measures to be taken for the physical and mental health of employees.

In the context of monitoring the health of employees:

- The occupational physician conducts medical examinations of employees in relation to their job, ensures that medical examinations and measurements of factors in the working environment are carried out, keeps a relevant medical file for each employee and issues a certificate of fitness for the specific job.
- The occupational physician supervises the implementation of measures to protect the health of employees, regularly inspecting workplaces and proposing measures to address any shortcomings identified, while explaining the need for the proper use of personal protective equipment.
- As part of their responsibilities, they investigate the causes of work-related illnesses among employees, analyze and evaluate the results of investigations, and propose measures for their prevention. The occupational physician reports work-related illnesses among employees to the Labor Inspectorate through the company.
- With regard to monitoring workers' compliance with health and safety rules, the occupational physician is required to inform workers of the risks associated with their work and how to prevent them, including the risks of violence and harassment, including sexual harassment.

- If the company does not have the appropriate infrastructure, it is obliged to refer employees for specific additional medical examinations, at the employer's expense, to private bodies or to the relevant units of insurance organisations or the National Health System (ESY).
- In the event of an accident, incident of violence, or sudden illness, it provides emergency treatment and carries out vaccination programs for employees on the instructions of the competent public health service of the region where the company is based.
- The occupational physician must maintain medical and operational confidentiality.
- The occupational physician is required to cooperate with the safety technician by conducting joint inspections of the workplace.

With regard to the prevention and treatment of violence and harassment at work (including gender-based violence and harassment), Greece has implemented a multifaceted approach to addressing violence with a strong legislative framework, institutional mechanisms, reporting and support mechanisms, and awareness-raising actions to promote a culture of zero tolerance.

According to the law, every employer, regardless of the number of employees, as well as persons exercising managerial authority or representing the employer, are required to take specific measures to prevent and address violence and harassment at work, to show zero tolerance for such incidents or behavior when receiving and dealing with related complaints, to provide accessible information and training on risks, prevention, protection, and the obligations of those involved (Articles 5-8, Law 4808/2021). Private sector companies employing more than twenty (20) people are subject to the obligations of Articles 9, 10, and 11 of Law 4808/2021 to adopt policies for both the prevention and combating of violence and harassment at work, as well as for the management of internal complaints of violence and harassment in accordance with the provisions of Ministerial Decision 82063/2021, issued pursuant to Article 22(1) of Law 4808/2021 (Government Gazette 5059B/1-11-2021), which includes a relevant indicative template. Finally, in the event of a violation by the liable employer of Articles 5 to 11 of PART II of Law 4808/2021 as a result of either an on-site inspection or a labor dispute, both Occupational Safety and Health Inspectors and Labor Relations Inspectors (Article 19(1) of Law 4808/2021) the administrative penalties provided for in Decision No. 80016/2022 (Government Gazette 4629B/01-9-2022) of the Minister of Labor and Social Affairs.

The institutional mechanisms in place include the Labor Inspectorate (SEPE), which is responsible for monitoring and enforcing all labor laws, as well as the Ombudsman, who is responsible for dealing with complaints of discrimination and harassment in the workplace and providing additional means of redress.

It should also be noted that construction activities must be carried out in accordance with national legislation, including legislation applicable to the specific sector of economic activity, including Presidential Decree 778/1980 (as amended and in force) on safety measures during the execution of construction works, Presidential Decree 1073/1981 (as amended and in force) on safety measures during the execution of works on construction sites and all types of civil engineering projects, Law 4144/1983 (as amended and in force) on Combating Social Security and Labor Market Violations and other provisions under the jurisdiction of the Ministry of Labor, Social Security and Welfare and Ministerial Decision 130646/1996 Safety measures log.

EnEarth belongs to the Energean group of companies. Energean implements a "Health & Safety Management System" through which relevant indicators are systematically monitored so that any necessary corrective actions can be taken. These indicators include, among others, man-hours worked, the number and frequency of accidents. Indicatively, 0.47 hours lost due to accidents at work per 1 million man-hours have been recorded, while specifically in Greece, the facilities in Prinos and Nea Karvali, Kavala, as well as the offices in Athens are certified according to ISO 45001, the first global international standard for occupational health and safety.

In 2022, more than 650 drills were conducted, and nearly 14,000 hours of training were provided to employees and contractors across the Energean group. In 2023, focusing on World Day for Safety and Health at Work, which is celebrated internationally on April 28e April, we conducted a series of innovative and, at the same time, critical safety training courses at workplaces such as the Prinos offshore complex and the Nea Karvali onshore facilities.

Specifically, 68 employees at the land and marine facilities in Kavala were trained and certified in the safe execution of work at height as well as in rescue techniques at height in collaboration with Active Point, one of the most specialized companies in Greece and abroad in the field of training executives and employees in these tasks.

In addition, 48 employees were trained and certified in confined space work and the corresponding rescue techniques, in collaboration with Dräger, one of the most established companies in the provision of safety solutions and services worldwide. It is worth noting that both the Kavala Fire Department and Energean's contractors in Kavala were invited to participate in this training with staff and observers.

The Energean group also has a a "Work Stoppage Policy" through which any person, regardless of position, seniority, or specialty, has the right and duty to issue a "Work Stoppage Order" whenever any person, property, or the environment is in danger. A "Code of Ethics" is also in place, which is linked to various policies such as the "Health, Safety, Environmental & Social Responsibility Policy," the "Equal Opportunities Policy," and the "Diversity and Inclusion Policy" to ensure the prevention of discrimination, violence, exclusion, or harassment.

Finally, taking into account standards set by European and national legislation, as well as the nature of the work of the staff in the project under study, measures such as frequent, regular breaks during each shift have been provided for.

With the full implementation of the provisions of the Law, the significance of the impact is assessed as negative, negligible in intensity, in the area of operations, temporary, short-term reversibility, irregular, non-cumulative, and non-synergistic. In terms of its Final Assessment, this impact is assessed as **Minor**.

With the implementation of the policies mentioned above, it is estimated that **there will be no negative impacts** on health and safety at work.

9.3.9.5.1.2 Public Health

Contemporary concepts and approaches to public health are based on the determinants of health[134] and the 17 sustainability goals of the United Nations (UN). Health and well-being determinants can be classified into the following categories:

- Socio-economic and demographic determinants (employment/unemployment, income, gender, age, education, living conditions, etc.).
- Environmental determinants (natural and built environment, access to clean water, air quality, soil, noise levels, etc.).
- Health services (quality, accessibility, total health expenditure, etc.).
- Behavioral determinants (diet, physical activity, substance use, psychological factors, health literacy, etc.).
- Genetic determinants (heredity plays a role in determining lifespan, health, and the likelihood of developing certain diseases).

Taking into account the results of the environmental impact assessment in this section of the MT AEPO, the correlation with the above health determinants is evaluated. The term "correlation" refers to the possibility of a health determinant being affected by the impacts, as assessed in this study, and therefore causing secondary potential health effects. Determinants that are not considered to be related to the proposed project will not be assessed in the following sections. The correlation assessment is presented in **the** following **table:**

[134] https://apps.who.int/gb/bd/PDF/bd47/EN/constitution-en.pdfhttps://www.euro.who.int/__data/assets/pdf_file/0006/185217/Social-and-environmental-determinants-Fact-Sheet.pdf

9 –16 : Correlation between the project and health determinants

Health determinant	Correlation
Environmental Determinants	
Air quality	Definite link
Water quality	Certain connection
Soil quality	Reliable connection
Acoustic environment quality	Certain connection
Eco-friendly features	Reliable connection
Demographic determinants	
Demographic indicators (permanent population, age distribution, life expectancy/aging)	No link
Socio-economic determinants	
Income from productive sectors	Definite link
Employment	Definite link
Education	Uncertain link
Behavioral determinants	
Smoking	No association
Dietary habits	No association
Alcohol consumption	No connection
Physical activity	No connection
Health literacy	No connection
Health services	
Health expenditure	Uncertain link
Population coverage for health care	No connection
Number of hospital beds	No link
Number of doctors/nursing staff	No connection
Genetic markers	No connection

Each health determinant can be linked to potential risks and possible health outcomes. The pathway of possible health outcomes followed for each selected health determinant (certain or uncertain link) **when there is uncontrolled exposure to potential risks** is described in **the** following **figures.**

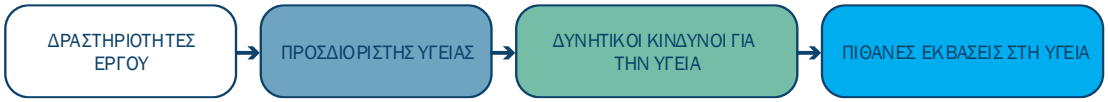
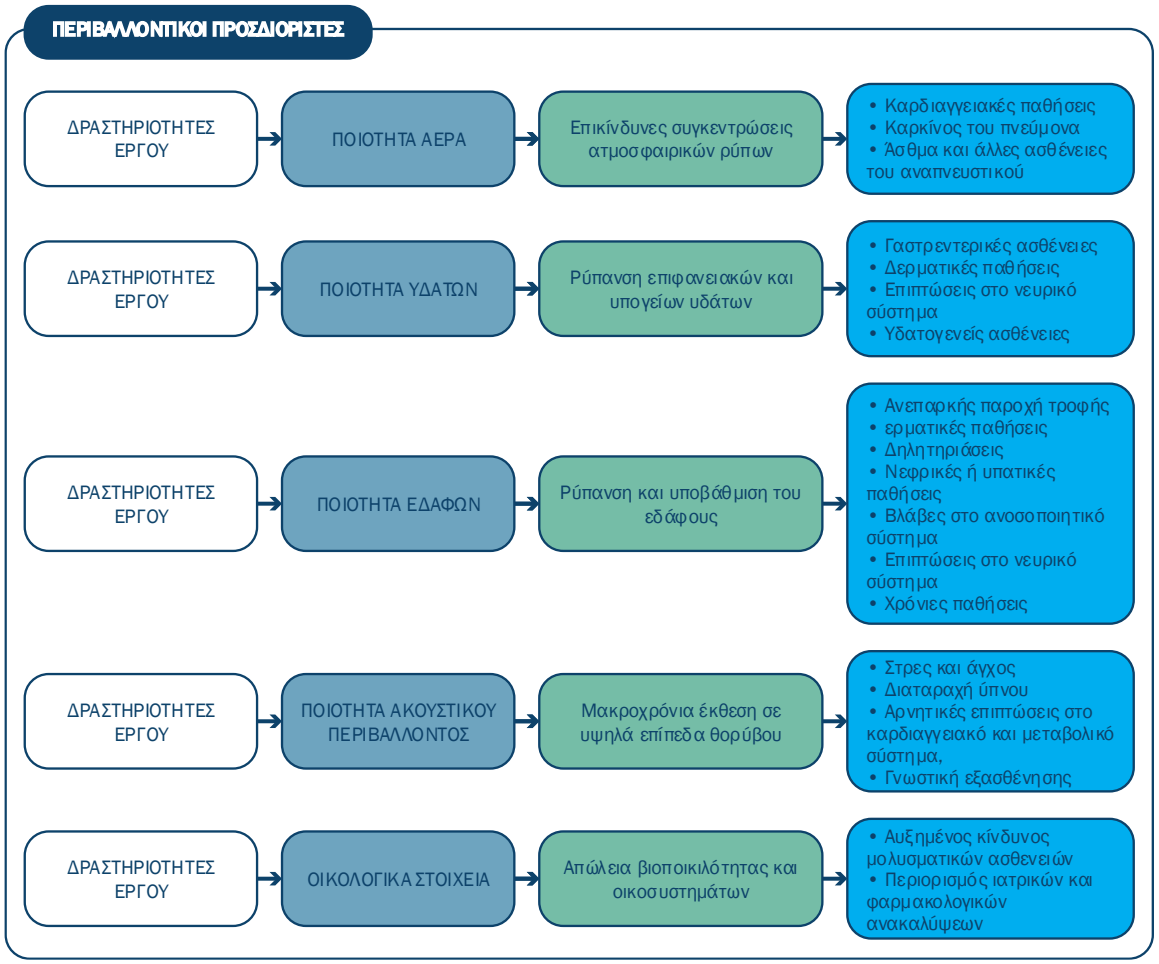


Figure9 –7 : Pathway project activity/potential health outcomes



9 –8 : Pathway for Environmental Determinants

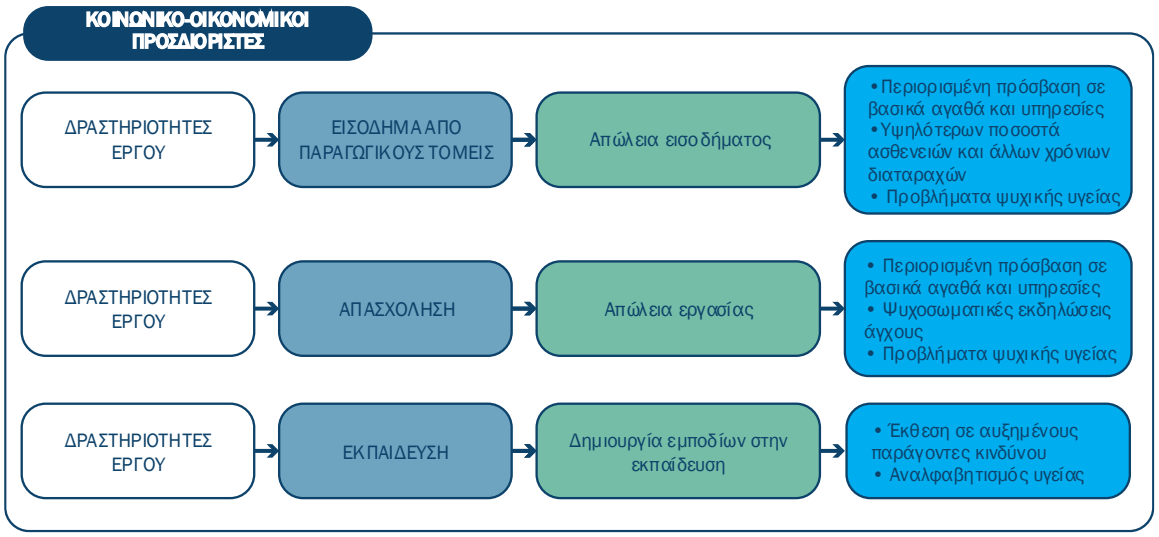


Figure9 –9 : Pathway for Socio-Economic Determinants

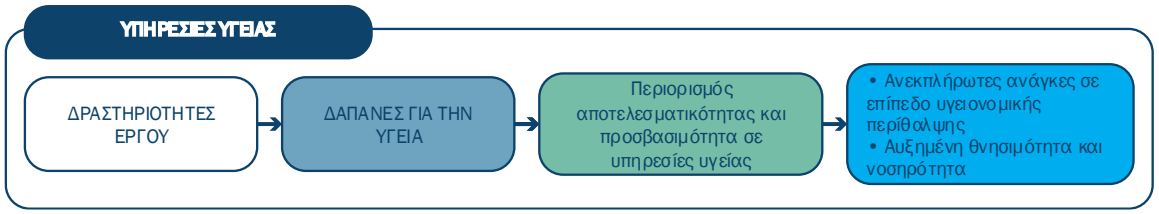


Figure9 –10 : Pathway for Behavioral Factors

The relevant **sections** below examine whether the activities of the proposed project modification, as identified by the Environmental and Social Content Delineation of the MT AEPO (**Chapter 8),** are likely to lead to the above potential health risks/outcomes.

The results of the assessment of potential impacts on selected health determinants according to the MT AEPO are summarized below:

- The impacts on air quality from activities during the construction phase were assessed as negative, of low to medium intensity, local in scope, short in duration, and overall **negligible.** Therefore, they are not expected to exceed the limits set by Greek legislation and the specifications of international organizations. In conclusion, **no dangerous concentrations of atmospheric pollutants are expected** that would have a significant adverse impact on public health.
- The impact on water from construction activities was assessed as negative, of low to medium intensity, local in scope, short in duration, and overall **minor.** In conclusion, **no pollution of surface and groundwater is expected** that would have a significant adverse impact on public health.
- The impact on soil quality from construction activities was assessed as negative, negligible to minor in intensity, limited in scope, short-term, and overall **negligible** to **minor**. Therefore, the construction phase of the project is not expected to cause **any deterioration in soil quality** that would have a significant adverse impact on public health.
- The impact on the acoustic environment from activities during the construction phase was assessed as negative, of minor to moderate intensity, local in scope, short in duration, and overall **Minor**.

Therefore, no **long-term exposure to high noise levels** is expected that would have adverse effects on public health.

- The impacts on the natural environment from activities during construction were assessed as negative, negligible to minor in intensity, local in scope, temporary in duration, and overall **negligible to moderate**. For the impacts assessed as Moderate, following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as Minor. In conclusion, no **loss of biodiversity and ecosystems** is expected that would have secondary impacts on public health.
- The impacts on the productive sectors of the region's economy from activities during the construction phase are not expected to cause significant changes in fishing, aquaculture, or tourism, resulting in loss of income. On the contrary, increased local economic activity due to the project is expected to lead to an increase in income for part of society. In conclusion, the impact of the project on this specific health determinant is expected **to be positive.**
- The activities that cause impacts during construction are expected to have positive effects on employment and, therefore, the impact of the project on this health determinant is expected **to be positive**.
- With regard to education and health expenditure, it is worth noting that the implementation of the proposed project modification will lead to the implementation of Corporate Social Responsibility Actions in consultation with local authorities and with an assessment of local needs (investment in education, health, etc.) which may have **a positive impact** on these specific determinants. It should also be noted that the overall program may provide an opportunity for scientists from educational institutions in the region to propose/participate in new research programs, as has been done in the past in Kavala, and where institutions actively collaborate with the hydrocarbon exploitation company. Opportunities could also be created for student internships or the promotion of lifelong learning, the provision of laboratory equipment, scholarships, etc., which would have **a positive** impact on the health determinant of education.

Based on the above, during the construction phase, environmental health determinants are not expected to be affected in ways that could have adverse effects on public health. Socio-economic determinants will be positively affected and there may be a marginal positive impact on health costs. Therefore, the overall impact on public health from the construction phase of the proposed project is assessed as **Positive.**

Activity	Recipient	Magnitude of Impact												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Construction work	Health and	-	1	1	4	1	1	1	4	1	1	1	19	Negligible	High	Low

Activity	Recipient	Magnitude of Impact												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
	safety at work															
Construction activities	Public Health	+	2	2	2	2	1	1	1	4	2	1	24	Positive	High	Positive

9.3.9.5.2 Operational Phase

9.3.9.5.2.1 Health and Safety at Work

The risk of injuries at work during the operation of the proposed project modification is possible and may arise from the handling of chemicals, maintenance work, or work at heights.

With the full implementation of the provisions of the Law, the significance of the impact is assessed as negative, negligible in intensity, temporary, short-term reversibility, irregular, non-cumulative, and non-synergistic in the Project area. In terms of its Final Assessment, this impact is assessed as **Minor**.

With the implementation of the policies mentioned above, it is estimated that **there will be no negative impacts** on health and safety at work.

9.3.9.5.2.2 Public Health

The results of the MT AEPO assessments for the selected health determinants are summarized below:

- The impacts on air quality from the activities during the operation of the proposed project modification were assessed as negative, of low to medium intensity, local in scope and of short to long duration. Overall, the impacts are assessed as **negligible**. Therefore, they are not expected to exceed the limits set by Greek legislation and the specifications of international organizations. In conclusion, **no dangerous concentrations of atmospheric pollutants are expected** that would have a significant adverse impact on public health. It is also worth noting that CO_2 projects can reduce atmospheric pollutant emissions. This reduction can indirectly lead to lower rates of asthma, bronchitis, heart disease, and other respiratory and cardiovascular diseases. Furthermore, reducing $CO_{(2)}$emissions helps mitigate climate change, contributing to a reduction in extreme weather events such as heat waves associated with heat stroke, dehydration, and worsening symptoms of chronic diseases. In conclusion, the overall impact of the project on this specific health determinant is expected **to be positive.**
- The impact on water quality from operational activities was assessed as negative, negligible to minor in intensity, local in scope, and overall **minor**. Therefore, **no surface or groundwater pollution is expected** that would have a significant adverse impact on public health.

- **No soil pollution is expected** from activities during operation, therefore no related adverse effects on public health are expected.
- The impact on the acoustic environment during the operation of the Project was assessed as negative, low to moderate in intensity, local in scope, and periodic. Overall, the impact is assessed as **minor**. Therefore, during the project's operational phase, no **long-term exposure to high noise levels** is expected that would have adverse effects on public health.
- The impacts on the natural environment from activities during operation are not expected to lead to **a loss of biodiversity and ecosystems.** Healthy ecosystems provide services and resources that are essential for human health. The contribution of CO_2 storage projects to climate change mitigation also contributes to the preservation of ecosystems and the services they provide. In conclusion, **positive** impacts on public health are expected.
- During operation,no significant changes in fishing, aquaculture, or tourism are expected that could cause income losses. On the contrary, increased local economic activity due to the project is expected to lead to an increase in income for part of society. In conclusion, the impact of the project on the productive sectors of the region's economy and this specific health determinant is expected **to be positive.**
- The impact on employment from activities during operation is positive and therefore the impact of the project on this specific health determinant is expected **to be positive**.
- With regard to education and health expenditure, similar to the construction phase (Corporate Social Responsibility Actions and opportunities in the education sector), the proposed modification of the project is expected to have **a positive impact** on these determinants. It is also worth noting that CO(2)storage projects, by reducing atmospheric pollutant emissions and thus diseases related to atmospheric pollution and climate-related health impacts, can lead to a reduction in the overall burden on healthcare systems, potentially reducing healthcare costs and improving people's quality of life. In conclusion, the overall impact of the project on the "Health services" determinant and, consequently, on public health is expected to be **positive.**

Based on the above, during the operational phase of the proposed project modification, environmental health determinants are not expected to be affected in ways that could have adverse effects on public health. On the contrary, positive effects are expected on socio-economic determinants, health costs, and selected environmental determinants. The overall impact on public health from the operational phase of the proposed project is assessed as **Positive.**

Activity	Recipient	Impact magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Operational tasks	Health and	-	1	1	4	1	1	1	4	1	1	1	19	Negligible	High	Low

Activity	Recipient	Impact magnitude												Significance of Impact	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
	safety at work															
Operational activities	Public health	+	4	4	2	3	3	1	1	4	4	1	39	Positive	High	Positive

9.3.9.5.3 Shutdown/Decommissioning Phase

9.3.9.5.3.1 Health and Safety at Work

The risks are similar to those of the construction phase.

With the full implementation of the provisions of the Law, the significance of the impact is assessed as negative, negligible in intensity, in the area of decommissioning works, temporary, short-term reversibility, irregular, non-cumulative, and non-synergistic. In terms of its Final Assessment, this impact is assessed as **Minor.** With the implementation of the policies mentioned above, it is estimated that there will be no negative impacts on health and safety at work.

9.3.9.5.3.2 Public Health

The results of the MT AEPO assessments for the selected health determinants are summarized below:

- The impacts on air quality during decommissioning/cessation of operation were assessed as negative, negligible to moderate in intensity, local in scope, periodic and temporary in duration, and overall **Minor.** Therefore, they are not expected to exceed the limits set by Greek legislation and the specifications of international organizations. In conclusion, **no dangerous concentrations of atmospheric pollutants are expected** that would have a significant adverse impact on public health.
- The impact on water quality from the activities during decommissioning/cessation of operation was assessed as **positive** in terms of the decommissioning of the project under consideration and the restoration of the site. Any negative impacts are assessed as negligible or minor in intensity, limited in extent and duration, and overall **minor.** In conclusion, **no surface or groundwater pollution is expected** that would have a significant adverse impact on public health.
- The impact on soil characteristics from activities during decommissioning/cessation of operation is expected to **be positive** in terms of the restoration of the Project's land area**.** Any negative impacts are assessed as being of limited intensity, extent, and duration, and overall as **negligible to minor.** Therefore, no relevant adverse impacts on public health are expected.
- The impacts on the acoustic environment from the activities during decommissioning/cessation of operation were assessed **as positive** in terms of the decommissioning of the proposed project

modification and the restoration of the land area of intervention**.** Any negative impacts are assessed as periodic, limited in intensity, extent, and duration, and overall as **Minor.** Therefore, no **long-term exposure to high noise levels** that would have adverse effects on public health is expected.

- The impacts on the natural environment from the activities during decommissioning/cessation of operation are not expected to lead to **a loss of biodiversity and ecosystems** that would have an impact on public health.
- The impact on **the productive sectors of** the region's **economy** during decommissioning/closure is not expected to cause significant changes in fishing, aquaculture, or tourism that would lead to loss of income. On the contrary, increased local economic activity due to the decommissioning phase is expected to lead to an increase in income for part of society. In conclusion, the impact of the project on this specific health determinant is expected **to be positive.**
- The impact on employment from the decommissioning activities is **positive**. After completion of the decommissioning phase, existing staff will need to find alternative employment. The impact is assessed as negative, moderate in intensity, local and of limited duration; however, the measures described in **Chapter 10** of the EIA report minimize the overall impact to **Minor.** Therefore, the project is not expected to have a negative impact on this specific health determinant.
- With regard to education and health costs, similar to previous phases (Corporate Social Responsibility Actions and opportunities in the education sector), the Project is expected to have **a positive impact** on these determinants.

Based on the above, during the decommissioning/shutdown phase, environmental health determinants are not expected to be affected in ways that could have adverse effects on public health. Socio-economic determinants will be mainly positively affected and there may be a marginal positive impact. The overall impact on public health from the decommissioning/closure phase of the proposed project is assessed as **Positive.**

Activity	Recipient	Magnitude of Impact												Impact Significance	Significance of SPP	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Decommissioning tasks	Health and safety at work	-	1	1	4	1	1	1	4	1	1	1	19	Negligible	High	Low
Decommissioning activities	Public health	+	2	2	2	2	1	1	1	4	2	1	24	Positive	High	Positive

9.3.9.5.4 Differentiation of Estimated Health and Safety Impacts from Project Modification

As documented in the above **sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification are assessed as Minor and in many cases positive and cannot change the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of the impacts from the new elements of the project, as introduced by the proposed amendment to the project (such as the new Omega offshore platform), the estimated impacts are limited to minor impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification).

Activity	Recipient	Final Impact Assessment[135]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
Construction works	Health and safety at work	**Minor**	**Minor**	**Low**
Construction activities	Public health	**Positive**	**Positive**	**Positive**
Operational Phase				
Operational tasks	Health and safety at work	**Minor**	**Small**	**Low**
Operational activities	Public health	**Positive**	**Positive**	**Positive**
Shutdown/Decommissioning Phase				
Decommissioning work	Health and safety at work	**Minor**	**Minor**	**Low**
Decommissioning activities	Public health	**Positive**	**Positive**	**Positive**

9.3.9.6 Impacts on Technical Infrastructure

The following paragraphs examine the possibility of potential adverse impacts on the technical infrastructure of the area as a result of the construction, operation, and decommissioning/removal of the proposed project modification.

[135] In the event that, in the Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts" as assessed with the application of the prevention/mitigation/countermeasures proposed in **Chapter 10** herein. The same applies to the estimates of the approved EIA presented in this Table.

9.3.9.6.1 Construction Phase

9.3.9.6.1.1 Maritime Transport/Traffic

The following paragraphs examine the possibility of potential adverse effects on maritime transport in the area as a result of the implementation of the proposed project modification.

The activities that cause impacts on maritime transport in the area as a result of the implementation of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8**),are as follows:

- Offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable
  - Maritime traffic - Daily vessel traffic for the installation of pipelines and cable (including the transport of workers and the movement of support vessels).
  - Maritime traffic - Definition of exclusion zones due to pipeline and cable installation works (and related works/activities).
- Drilling
  - Marine traffic - Daily vessel traffic for drilling operations (including transport of workers and support vessels).
  - Marine traffic - Establishment of exclusion zones due to drilling works.
- Installation of the Omega offshore platform
  - Maritime traffic - Daily vessel traffic for construction work (including transport of workers, materials, and support vessels).
  - Operation of heavy-duty floating crane vessels and other support vessels (support vessels and tugs, floating cargo barges). Waste/sewage production.
  - Maritime traffic - Definition of exclusion zones due to construction works.

The construction of the offshore sections of the project under consideration will require daily vessel traffic for the installation of the transfer pipelines (CO_2 and produced water transfer pipeline) of the power supply cable, the drilling of boreholes and the installation of the new Omega platform (including the transport of workers and support vessels). However, it is estimated that daily vessel traffic will not significantly increase maritime traffic in the area, given that, due to the relatively limited volume and nature of the construction work, only a few trips by a small number of construction and support vessels will be required on a daily basis, the vast majority of which will be carried out within the existing maritime traffic restriction zone. Therefore, due to the limited increase in daily vessel traffic required for the construction of offshore facilities, the expected impacts are characterized as negative, negligible in intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

In addition, with regard to **maritime traffic,** access exclusion zones are defined due to the installation of the transfer pipelines (CO_2 and produced water transfer pipeline) of the power supply cable, the drilling of boreholes and the installation of the new Omega platform. In any case, according to the existing project of the Prinos offshore mining complex, which has been environmentally licensed (AP ref. 8413 / 24-04-18,

ADA: ΨΓΛ14653Π8-Ζ79 on the subject of "Approval of environmental conditions for the Prinos Offshore Development project"), a zone of 500 m on either side of the offshore facilities (platforms, submarine pipelines, and cables) in which mooring and all forms of fishing are already prohibited. A corresponding zone is also provided for in the environmental permit for the licensed project.

The exclusion zones required for the implementation of the proposed project modification are offset by the existing zone, which is slightly extended, therefore no significant additional impact on maritime transport of passenger and commercial ships is expected, since the entire area is in fact restricted by the existing activities of Prinos. Consequently, the impacts on maritime transport/traffic from the maintenance and use of the maritime exclusion zone are characterized as negative, negligible in intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Installation of transfer pipes (CO_2transfer pipe and produced water transfer pipe) of the power supply cable, drilling of boreholes and installation of the new Omega platform platform (including transport of workers and support vessels)	Maritime Transport / Traffic	-	1	2	4	1	1	2	4	4	1	1	25	Small	Low	Negligible
Maintenance, limited expansion, and use of the maritime exclusion zone	Maritime Transport / Traffic	-	1	2	4	1	1	2	4	4	1	1	25	Small	Low	Negligible

9.3.9.6.1.2 Other Transport Infrastructure

The following paragraphs examine the possibility of potential adverse effects on other transport infrastructure in the region as a result of the implementation of the proposed modification of the project .

The activities that have an impact on maritime transport in the area as a result of the implementation of the proposed project modification ,based on the P&K content definition of the MT AEPO (**Chapter 8**) are as follows:

- Installation of the Omega offshore platform
  - Installation of the support network for the platform decks.
  - Installation of decks with the platform's surface equipment.

With regard to the movement of heavy vehicles, vehicles and trucks transporting materials and waste on **the road network,** a slight increase in traffic load is expected in the wider area due to the implementation of the construction works of the proposed project modification (see construction site composition, required construction materials, and waste production in **the** relevant **Sections** of **Chapter 3**).

Consequently, the impacts on road transport/traffic from the implementation of the construction works of the proposed project modification are characterised as negative, negligible in intensity, local, simultaneous with the construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Traffic on the road network of heavy vehicles, construction machinery, vehicles, and trucks transporting construction materials and waste due to the implementation of the construction works of the project under consideration	Road Network/Transport/Traffic	-	1	2	4	1	1	2	4	4	1	1	25	Small	Low	Negligible

9.3.9.6.1.3 Environmental Infrastructure Systems

The following paragraphs examine the possibility of potential adverse effects on the environmental infrastructure systems in the area as a result of the implementation of the proposed project modification.

The activities that have an impact on the environmental infrastructure systems of the area, as a result of the implementation of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8**), are as follows:

- Offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable
  - Operation of the pipe and cable laying vessel (which accommodates 200 people). Waste/sewage production.
- Drilling
  - Waste - Production, management, and disposal of mining waste (drilling mud and cuttings). During the drilling of the 26-inch (125-450 MD (m)) and 16 inches (450-2600 MD (m)), a seawater/lime-based mud will be used as drilling fluid. Cuttings from this section will be deposited on the seabed. Below this depth, the drilling fluids return to the surface where the cuttings are removed and the mud is treated.

Based on the description of the construction activities of the proposed project modification, as detailed **in Chapter 6** of this document, the following conclusions can be drawn:

- **The needs during the construction phase at** sea are mainly covered by seawater (or desalinated by the same means) or bottled water. During the installation of the Omega platform, approximately 15 m^3 of drinking water per day is required for the workers' living quarters and a total of 1**,500 m^{33}** during the construction phase. Drinking water and water for domestic use will be covered by a seawater treatment system (Vacuum Vapor Compression) available on the vessels and by the supply of bottled water. A significant increase in water demand is expected at the offshore facilities during the construction period of the new wells. Water consumption for one well is estimated at approximately 4**,500 $m^{(3)}$** .The water needs of personnel during the construction phase of the new wells are estimated at ~ **4,000 $m^{(3)}$**(of which approximately 200 $m^{(3)}$will be drinking water). Finally, during the construction of the pipelines and the submarine cable, approximately 30 $m^{(3)}$ /day of drinking water is required for the workers' living quarters and a total of 1**,350 $m^{(3)}$** during the construction phase.
- **Energy needs** during the construction phase will be covered by diesel generators and will not burden the existing energy system.
- Domestic wastewater from the platform construction works will be transported and stored in special tanks. The tanks are periodically emptied into the barge or the support vessel's tank. The contents of the tank are transported by barge to onshore facilities for biological treatment. Finally, wastewater from the vessels' employees is treated on board and does not burden the onshore biological treatment systems. It follows from the above that the load on land-based treatment systems is not particularly significant, as only a small number of employees are involved.
- With regard to **solid construction waste,** it is estimated that the Project will produce non-hazardous and hazardous municipal waste (MW) as well as certain other waste streams that fall under alternative management (AM). The production of MW corresponding to a parallel daily presence of 290 employees is presented below. Recyclables will be disposed of by alternative management bodies, while other waste will be sent to the relevant landfill site in Kavala.

Waste production		Mixed	Recyclables	Total	Unit
Total Production (14 months)	AA Production (tn)	14.83	7.17	22	tn
	AA production (m^3)	57.06	33.69	90.75	m^3

Other liquid waste expected to be produced on vessels during the construction of pipelines, cables, and the installation of the platform is bilge water and ballast water.

- Water from the ship's engine room may contain grease and/or oil (bilge water). Bilge water shall be managed in accordance with Annex I of MARPOL 73/78 (Regulations for the Prevention of Pollution by Oil) and its relevant amendments. The treatment equipment (bilge water separator) shall comply with the specifications of the IMO Guidelines (Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships, IMO Resolution MEP. 107(49)).
- The discharge of ballast water used to stabilize ships at sea is subject to the requirements of Annex I of MARPOL 73/78 and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management – BWM). The ballast water treatment system on board the ship shall comply with standard D-2, which concerns the treatment of ballast water.

The **extractive waste** generated, hazardous and non-hazardous, from drilling operations consists mainly of drill cuttings and drilling mud. A typical drilling operation for the CO_2 storage project produces approximately 920 m^3 of cuttings, so the four (4) drilling program will produce approximately **3,690 m^3 of cuttings.**

In each well, cuttings from 125 m to a depth of 2,600 m can be disposed of at the bottom due to biodegradable drilling mud. Below a depth of approximately 2,600 m, the drilling fluids will return to the surface where the cuttings will be removed and the mud will be treated. Extractive waste is managed in accordance with KYA 39624/2209/E103 (Government Gazette B/2076/25.9.2009).

In addition, the drilling muds that will be produced during the construction of the proposed modification of the project will amount to 2,240 m^3per well. It is estimated that the low-toxicity oil-based drilling muds that will be produced during the implementation of the project will amount to +/- 3,200 $m^{(3)}$.Correspondingly, the amount of cuttings that will result from sections that will be opened with low-toxicity oil-based mud will amount to +/- 1,300 $m^{(3)}$.

Based on the above, the construction works of the proposed project modification do not result in significant loads on water and energy needs. However, they cause a temporary load (maximum 14 months) on environmental infrastructure (MSW, wastewater).

Therefore, based on the above analysis, it appears that the expected adverse potential impacts from the construction of the proposed project modification are limited to the systems for the collection, transport, disposal, and management of liquid and solid waste. However, due to the relatively limited quantities of waste produced and the limited duration of the project, these impacts are characterized as negative, negligible in intensity, local, simultaneous with construction works, temporary, reversible in the short term,

synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Production of liquid and solid waste due to construction works	Systems for the collection, transport, disposal, and management of liquid and solid waste	-	1	2	4	1	1	2	4	4	1	1	25	Small	Low	Negligible

9.3.9.6.2 Operating Phase

9.3.9.6.2.1 Maritime Transport / Traffic

The following paragraphs examine the possibility of potential adverse effects on maritime transport in the area as a result of the operation of the proposed project modification.

The activities that cause impacts on maritime transport in the area as a result of the operation of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8**),are as follows:

- Maritime traffic
  - Daily vessel traffic due to the operation of the proposed project modification (including employee transportation and support vessel movements).
  - Definition of exclusion zones due to the operation of the proposed project modification.

The operation of the offshore sections of the project under consideration will require vessel traffic for the transport of isoboxes with CO_2, the transport of workers, and the movement of support vessels. However, it is estimated that daily vessel traffic will not significantly increase maritime traffic in the area, given that, due to the limited volume of $CO_{(2)}$ to be transported via isoboxes and the operational requirements of the project, only a few routes will need to be carried out by a small number of transport and support vessels on a daily basis, the vast majority of which will be carried out within the existing maritime traffic restriction zone. Therefore, due to the limited increase in daily vessel traffic required for the operation of the proposed project modification, the expected impacts are characterized as negative, low intensity, local, immediate, long-lasting, reversible in the short term, synergistic, direct, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

In addition, with regard to **maritime traffic,** access exclusion zones are defined due to the existence and operation of the proposed project modification. In any case, according to the existing project that has been environmentally licensed (AP ref. 8413 / 24-04-18, ADA: ΨΓΛ14653Π8-Ζ79 on the subject of "Approval of environmental terms for the Prinos Offshore Development Project"), a zone of 500 m on either side of the offshore facilities (platforms, submarine pipelines, and cables) in which mooring and all forms of fishing are prohibited. Corresponding zones are also provided for in the environmental permit for the licensed project.

The exclusion zones defined in the proposed amendment to the project are offset by the existing zone, which is slightly extended, therefore no significant additional impact on maritime transport of passenger and commercial ships is expected, since the entire area is in fact restricted by the existing activities of Prinos. Consequently, the impacts on maritime transport/traffic from the maintenance and use of the maritime exclusion zone are characterised as negative, low intensity, local, immediate, long-lasting, reversible in the short term, synergistic, direct, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Daily vessel traffic due to project operations (including employee transportation and support vessel movements).	Maritime Transport / Traffic	-	2	2	4	3	1	2	4	4	1	1	30	Small	Low	Negligible
Maintenance and use of the maritime exclusion zone	Maritime Transport / Traffic	-	2	2	4	3	1	2	4	4	1	1	30	Small	Low	Negligible

9.3.9.6.2.2 Other Transport Infrastructure

The following paragraphs examine the possibility of potential adverse effects on other transport infrastructure in the area as a result of the operation of the proposed project modification.

The activities that cause impacts on maritime transport in the area as a result of the operation of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8**),are as follows:

- **Physical presence and location of the project's land infrastructure**
  - Receipt of CO_2 in containers (CO_2 parcels). CO_2 loads from pilot projects will be transported to the Sigma facility dock by ISO container trucks with pressure vessels, insulated to minimize losses.

As regards the road network, increased traffic may be caused by CO_2container trucks, employee vehicles, and waste transport trucks. As the PATHE motorway is located at a distance of ~1 km from the Project's land facilities and main roads are selected for transport in combination with the small number of routes (~20) for the transport of ~400 tn $CO_{(2)}$,no significant burden is expected on the local network, which is not considered to be particularly congested. Finally, it should be noted that around 40 people are employed during the operational phase, which is too small a number to cause traffic problems in the area.

In conclusion, the impact on the road network in the area from the operation of the proposed modification of the project is characterized as negative, negligible in intensity, local, immediate, long-lasting, reversible in the short term, synergistic, direct, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Road network congestion due to project operation	Road Network/Transport/Traffic	-	1	2	4	3	1	2	4	4	1	1	27	Small	Low	Negligible

9.3.9.6.2.3 Environmental Infrastructure Systems

The following paragraphs examine the possibility of potential adverse effects on the environmental infrastructure systems of the area as a result of the operation of the proposed project modification.

The activities that cause impacts on the environmental infrastructure systems of the area as a result of the operation of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8**),are as follows:

- **Waste**
  - Production, management, and disposal of waste from the operation of the project's offshore facilities.

Based on the description of the operational activities of the proposed project modification, as detailed **in Chapter 3** of this document, the following conclusions can be drawn:

- For the operational phase of the CO_2storage facilities, **no fresh water is expected to be required**, except for the accommodation of personnel, in line with the current operation of the facilities.
- **During the operational phase**, **the new offshore facilities** will require power for CO_2 processing at the Omega platform in order to achieve the appropriate injection conditions (P, T). Based on the initial

estimate of the projected energy consumption for compressing CO_2 loads and heating bulk CO_2 during start-up, the power demand is expected to be in the order of 1.6 MW. Approximately 99% of this power demand is due to the operation of the electric heater required during start-up as a means of preventing low temperatures in the piping and the formation of hydrates/salts in the area near the well. To pump the produced water from the water wells on the Omega platform, two Electric Submersible Pumps (ESP) with a capacity of approximately 0.5 to 1 MW each are planned. Power will be supplied to the pumps via a power cable from the Delta platform. The Omega platform will also consume smaller amounts of energy for support operations, which will be supplied via the interconnection with the Delta platform through the submarine cable.

- It is estimated that the Project will generate non-hazardous and hazardous municipal waste (MW) as well as certain other waste streams that fall under alternative management (AM).

Production of MSW	Mixed	Recyclable	Total	Unit
AA production (tn)	2.98	1.44	4.42	tn
AA production (m^3)	11.45	6.76	18.22	m^3

- The **water produced from the planned** Omega platform **wells** will be transported to the Delta platform in Prinos, where it will be separated and treated in the existing systems and then discharged into the sea. Rainwater on the platforms will enter the closed drainage system through the enclosed areas. To minimize these quantities, the size of the enclosed areas has been minimized and protected from rain where possible.
- It is estimated that during the operation and maintenance of the underground CO_2 storage facility,non-hazardous and hazardous waste will be produced. The management of the above hazardous and non-hazardous waste and any other waste potentially generated during the operation and maintenance phase of the facility will be carried out in accordance with the provisions of the legislation in force. The waste produced will be collected separately by type in containers suitable for its safe temporary storage at the Project in accordance with safety and environmental protection regulations, and its management will be carried out by licensed waste collection, .

It should be noted that the increased energy requirements will be met by SIGMA's facilities (via an undersea cable that will connect to the Delta platform, where the existing power cable from Sigma arrives) and, therefore, by the HEDNO network, without causing any adverse effects due to, on the one hand, the limited energy requirements for the operation of the project and, on the other hand, the availability of the relevant network and transmission facilities, which, with limited interventions, can meet the needs of the proposed modification of the project.

Therefore, based on the above analysis, it appears that the expected adverse potential impacts from the operation of the proposed modification of the project are limited to the systems for the collection, transport, disposal, and management of liquid and solid waste. However, due to the relatively limited quantities of

waste produced, these impacts are characterized as negative, negligible in intensity, local, immediate, long-lasting, reversible in the short term, synergistic, direct, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

Activity	Recipient	Impact magnitude												Impact Significance	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Production of liquid and solid waste due to project operation	Systems for the collection, transport, disposal, and management of liquid and solid waste	-	2	2	4	3	1	2	4	4	1	1	30	Small	Low	Negligible

9.3.9.6.3 Shutdown/Decommissioning Phase

9.3.9.6.3.1 Maritime Transport/Traffic

The following paragraphs examine the possibility of potential adverse effects on maritime transport in the area as a result of the decommissioning/removal phase of the proposed project modification.

The activities that cause impacts on maritime transport in the area as a result of the decommissioning/removal phase of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8),** are as follows:

- **Shutdown/Dismantling of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable**
  - Maritime traffic - Daily vessel traffic for the implementation of offshore pipeline decommissioning works (including the transport of workers and support vessels).
  - Maritime traffic - Definition of exclusion zones due to the implementation of offshore pipeline decommissioning works.
- **Cessation of Operations / Removal of Drilling Rigs**
  - Maritime traffic - Daily vessel traffic for the implementation of offshore facility decommissioning works (including the transport of workers and support vessels).
  - Maritime traffic - Definition of exclusion zones due to the implementation of offshore facility decommissioning works.
- **Cessation of operation/dismantling of the Omega offshore platform**
  - Maritime traffic - Daily vessel traffic for the decommissioning of offshore facilities (including the transport of workers and support vessels).

- Maritime traffic - Definition of exclusion zones due to the implementation of offshore facility decommissioning works.

The decommissioning of the offshore parts of the proposed project modification will require daily vessel traffic (including the transport of workers and support vessels). However, it is estimated that daily vessel traffic will not significantly increase the maritime traffic load in the area, given that, due to the limited volume and nature of the decommissioning works, only a few trips by a small number of construction and support vessels will be required on a daily basis, the vast majority of which will be carried out within the existing maritime traffic restriction zone. Therefore, due to the limited increase in daily vessel traffic required for the decommissioning of offshore installations, the expected impacts are characterized as negative, negligible in intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible**.

In addition, with regard to **maritime traffic,** exclusion zones are defined due to the dismantling of offshore facilities under the proposed project modification (and related works/activities). In any case, according to the existing Prinos offshore mining project, which has been environmentally licensed (AP ref. 8413/24-04-18, ADA: ΨΓΛ14653Π8-Ζ79 on the subject of "Approval of environmental terms for the Prinos Offshore Development project"), a zone of 500 m on either side of the offshore facilities (platforms, submarine pipelines, and cables) in which mooring and all forms of fishing are prohibited. Corresponding provisions are also included in the environmental permit for the licensed project. The designated exclusion zones for the project are offset by the existing zone, which is slightly extended, therefore no significant additional impact on maritime transport of passenger and commercial ships is expected, since the entire area is already restricted by the existing activities of Prinos. In conclusion, the impacts on maritime transport/traffic from the maintenance and use of the maritime exclusion zone are characterized as negative, negligible in intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Decommissioning of offshore installations (including transport of workers and support vessels)	Maritime Transport/Traffic	-	1	2	4	1	1	2	4	4	1	1	25	Small	Low	Negligible

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Maintenance and use of the maritime exclusion zone	Maritime Transport / Traffic	-	1	2	4	1	1	2	4	4	1	1	25	Small	Low	Negligible

9.3.9.6.3.2 Other Transport Infrastructure

The following paragraphs examine the possibility of potential adverse effects on other transport infrastructure in the area as a result of the decommissioning/removal phase of the proposed project modification.

The activities that cause impacts on maritime transport in the area as a result of the decommissioning/dismantling phase of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8),** are as follows:

- Decommissioning/Dismantling of the Omega offshore platform
  - Onshore dismantling and recycling of material

In the case of onshore dismantling and recycling of the Omega platform material, in terms of heavy vehicle traffic on **the road network**, vehicles and trucks transporting materials, a slight increase in traffic load in the wider area is expected due to the implementation of the decommissioning works of the proposed project modification.

Consequently, the impact on road transport/traffic from the implementation of the decommissioning works of the proposed project modification is characterised as negative, negligible in intensity, local, simultaneous with the construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Appearance period)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Traffic on the road network of heavy vehicles, construction	Road Network/Transport/Traffic	-	1	2	4	1	1	2	4	4	1	1	25	Small	Low	Negligible

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Appearance period)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
machinery, waste transport vehicles and trucks due to the implementation of the project's decommissioning works																

9.3.9.6.3.3 Environmental Infrastructure Systems

The following paragraphs examine the possibility of potential adverse effects on the environmental infrastructure systems of the area as a result of the decommissioning/removal phase of the proposed project modification.

The activities that cause impacts on the environmental infrastructure systems in the area as a result of the decommissioning/removal phase of the proposed project modification,based on the P&K content definition of the MT AEPO (**Chapter 8),** are as follows:

- Decommissioning/Dismantling of the Omega offshore platform
  - Onshore dismantling and recycling of material
  - Production of solid and liquid waste.

Based on the description of the operational activities of the proposed project modification, as detailed in **Chapter 3** of this document, the most significant source of waste during the cessation of operation and decommissioning phase is the removable equipment and materials of the Omega platform. Priority in its management will be given to reuse, followed by recycling and finally the safe disposal of non-reusable and non-recyclable materials. Specifically, the amount of metal waste (expected to be the largest in volume) that will need to be managed will depend largely on the decommissioning method chosen (i.e., deep-sea disposal or towing ashore for dismantling).

A special type of waste stream during decommissioning comes from the growth of marine organic matter on the support pipes. It is preferable to remove the organic matter with a water jet in the marine area rather than on land during the dismantling stage, taking into account the environmental impact of the activity. The quantities of organic matter should be calculated when the exact date of the Project's decommissioning is known.

The usual special categories of waste are also expected, such as metal waste, batteries, electrical and electronic equipment (WEEE), but these cannot be determined at this stage in terms of quantities.

The waste produced will be collected separately by type in containers suitable for its safe temporary storage at the Project in accordance with safety and environmental protection regulations, and its management will be carried out by licensed waste collection, transport, and management.

Therefore, based on the above analysis, it appears that the expected adverse potential impacts during the decommissioning/dismantling phase of the proposed project modification are limited to the systems for the collection, transport, disposal, and management of liquid and solid waste. However, due to the relatively limited quantities of waste produced, these impacts are characterized as negative, negligible in intensity, local, simultaneous with construction works, temporary, reversible in the short term, synergistic, immediate, continuous, immediately remediable, and non-cumulative. In terms of their final assessment, these impacts are considered **negligible.**

Activity	Recipient	Impact Magnitude												Significance of Impact	SPP Significance	Final Impact Assessment
		S (Nature)	IN (Intensity)	EX (Extent)	MO (Period of occurrence)	PE (Duration)	RV (Reversibility)	SI (Synergy)	EF (Effect)	PR (Periodicity)	MC (Recovery)	AC (Accumulation)	Im (Impact Magnitude)			
Production of liquid and solid waste due to project decommissioning works	Systems for the collection, transport, disposal, and management of liquid and solid waste	-	1	2	4	1	1	2	4	4	1	1	25	Small	Low	Negligible

9.3.9.6.4 Differentiation of Estimated Impacts on Technical Infrastructure from Project Modification

As documented in the above **Sections**, the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification are assessed as Negligible and cannot change the final assessment of the potential impacts as included in the approved EIA of the project. Even in the case of impacts from new project elements, as introduced by the proposed project modification (such as the new Omega offshore platform), the estimated impacts are limited to negligible impacts, which do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.

The following table presents an assessment of the potential impacts of the licensed project (as assessed in the approved EIA for the project), the interventions of the proposed modification, and the overall modified project (licensed project incorporating the interventions included in the proposed modification).

Activity	Recipient	Final Impact Assessment[136]		
		Licensed Project	Proposed Amendment	Total Modified Project
Construction Phase				
Installation of transfer pipelines (CO_2transfer pipeline and produced water transfer pipeline), power cable, drilling wells, and installation of the new Omega platform platform (including transport of workers and support vessels)	Maritime Transport / Traffic	**Negligible**	**Negligible**	**Negligible**
Maintenance, limited expansion, and use of the maritime exclusion zone	Maritime Transport / Traffic	**Negligible**	**Negligible**	**Negligible**
Traffic on the road network of heavy vehicles, construction machinery, vehicles and trucks transporting construction materials and waste due to the implementation of the construction works of the project under consideration	Road Network/Transportation/Traffic	**Negligible**	**Negligible**	**Negligible**
Production of liquid and solid waste due to the implementation of construction works	Systems for the collection, transport, disposal, and management of liquid and solid waste	**Negligible**	**Negligible**	**Negligible**
Operational phase				
Daily vessel traffic due to project operation (including employee transportation and support vessel movements).	Maritime Transport / Traffic	**Negligible**	**Negligible**	**Negligible**

[136] In the event that, in terms of its Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts," as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** of this document. The same applies to the estimates of the approved EIA presented in this Table.

Activity	Recipient	Final Impact Assessment[136]		
		Licensed Project	Proposed Amendment	Total Modified Project
Maintenance and use of the maritime exclusion zone	Maritime Transport / Traffic	Negligible	Negligible	Negligible
Road network congestion due to project operation	Road Network/Transportation/Traffic	Negligible	Negligible	Negligible
Production of liquid and solid waste due to project operation	Systems for the collection, transport, disposal, and management of liquid and solid waste	Negligible	Negligible	Negligible
Decommissioning/Dismantling Phase				
Decommissioning of offshore facilities (including transport of workers and support vessels)	Maritime Transport/Traffic	Negligible	Negligible	Negligible
Maintenance and use of the maritime exclusion zone	Maritime Transport / Traffic	Negligible	Negligible	Negligible
Traffic on the road network of heavy vehicles, construction machinery, waste transport vehicles and trucks due to the implementation of the project's decommissioning works	Road Network/Transportation/Traffic	Negligible	Negligible	Negligible
Production of liquid and solid waste due to project decommissioning works	Systems for the collection, transport, disposal, and management of liquid and solid waste	Negligible	Negligible	Negligible

9.4 OVERALL IMPACT ASSESSMENT

A summary of the expected impacts from the implementation, operation, and decommissioning of the interventions of the **proposed project modification** is presented in matrix form in the following table, which also summarizes both the corresponding assessment of the approved EIA of the licensed project (per Environmental Parameter), as well as the overall/cumulative impacts in all phases of the life cycle of the **overall modified project.**

Table 9 –17 : Summary of the expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed modification of the project, the corresponding impacts of the approved EIA, and the total/cumulative impacts in all phases of the life cycle of the overall modified project.

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
Climatic and Bioclimatic Characteristics				
Construction Phase				
GHG emissions from the construction of land-based facilities	Climate / Climate Change	**Low**	**NA**	**Low**
GHG emissions from the construction of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable	Climate / Climate change	**Small**	**Small**	**Small**
GHG emissions from drilling operations	Climate / Climate change	**Small**	**Small**	**Small**
Emissions from the construction of the Omega platform	Climate / Climate change	**NA**	**Small**	**Small**
Operational phase				
Emissions from CO_2transport to offshore storage facilities in Prinos	Climate / Climate change	**Small**	**Small**	**Small**
GHG emissions from CO_2injection	Climate / Climate change	**Small**	**Small**	**Small**
GHG emissions from water pumping	Climate / Climate change	**Small**	**Small**	**Small**
GHG emissions from infrastructure and equipment maintenance and repair activities	Climate / Climate change	**Small**	**Small**	**Small**
GHG emissions from daily ship traffic due to project operations (including employee transportation and support ship movements)	Climate / Climate change	**Small**	**Small**	**Small**

[137] In the event that, in terms of its Final Assessment, an impact exceeds the classification of "Minor," this column includes the "Final Residual Impacts," as assessed by applying the prevention/mitigation/response measures proposed in **Chapter 10** of this document. The same applies to the estimates of the approved EIA presented in this Table.

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
CO_2storage from Project operation	Climate / Climate change	Positive	Positive	Positive
Shutdown/Decommissioning Phase				
Emissions from the dismantling of land-based facilities – Restoration of land area occupied by the Project	Climate / Climate Change	Small	NA	Low
Emissions from the decommissioning/decommissioning of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable	Climate / Climate change	Small	Small	Small
GHG emissions from the decommissioning/removal of offshore facilities (wells)	Climate / Climate change	Small	Small	Small
GHG emissions from the decommissioning/dismantling of the Omega offshore platform	Climate / Climate change	NA	Small	Small
Morphological and Landscape Characteristics				
Construction Phase				
Construction of land facilities	Morphology of land area	Negligible	NA	Negligible
Construction of land facilities	Landscape	Small	NA	Small
Construction of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable	Seabed morphology	Negligible	Negligible	Negligible
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable	Landscape	Minor	Minor	Minor
Drilling	Seabed morphology	Negligible	Negligible	Negligible
Drilling operations	Landscape	Small	Small	Small
Installation works for the Omega offshore platform	Seabed morphology	NA	Negligible	Negligible
Installation works for the Omega offshore platform	Landscape	NA	Small	Small
Operational phase				
Physical presence – Operation of land facilities	Morphology of land area	Negligible	NA	Negligible
Physical presence – Operation of land facilities	Landscape	Small	NA	Small
Physical presence – Operation of Omega platform	Landscape	NA	Small	Small
Phase of Cessation of Operation/Dismantling				

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
Dismantling of Land Facilities	Morphology of land area	Negligible	NA	Negligible
Restoration of Land Area of Project Facility	Land morphology	Positive	NA	Positive
Dismantling of Land Facilities	Landscape	Small	NA	Minor
Restoration of land area occupied by the Project	Landscape	Positive	NA	Positive
Dismantling of the Omega platform	Seabed morphology	NA	Small	Small
Dismantling of the Omega platform	Landscape	NA	Small	Small
Geological, Tectonic, and Soil Characteristics				
Construction Phase				
Construction of land facilities	Geological characteristics	Negligible	NA	Negligible
Construction of land facilities	Soil characteristics	Negligible	NA	Negligible
Construction of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable	Seabed quality characteristics and structure	Small	Small	Small
Drilling operations	Quality characteristics and structure of the seabed	Small	Small	Small
Drilling operations	Geological characteristics and submarine geological formations	Negligible	Negligible	Negligible
Omega platform installation works	Quality characteristics and structure of the seabed	NA	Small	Small
Omega platform installation works	Geological characteristics and submarine geological formations	NA	Negligible	Negligible
Operational phase				
Natural presence – Operation of land-based facilities	Terrain characteristics	Negligible	NA	Negligible
Physical presence and operation of facilities – CO_2injection into geological formations	Tectonics	Small	Minor	Small
Shutdown/decommissioning phase				
Production of solid and liquid waste during decommissioning	Soil characteristics	Negligible	NA	Negligible
Restoration of the land area of the Project site.	Soil characteristics	Positive	NA	Positive
Cessation of operation/decommissioning of offshore pipelines and cables	Quality characteristics and structure of the seabed	Small	Small	Minor

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
Decommissioning/Removal of offshore installations (excluding submarine pipelines and cable)	Seabed quality characteristics and structure	Small	Small	Minor
Waters				
Construction phase				
Construction works for land facilities	Quality characteristics of marine and coastal waters	Small	NA	Small
Construction work for the installation of pipelines (CO_2transport pipeline and produced water transport pipeline) and the power supply cable	Quality characteristics of marine and coastal waters	Small	Small	Small
Drilling works	Quality characteristics of marine and coastal waters	Small	Small	Small
Construction work for the installation of the Omega offshore platform	Quality characteristics of marine and coastal waters	NA	Small	Small
Construction works for onshore facilities	Quantitative characteristics of water resources in the area	Small	NA	Small
Construction work on pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Quantitative characteristics of water resources in the area	Small	Small	Small
Drilling works	Quantitative characteristics of water resources in the area	Small	Small	Small
Construction work for the installation of the Omega offshore platform	Quantitative characteristics of water resources in the area	NA	Small	Small
Operational phase				
Maintenance of offshore pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Quality characteristics of marine and coastal waters	Small	Small	Low
Operation of offshore facilities (Omega platform and related equipment)	Quality characteristics of marine and coastal waters	Small	Small	Small
Project operation	Quantitative characteristics of water resources	Small	Small	Small
Shutdown/decommissioning phase				
Cessation of operation and decommissioning of the project's land-based facilities	Quality characteristics of marine and coastal waters	Minor	NA	Low
Dismantling of the project's land facilities and restoration of the area where they were located	Quality characteristics of marine & coastal, surface and groundwater	Positive	NA	Positive
Cessation of operation of pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Quality characteristics of marine & coastal waters	Low	Low	Minor
Cessation of drilling operations	Quality characteristics of marine and coastal waters	Small	Small	Minor

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
Cessation of operations and decommissioning of the Omega offshore platform	Quality characteristics of marine and coastal waters	NA	Minor	Minor
Decommissioning and dismantling of project facilities	Quantitative characteristics of water resources in the area	Small	Small	Small
Atmospheric Environment				
Construction phase				
Air pollutant emissions from the construction of land-based facilities	Atmospheric environment	Negligible	NA	Negligible
Air pollutant emissions from the construction of pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Atmospheric environment	Negligible	Negligible	Negligible
Air pollutant emissions from drilling operations	Atmospheric environment	Negligible	Negligible	Negligible
Air pollutant emissions from the offshore platform installation	Atmospheric environment	NA	Negligible	Negligible
Operational phase				
Atmospheric emissions during CO_2 reception and CO_2 transport to offshore storage facilities in Prinos	Atmospheric environment	Negligible	Negligible	Negligible
Gaseous pollutants from CO_2injection	Atmospheric environment	Negligible	Negligible	Negligible
Gaseous pollutants from water pumping	Atmospheric environment	Negligible	Negligible	Negligible
Gaseous pollutants from infrastructure and equipment maintenance and repair activities	Atmospheric environment	Negligible	Negligible	Negligible
Gaseous pollutants from daily ship traffic due to the operation of the Project (including employee transportation and support ship movements)	Atmospheric environment	Negligible	Negligible	Negligible
Shutdown/Decommissioning Phase				
Gaseous pollutants from the dismantling of land-based facilities – Restoration of the land area of the Project facility	Atmospheric environment	Negligible	NA	Negligible
Cessation of Operation / Decommissioning of offshore transport pipelines (CO_2transport pipeline and produced water transport pipeline) and power supply cable	Atmospheric environment	Negligible	Negligible	Negligible
Cessation of operation / dismantling of boreholes	Atmospheric environment	Negligible	Negligible	Negligible
Cessation of Operation / Decommissioning of the Omega offshore platform	Seabed quality characteristics and structure	Negligible	Negligible	Negligible
Acoustic Environment and Vibrations				

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
Construction phase				
Construction of pipelines (CO_2transport pipeline and produced water transport pipeline) and power cable	Underwater Noise	Low	NA	Low
Drilling work	Underwater Noise	Small	Small	Small
Drilling operations	Vibrations	Minor	Small	Small
Installation of the Omega platform	Underwater Noise	NA	Small	Small
Installation of the Omega platform	Vibrations	NA	Small	Small
Construction of land facilities	Acoustic environment		NA	Minor
Construction of pipelines (CO2 transport pipeline and produced water transport pipeline) and power supply cable	Acoustic environment	Small	Small	Minimal
Drilling works	Acoustic environment	Minor	Small	Small
Installation of the Omega platform	Acoustic environment	NA	Small	Small
Operational phase				
• Receipt of CO_2 in containers (CO_2 parcels) • Transport of CO_2 to offshore storage facilities in Prinos • CO_2injection • Water pumping	Underwater noise	Small	Low	Low
Marine traffic	Underwater Noise	Low	Small	Small
• Receipt of CO_2 in containers (CO_2 parcels) • Transport of CO_2 to offshore storage facilities in Prinos • CO_2injection • Water pumping	Acoustic environment	Low	Low	Low
Maritime traffic	Acoustic environment	Low	Low	Low
Shutdown/decommissioning phase				
Dismantling of equipment and removal of land-based installations	Acoustic environment	Minor	NA	Low
Onshore decommissioning of parts of the offshore platform and recycling of material	Acoustic environment	NA	Minor	Minor
Road transport (of personnel, equipment, and materials) in the context of the decommissioning of the Project under consideration and	Acoustic environment	Minor	NA	Minor

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
restoration of the onshore intervention area				
Dismantling of equipment and removal of offshore installations	Acoustic environment	Small	Small	Minor
Maritime transport and transportation (of personnel, equipment, and materials) in the context of offshore facility decommissioning work	Acoustic environment	Small	Small	Minor
Dismantling of the Project under consideration and restoration of the land area affected	Acoustic environment	Positive	NA	Positive
Natural Biotic Environment				
Construction phase				
Construction of the land section of the CO_2transport pipeline	Land Habitats	Small	NA	Small
	Land Mammals	Negligible	NA	Negligible
	Amphibians and Reptiles	Small	NA	Small
Construction of the CO_2transfer pipeline, the produced water transfer pipeline, and the power supply cable.	Marine habitats	Negligible	Negligible	Negligible
	Marine mammals	Small	Small	Small
	Sea turtles	Small	Small	Small
	Fish	Small	Small	Small
	Bird fauna	Small	Small	Small
	Areas of the National System of Protected Areas	Small	Small	Small
	Other Important Natural Areas	Small	Small	Small
Drilling operations	Marine habitats	Negligible	Negligible	Negligible
	Marine mammals	Small	Small	Small
	Sea turtles	Small	Small	Small
	Fish	Small	Small	Small
	Bird fauna	Small	Small	Small

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
	Areas of the National System of Protected Areas	Small	Small	Small
	Other Important Natural Areas	Small	Small	Small
Installation works for the Omega offshore platform	Marine habitats	NA	Negligible	Negligible
	Marine mammals	NA	Small	Small
	Sea turtles	NA	Small	Small
	Fish	NA	Small	Small
	Bird fauna	NA	Small	Small
	Areas of the National System of Protected Areas	NA	Small	Small
	Other Important Natural Areas	NA	Small	Small
Operational Phase				
CO_2transport to the offshore storage facilities in Prinos (*section of pipeline to be installed on the coast*)	Terrestrial habitats	Small	NA	Small
Pumping water from the reservoir and discharging the treated water into the marine environment during project operation	Marine habitats	Negligible	Negligible	Negligible
	Marine mammals	Small	Small	Small
	Sea turtles	Small	Small	Small
	Fish	Small	Small	Small
	Bird fauna	Small	Small	Small
	Areas of the National System of Protected Areas	Small	Small	Small
	Other Important Natural Areas	Small	Small	Small
Daily boat traffic due to project operations (including employee transportation and support boat movements)	Marine habitats	NA	NA	NA
	Marine mammals	NA	NA	NA
	Sea turtles	Small	Small	Small
	Fish	NA	NA	NA

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
	Bird fauna	NA	NA	NA
	Areas of the National System of Protected Areas	Small	Small	Small
	Other Important Natural Areas	Small	Small	Small
Definition/maintenance of a no-anchoring and no-fishing zone during the operation of the Project.	Marine habitats	Positive	Positive	Positive
	Marine mammals	Positive	Positive	Positive
	Sea turtles	Positive	Positive	Positive
	Fish Fauna	Positive	Positive	Positive
	Bird fauna	Positive	Positive	Positive
	Areas of the National System of Protected Areas	Positive	Positive	Positive
	Other Important Natural Areas	Positive	Positive	Positive
Shutdown/Decommissioning Phase				
Shutdown/decommissioning of the additional section of the CO_2transport pipeline, the produced water transport pipeline, and the power supply cable	Marine habitats	Negligible	Negligible	Negligible
	Marine mammals	Small	Small	Small
	Sea turtles	Small	Small	Small
	Fish fauna	Small	Small	Small
	Bird fauna	Small	Small	Small
	Areas of the National System of Protected Areas	Small	Small	Small
	Other Important Natural Areas	Small	Small	Small
Dismantling of the Omega platform	Marine habitats	NA	Negligible	Negligible
	Marine mammals	NA	Small	Small
	Sea turtles	NA	Small	Small
	Fish	NA	Small	Small

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
	Bird fauna	NA	Small	Small
	Areas of the National System of Protected Areas	NA	Small	Small
	Other Important Natural Areas	NA	Small	Small
Spatial Planning, Land Use, and Marine Use				
Construction Phase				
Offshore pipelines and submarine CO_2transport cable: Definition of exclusion zones due to pipeline and cable installation works (and related works/activities).	Maritime uses	Negligible	Negligible	Negligible
Offshore installations (excluding offshore pipelines and submarine cable): Definition of exclusion zones due to drilling works.	Marine uses	Negligible	Negligible	Negligible
Cessation of operation/decommissioning of offshore pipelines and cable: Definition of exclusion zones due to the implementation of offshore pipeline and cable decommissioning works.	Marine uses	Negligible	Negligible	Negligible
Cessation of operation/decommissioning of offshore installations (excluding offshore pipelines and submarine cable): Definition of exclusion zones due to the implementation of offshore installation decommissioning works.	Marine uses	Negligible	Negligible	Negligible
Operation phase				
Physical presence and location of offshore infrastructure	Marine uses	Negligible	Negligible	Negligible
Maritime traffic: Definition of exclusion zones due to project operation	Marine uses	Negligible	Negligible	Negligible
Shutdown/decommissioning phase				
Decommissioning/Removal of offshore pipelines and cable: Definition of exclusion zones due to the implementation of offshore pipeline and cable removal works.	Marine uses	Negligible	Negligible	Negligible
Cessation of operation/decommissioning of offshore installations (excluding offshore pipelines and submarine cable): Definition of exclusion zones due to the implementation of offshore installation decommissioning works.	Marine uses	Negligible	Negligible	Negligible
Socio-economic environment				

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
Construction phase				
Construction of land facilities - Emissions, air pollutants, and noise	Tourism	Small	NA	Low
Construction of offshore facilities - Emissions, air pollutants, and noise	Tourism	NA	Small	Small
Mobilization (recruitment, employment, engagement) of the workforce	Other economic activities	Positive	Positive	Positive
Supply chain and procurement issues relating to the construction materials, resources, and services required for the implementation of the project.	Other economic activities	Positive	Positive	Positive
Mobilization (recruitment, employment, engagement) of the workforce	Employment and workforce	Positive	Positive	Positive
Supply chain and procurement issues relating to the construction materials, resources, and services required for the implementation of the project.	Employment and workforce	Positive	Positive	Positive
Operation phase				
Maritime traffic - Definition of exclusion zones due to project operation.	Fishing/aquaculture - local fish populations	Positive	Positive	Positive
Project operation - Offshore facilities (excluding offshore pipelines and submarine cable)	Tourism	Minor	Small	Small
Emissions of atmospheric pollutants and noise during CO_2collection	Tourism	Small	Small	Small
Mobilization (recruitment, employment, engagement) of labor force	Other economic activities	Positive	Positive	Positive
Supply chain and procurement issues relating to the operation of the project.	Other economic activities	Positive	Positive	Positive
Mobilization (recruitment, employment, engagement) of the workforce	Employment and workforce	Positive	Positive	Positive
Supply chain and procurement issues relating to the construction materials, resources, and services required for the implementation of the project.	Employment and workforce	Positive	Positive	Positive
Decommissioning/Dismantling Phase				
Shutdown/Dismantling of offshore facilities (excluding offshore pipelines and submarine cable): Maritime traffic - Definition of exclusion zones due to the decommissioning of offshore installations.	Fishing/aquaculture	Positive	NA	Positive
Emissions of atmospheric pollutants and noise during the dismantling of	Tourism	Low	NA	Low

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
onshore facilities - restoration of onshore facility area				
Emissions of air pollutants and noise during the decommissioning of offshore facilities (excluding offshore pipelines and submarine cables)	Tourism	NA	Low	Small
Mobilization (recruitment, employment, engagement) of labor force	Other economic activities	Positive	Positive	Positive
Supply chain and procurement issues relating to the cessation of operations/decommissioning of the project.	Other economic activities	Positive	Positive	Positive
Unemployment: Mobilization (recruitment, employment, engagement) of the workforce	Employment and workforce	Positive	Positive	Positive
Relocation: Supply chain and procurement issues for the construction materials, resources, and services required for the project implementation.	Employment and workforce	Low	Positive	Positive
Cessation of operations: Discontinuation of workforce activities	Employment and workforce	Small	Small	Minor
Health and Safety				
Construction phase				
Construction work	Health and safety at work	Minor	Minor	Low
Construction activities	Public health	Positive	Positive	Positive
Operational Phase				
Operational tasks	Health and safety at work	Minor	Small	Low
Operational activities	Public health	Positive	Positive	Positive
Shutdown/Decommissioning Phase				
Decommissioning work	Health and safety at work	Minor	Minor	Low
Decommissioning activities	Public health	Positive	Positive	Positive
Technical Infrastructure				
Construction Phase				
Installation of transfer pipes (CO_2transfer pipe and produced water transfer pipe), electrical power cable, drilling of boreholes, and installation of the new Omega platform platform (including	Maritime Transport / Traffic	Negligible	Negligible	Negligible

Activity	Recipient	Final Impact Assessment [137]		
		Licensed Project	Proposed Modification	Total Modified Project
transport of workers and support vessels)				
Maintenance, limited expansion, and use of the maritime exclusion zone	Maritime Transport / Traffic	Negligible	Negligible	Negligible
Traffic on the road network of heavy vehicles, construction machinery, vehicles and trucks transporting construction materials and waste due to the implementation of the construction works of the project under consideration	Road Network/Transportation/Traffic	Negligible	Negligible	Negligible
Production of liquid and solid waste due to the implementation of construction works	Systems for the collection, transport, disposal, and management of liquid and solid waste	Negligible	Negligible	Negligible
Operation phase				
Daily vessel traffic due to project operation (including employee transportation and support vessel movements).	Maritime Transport / Traffic	Negligible	Negligible	Negligible
Maintenance and use of the maritime exclusion zone	Maritime Transport / Traffic	Negligible	Negligible	Negligible
Road network congestion due to project operation	Road Network/Transportation/Traffic	Negligible	Negligible	Negligible
Production of liquid and solid waste due to project operation	Systems for the collection, transport, disposal, and management of liquid and solid waste	Negligible	Negligible	Negligible
Shutdown/Decommissioning Phase				
Decommissioning of offshore installations (including transport of workers and support vessels)	Maritime Transport/Traffic	Negligible	Negligible	Negligible
Maintenance and use of the maritime exclusion zone	Maritime Transport / Traffic	Negligible	Negligible	Negligible
Traffic on the road network of heavy vehicles, construction machinery, waste transport vehicles and trucks due to the implementation of the project's decommissioning works	Road Network/Transportation/Traffic	Negligible	Negligible	Negligible
Production of liquid and solid waste due to project decommissioning works	Systems for the collection, transport, disposal, and management of liquid and solid waste	Negligible	Negligible	Negligible

The conclusions drawn from the above **table** are analyzed in the following paragraphs.

Construction Phase

During the Construction Phase of the proposed project modification, negligible and minor negative impacts (and in any case compatible with environmental protection objectives) are expected on the following environmental parameters:

- Climatic and Bioclimatic Characteristics (minor impacts).
- Morphological and Landscape Characteristics (negligible to minor impacts).
- Geological, tectonic, and soil characteristics (negligible to minor impacts).
- Natural - Biotic Environment (negligible to minor impacts).
- Anthropogenic Environment (negligible to minor impacts).
- Technical Infrastructure (negligible impact).
- Air Quality (negligible impacts).
- Acoustic Environment and Vibrations (minor impacts).
- Water (minor impacts).

It is important to note that the Final Assessments of the impacts during the normal activities of the implementation phase of the proposed project modification did not exceed the classification **"Minor,"** with the exception of the following, which were assessed as **"Moderate"** as follows:

- Climate/Climate Change Impacts from GHG emissions from the construction of offshore pipelines (CO_2 and produced water transfer pipeline) and the power supply cable, GHG emissions from drilling operations, and GHG emissions from the installation of the offshore Omega platform.
- Impacts from underwater noise emissions during the installation of the Omega platform.
- Impacts on the natural environment from the construction of the subsea pipelines and cable, drilling operations, and the installation of the Omega offshore platform.

For impacts assessed as **"Moderate,"** following the implementation of the relevant measures proposed in **Chapter 11** of this study, the residual impacts are ultimately assessed as **"Minor"** and therefore the project is compatible with the environmental protection objectives that are prerequisites of this study.

Positive impacts are expected on the human environment from the mobilization (recruitment, employment, involvement) of the workforce, from supply chain issues and the procurement of the necessary construction materials, resources, and services related to the implementation of the proposed project modification, and from the implementation of Corporate Social Responsibility Actions.

Operation Phase

During the **Operation Phase** of the proposed project modification, negligible and minor negative impacts (and in any case compatible with environmental protection objectives) are expected on the following environmental parameters:

- Morphological and Landscape Characteristics (negligible and minor impacts).
- Geological, Tectonic, and Soil Characteristics (negligible and minor impacts).
- Natural - Biotic Environment (negligible and minor impacts).
- Anthropogenic Environment (negligible and minor impacts).
- Technical Infrastructure (negligible impacts).
- Air Quality (negligible impacts).
- Acoustic Environment and Vibrations (minor impacts).
- Water (minor impacts).

It is important to note that the Final Impact Assessments during the normal activities of the implementation phase of the proposed project modification did not exceed the classification **of "Minor."** with the exception of the following, which were assessed as **"Moderate"**:

- Impact on climate and climate change from GHG emissions from CO_2 to the offshore storage facilities at Prinos, CO_2 injection, water pumping, infrastructure and equipment maintenance and repair activities, and daily ship movements due to the operation of the Project (including the transport of workers and support vessels).
- Impacts on the natural environment from water pumping from the reservoir and discharge of treated water into the marine environment during project operation and daily vessel traffic due to project operation (including the transport of workers and the movement of support vessels)

For impacts assessed as **"Moderate,"** following the implementation of the relevant measures proposed in **Chapter 10** of this study, the residual impacts are ultimately assessed as **"Minor"** and therefore the project is compatible with the environmental protection objectives that are prerequisites of this study.

Positive impacts are expected on the following environmental parameters:

- Climate and climate change from CO_2storage from the operation of the Project.
- Natural and living environment from the designation/maintenance of a no-anchoring and no-fishing zone.
- The human environment, mainly from the mobilization (recruitment, employment, involvement) of the workforce, from supply chain issues and the procurement of the necessary resources and services related to the operation of the project, and from the implementation of Corporate Social Responsibility Actions.

Decommissioning/Dismantling Phase

During the **Decommissioning/Dismantling Phase** of the proposed project modification, negligible and minor negative impacts (and in any case compatible with environmental protection objectives) are expected on the following environmental parameters:

- Morphological and Landscape Characteristics (negligible and minor impacts).
- Geological, Tectonic, and Soil Characteristics (negligible and minor impacts).
- Natural - Biotic Environment (negligible and minor impacts).
- Anthropogenic Environment (negligible and minor impacts).
- Technical Infrastructure (negligible impacts).
- Air Quality (negligible impacts).
- Acoustic Environment and Vibrations (minor impacts).
- Water (minor impacts).

It is important to note that the Final Impact Assessments during the normal activities of the implementation phase of the proposed project modification did not exceed the classification **"Minor,"** with the exception of the following, which were assessed as **"Moderate"** as follows:

- Impacts on climate and climate change from GHG emissions from the dismantling and decommissioning of the Project facilities/decommissioning of offshore pipelines and cable
- Impacts on the living environment from the dismantling and removal of Project facilities.
- Impacts on employment and the workforce from the cessation of operations

For the impacts assessed as **"Moderate,"** following the implementation of the relevant measures proposed in **Chapter 10** of this document, the residual impacts are ultimately assessed as **"Minor"** and therefore the project is compatible with the environmental protection objectives that are prerequisites of this study.

Positive impacts are expected on the following environmental parameters:

- Anthropogenic environment, mainly from the mobilization (recruitment, employment, involvement) of the workforce, from supply chain issues and the procurement of the necessary resources and services related to the decommissioning of the project.

In conclusion, as documented in the above **sections** of this chapter, the overall expected impacts from the implementation, operation, and decommissioning of the interventions of the proposed amendment are assessed as Minor and Negligible and **cannot alter the final assessment of the potential impacts as included in the approved EIA of the project.** Even in the case of the impacts from the new elements of the project, as introduced by the proposed amendment to the project (such as the new Omega offshore platform), the estimated impacts are limited to minor and negligible impacts, which **do not alter any overall/cumulative impacts throughout all phases of the life cycle of the overall modified project.**

9.5 CUMULATIVE AND SYNERGISTIC IMPACTS

9.5.1 Cumulative Impacts from the Implementation of the Proposed Modification and the Licensed Project

This **section** presents the potentially significant **cumulative** and **synergistic impacts** of the proposed modifications in combination with the already licensed project.

It should be noted that, based on the analysis carried out in **Sections 9.3.1** to **9.3.11**, it is documented that there is no significant change in the potential impacts compared to those estimated in the approved EIA of the project (see the relevant paragraphs 'Differentiation of Potential Impacts from the Project Modification' included in each Environmental Parameter of **Sections 7.3.1** to 7.**3.11)** and therefore there appears to be no possibility of significant cumulative or synergistic action between the new impacts of the modification and those of the originally environmentally licensed project.

In conclusion, from the above analysis carried out in the context of this study, it appears that **there is no possibility of significant cumulative or synergistic effects between the new impacts of the modification and those of the originally environmentally licensed project.**

9.5.2 Cumulative Impacts from the Implementation of the Project and Other Projects in the Study Area

9.5.2.1 General Information

This section examines the potentially significant cumulative and synergistic impacts of **the overall modified project** (the licensed project incorporating the interventions of the proposed modification) with other existing and planned projects and activities of a similar scale in the study area.

Cumulative effects are considered to be the total of the potential effects of many individual projects or activities that either constitute a single project (or activity) for environmental licensing or are part of a set of projects (activities) of the same or similar type or, in any case, of a corresponding or similar size in the same spatial unit. **Synergistic effects** are those that arise from individual projects (activities) but, when combined, have a multiplicative effect and result in effects that are greater in intensity and nature than the cumulative total of the individual effects.

9.5.2.2 Assessment of Cumulative Effects

In the immediate vicinity of the overall modified project, there are no other similar or smaller development or production projects (CO_2capture and storage) that could practically be taken into account in terms of their negative impacts on the present project. However, there may be interaction between the proposed project and projects of a similar nature and size that are being implemented or planned at national level.

The CO_2 project in Prinos is the first initiative of its kind in Greece and the southeastern Mediterranean and, as such, cannot record interactions with projects of a similar nature and size at the national level, as no such projects exist, are not being implemented or planned at this time. According to the revised NECP, two projects have already been approved for co-financing by the Innovation Fund: the IRIS project for $CO_{(2)}$ capture at a hydrogen production unit at a refinery in Corinth, and the IFESTOS project for CO_2 at a cement production plant in Boeotia. However, as these projects are at a very early stage of planning, it is not possible to assess the potential impacts in combination with the project. Nevertheless, it is important to note that in any case, due to the nature and general technical characteristics of these projects, any potential cumulative environmental and social impacts are expected to be **mostly positive.**

Recently, developments have been taking place both at **national level** (National Climate Law (4936 FEK A 105/27.5.2022) as amended and in force, ESEK, MS 2050, Regional Plans for Adaptation to Climate Change, etc.), as well as at **European** level (European Green Deal, Framework for Climate and Energy for 2030, EU Strategy on Adaptation to Climate Change) and **international** [Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC)] a coordinated effort focused on energy transition, reducing GHG emissions and ultimately achieving climate neutrality.

In this context, EnEarth has designed and plans to implement a full-scale CO_2 facility in Prinos, capable of storing a significant amount of CO_2 with a corresponding significant offset of emissions, both at regional and national level. Therefore, the overall modified project has a strong direct and indirect interaction with a wide range of actions, activities, and infrastructure aimed at halting/combating climate change and achieving climate neutrality.

In conclusion, although there is no interaction between the overall modified project and projects of the same nature and similar size at national level, as such projects do not exist, are not being implemented and are not currently planned, it is nevertheless easy to see that it has a strong direct and indirect interaction with a wide range of actions, activities, and infrastructure (at national, European, and international level) aimed at halting/combating climate change and achieving climate neutrality in terms of their environmental footprint.

9.5.2.3 Assessment of Synergistic Effects

As presented in detail in **Section 5.11** of this Study**,** the overall modified project may interact with other projects or activities at the following three levels:

- **1ο Level**. Interaction with future infrastructure and activities to be developed at a later stage of the future Project's maturity, part of which is the overall modified project under consideration in this Study.
- **2ο Level**. Interaction with other projects and activities existing in the immediate or wider area of the overall modified project.
- **3ο Level**. Interaction with projects of the same nature and similar size that are being implemented or planned at national level.

More specifically, the interactions of Levels [1]and 2, which may also cause synergistic effects, are summarized below.

Level[1]. Interaction with future infrastructure and activities to be developed at a later stage of the future Project's maturity, part of which is the overall modified project examined in this study. As has been repeatedly emphasized, the subject of this Environmental Impact Assessment (EIA) Study is Phase 1 of the Project (the licensing of Phase 2 of the Project is not the subject of this study and will be implemented at the appropriate stage of its design maturity, through a request for modification of the approved environmental terms and a new, independent EIA).

2ο Level. Interaction with other projects and activities existing in the immediate or wider area of the overall modified project. The **Prinos offshore development project** and the **Sigma onshore industrial unit,** as described below, are located in the immediate vicinity of the Project.

According to the current AEPO DIPA/8413/24.04.2018 (ADA: ΨΓΛ14653Π8-Ζ79), the **Prinos Offshore Development project** concerns the existing offshore oil and gas extraction facilities located in the Gulf of Kavala, in the northeastern Aegean Sea, and its expansion with two new platforms, one of which is long-term. The total production capacity is 27,000 barrels/day of stabilized crude oil.

The existing offshore project consists of the following individual facilities:

- **Kappa** platform located in the sweet natural gas field, not derived from an oil field, in South Kavala.
- A 12 km, 6" pipeline (8-12 barg operating pressure) that transports sweet natural gas and condensate from South Kavala (Kappa platform) to the Delta platform in Prinos.
- **Alpha** and **Beta** production platforms, twelve drilling heads (wells) each, which are part of the Prinos complex, are connected by bridges to the Delta platform and are designed to accommodate drilling, repair, maintenance, and any other suitable drilling rigs.
- The **Delta** processing platform contains all the offshore initial processing facilities and currently receives the oil, natural gas, water, and condensate produced from the Prinos, North Prinos, and Epsilon fields. The Delta platform is connected by bridges to the Alpha and Beta platforms and to its flare. New vertical connection pipes (risers) are being added to the Delta platform to enable the reception of fluids produced by the Lambda platform (and possibly the Omicron platform) and to send natural gas (gas lift) and water for injection to the Lambda platform. A vertical protective pipe is also being added for the installation of the multi-carrier cable that will carry power, data, communications, and auxiliary fluids to the Lambda platform.
- Prinos platform complex **flare**.
- 18 km, 12" pipeline (8 barg operating pressure) for the transport of sour natural gas from the Delta platform to the onshore facilities.
- 18 km, 8” pipeline (20-40 barg operating pressure) for transporting crude oil from the Delta platform to the onshore facilities.
- 18 km, 5.3” pipeline for transporting sweet natural gas (gas lift) from the onshore facilities to the Delta platform.
- Two submarine power cables, each with a capacity of 10 kVA, from the onshore facilities to the Prinos platform complex.

The **Sigma onshore industrial unit** includes facilities for desalination, dehydration, stabilization, and desulfurization of the crude oil produced, conversion of the acid gas produced into sweet gas, the production

of liquid and solid sulfur, as well as the necessary facilities for the safe storage and handling of the crude oil, natural gas, and sulfur produced.

In the wider study area (which for the purposes of this **Section** consists of the Gulf of Kavala), there are a number of infrastructures and activities that could potentially interact with the proposed Project, specifically the following:

- The ports of Kavala (the commercial port "Philippos II" and the passenger port "Apostolos Pavlos").
- Keramotis passenger port.
- Part of the PATHE motorway.
- Wastewater treatment plants (WWTP).
  - Kavala WWTP (GR115001016) with discharge into the sea.
  - WWTP of Paleo Tsiflikio (GR 11500101117) with discharge into the sea.
  - WWTP of Philippi (GR 1150100118) with flow discharge.
  - WWTP of Nea Peramos (GR 1150030115) with flow discharge.
  - EEL Chrysoupoli (GR 115011018) with flow discharge.
  - EEL Limenas Thasou (GR 1150040116) with discharge into the sea.
- Hellenic Fertilizers (ELFE), originally founded in 1961 (as Phosphate Fertilizer Industry S.A. (PFI)), began operating in Nea Karvali in 1965. The facilities include:
  - Ammonia production unit.
  - Nitric acid and nitrate fertilizer production unit.
  - A sulfuric acid production unit.
  - A phosphoric acid production unit.
  - A compound fertilizer production unit.
- Coral Oil, located adjacent to the SIGMA facilities, and Revoil, approximately 1.5 km to the north, which operate as fuel storage and distribution sites.

The interaction of the proposed project with the above has been thoroughly examined in the context of assessing the potential impacts of the proposed project on each Environmental Parameter, and the **Synergy (SI)** parameter of the impact has been incorporated into the equation for calculating the quantified value of the significance of each potential impact (for details, refer to **Section '9.1.2.2.1 Calculation of the Significance of Impacts'**).

In conclusion, the documentation presented in **the sections** evaluating the potential impacts on each Environmental Parameter shows that **no significant adverse synergistic impacts are expected** in the context of the proposed project.

9.6 Assessment of Potentially Significant Impacts Arising from the Vulnerability of the Project to Project-Related Accident or Disaster Risks (Emergency Conditions / Unplanned Events)

The purpose of this chapter is to assess the potential impacts arising from the vulnerability of the proposed project modification interventions to the risk of serious accidents or disasters in accordance with the requirements of Joint Ministerial Decision 1915/2018.

9.6.1 Risk Investigation

9.6.1.1 Potential Leakage Routes

9.6.1.1.1 Possible Leakage Routes in CO_2Storage Projects

Possible leakage routes for any CO_2storage site and complex include:

- Leakage through old wells: Old wells are exposed to high pressures and high concentrations of injected CO_2.
- Leakage through the overlying formation: Potential leakage pathways depend on the extent and thickness of the overlying formation, including phase changes or corrosion. To evaluate potential leakage through the overlying formation, mapping using seismic and drilling data is required. Finally, potential leaks may be due to geochemical degradation of the quality of the overlying formation, including changes in permeability along fracture and fault zones. This process depends on the geochemistry of each layer and the potential interactions of $CO_2$with the geological formation and the fluids it contains.
- Leakage through faults and fractures: This leakage mechanism depends on the fracturing of the overlying formation and the increase in pressure at the storage site. It may also be related to microseismicity caused by fracturing. This CO_2 leakage mechanism can occur through natural (existing) faults and/or fractures. Obviously, not all fractures are potential leakage pathways, as some of them are closed or sealed. The likelihood of leakage through fractures depends on the distribution of fractures/cracks, their characteristics, and their geomechanical response. This potential $CO_{(2)}$leakage mechanism could occur through reactivation of the faults as a result of increased reservoir pressure or natural seismicity.
- Lateral leakage through deeper structural features: This potential CO_2leakage mechanism occurs through a deeper structural feature in the event that the reservoir is overfilled. It depends on the structure of the storage site and the management of its capacity during injection through monitoring and operational strategy.
- Lateral migration: This refers to storage sites without structural closure and mainly concerns sites based on residual trapping in formation pores. This potential leakage mechanism refers to the migration of CO_2 outside the lateral boundary of the storage site and complex (e.g., through upward migration) and depends on the existing phases, rock types, and permeability of the formation.

9.6.1.1.2 Possible CO_2Leakage Pathways in the Proposed Modification of the y Project

The potential CO_2leakage pathways in the subsurface outside the predefined field and the Prinos storage complex are described below. Three main categories have been identified: two possible leakage pathways related to the subsurface, vertical and lateral, and a third possible leakage pathway related to existing boreholes. This assessment of migration pathways outside the predefined storage complex is carried out with the aim of identifying potential leakage pathways on which the Monitoring Plan should focus.

There are additional potential leaks that may occur in the surface infrastructure, mainly related to potential pipeline leaks, which are discussed below.

9.6.1.1.2.1 Potential Vertical Leakage Routes in the Subsoil of Prinos

There are 5 possible leakage routes related to the subsoil that are characterized as vertical:

V1: This refers to CO_2leakage along a (theoretically reactivated) NE-SW fault, known as Fault 17, located on the western slope of the Prinos anticline structure, at the convergence between the Prinos and Epsilon structures. This leakage path is shown in **Figure 9- 12.**

V2: Refers to CO_2leakage along the northeast fault boundary separating Prinos from North Prinos (**Figure 9- 11** and **Figure 9- 13).**

V3: Refers to CO_2leakage along the NW-SE fault (sloping towards the SW) that overlaps the Prinos structure (**Figure 9- 12, Figure 9- 13, Figure 9- 14, Figure 9- 15)**

V4: Refers to CO_2leakage along the NW-SE fault (sloping towards the NE) - South fault delimiting Prinos (**Figure 9- 13, Figure 9- 15)**

V5: Refers to CO_2leakage through the overlying formation through the primary seal and secondary containment system.

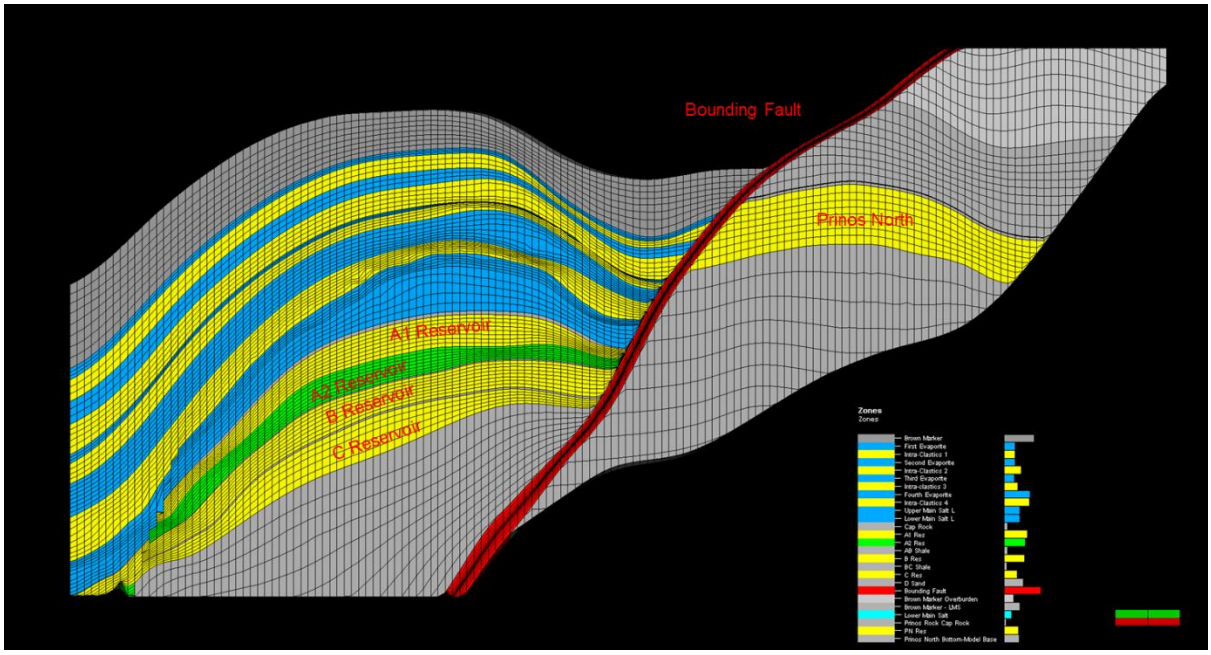


Figure9 –11 : Depiction of the fault separating Prinos from North Prinos

9.6.1.1.2.2 Possible Lateral Leakage Pathways in the Prinos Subsurface

There are three possible leakage routes related to the subsoil that are characterized as lateral:

L1: Refers to CO_2leakage through lateral movement to deeper points of the structure on its western side and ultimately to the migration of CO_2through the syncline (leakage point) in the Epsilon structure. This leakage path is shown in **Figure 9- 12.**

L2: Refers to CO_2leakage through the north-eastern fault boundary of Prinos (vertical leakage path - V2) in North Prinos. This leakage path is shown in **Figure 9- 14.**

L3: Refers to CO_2leakage along the NW-SE fault (sloping towards the SW) (vertical leakage path - V4) and the movement of the plume in the clastic sedimentary zones (below the Messinian evaporites) with migration towards the SW within the Prinos basin. This leakage path is also shown in **Figure 9-14.**

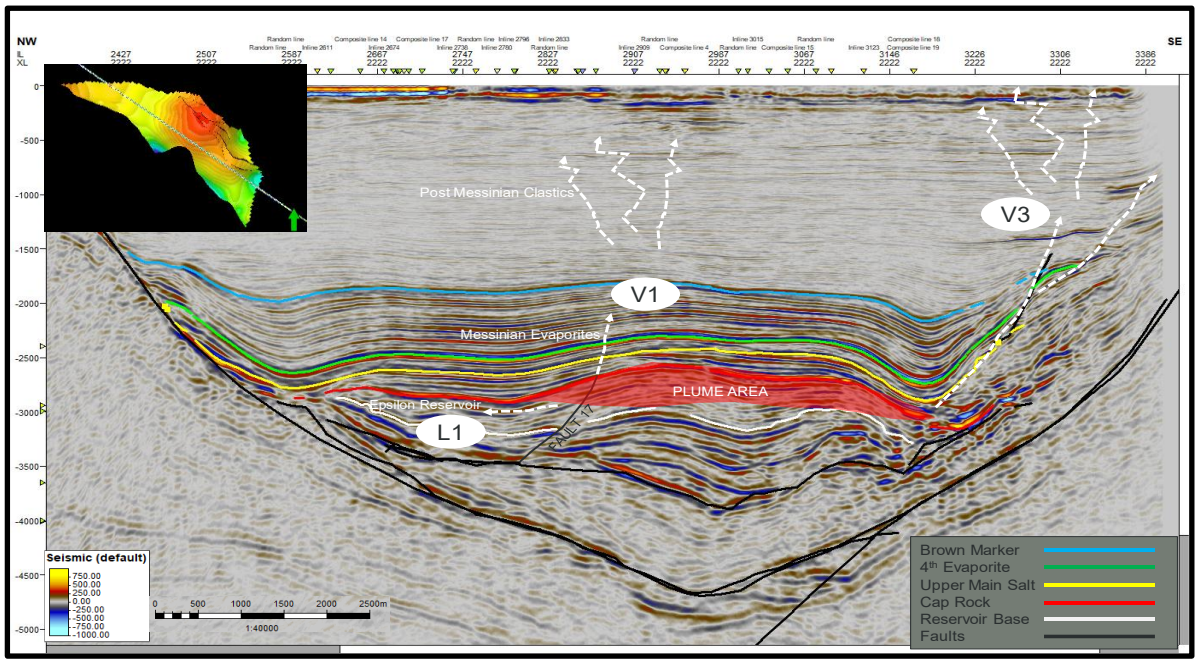


Figure9 –12 : Seismic section along the NW-SE direction with the possible lateral leakage paths L1 and the vertical paths V1 and V3

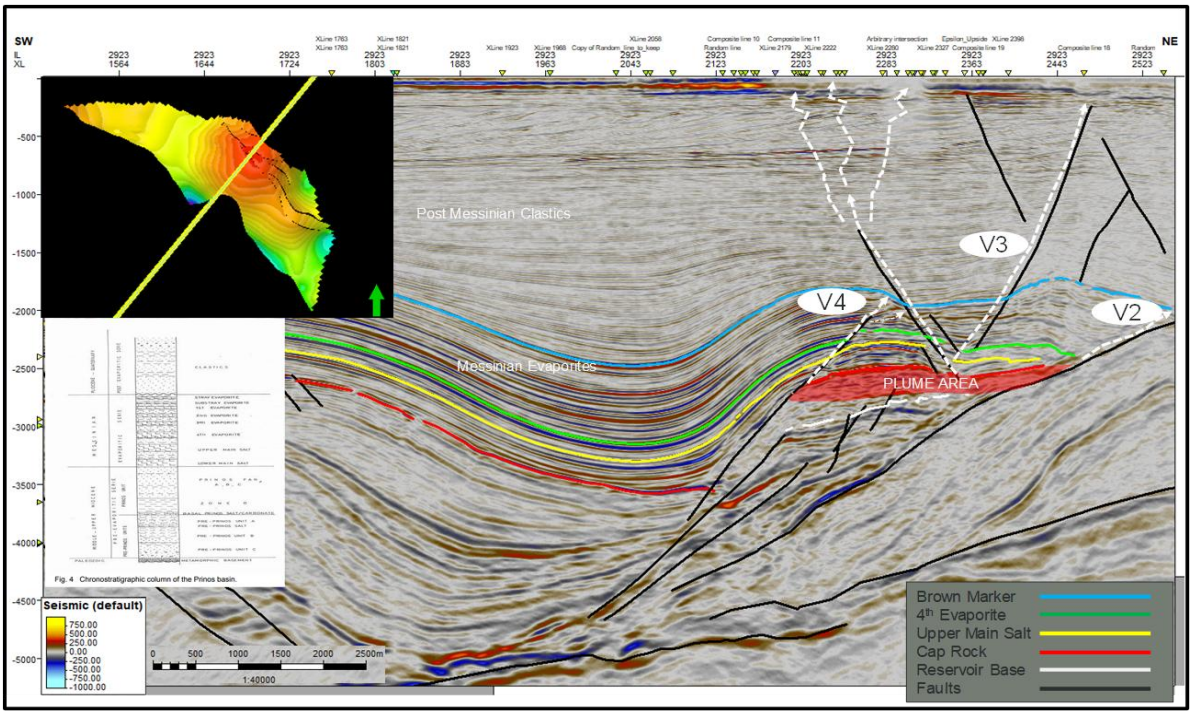


Figure9 –13 : Seismic section along the SW-NE direction with the vertical possible leakage paths V2, V3, and V4

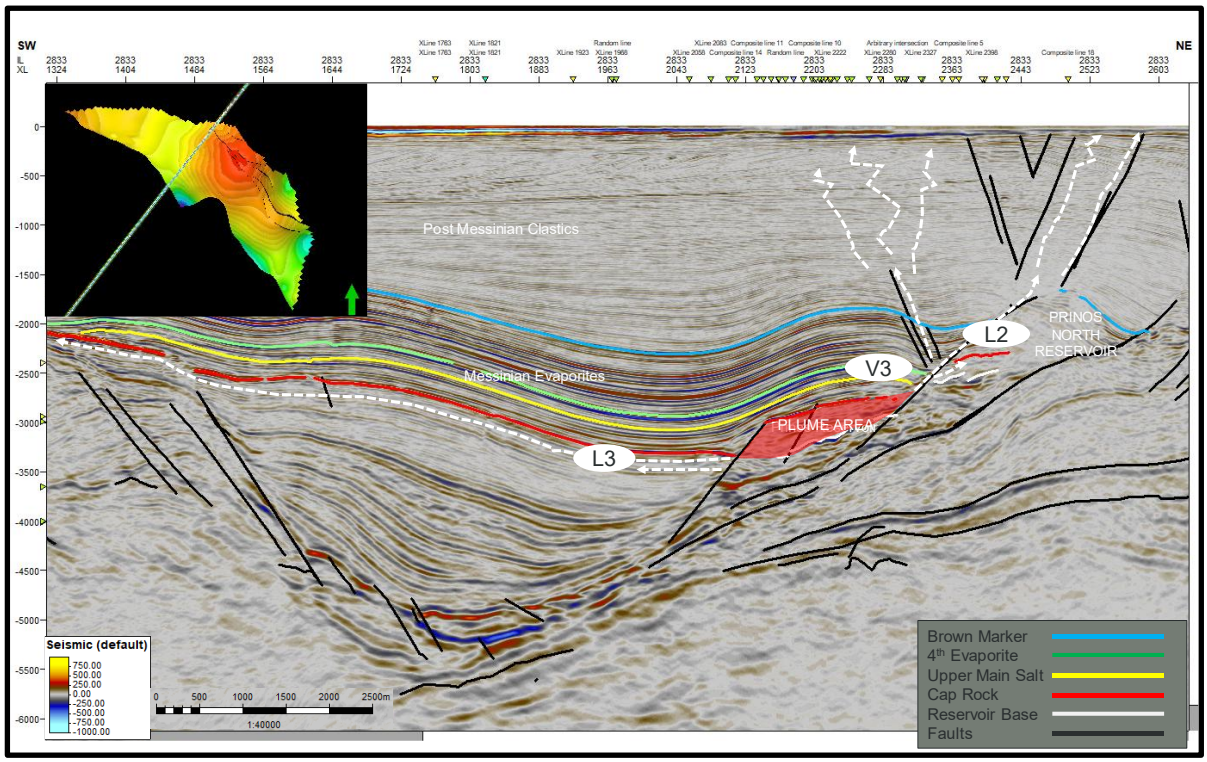
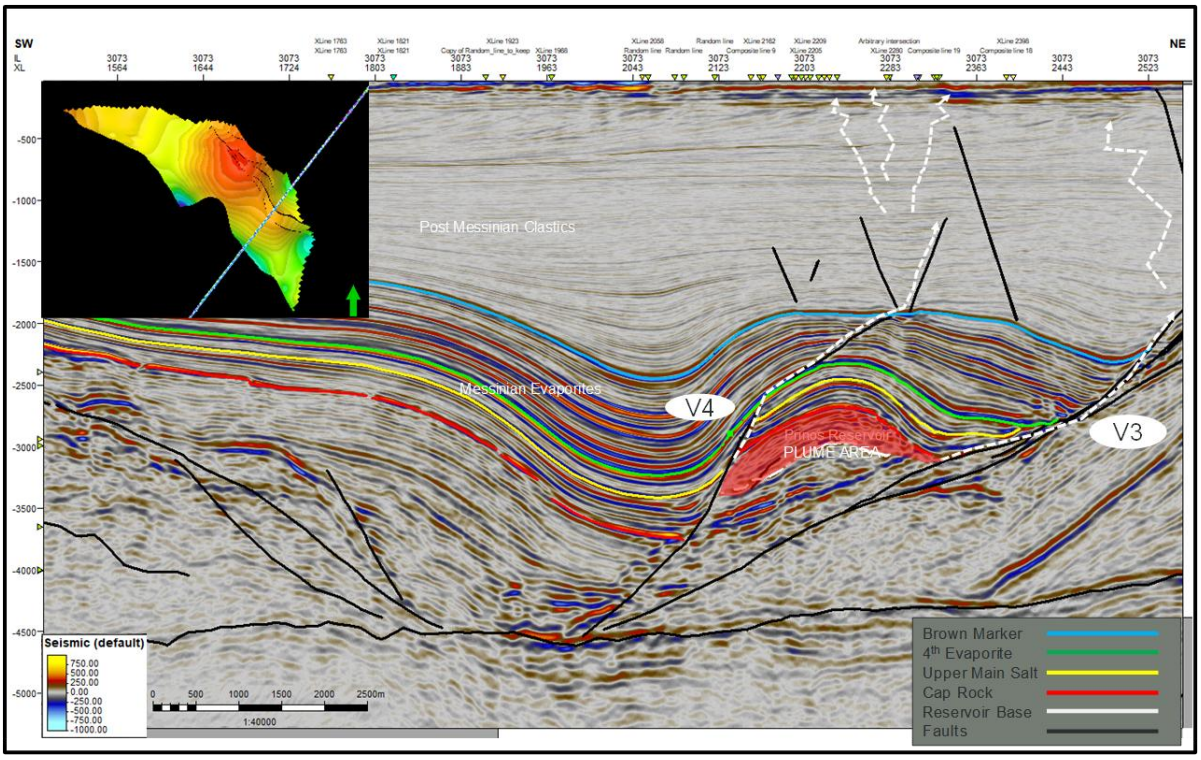


Figure9 –14 : Seismic section along the SW-NE direction with the possible lateral leakage paths L2, L3, and the vertical V3



9 –15 : Seismic section along the SW-NE direction, oriented towards the south, with the vertical potential leakage paths V3 and V4

9.6.1.1.2.3 Potential Leakage Pathways Through Old Prinos Wells

Possible CO_2leakage routes from the designated Prinos storage complex could be the existing old boreholes, which are exposed to high pressures and high CO_2concentrations.

The wells provide a passage between the onshore CO_2 processing facilities and the reservoir where the CO_2 is planned to be stored. As such, they are usually long and constructed using specialized techniques. Once constructed, leak detection and corrective actions are typically limited to locations where leakage from the well into permeable formations, the seabed, or the atmosphere is considered possible.

Following completion of the integrity assessment of existing old wells, a study has been carried out detailing the risks and consequences associated with wells as potential artificial leakage pathways within the CO_2 storage complex throughout the lifetime of the Project, which shows that the risks are low and/or can be adequately managed.

Prinos boreholes as potential leakage pathways

After assessing the leakage pathways in accordance with the Offshore Energies UK (OEUK) Well Abandonment Guidelines for CO_2 storage,the following conclusions can be drawn:

i. Inadequate barriers: Of the 76 wells from the Prinos platform complex, 29 have acceptable barriers (low risk), 7 are out of structure, 28 are considered acceptable (medium risk), and 12 are considered unacceptable (high risk). Of the 28 acceptable medium-risk wells, 2 have been deemed to require additional monitoring. The 12 high-risk wells (16% of total wells) do not have adequate barriers according to current industry practices to contain CO_2 storage in the long term.

ii. Barrier depth: 17 of the 29 old wells with acceptable barriers have been abandoned with the base of their internal primary barrier located along the evaporite sequence and therefore along an impermeable formation. However, permeable layers have been identified within the evaporite sequence below the bases of these inner barriers. Over time, the protective casing pipes are expected to corrode and the sandstones will be exposed to the CO_2 . This means that there is a risk of CO_2 plume ingress into these permeable zones, which are nevertheless likely to act as a secondary containment unit.

iii. Portland cement: Portland cement was used in the construction of all existing old wells. The use of Portland cement was not necessarily intended for high CO_2concentrations, but it can be concluded that the use of Portland cement for the construction and abandonment of old wells does not pose a significant risk of leakage if best practices have been followed and good isolation has been achieved.

iv. Current active production wells at Prinos: Some wells on the Alpha and Beta platforms at Prinos will continue to produce from the A reservoir layers during the early years of the project, while CO_2 will be injected into the underlying reservoirs B and C. Because they were constructed from standard carbon steel, there is a risk of accelerated corrosion of these wells if they come into contact with the CO_2 , which will cause integrity problems and possible leakage from the storage site.

v. Construction and abandonment of new wells: The construction of new CO_2injection wells could potentially pose a risk of leakage. During $CO_{(2)}$ injection, there is a significant drop in temperature near the injection well, which could affect the construction of the wells, causing shrinkage and possible micro-cracks. Electrical cement logs will be used to verify the quality of the cement outside the protective casing and injection pipes. In addition, the plastic nature of the evaporites is expected to provide insulation against potential $CO_{(2)}$leaks along the wells along the evaporite sequence.

9.6.1.1.2.4 The CO_2 Pipeline as a Potential Leak Path

Potential CO_2leakage routes can be identified along the pipeline through various exposure mechanisms. High pressures, high CO_2 containing **impurities,** combined with potential accidental damage from external activities and operational events, are some of the leakage mechanisms that must be managed and mitigated to ensure the safe transport of CO_2 to the new Omega offshore platform.

The high arrival pressure of CO_2 from both sources, i.e. via the onshore CO_2 pipeline (102 barg) and CO_2 cargoes (60-80 barg), combined with the risk of overpressure due to equipment failure, pipeline blockage due to accumulation of impurities or operational errors, could lead to pipeline rupture or explosion, resulting in CO_2 into the atmosphere. In addition, pipeline corrosion can increase the likelihood of leaks over time, while mechanical failures such as material fatigue or welding defects can also contribute to corrosion phenomena, creating vulnerable points in the pipeline that may fail under high pressure conditions.

Accidental damage from external activities, such as construction work or natural events, poses additional threats to the integrity of the pipeline structure, causing physical damage and leading to potential leaks. In addition, incidents during the unloading and loading of CO_2 , particularly during crane lifting or pipe transport operations, are another potential exposure mechanism which, when combined with inappropriate operating procedures, material incompatibility, and inadequate maintenance, can lead to the fall of CO_2 , causing the release of high-pressure CO_2 and occupational accidents that jeopardise the integrity and safety of personnel (injuries).

9.6.1.2 Critical Parameters Affecting Leakage

The main parameter affecting potential leaks is reservoir pressure. The maximum pressure for safe CO_2 storage is limited by several factors. The maximum reservoir pressure that the formation can withstand before failure is calculated as a product of geomechanical study. Reservoir pressure also depends on the integrity of abandoned wells.

Another important parameter affecting potential leaks is the reservoir temperature. The injection of cold CO_2cools the warm reservoir with a corresponding effect on the integrity of the rocks.

9.6.1.3 Secondary Effects of CO_2 Storage

The main phenomena in the drilling area due to injection, including geochemical and thermal effects, relate to the possible formation and development of a dry zone and the evaporation of saline water due to high

injection rates. This may increase the likelihood of salt precipitation, which can negatively affect permeability near the well. In addition, the injection of cold $CO_{(2)}$ into warmer formations could cause Joule-Thomson effects[138] , risking the formation of $CO_{(2)}$ hydrates. High injection rates combined with a sharp increase in pressure and temperature from the wellbore outward can also cause hydrothermal geomechanical changes.

Based on the simulation results, there is no significant risk of hydrate formation in the immediate vicinity of the well, as the Joule-Thomson effect is minimal due to the relatively high pressure and temperature prior to injection. The evolution of the temperature level in the reservoir can be divided into three areas: a zone up to 50-75 m, which depends exclusively on the injection temperature, a transition zone with a radius of 200–250 m, where the temperature begins to return to the existing levels of the reservoir, and the remote field area, where the temperature remains at the reservoir values.

A dry zone of up to 50 m is formed, where the water evaporates completely and the precipitated salt clogs the pores, depending on the initial salinity of the brine, while salt precipitation phenomena are observed in an area with a radius of 100 m. This drying zone probably has reduced permeability, affecting the infiltration capacity, with a flow resistance coefficient of up to 1.4, indicating a reduction in permeability of up to 30% within a radius of 50 m.

9.6.1.4 Other Factors Hazardous to Human Health or the Environment

CO_2storage sites, if not designed to safety standards, can pose risks to human health beyond leakage pathways and secondary protection issues. These risks and their classification are presented in the following paragraphs.

9.6.1.4.1 Induced Seismicity

Risk	The injection of CO_2 into geological formations can increase the pressure within the rock formations, potentially triggering seismic events.
Health effects	Induced seismicity can cause ground shaking, which in turn can lead to structural damage to existing infrastructure. This could potentially cause injuries or deaths in the event of partial or total collapse of infrastructure, falling objects/debris, etc.
Risk analysis	The characterization of the risk of induced seismicity from human activities at the Prinos reservoir involves the assessment of geological, operational, and environmental parameters that determine the probability and impact of seismic events.
Geological parameters	Faults • Presence of faults in the area • Fault characteristics (orientation, length, slip rate) • Stress field and orientation in relation to faults
	Rock properties • Lithology: type of rock (e.g., schist, sandstone, granite).

[138] The Joule-Thomson (JT) effect is defined as the change in temperature of a substance caused by adiabatic expansion during pressure reduction.

	• Permeability and porosity: Higher permeability can lead to easier fluid migration. • Mechanical properties: Strength and elasticity of rocks.
Operational parameters	Injection and production • Injection quantities and rate: Higher injection rates can increase pore pressure and the risk of seismicity. • Depth of injection: At greater depths, injection is more likely to occur near seismic zones. • Production rate: Higher production rates can also affect the underground stress field.
	Fluid properties • Different types of fluids (water, CO_2 , liquid waste) have different impacts. • Temperature and chemical composition: Hotter fluids or those that react chemically with formations may affect the risk.
Environmental parameters	Historical seismicity data • Previous seismic events: Areas with a history of induced seismicity are more sensitive. • Past seismic activity in the area
	Surface activity • Population density: Higher risk in densely populated areas. • Proximity to dams, power stations, and other critical infrastructure.
Risk classification	Based on the above analysis, the risk of induced seismicity can be qualitatively classified as **low**, in accordance with the following conclusions:
Geological parameters	No significant faults, stable lithology and low permeability observed
Operational parameters	Low injection rate, high injection depth, stable production rates
Environmental parameters	No historical seismicity. Low background seismicity, remote location with sparse population
Mitigation	Continuous monitoring of seismic activity, controlled injection rates.

9.6.1.4.2 Groundwater pollution

Risk	CO_2 can cause changes in the chemical composition of groundwater by dissolving minerals from rocks or through reactions with pollutants present in the storage site formations.
Health Effects	Contaminated groundwater can pose serious health risks if used for drinking, irrigation, or other purposes. Potential contaminants include heavy metals and other toxic substances that can cause a range of health problems, from gastrointestinal problems to long-term illnesses.
Risk analysis	The characterization of groundwater pollution risk in the Prinos reservoir involves the assessment of geological, operational, and environmental parameters. The aim is to assess the possible pathways and likelihood of $CO_{(2)}$ or other pollutants migrating into groundwater resources.
Geological parameters	Fractures • Presence and density of faults in the area, which act as migration pathways for CO_2 • Fault activity: Active faults pose a higher risk
	Integrity of overlying formation • Barrier quality and ability of overlying formation to prevent CO_2migration • Adequacy of the overlying formation in terms of thickness and lateral extent • Low permeability of the overlying formation is critical for effective sealing.
	Reservoir properties • Permeability and porosity: High porosity and permeability are necessary for CO_2storage, but adequate management is required to avoid risks.

	• Trapping mechanisms: Structural (anticlines, faults) or stratigraphic trapping mechanisms should be reliable.
Operational parameters	Injection practices • Injection pressure must be controlled to prevent fracturing of the overlying rock. • Injection rate: High rates may increase the risk of overpressure. • Well integrity: Wells must be properly cemented and maintained to prevent leakage.
	Monitoring and verification • Current status (quality) of groundwater prior to CO_2injection. • Continuous monitoring of pressure, CO_2 plume movement,and groundwater quality.
Environmental parameters	Proximity to groundwater resources • Distance from aquifers: Greater distances reduce the risk of contamination. • Hydraulic connection between the storage site and freshwater aquifers
	Marine environment • Seawater intrusion: The interaction between injected CO_2 and seawater could affect marine ecosystems. • Pressure conditions in the marine environment
Risk classification	Based on the above analysis, the risk of groundwater contamination at the storage site can be qualitatively classified as **low**, in accordance with the following conclusions:
Geological parameters	High-quality, thick, continuous overlying rock with low permeability. Few faults in the area
Operational parameters	Controlled pressure and injection rate. Operation of monitoring systems
Environmental parameters	Significant distance from underground water resources. Low hydraulic connectivity with freshwater zones. Stable pressure conditions in the marine environment.
Mitigation	Studies of the current situation and monitoring of groundwater.

9.6.1.4.3 Equipment Failure

Risk	The infrastructure required for CO_2transport and injection, such as pipelines, wells, and compressors, may fail due to corrosion, mechanical failure, or operational errors.
Health impacts	Failures can lead to CO_2 leaks on the surface, which can cause suffocation in humans and animals, as high concentrations of CO_2 can displace oxygen.
Risk analysis	The characterization of surface infrastructure failure risk involves the assessment of parameters related to infrastructure integrity and reliability, environmental conditions, and operating practices.
Infrastructure integrity	Structural design and materials • Adherence to design standards and best practices in infrastructure design. • Use of high-quality materials that are resistant to corrosion and mechanical stress. • Monitoring the age and condition (wear and tear) of the infrastructure.
	Maintenance and inspections • Adherence to a regular maintenance schedule • Frequent inspections to identify wear, corrosion, and other issues. • Repair protocols: Effective and timely repair procedures.
Environmental parameters	Seismic Activity • Assessment of seismicity in the area and potential impacts on infrastructure.

	• Monitoring for any underground movements that could affect the stability of the infrastructure.
	Marine Environment • Risk of corrosion due to exposure to seawater. • Assessment of the potential impact of marine organisms on infrastructure. • Frequency and intensity of storms, waves, and other weather conditions.
Operational parameters	Injection and production operations • Pressure and injection rate within operational limits. • Operational stress on infrastructure. • Impact of any operational changes on operating procedures.
	Emergency response • Emergency response plans for infrastructure failures. • Regular training and emergency drills for staff
Human factors	Staff training • Skill levels: adequately trained and experienced personnel. • Human error: Probability and impact of human error.
	Management practices • Safety culture within the organization. • Compliance with regulatory requirements and industry best practices.
Risk classification	Based on the above analysis, the risk of surface infrastructure failures can be qualitatively classified as **moderate**, in line with the following conclusions, mainly due to the marine environment and the age of the infrastructure:
Infrastructure integrity	Well-maintained infrastructure, good quality materials, regular maintenance with occasional minor problems
Environmental parameters	Moderate corrosion potential Rare and mild storms Low seismic activity
Operational parameters	Operational practices within safe limits Defined emergency response plans
Human factors	Adequately trained personnel Strong safety culture Strict compliance with legislation
Mitigation	Regular maintenance Use of corrosion-resistant materials Implementation of robust safety protocols

9.6.1.4.4 Impact on soil and vegetation

Risk	CO_2leakage can affect soil chemistry and disrupt vegetation growth by changing pH levels and nutrient availability.
Health impacts	Changes in soil and vegetation can affect local agriculture and food supply, impacting human health through reduced food quality and availability.
Risk analysis	The risk characterization of impacts on soil and vegetation includes an assessment of the likelihood of CO_2leakage and its impacts on the marine environment, which may indirectly affect nearby coastal ecosystems. Although direct impacts on soil and vegetation are less relevant in offshore areas, broader ecological impacts need to be considered.

Geological parameters	Reservoir integrity • Quality (integrity and permeability) of the overlying formation to prevent CO_2leakage. • Presence and activity of faults in the area, which act as CO_2migration pathways • Geochemical conditions favorable for CO_2 trapping.
	Barriers and confinement • Secondary containment: Presence of secondary barriers that provide additional containment. • Possible migration pathways for CO_2 to the seabed.
Operational parameters	Injection practices • Injection pressure and rate within safety limits to prevent fracturing of the overlying rock. • Continuous monitoring of CO_2plume and pressure within the reservoir. • Integrity of injection and monitoring wells.
	Leak detection • Use of sensors and technologies to detect CO_2leakage at the seabed. • Geochemical monitoring: Analysis of water chemistry to detect any changes indicative of CO_2leakage.
Environmental parameters	Marine ecosystem • Benthic Ecology: Impacts on benthic organisms and habitats. • Water chemistry: Changes in pH and carbonate chemistry due to CO_2dissolution. • Marine flora and fauna: Effects on marine life, especially species sensitive to changes in CO_2levels.
	Coastal Ecosystems • Potential impact of CO_2 emissions on the coastal environment due to proximity to the coastline. • Impacts on coastal vegetation. • Changes in soil chemistry in coastal zones due to changes in seawater.
Human factors	Monitoring and response • Defined response plans for responding to detected spills. • Training and awareness: Ensure staff are trained to detect and respond to spill incidents.
	Regulatory Compliance • Regulations and Standards: Compliance with environmental regulations and industry standards. • Stakeholder Engagement: Engage with local communities and stakeholders regarding potential risks and mitigation measures.
Risk Classification	Based on the above analysis, the risk of impact on soil and vegetation can be qualitatively classified as **low**, in accordance with the following conclusions:
Geological parameters	High-quality overlying rock. Few faults in the area Favorable geochemical conditions
Operational parameters	Controlled injection practices. Operation of monitoring systems Integrity of boreholes
Environmental parameters	Low impact on the marine ecosystem Significant distance from the coastline. Stable conditions in the marine environment.
Human factors	Comprehensive CO_2leakage response plans Strict compliance with legislation Adequate stakeholder involvement
Mitigation	Soil and vegetation monitoring

	Comprehensive CO_2leakage response plans

9.6.1.4.5 Operational Accidents

Risk	Causes such as human error, equipment failure, or natural disasters can cause accidents during the construction, operation, and maintenance of CO_2storage sites.
Health impacts	Accidents can result in injuries or fatalities to workers and nearby residents. The release of CO_2 or other hazardous substances during an accident can create immediate health hazards through inhalation or contact.
Risk analysis	The characterization of the risk of operational accidents involves the assessment of parameters related to infrastructure design and maintenance, operational practices, environmental conditions, and human factors.
Infrastructure integrity	Structural design and materials • Adherence to design standards and best practices. • Use of materials that are resistant to corrosion, pressure, and marine conditions. • Monitoring of infrastructure age and condition (wear and tear).
	Maintenance and inspections • Compliance with regular maintenance schedule • Frequent inspections to identify wear, corrosion, and potential failures. • Repair protocols: Effective and timely repair procedures.
Operating parameters	Injection and production functions • Injection pressure and rate within operational limits. • Adherence to standard operating procedures (SOPs). • Equipment reliability: Regular testing and maintenance of critical equipment.
	Emergency response • Emergency response plans for various scenarios. • Regular emergency training and drills for personnel • Availability and functionality of safety equipment
Environmental parameters	Seismic activity • Assessment of seismicity in the area and potential impacts on infrastructure. • Monitoring for any underground movements that could affect the stability of the infrastructure.
	Marine environment • Weather and sea conditions: Impact of storms, waves, and other weather conditions. • Risk of corrosion due to exposure to seawater. • Assessment of the potential impact of marine organisms on infrastructure.
Human factors	Staff training • Skill levels: adequately trained and experienced personnel. • Human error: Probability and impact of human error.
	Management practices • Safety culture within the organization. • Compliance with regulatory requirements and industry best practices.
Risk classification	Based on the above analysis, the risk of operational accidents can be qualitatively classified as **low**, in accordance with the following conclusions.
Infrastructure integrity	Well-maintained infrastructure with occasional minor problems, good quality materials
Operational parameters	Operational practices within safe limits

	Defined emergency response plans Reliable equipment
Environmental parameters	Mild and stable sea conditions Moderate corrosion potential Low seismic activity
Human factors	Adequately trained personnel Strong safety culture Strict compliance with legislation
Mitigation	Employee safety training Emergency response planning and regular drills

9.6.2 Exposure and Effects Assessment

9.6.2.1 General Information

To achieve a comprehensive overview of the risks of the proposed project modification, the risk level in each section (offshore facilities, drilling, storage site) is assessed. Deviations from standard operating procedures and conditions (pressure, temperature, flow rates) that could cause hazards and affect the safety, integrity, and reliability of both the infrastructure and the hydrocarbons in the reservoir are thoroughly examined.

9.6.2.2 Facility Risk Assessment

The assessment of risks related to facilities mainly concerns the following:

- Transportation of bulk CO_2 to the Omega offshore platform via the 12-16" offshore pipeline
- Compression of CO_2 loads to achieve a pressure suitable for injection,
- Loading of CO_2 cargoes onto supply vessels/tankers for offshore transport,
- Processing of CO_2 loads on the supply vessel/tanker or on the platform,
- Connecting the transport vessel's pipe to the platform for direct injection.

The main risks in the operation of the facilities include:

- CO_2leakage due to pipeline rupture,
- Pipe blockage,
- Hydraulic shock in the pipeline,
- Connection failures during loading/unloading,
- Pressure drop and accidents during unloading.

Partial or total rupture of the pipeline is a significant risk associated with the proposed project modification. Considering the high arrival pressures of bulk CO_2(102 barg) and CO_2 cargoes (60-80 barg), overpressure due to equipment failure or operational errors must be prevented and mitigated to avoid consequences such as CO_2leakage,asphyxiation hazards, high repair costs, and shutdown for repair purposes. Basic preventive measures include designing the pipeline with pressure relief systems and automated pressure control systems. The design should also include appropriate safety margins.

Overpressure can also be a consequence of pipeline blockage, which can result from the formation of hydrates or other solid deposits, or contaminants accumulating along the pipeline. Basic preventive measures include ensuring the purity of CO_2 in accordance with specified standards, frequent cleaning of the pipeline, and monitoring the condition of the pipeline and supply.

Pipeline **corrosion** due to impurities or environmental conditions, mechanical failure (material fatigue or welding defects), and accidental damage from external activities are the other main causes of CO_2 , which pose a major risk with consequences for both human health and the environment (soil and atmospheric pollution). Corrosion-resistant materials, protective coatings, and reduced welded joints during pipeline

construction to reduce weak points can significantly prevent leakage. In addition, the installation of new and upgrading of existing monitoring equipment, including leak detection systems, is vital as part of the Monitoring Plan under development.

Another risk is accidents during the loading and unloading of CO_2cargoes, which can occur during unloading via a pipe system on the platform deck.

Inadequate maintenance of the crane and other lifting or transport equipment, mechanical failures, inappropriate connection and disconnection procedures, material incompatibility, and deterioration of connections can lead to CO_2 (crane lifting or accidents during pipe connection/disconnection), causing high-pressure CO_2 leaks, structural damage, and serious injury to personnel. It is therefore necessary to ensure that equipment meets the required lifting specifications, that it is frequently maintained and inspected, and that road transport procedures and plans are followed.

In addition to the above risks, roughness of the inner surface of the pipe, accumulation of ice or corrosive impurities/contaminants, and temperature changes during transport (e.g., during start-up) can also lead to pressure drops along the pipeline, causing operational delays and increased energy consumption to achieve the required injection pressure. To prevent pressure drops, proper pipeline design based on flow assurance studies, pressure monitoring throughout the CO_2 transport system, and addressing low temperatures through start-up equipment are required.

Natural hazards and adverse environmental conditions (strong winds, rain, extreme temperatures) can affect operations by either delaying or interrupting injection, leading to shutdowns, low efficiency, and hazards such as fires, explosions, and personnel injuries. To account for this unpredictable risk, equipment and pipeline design should take extreme weather conditions into account to prevent such incidents.

Error! Reference source not found. summarizes the risks identified in relation to the facilities of the proposed C O_2storage project and the corresponding potential impacts.

Table9 –18 : Risks associated with the facilities of the proposed project modification and potential impacts

AA	Risk description	Potential impacts	Initial risk
1	CO_2leakage due to pipeline corrosion, impurities/contaminants in the CO_2stream,or environmental conditions	• CO_2escape into the atmosphere - greenhouse gas emissions • Risks to human health • Environmental damage (soil and/or water pollution)	C3
2	CO_2leakage due to mechanical failure (e.g. poor welding, material deterioration)	• CO_2escape into the atmosphere - greenhouse gas emissions • Risks to human health • Environmental damage (soil and/or water pollution)	C3
3	CO_2leakage due to accidental damage from external causes (e.g., construction work)	• CO_2escape into the atmosphere - greenhouse gas emissions • Risks to human health • Environmental damage (soil and/or water pollution)	C3

AA	Risk description	Potential impacts	Initial risk
4	Partial/total rupture of pipeline due to overpressure, equipment failure or operational errors	• Large-scale CO_2escape (leakage) posing risks to human and animal safety (risk of asphyxiation) • Significant environmental pollution • High repair costs and operational downtime	C4
5	Partial/total pipe rupture due to significant corrosion or material defects leading to structural failure	• Large-scale CO_2leakage posing risks to human and animal safety (risk of asphyxiation) • Significant environmental pollution • High repair costs and operational downtime	C4
6	Pipe blockage due to the formation of hydrates or other solid deposits inside the pipe	• Disruption of CO_2flow leading to inadequate operation. • Possible pressure increase resulting in risk of leaks or explosions. • Increased maintenance and cleaning costs	C2
7	Pipe blockage due to accumulation of impurities/contaminants or pollutants in the CO2 stream	• Disruption of CO_2flow leading to inadequate operation. • Possible pressure increase resulting in risk of leaks or explosions. • Increased maintenance and cleaning costs	C2
8	Hydraulic shock in the pipeline due to rapid valve closure or compressor failure combined with inadequate design, without safety margin or high pressure protection mechanism	Possible damage to the pipeline due to pressure spikes.	B
9		Increased wear on pipeline components leading to failures	B2
10	Accidents during unloading of CO_2cargo (failure during lifting) due to mechanical failure of crane/other lifting equipment, inadequate maintenance	Falling CO_2 loads, possible structural damage to containers	C3
11		Risk of container rupture or high-pressure CO_2leakage	C4
12	Accidents during unloading of CO_2cargo (failure during lifting) due to mechanical failure of crane/other lifting equipment, inadequate maintenance	Serious injury or death to personnel and damage to infrastructure	C4
13	Failures during connection (flexible connection/disconnection hoses) due to inappropriate connection/disconnection procedures	Risk of CO_2leakage at connection points, risk to safety and the environment	D3
14	Connection failures (flexible connection/disconnection hoses) due to material incompatibility or deterioration of connectors and sealing elements	Delayed operation and increased repair costs	D2
15		Increased risk of equipment damage and injury	D3

AA	Risk description	Potential impacts	Initial risk
16	Drop in CO_2pressure in pipes and conduits (bulk/load) due to friction losses and resistance caused by the roughness of the conduit's inner surface	Reduced injection rate if pressure is lower than optimal	B
17	CO_2pressure drop in pipes and conduits (bulk/load) due to ice accumulation (hydrate formation) or corrosion products in pipes or conduits	Possibility of requiring an additional compressor to compensate for the pressure drop, resulting in higher energy consumption and OPEX.	B2
18	CO_2pressure drop in pipes and conduits (bulk/load) due to friction losses and resistance caused by the roughness of the inner surface of the conduit	Delays in operation leading to reduced efficiency	B2
19	CO_2pressure drop in pipes and conduits (bulk/load) during transport due to temperature changes (cooling) in winter, causing hydrate and ice formation on the outside of conduits/pipes	• Possibility of requiring an additional compressor to compensate for the pressure drop, resulting in higher energy consumption and OPEX. • Operational delays leading to reduced performance	B2
20	CO_2leakage following an accident (overturning or falling object) in trucks	• CO_2leakage into the atmosphere - greenhouse gas emissions • Risks to human health • Environmental damage (soil and/or water pollution)	C2
2	Partial/total pipeline rupture due to fishing/trawling	• CO_2escape into the atmosphere - greenhouse gas emissions • Risks to human health • Environmental damage (soil and/or water pollution)	D4
2	Rupture of lift pipe due to ship collision with platform	• Safety hazards, including asphyxiation and extreme cooling caused by rapid decompression of compressed CO_2 • Risks to the ecosystem, including marine acidification • Operational disruption due to leakage and secondary damage to other equipment	C2
23	Losses due to platform collapse	Rupture of wells, pipeline, riser pipe	B
24	Natural hazards due to weather conditions (strong winds, rain, extreme temperatures) that may affect the facilities	Failure of installations and risks to personnel	C3
25	Solidification/formation of dry ice CO_2due to low temperatures during injection	Equipment failure and risks to personnel	B2
26	High temperatures due to heat from compression	• Personnel injury • Exceeding design temperature (multiple exhaust pipe, duct, multiple borehole pipe)	C2
27	Waves/adverse environmental conditions	Operational delays or need to disconnect/stop injection	D2

To ensure safe operation, in addition to preventive design, it is important to establish a mitigation framework to reduce the impact of risks. Immediate mitigation actions will include cleaning and repairing damaged pipelines and/or equipment to reduce health and environmental impacts, reviewing and updating operating procedures, and conducting frequent maintenance and inspections after the incident to prevent recurrence.

Backup equipment and emergency shutdown systems should be available. Finally, medical assistance should be provided to personnel to mitigate the effects of risks to human health.

Overall, the estimated **residual risk** after implementing the proposed risk mitigation control measures is significantly reduced to an **ALARP (As-Low-As-Reasonably-Practicable)** level, as shown in **the Risk Assessment Tables** below. All the risks described, which initially ranged between B1-D4 (Error! Reference s ource not found. **9**), are considered low level after the implementation of corrective measures and are classified between A1-B3 (20).

Table9 –19 : Level of risks associated with the operation of CO_2storage facilities in Prinos

Criticality level (1-5)	Probability (A-E)				
	A	B	C	D	E
1		1			
2		8	5	2	
3			5	2	
4			4	1	
5					

Table9 –20 : Residual risk level during the operation of the CO_2storage facilities in Prinos

Criticality level (1-5)	Probability (A-E)				
	A	B	C	D	E
1	1	3			
2	9	6			
3		9			
4					
5					

9.6.2.3 Drilling Risk Assessment

The assessment of risks related to well integrity covers the following scope:

- Abandoned inaccessible wells
- Accessible wells

9.6.2.3.1 Future wells for the project.

It should be noted that the quantification of leaks in wells is of limited accuracy due to the large number of variables per well (input data in simulation models) and the lack of data on the probability of well equipment failure. However, an assessment has been carried out with a focus on the integrity of the wells to determine the condition of the existing infrastructure, which has helped to identify possible leakage routes.

9.6.2.3.1.1 Abandoned Inaccessible Wells

The assessment of well integrity identified twelve abandoned wells as higher risk due to the placement of permanent plugs that could cause lateral leakage into permeable formations and potentially create a leakage path to the surface over time.

The twelve wells are currently considered to be holding the current reservoir pressure and there are no indications of integrity problems. No risks are expected until the pressure increases significantly due to CO_2 injection into the reservoir.

The twelve wells will require additional monitoring or remediation to reduce the risk to an **ALARP (As-Low-As-Reasonable-Practicable)** level. The details of the control measures will be finalized during the final design phase.

One of the initial offshore exploration and appraisal wells, P-6, has no data available to verify its "as abandoned" status, so additional monitoring is proposed where the location of the wellhead is known and located on the seabed. The choice of monitoring technology will be finalized during the final design phase.

9.6.2.3.1.2 Sandstone layers in the evaporite formations

Seventeen wells have been abandoned where the base of their inner barrier is located along the evaporite sequence and therefore along an impermeable formation. However, permeable layers have been identified within the evaporite sequence beneath the bases of these internal barriers. Over time, the protective casings could corrode and the sandstones could be exposed to CO(2) .This means that there is a risk of CO(2) entering these permeable zones. A study is currently underway to confirm whether the evaporite sand layers are suitable as a secondary containment barrier and that they are not characterized as leakage pathways.

9.6.2.3.1.3 Portland cement

Portland cement was used in the construction of the abandoned wells, which is not necessarily intended for high concentrations of CO_2. There is therefore a risk of cement deterioration, which in turn could create a leakage pathway.

According to extensive research, the effect of CO_2 on Portland cement is extremely slow and limited to 0-10 m over 10,000 years, provided that good installation practices are followed. The integrity analysis of the wells has assessed the risks of cementing operations as a barrier. Furthermore, an independent geological study has confirmed that salt formations within the evaporite sequence will move around the incompletely cemented casing, thus reducing the need for Portland cement in certain wells.

9.6.2.3.1.4 Accessible Wells

Some wells on the Alpha and Beta platforms at Prinos will continue to produce from the A reservoir layers during CO_2 injection into reservoirs B and C. Being constructed from standard carbon steel grade metals, there is a risk of potential accelerated corrosion of these wells if they come into contact with CO_2 , causing integrity problems and potential leakage from the reservoir. However, reservoir modeling can simulate the movement of CO(2) through its various layers and predict when the CO(2) plume will reach each well. Before this "CO(2)wetting" occurs, the wells will be abandoned to prevent integrity problems. In addition, fluid sampling as part of the monitoring program can confirm CO(2) concentrations during oil production.

9.6.2.3.1.5 Construction of New Wells and Abandonment

The construction of new CO_2 injection wells could potentially pose a risk of leakage. During CO_2 injection, a significant drop in temperature is observed near the well, which could affect the construction of the wells, causing shrinkage and possible annular micro-cracks. The quality of the cement ring of the cemented casing

and production liners will be verified through logging. In addition, the creep and sealing of salts in the formation of evaporites will help seal the rings, minimizing microcracks as potential leakage paths.

9.6.2.3.1.6 Drilling Risk Assessment

Prinos is a mature field and the geological risks are known. The well designs have evolved over the years to establish a robust design that could also be suitable for CO_2 storage. During the design phase, the abandonment plan will identify the steps that can be taken to abandon the wells if required.

The following **table** summarizes the risks identified in relation to the wells of the proposed CO_2 storage project in Prinos and the potential impacts.

9 –21 : Risks associated with the Project wells and potential impacts

AA	Risk description	Potential impacts	Initial risk
1	Poor condition of abandoned wells. After analyzing the integrity of the wells, 12 were deemed unsuitable based on their condition.	Leakage of CO_2 / oil / water through wells into the formation layers or onto the surface	C4
2	Drilling of intervention wells. Failure of intervention wells and inability to place barriers at greater depths in high-risk wells	Leakage of CO_2 / oil / water through boreholes in formation layers or on the surface	C
3	Abandoned inaccessible wells - 28 abandoned wells have not been abandoned in accordance with modern industry standards, e.g. cementing on a mechanical basis, etc.	CO_2/ oil / water leakage through wells in formation layers or at the surface	C4
4	Abandoned old inaccessible wells - 17 wells have been abandoned where the base of their internal barrier is located along the evaporite sequence and therefore the well has been abandoned at depths of impermeable formations. However, there are permeable layers within the evaporite sequence below the bases of these inner barriers. Over time, the pipes could corrode and the sandstones could be exposed to $CO_{(2)}$.	CO_2/ oil / water leakage through wells in the formation layers - secondary containment	C4
5	Use of Portland cement in the construction and abandonment of (abandoned) wells. Portland cement can react with the carbonic acid of CO_2 .	Leakage of CO_2 / oil / water through boreholes in the formation layers - secondary storage reservoir	C3
6	No data available for exploration well P-6, therefore "as abandoned" status is unknown	CO_2/ oil / water leakage through boreholes in the formation layers or at the surface	C
7	The accessible wells on the Alpha and Beta platforms that remain active are not designed for exposure to an acidic mixture of CO_2 / water.	Leakage of CO_2 / oil / water through boreholes in the formation layers or on the surface.	C
8	In new water production wells, there is a possibility of damage to the pumps (ESP).	Reduction in CO_2storage capacity.	C
9	New injection wells have not been constructed to supply CO_2 for storage	Leakage of CO_2 / oil / water through wells into formation layers or onto the surface	C4
10	Abandoned CO_2wells	Leakage of CO_2 / oil / water through wells into formation layers or onto the surface	C4

The right choice of materials to prevent accelerated corrosion is a basic prerequisite for successful CO_2drilling.

Overall, the estimated **residual risk** after implementing the proposed risk mitigation control measures is significantly reduced to an **ALARP (As-Low-As-Reasonably-Practicable)** level, as shown in **the** following **Risk Assessment Tables.** All the risks described, which initially ranged between C2-C4 (**Table 9- 23)**, are considered low to moderate after the implementation of corrective measures and are classified between A3-B4 (**Table 9-** 24Error! Reference source not found.).

Table9 –22 : Level of risks associated with the drilling operations of the Prinos$_{CO2}$ storage project

Criticality level (1-5)	Probability (A-E)				
	A	B	C	D	E
1					
2			1		
3			3		
4			6		
5					

9 –23 : Residual level of risk associated with drilling $_{for}$the Prinos$_{CO2}$ storage project

Criticality level (1-5)	Probability (A-E)				
	A	B	C	D	E
1		1			
2					
3	1	3			
4	1	4			
5					

9.6.2.4 Storage Site Risk Assessment

The risk assessment related to possible leakage routes into the subsoil from the Prinos storage complex covers the following elements:

- Vertical faults
- Lateral faults

9.6.2.4.1 Vertical Leakage Pathways

Five (5) potential leakage routes have been identified along which CO_2 can escape vertically beyond the boundaries of the storage complex. The leakage routes associated with the storage site are:

- Leakage path #V1: Along the (active) 17 NE-SW (northeast-southwest) fault.

- Leakage path #V2: Along the fault (which also forms the boundary of the site) NE towards North Prinos.
- Leakage path #V3: Along the NW-SE fault (sloping towards the SW).
- Leakage path #V4: Along the NW-SE fault (sloping towards the NE) - South fault delimiting Prinos.
- Leakage path #V5: Through the overlying formation, through the primary seal and the secondary sealing system.

9.6.2.4.2 Lateral Leakage Pathways

Three (3) possible leakage paths have been identified along which CO_2 can escape laterally outside the boundaries of the storage complex, i.e. outside the Prinos reservoir. The leakage paths related to the storage site are:

- Leakage path #L1: Through lateral movement to deeper points of the structure towards its western side and ultimately to the migration of CO2 through the syncline (leakage point) in the Epsilon structure.
- Leakage path #L2: Along the fault (which also forms the boundary of the site) NE towards North Prinos.
- Leakage path #L3: Along the NW-SE fault (sloping towards the SW).

9.6.2.4.3 Risk Assessment of the Storage Site

The Risk **Assessment Table** (see **Table** below) shows that **leakage path #L1** (downslope path and displaced to the anticline and Epsilon) is the only subsurface leakage path of concern compared to other potential subsurface leakage paths, as it could affect the future development of hydrocarbons in the Epsilon field. This means that the Monitoring Plan in relation to subsurface leakage risks should focus exclusively on monitoring and preparing corrective measures in the event that $CO_{(2)}$ leaks into the Epsilon structure.

9 –24 : Storage site risk assessment tables

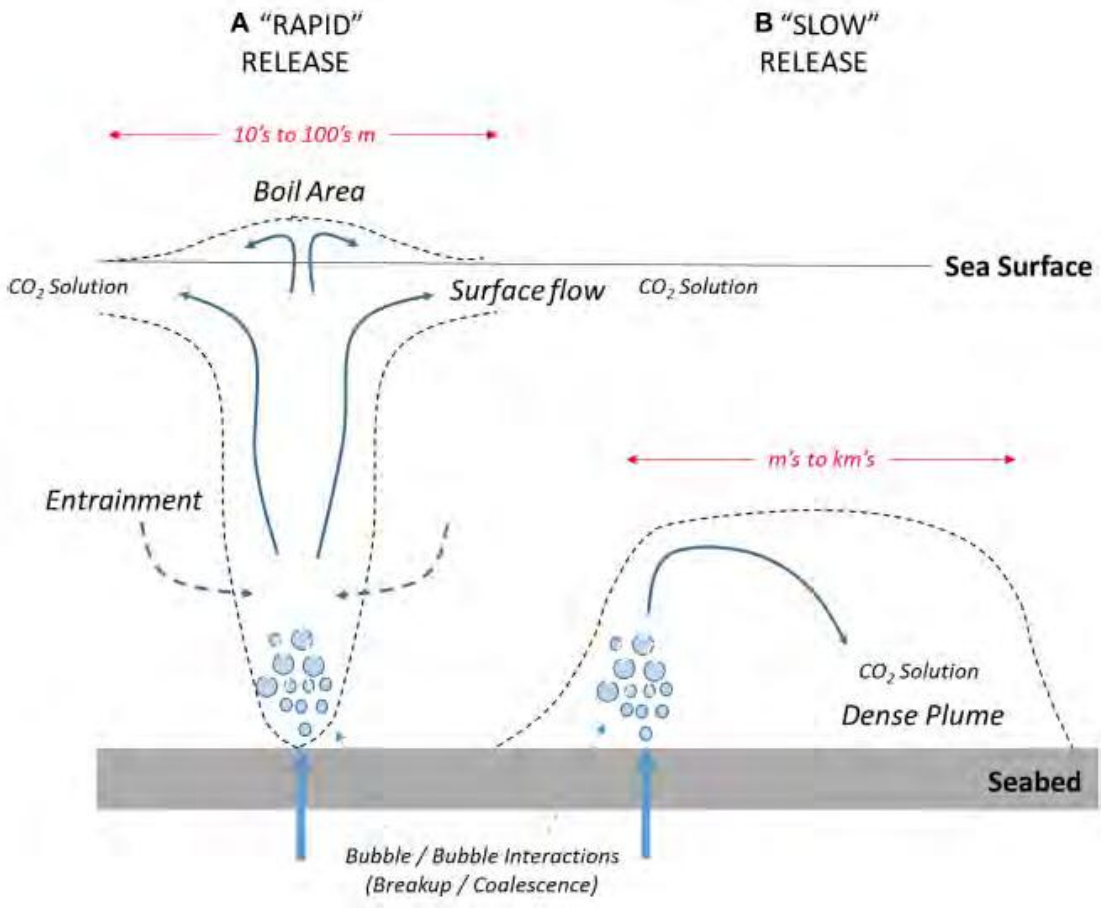
	Small ≤ 10 t/day	Medium ≤ 100 t/day	Large ≤ 1000 t/day	Catastrophic > 1000 t/day
Short (≤ 1 year)			**V2**	**V1 V3 V4**
Medium (≤ 10 years)			**L1 L2 L3**	
Long (≤ 100 years)		**V5**		
Extended (< 1000 years)				

			Consequence (Release Rate & Duration Combined)				
			Very Small < 0.01%	Small < 0.1%	Medium < 1%	Large < 10%	Catastrophic > 10%
Likelihood	Very Remote	≤ 1.00E-6		V5			
	Remote	≤ 1.00E-5				V4	
	Highly unlikely	≤ 1.00E-4			V2 L2	V1 V3	
	Unlikely	≤ 1.00E-3			L3		
	Possible	≤ 1.00E-2			L1		
	Probable	≤ 0.1					
	Likely	≤ 1					

9.6.3 Risk Classification - Geographic Range of Potential Risks

Subsea CO_2transport pipeline

The modeling of the impacts for the assessment of risks related to CO_2 from the project's subsea CO_2 transport pipeline show that potential subsea CO_2 leaks form a cone of bubbles that reaches the surface, as shown in **the** following **figure**.



9 Figure –16 : Simulation models of CO_2 leakage pathways. (A) A "fast" CO_2 leak where CO_2 reaches the surface of the water column as a gas (from Chen et al., 2005). (B) A "slow" $CO_{(2)}$leak where $CO_{(2)}$dissolves in the sea before reaching the surface (from Dewar et al., 2013; Dewar, 2016)

The diameter of the plume at the surface is estimated to be 20% of the depth at the release point. The average depth of the sea at Prinos is approximately 40 meters. Therefore, the diameter of the plume surface in the worst case will be 8 m. In the case of this specific project , the release rate simulation was performed using Phast v9 software for each pipe hole size to calculate the leakage rate feeding the cloud formed.

The simulation results showed that at sea level, the maximum distance with a CO_2concentration corresponding to a 1% mortality level is approximately 1 km in the direction of the prevailing wind (for an underwater pipeline rupture in scenario FC08). In the early stages of the leak (t = <60 s), a high plume is predicted that may exceed the deck level of the platform for a short period of time, but the distances in the

direction of the wind at these altitudes are limited. As the pipeline decompresses, the plume height decreases significantly and disperses over significant distances in the wind direction. The height of the dispersion plume is less than 2 m above sea level for distances in the direction of the wind greater than ~100 m, which means that the risk to ship personnel is reduced in these scenarios, and the risk of potential adverse effects on the natural environment is reduced accordingly.

It should be noted that with the implementation of preventive measures (as required by law and provided for in the health and safety plans that will apply to the implementation and operation of the project), this scenario becomes extremely rare.

Omega offshore platform

With regard to the new **Omega offshore platform**, the simulation results show that the risk distances from the specified mortality levels are limited to the immediate vicinity of the new Omega platform. The maximum risk distance for 1% mortality is estimated to be 80 m at the deck level of the Omega platform, resulting from a leak due to a rupture in the CO_2 (scenario FC04), which is also the worst-case scenario .

Given that CO_2 is heavier than air, a leak at an altitude above the surface moves towards sea level and an underwater leak remains close to the surface and disperses, creating a potential hazard for support vessels.

Similar to the case of the subsea pipeline discussed above, the simulation results showed that at sea level, the maximum distance with a CO_2concentration corresponding to a 1% mortality level is approximately 1 km in the direction of the prevailing wind. In the initial stages of the leak (t = <60 s), a high plume is predicted that may exceed the deck level of the platform for a short period of time, but the distances in the wind direction at these altitudes are limited. As the pipeline decompresses, the plume height decreases significantly and disperses over significant distances in the direction of the wind. The height of the dispersion plume is less than 2 m above sea level for distances in the direction of the wind greater than ~100 m, which means that the risk to ship personnel is reduced in these scenarios, and the risk of potential adverse effects on the natural environment is reduced accordingly.

It should be noted that by taking preventive measures (as required by law and provided for in the health and safety plans that will apply to the implementation and operation of the project), this scenario becomes extremely rare.

9.6.4 Recommendations and Proposed Preventive Measures

With regard to the CO_2storage project facilities, the main risks include pipeline rupture, blockages, corrosion, and accidents during unloading. Mitigation measures include pressure relief systems, regular cleaning of pipelines and equipment, use of corrosion-resistant materials, and intensive monitoring. These measures aim to reduce operational delays and health risks.

The assessment of well integrity covers abandoned, active, and future CO_2 storage wells. Risks include potential leakage due to worn well components, especially in older wells. High-risk wells will be subject to special monitoring or remediation. Wells that are productive will be abandoned before or during CO_2 injection

and before the CO_2 plume reaches any active wells. New wells will be designed with appropriate materials to prevent leaks.

The risk assessment of the storage site indicates that it is "possible" for $CO_2$to leak through the main Prinos block via the structural anticline towards the Epsilon field (leak path #L1). The Epsilon field is scheduled to be developed over the next five years. New wells that will penetrate the Epsilon field structure are expected to provide additional pressure data that will confirm the aquifer model in terms of pressure development in the Prinos and Epsilon fields. This could be considered part of the Prinos Monitoring Plan.

A specific integrity assessment of the abandoned wells in Prinos, North Prinos, and Epsilon should incorporate the results of the underground leakage risk assessment. For now, it is assumed that wells that may leak in Prinos and North Prinos act as escalating factors that only affect the probability for leakage paths V1, V2, V3, and L2.

The abandoned wells in Epsilon are considered safe in terms of integrity. Considering also that there is oil in Epsilon, which would act as a barrier to any potential brine or CO(2)leakage from the abandoned wells, it is concluded that there is no escalation factor affecting leakage path #L1. It is recommended that the risks of leakage in abandoned wells that will not be intervened or used for monitoring prior to the start of injection be quantified in order to determine more accurately the Probability and Severity of Consequences of a potential leak on the seabed.

In conclusion, the risk assessment study has identified risks to the environment and safety through detailed assessments and proposes mitigation measures to ensure a low-risk operating environment. The risk assessment will be updated as the project progresses in order to incorporate new information and improve mitigation strategies.

The proposed risk prevention and mitigation measures are presented in detail in **Chapter 10**.

9.6.5 Summary of Impacts Arising from the Project's Vulnerability to Risks of Serious Accidents or Disasters Related to the Project

The results of the assessment of the P&E impacts arising from accidents and/or disasters related to the operation of the proposed modification of the Project are summarized below, in accordance with the methodology presented in the previous section.K impacts resulting from accidents and/or disasters related to the operation of the proposed modification of the Project, in accordance with the methodology presented in **Section 10.1.3** and the analysis carried out in **the** above **Sections.**

9.6.5.1 General Information

According to the risk studies and simulations carried out in the context of the licensed project and the proposed modification, it is estimated that the toxic effects of CO_2 that could potentially cause adverse H&S impacts in the event of a serious project-related accident or disaster extend to approximately 1000 m in the area above sea level and a few meters radius within the sea from the point of the CO(2) subsea pipeline that may rupture or from the location of the offshore facilities.

Furthermore, according to data collected by Energean over a number of years, it has been demonstrated that depleted hydrocarbon fields and related structures have proven storage capacity, a proven impermeable cap to prevent possible leakage of stored fluids, a defined volume of resources suitable for CO_2 storage and are tectonically stable areas. Furthermore, it should be noted that the Prinos basin is a **tectonically stable area,** as required for CO_2 storage areas in terms of tectonic (seismic) activity. Therefore, the scenario of CO_2 leakage from the reservoir itself during the operation of the Project (the effects of which are mostly catastrophic) is unlikely. As for possible leakage from the pipeline, this can be prevented by the planned inspection of the pipeline using a smart tool (pigging), which measures the thickness of the pipeline wall (every 5 years or in other cases of system shutdown) and by the planned monitoring system. In any case, the consequences depend on the quantity and duration of the leak.

9.6.5.2 Impact on Climate and Bioclimatic Characteristics

The leakage of CO_2 essentially undermines the operation and feasibility of the Project, as CO_2 will remain unbound in the atmosphere and thus may contribute to climate change, by increasing global temperatures and causing extreme weather events such as heat waves, floods, and droughts. However, in any case, any impacts will not be worse than the baseline scenario (non-implementation of the project) and therefore no negative impacts are expected.

9.6.5.3 Impact on morphological and soil characteristics

Increased water acidity can erode carbonate materials on the seabed, leading to changes in the morphology and stability of sediments. Erosion can cause destabilization of sediments and their subsequent transport, changing the relief of the seabed.

Rapid decompression, however, can create a type of "crater" that can cause physical damage to the seabed.

However, even if these effects occur, they will be limited to the area calculated above and are therefore not considered significant.

9.6.5.4 Impact on Geological and Tectonic Features

CO_2leakage can cause erosion of the rocks beneath the seabed, creating cracks and cavernous structures that can destabilize the geological formation of the area. In areas with carbonate rocks, soil erosion In areas with high seismicity, CO_2 leakage can cause or exacerbate geological vibrations, increasing the risk of undersea earthquakes.

However, according to the deliverable reports for the Exploration License prepared by Energean in November 2023, it emerged that CO_2 is already present in these deposits and has been there for millions of years (at least for oil charging). Therefore, it can be concluded that the presence of natural CO_2 in the reservoir suggests that high reaction rates between the injected CO_2 and the reservoir rocks may be unlikely.

Chlorite, which is reported to react with CO_2, is found in the Epsilon reservoir from wells EL-1-ST1, EL-2, and EL-3 (with a total average of 1.7%), but appears to be insignificant in the Prinos reservoir (well PB-14) (with

a total average of 0.06%). No separate chlorite was observed from the point count data, suggesting that chlorite is found within rock fragments and therefore will not be particularly reactive (it will have a relatively small exposed surface area).

The Epsilon EL-1-ST1, EL-2, and EL-3 wells contain more smectite/illite than the Prinos well (PB-14). The Epsilon wells contain less "illite and mica" than the Prinos well. Smectite (can absorb $CO_{(2)}$ and/or react with $CO_{(2)}$ if it is Mg-, Fe- or Ca-bearing, however the smectite/illite ratio is approximately 20-25% (i.e., minor). It should be noted that dioctahedral smectite is much more common in sandstones than trioctahedral smectite, but that trioctahedral smectite is much more reactive to CO_2 , as it contains divalent Fe and Mg that can form magnesite and siderite carbonates.

9.6.5.5 Impact on the Aquatic Environment Environment

The addition of large amounts of CO_2 to the sea reduces its pH, i.e. it becomes more acidic. Due to the increase in atmospheric CO_2 and the absorption of CO_2 by the oceans, the average pH at the ocean surface has decreased by 0.1 (Humphreys et al., 2020), a phenomenon referred to as ocean acidification.

In the event of a CO_2 leak from an offshore carbon storage facility, the CO_2 will enter the sea as a gas or dissolved in the water in the sediment pores. $CO_{(2)}$ as a gas will dissolve in seawater and/or escape as a gas into the atmosphere, depending on the initial conditions of the leak.

In the event of a CO_2leak, in addition to the aforementioned pH reduction, the following are also expected:

- Increased dissolution of $CaCO_3$,
- Lower carbonate saturation in seawater, which negatively affects the structure of organisms with calcareous shells,
- Changes in microbial communities in sediments, both in terms of species composition and respiratory activity, which also has implications for the biogeochemical cycle of carbon and other elements,
- Changes in the reactivity and bioavailability of various chemical elements, not only those essential to marine organisms, such as Ca, Mn, and nutrients such as Si and Fe, but also those with toxic biological effects, e.g. heavy metals,
- Reduction in the effectiveness of P burial in marine sediments, which contributes to an increase in P concentration in the water column and enhances eutrophication, especially in shallow areas.
- Various authors have used different pH change criteria to describe varying degrees of ecological impact. However, a general consensus is as follows:
    - <0.01 No disturbance or below detection levels, no ecological significance
    - <0.1 Possible zero or minimal effect, disturbance less than natural variability
    - 0.1 to 0.3 Disturbance of the order of natural variability, possible minor effects without systemic significance
    - 0.3 to 0.4 Some species and processes are significantly affected
    - 0.4 Broader and significant to severe impacts are anticipated
    - 1.0 Significantly harmful impact

However, even if these impacts occur, they will be limited to the extent calculated above and are therefore not considered significant.

9.6.5.6 Impact on the Atmospheric Environment

CO_2 leakage may affect air quality at the local level, negatively impacting human health near the leakage site. However, in any case, any impacts will not be worse than the baseline scenario (non-implementation of the project) and therefore no negative impacts are expected.

9.6.5.7 Impact on the acoustic environment

No particular impacts on the acoustic environment are expected, either in terms of underwater noise or atmospheric noise. However, a very significant CO_2leak could create gas bubbles that rise to the surface of the water. The movement of these bubbles can create noise that disturbs underwater ecosystems. The bubbles can also change the way sound propagates and reflects in the water, affecting the acoustic communication of marine organisms. However, in such cases, organisms are primarily at risk from water acidification.

9.6.5.8 Impact on the Biotic Environment

Impact on Marine Life – Phytoplankton and Microbes

Plankton and microbial communities may be affected by changes in the carbonate system. Previous studies examining the effects of a controlled CO_2 on the microbial community have identified changes in the relative abundance of both major and minor bacterial taxonomic ranks (Tait et al., 2015). The effect of increased pCO_2 on phytoplankton is complex (Sommer et al., 2015; Wells et al., 2015). Some phytoplankton species are poor absorbers of dissolved inorganic carbon (DIC), and while the response to increases in pCO_2 may vary between groups and species, it is likely to lead to seasonal changes in the structure of the phytoplankton community (Mackey et al., 2015; Bach and Taucher, 2019). Some harmful species may increase toxin production under conditions of increased DIC, which could pose a potential risk to fish in the area around a $CO_{(2)}$leak (Riebesell et al., 2018).

However, even if these effects occur, they will be limited to the area calculated above and are therefore not considered significant.

Impact on Marine Life – Zooplankton

The corrosive conditions associated with increased CO_2 are likely to have a significant impact on zooplankton calcifying species. Short-term exposure to extreme acidification conditions is sufficient to cause significant damage to shells and deaths in marine gastropods (Bednaršek et al., 2014; Gardner et al., 2018) and commercially important bivalve larvae (Wijsman et al., 2019), resulting in reduced recruitment (Parker et al., 2013).

However, even if these effects occur, they will be limited to the restricted area calculated above and are therefore not considered significant.

Impact on Marine Life – Benthic Organisms

Benthic organisms, including some related to commercial fishing activities, are likely to die under extreme acidification scenarios near a spill area, while mortality will be reduced for organisms that have the ability to move away from the spill area. The QICS (Quantification and Monitoring of Potential Ecosystem Impacts from Geological Carbon Storage) project (e.g., Blackford et al., 2014) reported rapid recovery of the seafloor community once a small-scale leak was stopped. However, impacts on coral habitats and rubble bottoms (tragans) and bivalve reefs may cause long-term damage with potential recovery on a decadal scale.

Impact on Marine Life – Marine Mammals and Seabirds

Marine mammals and seabirds may be indirectly affected by CO_2leakage through disruption of the food chain.

9.6.5.9 Impact on the Human Environment

Based on an Impact Modeling study to assess the risks associated with CO_2 from **offshore installations**, the results show that the risk distances from the specified mortality levels are limited to the immediate vicinity of the Omega platform. The maximum risk distance for 1% mortality is estimated to be 80 m at the deck level of the Omega platform, resulting from a leak due to a rupture in the $CO_{(2)}$ pipeline (scenario FC04). Since CO_2 is heavier than air, a leak at an elevation above the surface moves towards sea level and an underwater leak remains close to the surface and disperses, creating a potential hazard to support vessels.

At sea level, the maximum distance in the direction of the wind where the concentration is equivalent to a 1% mortality level is approximately 1 km for the subsea pipeline rupture scenario (FC08). In the early stages of the spill (t = <60 s), a high plume is predicted that may exceed the deck levels of the platform for a short period of time, but the distances in the wind direction at these heights are limited. As the pipeline decompresses, the plume height decreases significantly and disperses over significant distances in the wind direction. The height of the dispersion plume is less than 2 m above sea level for distances in the direction of the wind greater than ~100 m, which means that the risk to ship personnel is reduced in these scenarios. However, with the implementation of preventive measures (e.g., pipeline inspection), this scenario becomes extremely rare.

With regard to fishing activities, the fishing industry can generally be relocated to other areas without harmful effects, provided that the fish population manages to move away from the affected area. However, the nearest fish farm may suffer damage. Tourism is not expected to be affected as the impacts are local in nature and extend to an area outside the project area. Furthermore, there is no expected impact on cultural heritage, as it is located at a significant distance from the project area (>2km).

9.6.5.10 Impact on the socio-economic environment

In the event of an accident involving a spill and impact on fish stocks, the local economy, which depends to some extent on this activity, is also expected to be affected.

9.6.5.11 Impact on technical infrastructure

No impact on technical infrastructure is expected from the carbon dioxide leak.

9.6.6 Differentiation of Impacts Arising from the Vulnerability of the Project to Risks of Serious Accidents or Disasters Related to the Project from the Modification of the Project

As can be seen from the above **paragraphs**, the expected P&K impacts arising from the project's vulnerability to risks of serious accidents or disasters related to the project from the interventions of the proposed modification of the project are similar to those estimated and assessed in the approved EIA for the Project, and it should be noted that **under no circumstances** can they alter the aforementioned impacts, as estimated in the assessment of the licensed project.

9.7 IMPACTS FROM EXPECTED CLIMATE RISKS

The following **sections** provide a detailed assessment of the impact of expected climate risks on the proposed project modification and examine its vulnerability to these risks in particular and to climate change-related phenomena in general, in accordance with the Methodology presented in **Section 9.4.1.**

9.7.1 Sensitivity Analysis

The purpose of the sensitivity analysis is to identify the **sources of risk (hazards)** for the specific type of infrastructure, based on its construction and operational characteristics, **regardless of its location**. In other words, sensitivity concerns the type of project and how it operates.

A hazard is defined as the possible occurrence of a natural or man-made event or trend that could cause loss of life, injury, or other health effects, as well as damage to or loss of property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.

More specifically, the sensitivity analysis for the project under consideration, according to the calculation tool of the General Secretariat for Public Investment & NSRF, is summarized in **the** following **table (Table of Risk Sources)**.

Table9 –25 : Sensitivity analysis for the project under consideration

Risk Source	Sensitivity				
	Construction	Operation	Products Services	Integration into the area	Total Sensitivity
Heatwave	Low	Low	Low	Low	**Low**
Cold wave	Low	Low	Low	Low	**Low**
Frost (Number of Days with TN<0)	Low	Low	Low	Low	**Low**
Forest fire	Low	Low	Low	Low	**Low**
Cyclone, Severe storms, hurricane	Moderate	Moderate	Moderate	Low	**Moderate**
Storm (including snowstorms, dust storms)	Low	Low	Low	Low	**Low**
Tornado/Stormy Winds	Moderate	Moderate	Moderate	Low	**Moderate**
Drought	Low	Low	Low	Low	**Low**
Heavy precipitation (rain, hail, snow/ice)	Low	Low	Low	Low	**Low**
Flooding (in coastal areas, rivers, due to rain, groundwater)	Low	Low	Low	Low	**Low**
Landslides/Soil erosion	Low	Low	Low	Low	**Low**
Settling	Low	Low	Low	Low	**Low**
Change in average air temperature	Low	Low	Low	Low	**Low**
Urban heat island	Low	Low	Low	Low	**Low**

Risk Source	Sensitivity				
	Construction	Operation	Products Services	Integration into the area	Total Sensitivity
Thermal stress	Low	Low	Low	Low	**Low**
Temperature variability	Low	Low	Low	Low	**Low**
Change in solar radiation	Low	Low	Low	Low	**Low**
Change in wind characteristics	Low	Low	Low	Low	**Low**
Change in precipitation characteristics and types (rain, hail, snow/ice)	Low	Low	Low	Low	**Low**
Precipitation variability or hydrological variability	Low	Low	Low	Low	**Low**
Change in average water temperature in water bodies	Low	Low	Low	Low	**Low**
Acidification/salinity of seawater	Low	Low	Low	Low	**Low**
Saltwater intrusion, salinization of surface and groundwater	Low	Low	Low	Low	**Low**
Sea level rise	**High**	**High**	**High**	Low	**High**
Availability and stress on water resources	Low	Low	Low	Low	**Low**
Coastal erosion	Low	Low	Low	Low	**Low**
Soil degradation, change in salt content, desertification	Low	Low	Low	Low	**Low**
Changes in the duration of growing seasons	Low	Low	Low	Low	**Low**

9.7.2 Survey Analysis

The purpose of the exposure analysis is to identify the **sources of risk (hazards)** for the planned geographical location of the infrastructure (or for alternative locations), both in the immediate and distant future, **regardless of its type**.

The **Hazard Source Table** selected for the sensitivity analysis of the project will be used for the exposure analysis process.

More specifically, the exposure analysis for the project under consideration, according to the calculation tool of the General Secretariat for Public Investment & NSRF, is summarized in **the** following **Table**.

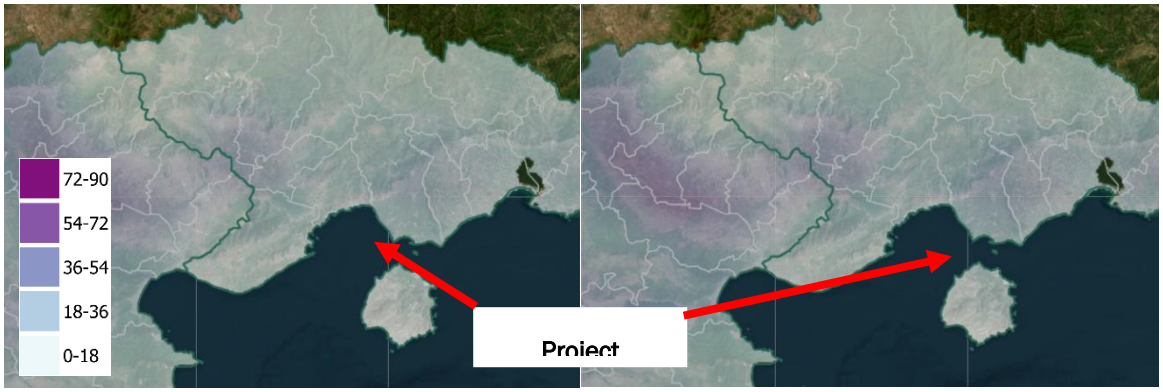
Table9 –26 : Exposure analysis for the project under consideration

Risk Source	Exposure		
	Existing conditions	Future conditions	Total Exposure
Heatwave	Low	Moderate	**Moderate**
Cold wave	Low	Moderate	**Moderate**
Frost (Number of Days with TN<0)	Low	Low	**Low**
Forest fire	Low	Low	**Low**
Cyclone, severe storms, hurricane	Low	Low	**Low**
Storm (including snowstorms, dust storms)	Low	Low	**Low**
Tornado/Gale-force winds	Low	Low	**Low**
Drought	Low	Moderate	**Moderate**
Heavy precipitation (rain, hail, snow/ice)	Low	Moderate	**Moderate**
Flooding (in coastal areas, rivers, due to rain, groundwater)	Low	Low	**Low**
Landslides/Soil erosion	Low	Low	**Low**
Subsidence	Low	Low	**Low**
Change in average air temperature	Low	Low	**Low**
Urban heat island	Low	Low	**Low**
Thermal stress	Low	Low	**Low**
Temperature variability	Low	Low	**Low**
Variation in solar radiation	Low	Low	**Low**
Change in wind characteristics	Low	Low	**Low**
Change in precipitation characteristics and types (rain, hail, snow/ice)	Low	Low	**Low**
Precipitation variability or hydrological variability	Low	Low	**Low**

Risk Source	Exposure		
	Existing conditions	Future conditions	Total Exposure
Change in average water temperature in water bodies	Low	Low	**Low**
Acidification/salinity of seawater	Low	Low	**Low**
Saltwater intrusion, salinization of surface and groundwater	Low	Low	**Low**
Sea level rise	Low	Low	**Low**
Availability and stress on water resources	Low	Low	**Low**
Coastal erosion	Low	Low	**Low**
Soil degradation, change in salt content, desertification	Low	Low	**Low**
Changes in the length of growing seasons	Low	Low	**Low**

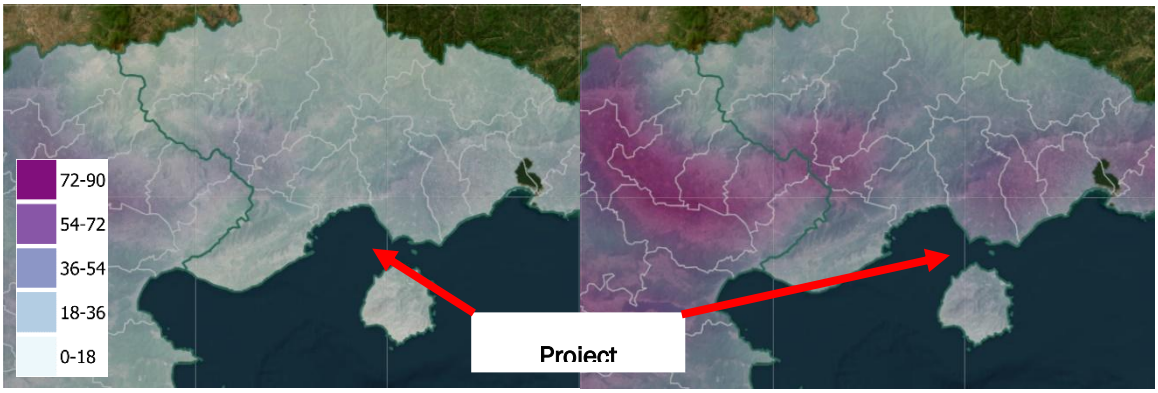
More specifically, the exposure analysis for the project under consideration, as used for the **Analysis of the Adaptation and Resilience of the Project under Consideration to Climate Change**, is as follows:

- In terms of the **Heatwave** Risk Source, the exposure of the project under consideration was assessed as **moderate**, as shown by the evolution of the indicator *'Number of days with TX > 35 °C - very hot days'*, as presented for the region in **the** following **Figures**.



(Source: https://geo.adaptivegreecehub.gr/)

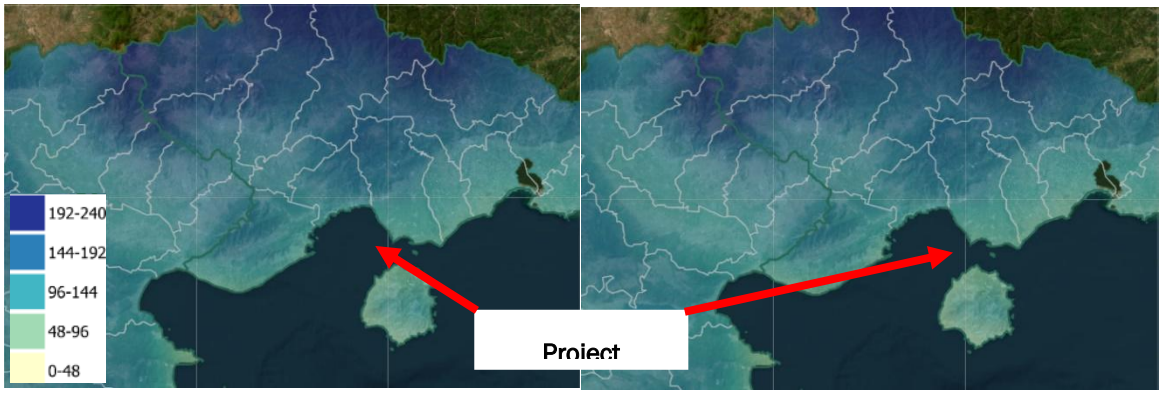
Figure9 –17 : Number of days with TX > 35 °C - very hot days in the near future (2031-2060) (left scenario RCP 4.5 and right scenario RCP 8.5)



(Source: https://geo.adaptivegreecehub.gr/)

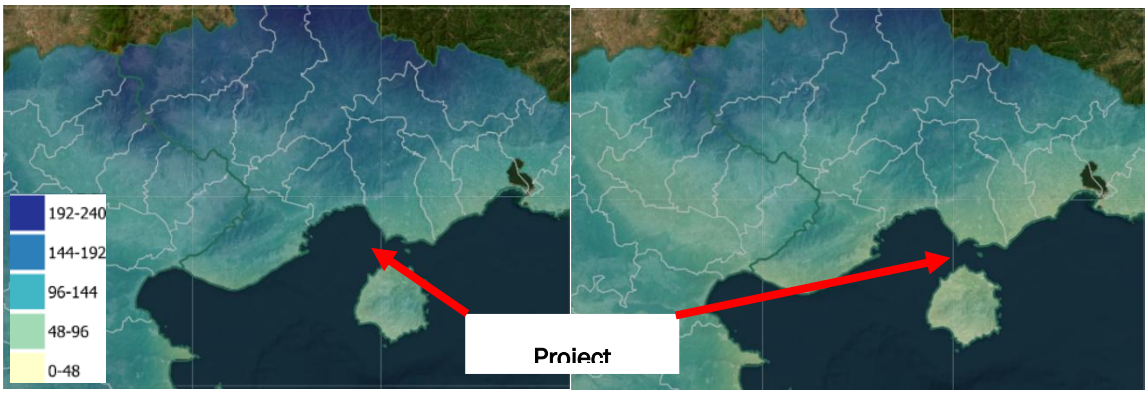
9 –18 : Number of days with TX > 35 °C – very hot days in the distant future (2071-2100) (left: RCP 4.5 scenario and right: RCP 8.5 scenario)

- With regard to the **Cold Wave** Risk Source, the exposure of the project under consideration was assessed as **moderate**, as shown by the evolution of the indicator *'Number of days with strong heating needs (days with TG<10 °C)'*, in the near future (2031-2060) and the distant future (2071-2100), for scenarios RCP 4.5 and RCP 8.5.



(Source: https://geo.adaptivegreecehub.gr/)

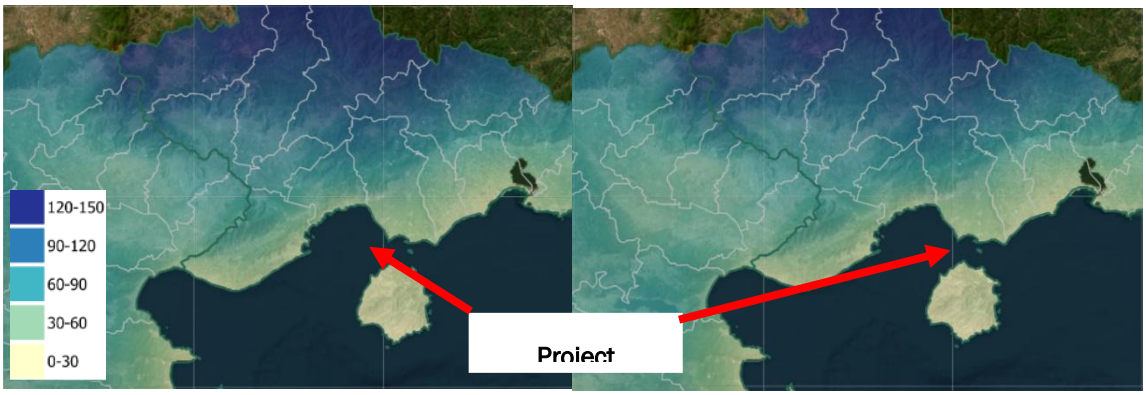
Figure9 –19 : Number of days with TG<10 °C in the near future (2031-2060) (left: RCP 4.5 scenario and right: RCP 8.5 scenario)



(Source: https://geo.adaptivegreecehub.gr/)

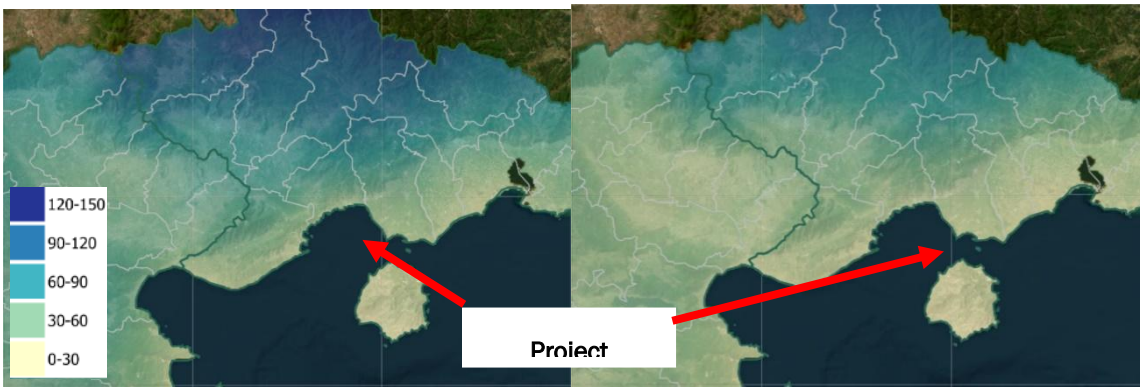
9 –1 : Number of days with TG<10 °C in the distant future (2071-2100) (left scenario RCP 4.5 and right scenario RCP 8.5)

- With regard to the **Frost** Risk Source, the exposure of the project under consideration was assessed as **low**, as shown by the evolution of the *'Number of days with TN < 0 °C - night frost'* in the near future (2031-2060) and the distant future (2071-2100) for scenarios RCP 4.5 and RCP 8.5.



(Source: https://geo.adaptivegreecehub.gr/)

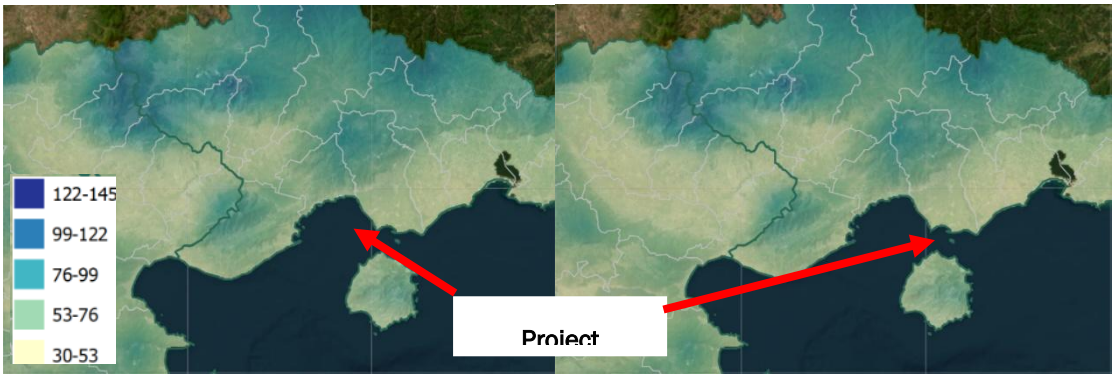
Figure9 –20 : Number of days with TN < 0 °C in the near future (2031-2060) (left: RCP 4.5 scenario and right: RCP 8.5 scenario)



(Source: https://geo.adaptivegreecehub.gr/)

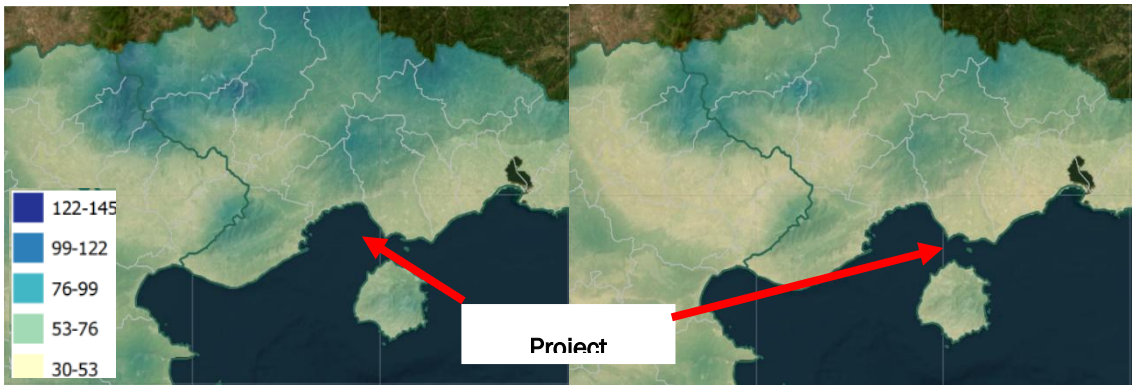
9 –21 : Number of days with TN < 0 °C in the distant future (2071–2100) (left: RCP 4.5 scenario; right: RCP 8.5 scenario)

- With regard to the **drought** risk source, the project under review was assessed as **moderate**, as shown by the evolution of the *'Maximum duration of consecutive days with PR < 1mm - maximum drought duration in days'* indicator, as presented for the region in the following Figures. *1mm - maximum duration of drought in days',* as presented for the region in **the** following **Figures.**



(Source: https://geo.adaptivegreecehub.gr/)

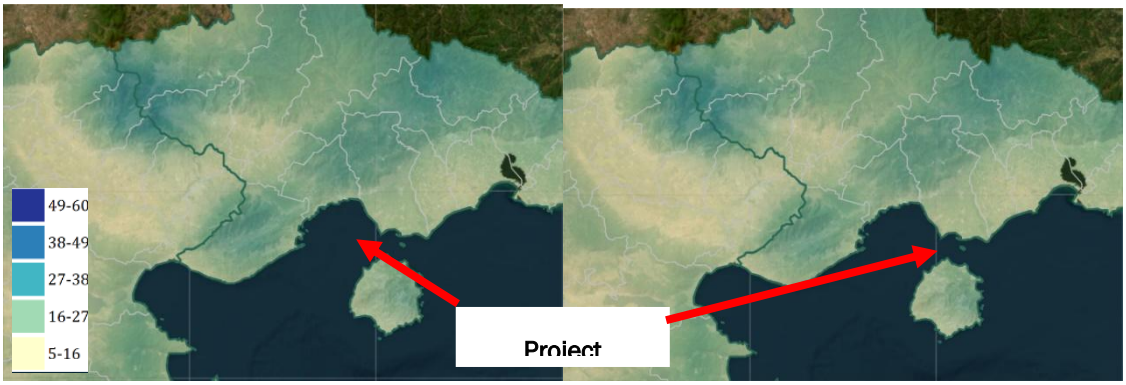
Figure9 –22 : Maximum duration of consecutive days with PR < 1 mm – maximum duration of drought in days in the near future (2031–2060) (left: RCP 4.5 scenario; right: RCP 8.5 scenario)



(Source: https://geo.adaptivegreecehub.gr/)

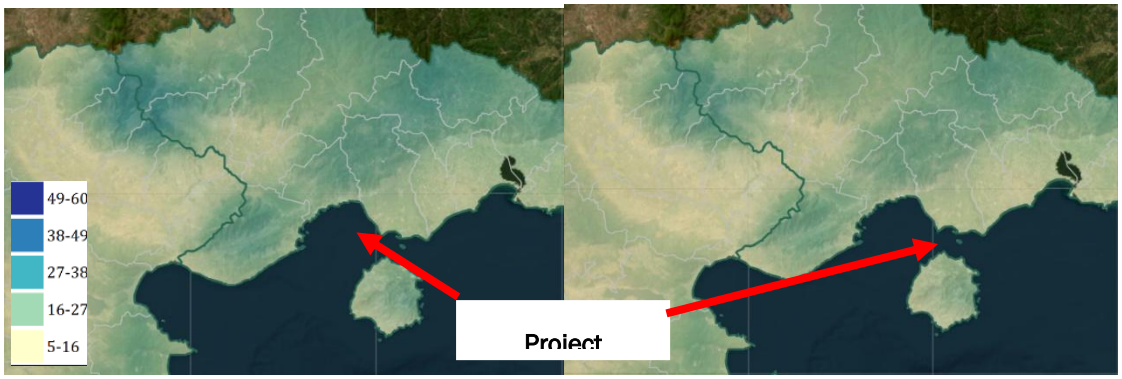
Figure9 –23 : Maximum duration of consecutive days with PR < 1 mm - maximum duration of drought in days in the distant future (2071-2100) (left scenario RCP 4.5 and right scenario RCP 8.5)

- In terms of the risk source **of heavy precipitation (rain, hail, snow/ice)**, the exposure of the project under consideration was assessed as **moderate**, as shown by the evolution of the index *'Number of days with PR > 10mm - days of heavy rainfall'*, as presented for the area in **the** following **Figures.**



(Source: https://geo.adaptivegreecehub.gr/)

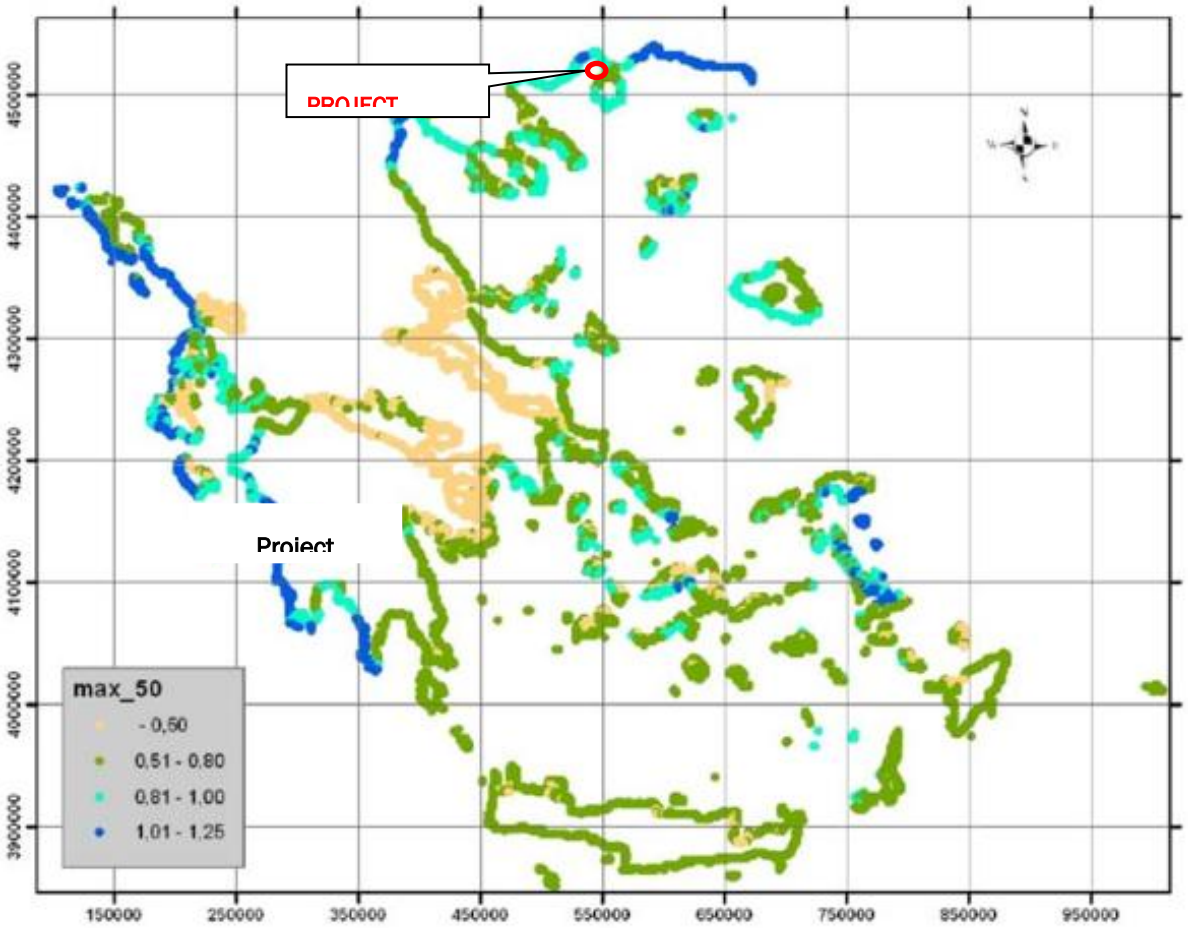
Figure9 –24 : Number of days with PR > 10mm - days of heavy rainfall - in the near future (2031-2060) (left scenario RCP 4.5 and right scenario RCP 8.5)



(Source: https://geo.adaptivegreecehub.gr/)

9 –25 : Number of days with PR > 10 mm – days of heavy rainfall in the distant future (2071-2100) (left: RCP 4.5 scenario and right: RCP 8.5 scenario)

- With regard to the following Risk Sources, the exposure of the project under consideration was assessed as **low** based on the characteristics of the area under consideration and the history of occurrence of relevant phenomena in it: Forest fire, Flooding (in coastal areas, rivers, due to rain, groundwater), change in average air temperature, urban heat island, thermal stress, temperature variability, change in solar radiation, change in wind characteristics, change in precipitation characteristics and types (rain, hail, snow/ice), precipitation variability or hydrological variability, change in average water temperature in water bodies, acidification/salinity of seawater, saltwater intrusion, salinization of surface & groundwater.
- With regard to the risk source **of sea level rise**, the exposure of the project under consideration was assessed as **low**, as the area under consideration is located in areas that will not be flooded by a possible MSW, even if it reaches levels of 1 meter.



(YPEN-EGY, 2017)

9 –26 : Total maximum MSL rise on the coastline (maximum astronomical tide and meteorological flood with maximum waves) for a return period T=50 years

- With regard to the following sources of risk, the exposure of the project under consideration was assessed as **low** based on the characteristics of the area under consideration and the history of occurrence of relevant phenomena in it: Saltwater intrusion, salinization of surface and groundwater, availability and stress on water resources, coastal erosion, soil degradation, changes in salt content, desertification, changes in the length of growing seasons.

9.7.3 Vulnerability Analysis

The vulnerability analysis combines the exposure and sensitivity analyses to determine which **hazards** are relevant to the infrastructure in question, **in terms of type and geographical location**. It forms the basis for determining whether the analysis will continue to the second stage of detailed analysis.

For the sensitivity and exposure analyses, a three-level assessment scale (low, moderate, high) has been established, which indicates the level of vulnerability for each climate hazard (low, moderate, high).

In cases where the same hazard is related to both sensitivity and exposure, the vulnerability of the infrastructure to that hazard is the combination of the two cases.

Vulnerability = Combination {Sensitivity, Exposure}

If the vulnerability analysis reasonably concludes that the infrastructure is not vulnerable to any hazard source, no further **risk analysis** is necessary and the examination of the infrastructure's adaptation to climate change is thus complete.

However, if moderate or high levels of vulnerability are identified for certain risk sources, a detailed **risk assessment** should be carried out for each of them.

More specifically, the vulnerability analysis for the project under consideration, according to the calculation tool of the General Secretariat for Public Investment & NSRF, is summarized in **the** following **table**.

Table9 –27 : Vulnerability analysis for the project under consideration

Risk Source	Sensitivity	Exposure	Vulnerability
Heatwave	Low	Moderate	Low
Cold wave	Low	Moderate	Low
Frost (Number of Days with TN<0)	Low	Low	Low
Forest fire	Low	Low	Low
Cyclone, severe storms, hurricane	Moderate	Low	Moderate
Storm (including snowstorms, dust storms)	Low	Low	Low
Tornado/Gale-force winds	Moderate	Low	Moderate
Drought	Low	Moderate	Low
Heavy precipitation (rain, hail, snow/ice)	Low	Moderate	Low
Flooding (in coastal areas, rivers, due to rain, groundwater)	Low	Low	Low
Landslides/Soil erosion	Low	Low	Low
Settling	Low	Low	Low
Change in average air temperature	Low	Low	Low
Urban heat island	Low	Low	Low
Thermal stress	Low	Low	Low
Temperature variability	Low	Low	Low
Variation in solar radiation	Low	Low	Low
Change in wind characteristics	Low	Low	Low

Risk Source	Sensitivity	Exposure	Vulnerability
Change in precipitation characteristics and types (rain, hail, snow/ice)	Low	Low	Low
Precipitation variability or hydrological variability	Low	Low	Low
Change in average water temperature in water bodies	Low	Low	Low
Acidification/salinity of seawater	Low	Low	Low
Saltwater intrusion, salinization of surface and groundwater	Low	Low	Low
Sea level rise	High	Low	High
Availability and stress on water resources	Low	Low	Low
Coastal erosion	Low	Low	Low
Soil degradation, change in salt content, desertification	Low	Low	Low
Changes in the length of growing seasons	Low	Low	Low

The above analysis reveals moderate or high levels of vulnerability to cyclones, severe storms, hurricanes, tornadoes/storm winds, and sea level rise. Therefore, **a detailed risk assessment** will be carried out for each of these in the following **section.**

9.7.4 Detailed Analysis

9.7.4.1 General Information

s includes the following steps:

- Risk analysis.
- Measures to enhance adaptation to climate change/Monitoring program.

9.7.4.2 Risk Analysis

The risk analysis performed for climate risks identified as moderate or high by the vulnerability analysis is a combination of **the probability** of occurrence of each risk source identified in the vulnerability pre-assessment stage and the **expected intensity** of the impact of that risk source (hazard).

The analysis carried out in **Sections 9.7.1**, 9.**7.2**, and 9.**7.3,** moderate or high levels of vulnerability are identified for the risk sources of cyclones, severe storms, hurricanes, tornadoes/storm winds, and sea level rise. Therefore, **a detailed risk assessment** will be carried out for each of these, which is presented in **the** following **table.**

9 –28 : Calculation of the inherent risk scale for the project under consideration

Risk Source	Probability of occurrence	Scale of consequences	Inherent risk	
			Rating	Description
Cyclone, severe storms, hurricane	Unlikely	Moderate	3	Low
Tornado/Gale-force winds	Rare	Minor	4	Low
Drought	Almost certain	Negligible	5	Low
Sea level rise	Unlikely	Significant	4	Low

9.7.4.3 Measures to Enhance Adaptation to Climate Change and Residual Risk

Based on the results of the risk analysis, **minor inherent risks (low risk)** were identified. For moderate and significant inherent risks, (additional) adaptation measures should be considered in order to achieve the maximum possible reduction of **residual risk.** Therefore, in this specific case, **no** (additional) adaptation measures **need** to be considered, as minor risks (negligible and low) are excluded from the risk analysis.

9.7.5 Differentiation of Expected Climate Risks from the Project Modification

As can be seen from the above **paragraphs**, the expected climate risks from the interventions of the proposed project modification **cannot** in any way alter the expected climate risks of the licensed project, as estimated and evaluated in the approved EIA of the Project, as summarized below.

Table9 –29 : Calculation of the scale of inherent risk and residual risks for the licensed project in accordance with the approved EIA for the project

Risk Source	Probability of occurrence	Scale of consequences	Inherent risk		Residual Risk	
			Rating	Description	Rating	Description
Forest fire	Rare	Catastrophic	10	Moderate	4	Low
Cyclones, severe storms, hurricanes	Unlikely	Moderate	3	Low	3	Low
Tornadoes/stormy winds	Rare	Minor	4	Low	4	Low
Drought	Almost certain	Negligible	5	Low	5	Low
Flooding (in coastal areas, rivers, due to rain, groundwater)	Moderate	Moderate	9	Moderate	4	Low
Sea level rise	Unlikely	Significant	4	Low	4	Low

10 MEASURES TO PREVENT/ADDRESS/MINIMIZE POTENTIAL IMPACTS AND ENVIRONMENTAL MANAGEMENT OF THE PROJECT

10.1 MEASURES TO AVOID/ADDRESS/MINIMIZE POTENTIAL IMPACTS

10.1.1 Introduction

Based on the analysis in **Chapter 9** above, it is documented that the proposed amendment does not result in any substantial change in the environmental impacts compared to those examined and assessed for the project initially approved for environmental licensing. On the contrary, in some cases, the proposed amendment even has a positive effect by limiting the potential adverse impacts from the implementation and operation of the overall project, as it is estimated that it further minimises the predictions and estimates of the impacts that were implemented both within the framework of the approved EIA

Consequently, the measures and conditions of the approved EIA and the corresponding AEPO of the project (No. YPEN/DIPA/xxxxxxxx (ΑΔΑ: χχχχχχχχχχχχ)), **are considered adequate and remain in force,** as they cover all the necessary Environmental Terms required for the implementation, operation, and decommissioning of a $CO_{(2)\ project}$ of a similar nature and scale, adapted to the specific Environmental and Social conditions of the study area. However, an exception to the above is the fact that certain interventions are added to the overall project (new Omega offshore platform, produced water transfer pipeline, etc.) have been added to the overall project, the proper management of which requires a limited number of additional EAs. Therefore, in the context of this document, the following measures are proposed to avoid/address/minimize potential impacts, which are incorporated in **the** next **section** into the codification of the proposed Environmental Terms.

It should be noted that, in the context of the implementation of the proposed project, EnEarth will develop and implement appropriate management systems to ensure that normal and unexpected environmental impacts are mitigated to a level that is as low as reasonably practicable (ALARP). The usual impacts are subject to an **Environmental and Social Management Plan (ESMP),** which for the project has been described in detail in **the** approved **Environmental Impact Study** and continues to apply in the case of the incorporation of the proposed amendment into it. The effectiveness of these systems and procedures is checked regularly by the project operator.

In designing the development of the facilities proposed herein, EnEarth's intention is to incorporate safety, prevention, and mitigation measures for environmental and social risk into the design wherever possible. It is clear that risk is mitigated/ minimized more effectively by conducting appropriate studies and incorporating their findings/recommendations into the implementation of the project than by attempting to mitigate risks through controls and emergency measures during the project's life cycle.

10.1.2 Construction Phase

This **chapter** presents the proposed measures to prevent and address the potentially significant impacts of the proposed interventions, which target the project as a whole (licensed project and proposed modification). For this reason, the following measures incorporate both the provisions of the approved EIA for the licensed project and the corresponding measures dictated by the addition of the proposed modification to it.

Chapter 9 explored the activities during the construction of the Project that could potentially cause undesirable adverse impacts in terms of their interaction with a number of Environmental and Social Parameters.

The proposed measures for minimising/mitigating/avoiding/addressing the potential impacts that have been analysed/assessed and evaluated as minor, moderate, or significant, as the case may be (in the context of this project, the estimated impacts range from negligible to moderate, as discussed in detail in **Chapter 9**).

In cases where, during the Final Assessment, certain impacts were assessed as **Moderate**, this **Chapter** proposes prevention/mitigation/response measures so that these impacts are reduced to at least **Minor**.

Furthermore, because in the context of the Project under consideration, the implementing body's philosophy is to achieve the desired technical result with the least possible environmental footprint, additional mitigation measures are proposed even in the case of potential impacts that were assessed as **Negligible**.

The following are mentioned as general measures during the Construction Phase:

- Implementation of the Environmental Monitoring Program.
- Design and implementation of an Environmental Management Plan by the contractor(s), compatible with the corresponding **EMP** of the Project.

The following **table** presents the measures for preventing, minimizing, and addressing potential adverse environmental and social impacts during the **Construction** Phase of the proposed Project.

Table10 –1 : Measures to prevent, minimize, and address potential adverse environmental and social impacts during the construction phase of the proposed Project

Environmental Parameter		Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
Natural Abiotic Environment	Climatic and Bioclimatic Characteristics	Minimisation of the impact of air emissions (gaseous pollutants and PM) on climate change	**MAK 1.** To protect against exhaust fumes from machinery and vehicles working on the project, regular maintenance is required, which is necessary in any case. It should be noted that maintenance should not be carried out within the work area.	Impacts contributing to climate change due to combustion emissions from machinery, vehicles, and vessels involved in construction work.
			MAK 2. The machinery, vehicles, and equipment involved in the construction of the project must also meet the exhaust emission specifications in accordance with EU standards for such machinery and must not be old technology that emits increased pollutants.	
			MAK 3. Vessels to be used must fully comply with the international standards of the MARPOL 73/78 Convention, Annex VI "Regulations for the Prevention of Air Pollution from Ships." Annex VI regulates emissions of ozone-depleting substances, nitrogen oxides (NOX), sulfur oxides (SOx), and volatile organic compounds (VOCs).	
			MAK 4. The drilling rig shall be designed and constructed in accordance with API 4F and the latest European regulations, including low emission specifications.	
			MAK 5. Transport of materials: Where technically feasible and applicable, the transport of construction materials and waste by sea shall be preferred over road transport.	Impacts related to waste management.
	Morphological and landscape characteristics	Minimisation of impacts within the Project's footprint	**MAK 6.** Prohibit any permanent unauthorized covering with impermeable material (e.g., asphalt mix or concrete) of surfaces that do not serve the absolutely necessary functional needs of the project. All other surfaces should be covered with permeable material, using materials as similar as possible to those found in the immediate environment of the project	Impacts related to the extent of the project's footprint and minimization of the impact zone.
		Minimisation of impacts outside the project's footprint	**MAK 7**. It is proposed that the construction site be located within the designated area within the SIGMA industrial facility. Otherwise, the construction site facilities shall be determined after approval by the relevant TEPEM. Any activity outside the boundaries of the areas designated for the implementation of the projects and the construction site, which may cause aesthetic degradation and alteration of the landscape (disposal of waste materials, parking of machinery, etc.) shall be prohibited..	Impacts related to activities outside the project area and minimisation of the impact zone.

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
	Minimisation of impacts through the use of good practices	**MAK 8.** Prohibit the uncontrolled disposal of surplus materials in the immediate or wider area. Under no circumstances is the disposal of these materials in stream beds or other water bodies permitted. The technical interventions included in the implementation of the project and related to the effective drainage of the project site, the hydraulic communication of the areas on either side of it, etc., must be checked, cleaned, and maintained systematically at regular intervals. The effectiveness of the technical interventions (included in the implementation of the project and related to the effective drainage of the project site, the hydraulic communication of the areas on either side, etc.) should be systematically checked in terms of their design and effectiveness, based on new scientific data or the corresponding revisions of the relevant Plans (SDLAP, SDKP, etc.).	Impacts related to the management of waste and surplus materials.
		MAK 9. Systematic maintenance of the infrastructure and cleanliness of the Project area is required.	
		MAK 10. Collection points for solid waste on the construction site should be designated, and regular collection should be arranged so as not to degrade the landscape.	
		MAK 11. Any storage of materials outside the construction site, even temporary, is prohibited.	Impacts related to the management of construction materials and the project schedule.
		MAK 12. The work schedule should be designed so that temporary material deposits are used as soon as possible.	
	Minimization of impacts within the project area	**MAK 13.** All types of construction site installations (machinery, temporary structures, all types of waste, etc.) must be removed after the completion of the specific phase of the project, regardless of the ownership status of the construction site.	Impacts related to the condition and restoration of the project occupation zone.
	Minimisation of impacts through the use of good practices	**MAK 14.** Excavations and soil removal should be carried out using conservative methods and in harmony with the natural morphology of the terrain. In addition, mild levels of work intensity must be maintained.	Impacts related to the extent of the project's footprint and minimization of the impact zone.

Environmental Parameter		Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		Minimisation of impacts through the use of good practices	**MAK 15.** No work should be carried out on days when weather conditions, the intensity and direction of sea currents favor the dispersion of solid particles.	Impacts related to the construction method and project schedule.
		Minimization of impacts through the use of good practices	**MAK 16.** All technically feasible measures should be taken to contain suspended materials (installation of filters/curtains to retain suspended solids or other appropriate equipment) in order to reduce the dispersion of the plume during the installation of the offshore sections of the project (with emphasis on the CO_2) and the possible disposal of materials at sea. During the implementation of the proposed project, it is recommended that, as a minimum, modern equipment be used to contain suspended solids (special floating barriers - debris containment booms, siltation curtains, etc.) around the perimeter of the works, so that the quality and transparency of the water over a large distance is not affected by the construction activities, and so that solid materials do not settle over a large area of the seabed. If the measure proves to be partially adequate during the construction phase of the project, additional measures should be taken in accordance with the findings of the relevant monitoring program.	Impacts related to construction works.
		Minimisation of impacts through monitoring, identification and mitigation	**MAK 17**. It is recommended that the Environmental Monitoring Program be implemented .	Impacts related to the construction method
	Geological, tectonic, and soil characteristics	Minimisation of impacts on soil and seabed	The measures for minimizing the impact on morphological and landscape characteristics (**MAK 5** to **MAK 13**) also apply to minimizing the impact on geological, tectonic, and soil characteristics.	Impacts related to various influences on a wide range of environmental parameters from the construction of the project.
			MAK 18. Earthworks should be carried out mainly during the period of the year when there is no heavy rainfall or extreme wave conditions, so as to avoid soil erosion and the creation of suspended particles, respectively. The work schedule should include provisions to avoid heavy earthworks during periods of heavy rainfall and rough seas, and to avoid earthworks on days when rain and heavy waves are forecast.	Impacts related to the construction method and project schedule.

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		In the exceptional case of heavy rainfall or rough seas during the relatively short excavation phase, it is recommended that work be suspended and geogrids be installed on the slopes, if deemed geotechnically necessary.	
		MAK 19. During the construction phase, methods and techniques should be applied to minimize the compaction of uncovered soils, such as restricting access during rainfall and using protective boards and low ground pressure machinery. Suitable water-permeable materials shall be used for the construction of parking areas within the construction site in order to limit rainwater runoff from the construction sites as much as possible.	Impacts related to the construction method of the project.
	Protection of soil and seabed through proper waste management	**MAK 20.** All waste and debris resulting from construction site activities during the construction of the projects (solid and liquid, hazardous or non-hazardous) must be managed appropriately by the project contractor, in accordance with the law, in order to prevent pollution of the area (soil, subsoil, surface and groundwater) from uncontrolled disposal or any leaks. **A "Waste Management Plan"** should be implemented during the construction/operation/decommissioning stages, examining all aspects of the project and the waste produced, with the aim of ensuring that the waste produced (hazardous, non-hazardous) is managed properly.	Impacts related to the construction method and project schedule.
		MAK 21. Construction sites should be equipped with waste bins in which urban waste generated by construction site workers can be collected. This waste should be collected by the competent local authority or collection and transport agency—if this is not possible, the project operator should arrange for the waste to be deposited in the existing collection system of the relevant local authority. It should be noted that special care should be taken to ensure that this solid waste does not include rubble or hazardous materials, the disposal of which should be carried out in accordance with the applicable legislation on the respective categories of waste.	Impacts related to waste management.
		MAK 22. For the management of liquid waste from the project construction personnel, it is recommended that chemical toilets be installed and that they be transported and disposed of at the nearest available WWTP and/or that the sanitary facilities of the company's existing facilities in the area be used.	Impacts related to waste management.

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		MAK 23. Liquid and solid waste containing hazardous or potentially hazardous substances should be transported immediately in sealed containers, which will be stored (temporarily for the short period of time required to carry out the relevant work) in a covered area with an impermeable industrial-grade concrete floor and the necessary secondary containment systems. Their transport and final disposal or treatment will be carried out by a specialized and appropriately licensed company, in accordance with best available practices.	Impacts related to the management of waste and construction materials from the project.
		MAK 24. The management of any excess excavation products, as well as (non-hazardous) CDW produced by the construction works, shall be carried out in accordance with the provisions of Joint Ministerial Decision 36259/1757/E103 (Government Gazette 1312/24-08-2011) "Measures, conditions, and program for the alternative management of waste from excavations, construction, and demolition (AECC)". Materials that cannot be reused/recycled within the project must be delivered to a Collective Alternative Management System (SSED) approved by the EOAN. The management of AECW in the Project area is carried out in accordance with the provisions of Joint Ministerial Decision 36259/1757/E103/2010 through the following Alternative Management Systems (based on data from the Hellenic Recycling Agency (EOAN, https://www.eoan.gr): • SSED "Recycling of Inert Waste of Northern Greece S.A.", with the distinctive title "AN.A.B.E. S.A.". • SSED "Recycling of Central Macedonia SA", with the distinctive title "ANAKEM". • SSED "Central Greece Recycling System Ltd" with the distinctive title "S.A.N.K.E. Ltd". • SSED "PEDMEDE ECO Limited Liability Company," with the distinctive title "PEDMEDE ECO MEPE."	Impacts related to waste management.
		MAK 25. If, at the time of implementation of the proposed project, it is not within the geographical scope of an Alternative Management System approved by the EEA, the excess material should be disposed of at the nearest approved CASS or in a suitable storage facility, after submission and approval of a Technical Environmental Study (TES) by the competent licensing authority, in accordance with paragraph 2 of Article 7 of Law 4014/2011 (Government Gazette 209/A 21.09.2011). In this case, the land proposed by the contractor shall be approved by the competent authority and in accordance with the provisions of specification	

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		ELOT TP 1501-02-05-00-00. When selecting the location of the storage facility, attention should be paid to the following: • The location of the storage chamber must not be within the boundaries of an ecologically sensitive or protected area. • Avoid areas with natural vegetation or wildlife habitats. • Avoid locating the storage chamber on productive land or in areas with surface water bodies. • Avoid locations that would affect the landscape of the area or conflict with existing human uses and activities. Preference should be given to locating the storage chamber in an already disturbed location, which would have a positive impact on the environment of the study area. The method of disposal and the layout of the deposits will be specified in a relevant TEPEM, which will be prepared and submitted to the competent licensing authority before the start of the relevant works, in accordance with paragraph 2 of Article 7 of Law 4014/2011 (Government Gazette 209/A 21.09.2011).	
		MAK 26. Construction sites should be equipped with recycling bins in which mixed recyclable materials such as paper/cardboard, plastic, metal, and glass can be collected. This waste should be collected by the competent local authority or collection and transport agency. If this is not possible, the project operator should arrange for the waste to be deposited in the local authority's existing collection system (Recyclable Materials Sorting Center - KDAY).	
		MAK 27. Separate collection of specific waste streams such as Waste Electrical and Electronic Equipment (WEEE), Waste Electrical Batteries (batteries) & Accumulators (WBA), Waste Lighting Equipment, Lamps and Small Appliances (WEEE) and their collection by licensed collection, transport and management bodies. If this is not feasible, provision should be made for the disposal of waste by the Project operator at appropriate recycling points of the WEEE.	
		MAK 28. The management of used mineral oils shall be carried out in accordance with the provisions of PD 82/25.2.2004 (Government Gazette 64/A/2.3.04) on "Establishment of measures and conditions for the management of used mineral oils," which replaced KYA 98012/2001/96. Waste lubricating oils (WLO) and liquids of all types shall be collected separately by category so that they can be delivered to a Collective Alternative Management System (CAMS) approved by the EEA.	

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		Mak 29. Hazardous waste shall be managed in accordance with the provisions of Joint Ministerial Decision 13588/725/2006 (Government Gazette 383B/28-3-2006) "Replacement of KYA 19396/1546/97 (Government Gazette 604B/18-7-1997)".	
	Protection of soil and seabed through good construction site practices	MAK 30. Fuel, machinery, and construction materials should be stored in such a way as to minimize the risk of contamination of soil and water resources. Chemicals, fuels, and lubricants shall be stored in suitably designed and sealed areas away from water bodies. Collection containers should be used on stationary machinery to prevent soil and groundwater contamination from oils and lubricants.	Impacts related to the management of construction materials.
		MAK 31. The maintenance of construction and material transport machinery should be carried out in an organized workshop in the area and not in the project area. The manufacturer should ensure that the maintenance schedule for the construction site machinery is properly organized so that oil changes and regular maintenance are carried out in organized workshops. Oils, lubricants, and other products from the mechanical parts of earthmoving and other machinery should be collected and disposed of appropriately, as required by law (Presidential Decree 82/2004, Government Gazette 64/A/2.3.2004).	Impacts related to the cleaning and maintenance of vehicles and equipment
		MAK 32. Within the construction site, equipment and vehicles shall be washed and cleaned frequently in specially designated areas in order to prevent the leakage of hazardous substances through the liquid waste produced. To reduce the volume of liquid waste from this area, it is recommended that vehicles first be cleaned with dry means, e.g., brooms, brushes, etc. In addition, low water consumption rinsing equipment such as pressure systems should be used.	
		MAK 33. Wet or damp concrete residues inside concrete mixers must not be discharged into the environment. The emptying and washing of residues from concrete barrels must be carried out at the ready-mixed concrete supply industry site.	Impacts related to the cleaning and maintenance of vehicles and equipment
		MAK 34. The contractor should implement **controls to prevent accidental pollution**, take all preventive measures to avoid oil spills from damage, negligence, etc., and appropriate measures should be taken to minimize such incidents.	Impacts related to accidental pollution.

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		In addition, accident response throughout the entire length of the works should be provided for in the manufacturer's program. Thus, the manufacturer should provide its crew with the appropriate materials to deal with accidental pollution incidents both on land and at sea. The manufacturer should provide the construction site with appropriate absorbent materials (e.g., sawdust, sand) in sufficient quantities to absorb and thus contain and limit the spread of spilled fuels and lubricants. After use, these absorbent materials should be properly managed in accordance with current legislation as hazardous waste. In addition, at least one of the vessels participating in the construction work must be equipped with means of containing the spill, as well as with appropriate absorption and chemical dispersion equipment to combat the spill. The above should be explicitly stated in the manufacturer's contract of obligations and their implementation should be properly supervised during construction.	
		MAK 35. From the pipeline approach works (placement of the specific section of the pipeline in a trench approximately 500 m long, 5 m wide, and 3 m deep), the volume of excavated material from the bottom is expected to be approximately 7,500 m^3 . The excavated material will be kept at the side of the trench for subsequent backfilling. In addition, earthworks should be avoided near the coastal front during periods of heavy rainfall in the area or strong waves.	Impacts related to construction works
		MAK 36. The supply of raw materials (aggregates) required during construction shall be sourced from legally operating quarries and environmentally approved quarrying areas.	Impacts related to the management of construction materials.
	Protection of the seabed using non- - hazardous materials	**MAK 37.** Cuttings from the drilling section to a depth of 2,600 m shall not contain hazardous substances and shall be deposited on the seabed. In this section, a seawater- and lime-based drilling fluid that is biodegradable and has no negative impact on the environment will be used as the drilling fluid. As for the products of the drilling operations from the drilling section to a depth of 2,600 m, these can be disposed of provided that the analyses carried out during the construction phase confirm that they do not contain pollutants they may be disposed of in the marine environment, following a positive opinion from	Impacts related to the management of drilling products.

Environmental Parameter		Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
			an appropriate laboratory. The following conditions must be met for the disposal of these sediments in the marine environment: • The disposal site must be located at a considerable distance from Posidonia meadows. • The disposal site must be located at a short distance from the extraction site and at the greatest possible depth (ideally at a depth greater than 50 m) to avoid long-distance transport. • The materials must be evenly distributed in accordance with the above conditions. • Dumping should be carried out vertically and as deep as possible from the sea surface.	
		Protection of the seabed through proper management of hazardous or potentially hazardous waste.	**MAK 38.** For the section of drilling below a depth of approximately 2,600 m, the drilling fluids will be returned to the drill rig to remove the cuttings and the mud will undergo appropriate treatment.	Impacts related to the management of drilling products.
			MAK 39. Separate collection of cuttings containing hazardous substances. Temporary storage within the Project and disposal to licensed collection, transport, and management agencies. For drill cuttings that may contain hazardous substances, provide for their immediate classification by a specialized and certified body and then, as soon as possible, their collection, removal, and disposal by a suitable specialized and certified body in approved suitable areas or SEDs.	Impacts related to the management of drilling products.
		Minimisation of impacts through the process of monitoring, identification and response	Implementation of the Environmental Monitoring Program (**MAK 17**) is recommended.	Impacts related to construction works.
	Air quality	Minimization of impacts through the use of good practices	**MAK 40.** Wet surfaces and materials to limit dust emissions during earthworks.	Impacts related to construction works, management, and transport of materials
			MAK 41. Machinery operating on site should be operated with care, and trucks should be driven at low speeds to limit dust emissions.	
			MAK 42. Construction materials and excavation waste deposits should be covered with tarpaulins until they are used or removed, respectively.	

Environmental Parameter		Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
			MAK 43. Trucks transporting inert materials should have special covers in accordance with existing regulations, and overfilling of trucks transporting bulk materials should be avoided.	
			MAK 44. In any construction or worksite activity where there is a possibility of dust emissions, suspended particles, or odorous substances, procedures and equipment should be adopted to ensure a significant reduction in these emissions, while the duration of these procedures should be minimized.	
		Minimization of the impact of gaseous pollutant emissions	**MAK 45.** For the construction of the CO_2pipeline, marine fuel (Marine Gasoil DMA ISO 8217:2012) with a maximum sulfur content of 0.1% (M/M) should be used on the construction vessel and auxiliary vessels.	Impacts contributing to air pollution and climate change due to combustion emissions from machinery, vehicles, and vessels involved in construction work.
			In addition, for construction works, it is recommended that the above measures **MAK 1** to **MAK 5** be implemented.	
	Noise and Vibrations	Minimisation of impacts through the use of good practices	**MAK 46.** The contractor should choose the layout and schedule of individual tasks so that multiple machines are not operating simultaneously in close proximity, causing minimal disturbance to the human environment in the immediate vicinity of the project.	Impacts related to the construction method and project schedule.
			MAK 47. The operation of the construction site and the movement of trucks on the urban road network within the settlements of the project area during quiet hours should be avoided as much as possible (Ministerial Decision 1023/2/37/96 (Government Gazette 15/B/12.1.96).	
			MAK 48. The *construction machinery to be used must comply with the provisions of the legislation "on measures and conditions for noise emissions in the environment from equipment for use in outdoor areas"* (Joint Ministerial Decision 37393/2028/2003, Government Gazette 1418/B/2003, as amended by Joint Ministerial Decision 9272/471/2007, Government Gazette 286/B/2007) and bear the CE conformity marking required by the above legislation.	Impacts contributing to noise emissions from machinery, vehicles, and vessels involved in construction works.
		Minimization of impacts through monitoring, identification, and mitigation	In any case, it is recommended that noise levels be systematically monitored within the project boundaries during construction (implementation of the Environmental Monitoring Program (**MAK 17**)) and that additional measures be taken if exceedances are found .	Impacts related to construction works

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		In addition, the measured noise emission levels should be taken into account in terms of their impact on project workers, and workers should be provided with appropriate protective equipment (e.g., earplugs, etc.).	
	Minimisation of impacts through the use of good practices	**MAK 49.** In any case, all activities and works to be carried out shall comply with the provisions of Greek law as set out below: ▪ Ministerial Decision 2640/270 (Government Gazette 689/B/18.8.78) on the use of silenced air hammers. ▪ PD 1180/81 (Government Gazette 293/A/6.10.81), On the regulation of matters relating to the establishment and operation of industries, crafts, all types of mechanical installations and warehouses and the protection of the environment in general, as amended and in force. ▪ Ministerial Decision 56206/1613 (Government Gazette 570/B/9.9.86), Determination of the noise emission of construction site machinery and equipment in accordance with Directives 79/113/EEC, 81/1051/EEC, and 85/405/EEC. ▪ Ministerial Decision 69001/1921 (Government Gazette 751/B/18.10.1988), EEC type approval for the noise level limit of construction site machinery and equipment, in particular motor-driven air compressors, tower cranes, welding and power generators, and portable concrete breakers and jackhammers, as amended. ▪ Ministerial Decision 10399/91 (Government Gazette 359B/91), Determination of the noise level limit for tower cranes, supplementing Ministerial Decision 69001/1921/88 ▪ Ministerial Decision 765/91 (Government Gazette 81B/21-2-91), Determination of noise level limits for hydraulic shovels, cable shovels, loaders, and loader-excavators, as amended by Joint Ministerial Decision 11481/523/97 (Government Gazette 295B/97) ▪ Joint Ministerial Decision 37393/2028/01.10.2003, Measures and conditions for noise emissions into the environment from equipment for use outdoors (Government Gazette 1418B), as amended by Joint Ministerial Decision 9272/471/2007 ▪ Presidential Decree 149/06, (159/A/28.7.2006) "Minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (noise) in accordance with Directive 2003/10/EC."	
		MAK 50. In addition, the provisions of the following shall be taken into account:	

Environmental Parameter		Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
			▪ BS 5228 "Code of Practice for noise control on construction and demolition sites" in relation to the determination of the methodology for predicting noise and vibrations during construction works and the applicable indicators and limits. ▪ BS 6472 Vibration dose value – vdv in relation to the determination of the maximum permissible vibration dose, which concerns human disturbance due to construction activities. ▪ BS 7385 in relation to the determination of the maximum permissible vibration level for the protection of buildings from structural damage. ▪ Ministerial Decision 13586/724/06 (Government Gazette 384/B/28.3.2006) Determination of measures, conditions, and methods for the assessment and management of environmental noise, in compliance with the provisions of Directive 2002/49/EC "relating to the assessment and management of environmental noise" of the Council of 25.6.2002). ▪ Ministerial Decision 211773/2012 (Government Gazette 1367/B/2012), Determination of Assessment Indicators and Maximum Permissible Limits for Environmental Noise Indicators arising from the operation of transport projects, technical specifications for special acoustic studies for the calculation and application (EAMYE) of noise barriers, specifications for monitoring environmental noise, and other provisions.	
		Minimisation of impacts through the use of good practices	**MAK 51.** Inform residents, users, and visitors to the area of the operating hours of machinery that may cause potential disturbance.	Impacts related to the construction method and project schedule.
	Water	Minimization of impacts on the water regime through the use of good practices	**MAK 52**. To meet the project's water needs, commercially bottled water should be used as drinking water for workers. The needs of the construction sites and the wetting of concrete will be met by installing water tanks on site, which will be filled by tankers or from the network of the existing SIGMA industrial facility.	Impacts related to the use of natural resources during the construction of the project.
			Construction of ditches and other hydraulic interventions where provided for in the project design, so that the flow of surface water remains unimpeded (**MAK 8**).	Impacts on surface water flow.
		Minimization of impacts on surface and groundwater through the use of good practices	The uncontrolled disposal of surplus materials in the immediate or wider area is prohibited. Under no circumstances is the disposal of these materials in stream beds or other water bodies permitted (**MAK 8**).	Impacts related to the production of surplus materials

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
			and their management during the construction of the project.
		Systematic maintenance of the infrastructure and keeping the project area clean is required (**MAK 9**).	Impacts related to project management and the methodology for implementing the construction works.
		Solid waste collection points should be designated at the construction site, and regular collection should be arranged so as not to degrade the landscape (**MAK 10, 11, 21**).	Impacts related to the production of solid waste and its management during the construction of the project.
		The work schedule should be designed so that temporary material deposits are used as quickly as possible and material washouts are avoided (**MAK 9,15,18**).	Impacts related to the construction method and project schedule.
	Water protection through good site practices	Fuel, machinery, and construction materials should be stored in such a way as to minimize the risk of soil and water pollution. Chemicals, fuels, and lubricants should be stored in appropriately designed and sealed areas away from water bodies. Collection containers should be used on stationary machinery to prevent soil and groundwater contamination from oils and lubricants (**MAK 30)**.	Impacts related to the production of surplus materials and their management during the construction of the project.
		Liquid or damp concrete residues in concrete mixers must not be discharged into the environment. The emptying and washing of concrete barrel residues must be carried out at the ready-mixed concrete supply industry site (**MAK 33)**.	Impacts related to the cleaning and maintenance of vehicles and equipment
		MAK 53. Water resulting from trenches or excavations during the installation of land infrastructure shall be removed using appropriate systems (pumps or wells) and, after classification (following appropriate sampling and relevant laboratory analyses), their intended treatment/discharge into water bodies in the project area will be determined.	Impacts related to the production of liquid waste and its management during the construction of the project.
	Minimization of impacts on water quality through the use of good practices	The main factor for the overall protection of the wider area's environment during construction works is the proper organisation and smooth operation of the construction site. To protect water quality, the implementation of measures (**MAK 6** to **MAK 8, MAK 11, MAK 13**) is recommended**.**	Impacts related to the organization and operation of the construction site, mainly

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		In order to protect water quality from activities involving the management, disposal, and use of construction materials and waste, as well as the cleaning and maintenance of vehicles and equipment, it is recommended that measures **MAK 20** to **MAK 29, MAK 31** to **MAK 32** and **MAK 38** to **MAK 39**	waste and construction material management.
	Protecting water quality from improper practices, damage, or negligence.	To protect water quality from improper practices, damage, or negligence, measure **MAK 34** is recommended**.**	Impacts related to accidental pollution during normal construction phase activities
	Minimisation of impacts through monitoring, detection and response procedures	The implementation of the Environmental Monitoring Program (**MAK 17**) is recommended**.**	Impacts related to construction works.
	Protection of marine waters	**MAK 53.** Implementation of emergency risk prevention and mitigation measures related to possible CO_2leakage as included in **Table 12 4**: Measures for the Prevention of Significant Anomalies in this **Chapter**.	Impacts related to accidental pollution during normal construction phase activities.
		MAK 55. Compliance with international guidelines and the IMO's International Safety Management Code (Safety Management Code - ISM) for the safe operation of ships and the prevention of environmental pollution, as well as strict compliance with navigation, communication, and safety procedures.	Impacts related to construction work, prevention of accidental pollution, and implementation of good construction practices.
		MAK 56. Compliance with MARPOL requirements for waste and sewage, with emphasis on the following: Annex I Regulations for the prevention of pollution by oil, Annex III Regulations for the prevention of pollution by harmful substances carried by sea in packaged form, Annex IV Regulations for the Prevention of Pollution by Sewage from Ships, Annex V Regulations for the Prevention of Pollution by Garbage from Ships.	
		MAK 57. The vessels to be used for the project shall comply with the International Regulations for Preventing Collisions at Sea 1972 (COLREG).	
	Protection of marine waters through good construction practices	**MAK 58.** Fuel supply procedures shall be implemented in accordance with applicable national regulations and vessel specifications.	
		MAK 59. Take all necessary measures to prevent marine pollution during the construction phase, as well as any additional measures recommended by the competent Port Authority, in accordance with Law 743/77 (Government Gazette A 319), as codified by Presidential Decree 55/98 (A' 58) and as applicable.	

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
	Protection of marine waters through proper waste management	A "Waste Management Plan" shall be implemented during the construction/operation/decommissioning stages, examining all aspects of the project and the waste produced, with the aim of ensuring that the waste produced (hazardous, non-hazardous) is managed properly (**MAK 20**).	Impacts related to construction works, prevention of accidental pollution, and implementation of good construction practices.
	Protection of marine waters	**MAK 60. A Chemical Use Plan** shall be implemented, which shall include: (i) The chemical substances that the operator intends to use during the work. A list of the ecotoxicity of these substances. (ii) The purpose or purposes for which the operator intends to use the chemicals. (iii) The maximum concentrations of the chemicals that the operator intends to use in any other substances, as well as the maximum quantities intended to be used in any specified period. (iv) The area within which the chemical substance may escape into the marine environment.	
		MAK 61. Approved biocides and anti-fouling agents that meet the requirements of applicable national and EU legislation and comply with international conventions on the protection of the sea, such as the Barcelona Convention in particular, shall be used. The substances to be used for the above purposes should be selected from the current version of the OSPAR List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment (PLONOR). The use of substances included in the OSPAR List of Substances of Possible Concern (LSPC) is not permitted.	
		MAK 62. Ensure that the materials used in the construction and maintenance of the project (paints, insulation, coatings, etc.) do not contain the substances referred to in the decision of the Supreme Chemical Council 1100/91/91 (Government Gazette B 1008/12-12-1991) and in Ministerial Decisions 475/2002/03 (B 208/2003) and 121/2003/03 (B 1045/2003), as applicable, i.e. mercury compounds, arsenic and organotin compounds, as well as other chemicals considered hazardous under the relevant legislation on hazardous substances and for which restrictions on their circulation and use in the marine and aquatic environment in general apply.	
		All technically feasible measures should be taken to contain suspended materials (installation of filters/curtains to retain suspended solids or other appropriate equipment) in order to reduce the dispersion of the plume during the installation of the offshore parts of the project (with emphasis on the CO_2 and the Omega platform) and the possible disposal of materials at sea. During the implementation of the proposed project, it is recommended that, as a minimum, modern equipment be used to contain suspended solids (special	Impacts related to construction works, prevention of accidental pollution, and implementation of good construction practices.

Environmental Parameter		Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
			floating barriers - debris containment booms, siltation curtains, etc.) around the perimeter of the works, so that the quality and transparency of the water over a large distance is not affected by the construction activities, and so that solid materials do not settle over a large area of the seabed. If the measure proves to be partially adequate during the construction phase of the project, additional measures should be taken in accordance with the findings of the relevant monitoring program (**MAK 16**).	
Natural Biotic Environment	Flora, fauna, habitats, and protected areas	Protection of the terrestrial biotic environment	**MAK 63.** During the construction phase on the land section, which is located in a zone outside Natura sites but with sand dunes, it is recommended that: • (A) Avoid disturbance and intervention in the sand dune zone during the breeding season of turtles and water birds. In particular, avoid the period from mid-April to the end of June for the excavation and installation of the pipeline in the sand dune zone. This restriction will prevent disturbance during the breeding season and the possible destruction/abandonment of bird or turtle nests. • (B) In order to maintain the dunes in good condition during the excavation phase for the installation of the pipeline, the surface layer 20 cm deep (surface zone with seeds) should be removed and placed in a special zone separately (marked appropriately) from the sand of the deeper layers. After the pipeline has been laid, this layer should be replaced on the surface. In this way, the seeds will be preserved and the sand dunes will be able to regrow. • (C) No construction site or material storage area should be set up on the sand dunes to avoid soil compaction and destruction of the flora on the sand dunes.	Impacts related to construction works and the application of good construction practices.
			MAK 64. Implement **a Biodiversity and Wildlife Management Plan** and **Environmental Monitoring Program (MAK 17),** with specific actions and indicators, frequency, and methodology for conducting records/field work/measurements per environmental parameter.	Impacts related to construction works
		Protection of the marine environment	**MAK 65.** The speed of all vessels involved in the implementation of the Project should not exceed 20 knots in order to minimize the possibility of collision with marine mammals and sea turtles.	Impacts related to construction works, accident prevention,

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
	Protection of the marine environment	**MAK 66.** On the support vessel for the installation of the submarine pipelines and cable using the S-lay method (Phase 3) and its backfilling (Phase 5), the installation of the Omega platform and the drilling of boreholes, two certified marine mammal observers (MMO) shall be on board. Before the start of construction work, the MMOs should check for the presence of marine mammals within 500 m of the activity site. Noisy work should not commence if marine mammals have been detected within this radius or until at least 20 minutes have passed since the last detection. During periods of darkness or poor visibility (such as fog), the PTH should use night vision goggles or passive acoustic monitoring devices.	and the implementation of good construction practices.
		MAK 67. Installation and operation of marine mammal deterrent devices (pingers) for at least 10 minutes (in addition to 20 minutes of monitoring by MMOs) before the start of pulsed or impulse noise generation.	
		MAK 68. Use of the slow start method with reduced sound production for the first 30 minutes of operations to allow time for remaining marine mammals to move away safely.	
		MAK 69. When installing the new OMEGA platform, bubble curtains should be installed to limit noise propagation more broadly, in accordance with the recent ACCOBAMS guidelines on underwater sound. https://accobams.org/wp-content/uploads/2022/11/MOP8.Inf44_Methodological-guide-noise-V3.1.pdf	
		MAK 70. Consider the possibility of using Pile-Sleeves to further mitigate noise propagation in the area.	
		Implement a Chemical Use Plan (**MAK 60**) and comply with **MAK 61** and **MAK 62** regarding the suitability of the chemicals to be used.	
		MAK 71. In the event of a collision between a project vessel and marine mammals, the incident should be reported to the competent Directorate of Natural Environment and Biodiversity of the Ministry of Environment and Energy and to the relevant Management Unit of OFYPEKA/Ministry of Environment and Energy.	Impacts related to construction works and potential accidents.
		MAK 72. It is recommended that the construction phase in the marine environment be avoided during the breeding season of the cormorant (February-May).	Impacts related to construction works and the application of good construction practices.

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
	Minimising impacts on the living environment through the use of good practices	The main factor for the overall protection of the wider area's environment during construction works is the proper organization and smooth operation of the construction site. To protect water quality, the implementation of measures (**MAK 6** to **MAK 8, MAK 11, MAK 13**) is recommended.	Impacts related to activities outside the project area and minimisation of the impact zone.
		MAK 73. All hazardous materials on the construction site must be stored in such a way as to prevent access by wildlife. Containers with oil or fuel must be closed, and deep holes or large pits in the ground must be covered. In addition, during the construction period, special care should be taken to avoid capturing or killing wildlife.	Impacts related to waste and construction material management.
		MAK 74. Proper organization of the surrounding area to prevent the spread of fire (e.g., use of non-flammable building and decoration materials, creation of firebreaks in key locations to prevent the spread of a possible forest fire, installation of fire tanks and other firefighting equipment in accordance with the fire protection studies of the area and the recommendations of the relevant fire department, etc.).	Impacts related to construction work, accident prevention, and the application of good construction practices.
		MAK 75. Systematic cleaning and maintenance of the surrounding area and facilities within the project site to prevent the outbreak and spread of fire (e.g., systematic cleaning of litter that may be scattered by project workers or occasional visitors to the wider area, systematic cleaning of biomass waste resulting from vegetation management on adjacent land, systematic control and monitoring of the condition of infrastructure networks, etc.).	
		MAK 76. Development of an effective firefighting system. Legal requirements for fire safety and firefighting may not be sufficient, and additional measures may need to be taken. For example, installation of more firefighting water tanks, installation of backup fire extinguishers, etc.	
		MAK 77. Development of a fire response procedure that includes the organisation of fire safety procedures, training of personnel for emergencies involving fire hazards, and cooperation with the local fire department.	
		In order to protect the living environment from activities involving the management, disposal, and use of construction materials and waste, as well as the cleaning and maintenance of vehicles and equipment, it is recommended that measures **MAK 20** to **MAK 29, MAK 31** to **MAK 32** and **MAK 38** to **MAK 39**	Impacts related to the operation of the construction site and, in particular, the management of waste and construction materials.

Environmental Parameter		Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		Protection of the living environment from improper practices, damage, or negligence.	Monitoring and preventing potential accidental pollution incidents that would have a direct impact on the soil and, consequently, on the living environment of the area. To protect the quality of the living environment from improper practices, damage, or negligence, measure **MAK 34** is recommended.	Impacts related to accidental pollution during normal construction phase activities
		Minimisation of impacts through information/training/communication actions	**MAK 78.** Provide detailed information to employees, both during the construction and operation phases, so that all environmental conditions are complied with, especially those relating to the natural living environment.	Impacts related to construction works
Anthropogenic Environment	Spatial Planning - Land Use	Minimisation of impacts on the anthropogenic environment through the use of good practices	**MAK 79.** Compliance with the requirements of current spatial planning and best practices	Impacts related to construction works and the transport of materials and waste
			MAK 80. Paying particular attention when carrying out work and moving machinery/vehicles near infrastructure and buildings to avoid causing damage.	
			The contractor is required to remove all facilities created for the purposes of construction and restore the site to its condition prior to the commencement of the project. Therefore, the implementation of measure (**MAK13**) is recommended.	
	Structure and functions of the man-made environment	Minimising the impact on the structure and functions of the man-made environment through the use of good practices	Proper organization and smooth operation of the works will help to limit the disturbance caused to the anthropogenic functions of the area and the temporary visual pollution caused. In addition, the fencing of the construction site and work areas should be done in an aesthetically pleasing manner so as to limit the temporary alteration of the area's appearance. To protect the human environment, it is recommended that measures (**MAK 6** to **MAK 8, MAK 11, MAK 13)** be implemented.	Impacts related to the construction method and project schedule.
			MAK 81. The works should be timed so as to avoid intense pressure on productive human activities and the implementation of measures to reduce negative impacts (indirectly from other parameters) proposed in detail in the relevant fields.	Impacts related to possible disturbances to human activities in the area during the construction phase.
			MAK 82. Implementation of a comprehensive **Stakeholder Engagement Plan** in accordance with PR1 / PR4 / PR5 / PR8 / PR10 of the ETAA, including the Complaints Mechanism (CM) for the creation of strong, constructive, and flexible relationships with stakeholders and the building of understanding with the active participation of individuals, groups, and organizations in the Project, and appointing suitably qualified staff (including a person responsible for the	Impacts related to potential pressures on the anthropogenic functions of the area from construction works

Environmental Parameter		Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
			complaints mechanism) to manage, monitor, and report on the implementation of the Stakeholder Engagement Plan.	
			MAK 83 In accordance with the Stakeholder Engagement Plan. and complaint management requirements, responding/providing feedback to stakeholders and affected communities, and implementing appropriate adjustments to the Project as a result of consultations and complaints	Impacts related to potential information gaps regarding Project construction, potential inadequate stakeholder engagement, and complaint handling.
	Cultural Heritage – Underwater Cultural Heritage	Minimisation of impacts on Cultural Heritage – Underwater Cultural Heritage through the use of good practices	**MAK 84.** Compliance with the specifications and requirements of applicable national legislation and best practices such as PR8 of the ETAA (Cultural Heritage).	Impacts related to the possible discovery of accidental finds during the construction phase
			MAK 85. Before the start of construction, the competent Archaeological Services will be notified in writing in a timely manner so that they can arrange for the supervision of the works by a qualified employee. The opinions and comments of the competent Archaeological Services shall be taken into account. Any reservations of the archaeological services shall be taken into account and, if deemed necessary, appropriate modifications shall be made to the design or construction methodology of the project. In the event of findings, construction activities shall be suspended and the procedure for accidental findings required by Greek law (Law 3028/2002, as amended and in force, Law 4858/2021 as amended and in force), EU legislation, and in accordance with best practices such as ETAA PR8 (Cultural Heritage).	
	Socio-economic environment	Minimisation of impacts on the socio-economic environment through the use of good practices	Measures to reduce negative impacts on the socio-economic environment (indirectly from other parameters) are proposed in detail in the relevant fields for noise, air pollution, dust, etc.	Indirect impacts from other environmental parameters related to construction works
			MAK 86. Utilisation of local labour and technical resources as much as possible and preference for suppliers from the wider project area in order to stimulate local employment and the economy.	Impacts on the local economy and employment related to construction works
			MAK 87. A particularly effective practice for addressing and avoiding any complaints from local residents is for the supervising authority and the contractor to inform residents about the type and duration of the works before they	Impacts related to possible lack of information about the construction of the Project, possible inadequate

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		commence. Therefore, it is recommended that measures MAK 78 and 79 be implemented.	cooperation with stakeholders, and handling of complaints.
Health and Safety	Minimisation of health and safety impacts through the use of good practices	MAK 88. Implementation of a legal framework for labor and development and implementation of a Project-specific Human Resources Management Plan and Human Resources Policy.	Impacts on human resources and the local community related to construction works
		MAK 89. Strict compliance with the safety regulations provided for by law.	
		MAK 90. Given that construction works inherently involve the possibility of accidents. It is recommended that: • Strict compliance with the safety regulations for construction sites provided for by law. • Preparation of an Occupational Risk Assessment (ORA) • Establish a Health and Safety Plan and File (HSP and HSF) and strictly comply with the provisions of national legislation and the provisions of PR4 of the ETAA. The SHS and SHSF should be adjusted in line with the progress of the work and, in any case, contain accurate and up-to-date information.	
		MAK 91. Employment of a Health and Safety Coordinator and provision of the services of a Safety Technician and Occupational Physician	
		MAK 92. Develop a policy for the prevention and handling of violence and harassment at work and gender-based violence and harassment, and incorporate it into the Human Resources Management Plan.	
		MAK 93. As part of the Human Resources Management Plan and the complaints mechanism, implementation of a procedure for reporting incidents of violence and harassment.	
		MAK 94. Inform and train employees in accessible formats on the risks, prevention, protection, and obligations related to addressing violence and harassment at work and gender-based violence and harassment	
		MAK 95. Ensuring that requirements relating to the prevention of violence and harassment at work and gender-based violence and harassment are incorporated into the requirements for contractors and subcontractors.	
		MAK 96. Implement internal Occupational Health and Safety policies and actions (e.g., training and certification in safe work practices, "Work Stoppage Policy," "Work Stoppage Order", "Health, Safety, Environmental & Social Responsibility	

Environmental Parameter		Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
			Policy", "Equal Opportunities Policy", "Diversity and Inclusion Policy", "Code of Ethics", etc.)	
			MAK 97. Provision of all necessary protective equipment to personnel in accordance with Law 3850/2010 and SAU. Special equipment specified in accordance with the Fire Prevention Plan and Waste Management Plan	
			MAK 98 The construction site must be fenced off so that the public cannot access it or areas where work is incomplete.	Impacts related to construction works
			MAK 99. There should be appropriate signage to inform the public of the dangers and at the same time prevent them from accessing the construction sites.	
	Technical Infrastructure	Smooth operation of wastewater and waste management infrastructure	To protect technical infrastructure from activities involving the management, disposal, and use of construction materials and waste, and the cleaning and maintenance of vehicles and equipment, it is recommended that measures **MAK 20** to **MAK 29, MAK 31** to **MAK 32** and **MAK 38** to **MAK 39**	
		Ensuring conditions for smooth and safe navigation	**MAK 100.** Cooperation between the proposed Project operator, the competent authorities, and shipping operators to determine safe navigation routes around the demarcated area for the development of the Project. This includes timely notification of the competent port authorities regarding the planned works.	
			MAK 101. Works should be planned so as to minimize their impact on existing shipping routes, such as scheduling activities, where possible, during periods of lower maritime traffic to avoid periods of intense fishing, commercial, or tourist traffic.	
			MAK 102. Regular checks should be carried out to ensure compliance with the regulations and conditions set, in order to avoid any risks to navigation.	
		Minimising the impact on the road network	**MAK 103.** During transport and movement on the wider road network, special precautions should be taken by machine operators and heavy vehicle drivers to avoid damage to the networks.	
			MAK 104. If required, information signs and appropriate road safety signs should be installed in the immediate vicinity of the project and traffic regulations should be implemented, under the responsibility of the contractor. Where possible, real-	

Environmental Parameter	Objective of Proposed Measure	Mitigation Measures During Construction (MMC)	Potentially Significant Impacts to be Avoided/Minimized/Addressed
		time updates should be provided via digital platforms (e.g., traffic management applications or GPS) to guide road users.	
		MAK 105. Optimising and minimising vehicle movements, optimising the required time distances and maximising the utilisation rate of vehicles are the principles that apply to vehicles transporting passengers, goods and waste during construction.	
		MAK 106. The transport of bulky parts of the required equipment on the entire road network shall be carried out after consultation with the competent Traffic Police Departments and after taking into account their recommendations (e.g., escort vehicles, alternative routes, transport schedule, etc.).	
		MAK 107. Cooperation between the proposed Project operator and the competent transport authorities to align construction schedules with public works or other infrastructure projects.	
		MAK 108. Transport planning to avoid, as far as possible, peak hours or seasons when the road transport network is congested.	
	Minimization of impacts on public utility networks	**MAK 109.** Implement good energy management practices. Monitor and control heating, ventilation, and cooling systems, as well as information and communication systems. Install energy-efficient lighting.	
		MAK 110. All utility network operators in the immediate area who may be affected should be notified in good time by the manufacturer.	

10.1.3 Operation Phase

This chapter presents the proposed measures to prevent and address the potentially significant impacts of the proposed interventions, which target the project as a whole (licensed project and proposed modification). For this reason, the following measures incorporate both the provisions of the approved EIA for the licensed project and the corresponding measures dictated by the addition of the proposed amendment to it.

Chapter 9 explored the activities during the normal operation of the Project that could potentially cause undesirable adverse impacts in terms of their interaction with a number of Environmental and Social Parameters.

The proposed measures for minimising/mitigating/avoiding/addressing the potential impacts that have been analysed/assessed and evaluated as minor, moderate, or significant, as the case may be (in the context of this project, the estimated impacts range from negligible to moderate, as discussed in detail in Chapter 9).

In cases where, during the Final Assessment, certain impacts were assessed as Moderate, this Chapter proposes prevention/mitigation/response measures so that these impacts are reduced to at least Minor.

Furthermore, because the philosophy of the implementing body within the framework of the proposed Project the implementing body's philosophy is to achieve the desired technical result while causing the least possible environmental footprint, additional mitigation measures are proposed even in the case of potential impacts that were assessed as Negligible.

The following are mentioned as general measures during the Operation Phase:

- Implementation of the Environmental Monitoring Program.
- Implementation of the Project's Environmental Management Plan.

The following table presents the measures for preventing, minimizing, and addressing potential adverse environmental and social impacts during the Operation phase of the proposed Project.

Table10 –2 : Measures to prevent, minimize, and address potential adverse environmental and social impacts during the operation phase of the proposed Project

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Operation (CMO)	Potential Significant Impacts to be Avoided/Minimized/Addressed
Natural Abiotic Environment	Climatic and Bioclimatic Characteristics	Minimization of the impact of air emissions (air pollutants and greenhouse gases) on climate change	**MAL 1.** To protect against exhaust fumes from machinery, boats, and vehicles working on the project, regular maintenance is required, which is necessary in any case. It should be noted that maintenance should not be carried out within the work area.	Impacts contributing to climate change due to combustion emissions from machinery, vehicles, and boats during the project's operational phase.
			MAL 2. The machinery, vehicles, and equipment involved in the operation of the project must also meet the exhaust emission specifications in accordance with EU standards for such machinery and must not be old technology that emits increased pollutants.	
			MAL 3. The vessels to be used must fully comply with the international standards of the MARPOL 73/78 Convention, Annex VI "Regulations for the Prevention of Air Pollution from Ships." Annex VI regulates emissions of ozone-depleting substances, nitrogen oxides (NOX), sulfur oxides (SOx), and volatile organic compounds (VOCs).	
			MAL 4. All machinery and devices that use electricity must be of the highest energy class.	
			MAL 5. Avoid unnecessary operation of the engines of vessels approaching the Project infrastructure.	
			MAL 6. Minimise vehicle movements within the project boundaries and avoid unnecessary operation of vehicle engines related to project operations.	
			MAL 7. Avoid unnecessary operation of outdoor lighting.	
			MAL 8. All interior lighting fixtures shall be LED and controlled by an automation system that adjusts the intensity based on external lighting.	
		Minimization of impacts through monitoring, identification, and mitigation	**MAL 9.** It is recommended that the Environmental Monitoring Program be implemented, as specified in the present , which must include an annual calculation of the project's carbon footprint.	
			MAL 10. Systematic maintenance of the Project's onshore and offshore facilities.	

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Operation (CMO)	Potential Significant Impacts to be Avoided/Minimized/Addressed
Morphological and Landscape Characteristics	Minimising impacts through the use of good practices	**MAL 11.** Maintenance of cleanliness, both on land and in the marine zone of the Project.	Impacts related to the physical presence and operation of the project
		MAL 12. For the management of solid waste originating from the packaging of materials/facility maintenance and from cleaning, living and hygiene materials for staff, bins will be placed in appropriate locations within the facility. In addition, waste should be transported outside the facility at frequent intervals.	
		MAL 13. Waste resulting from maintenance (electrical and mechanical equipment parts, pipes, batteries, etc.) will be transported outside the facility under the responsibility of the maintenance technicians and will be recycled.	
		MAL 14. The management of hazardous waste (collection, transport, storage, treatment, recovery or disposal) shall be carried out by a natural or legal person (under public or private law to whom a relevant licence has been granted) or the hazardous waste shall be delivered, with the authorisation of the project contractor, to approved alternative waste management systems.	
		MAL 15. The temporary storage of hazardous waste (at the project site until collection) should be carried out using special UN-approved packaging for solid waste.	
		MAL 16. The disposal of other (non-hazardous waste) is carried out in consultation with the relevant local authority and device recycling agencies, and in accordance with the general provisions governing waste management and the recycling of paper, glass, aluminum, etc. And always in accordance with the provisions of Law 4819/2021. **MAL 17**. In the event that potential failures are identified, the project operator will be responsible for both addressing them and remedying any potential adverse environmental impacts resulting from them.	
		MAL 18. With regard to the risk of fire, all necessary fire safety and firefighting measures shall be implemented in accordance with the legislation and guidelines of the Fire Service.	
		MAL 19. Any storage, even temporary, of waste or construction materials (e.g., for maintenance work on the facilities) outside the boundaries of the project site is prohibited.	

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Operation (CMO)	Potential Significant Impacts to be Avoided/Minimized/Addressed
		Minimization of impacts through the use of proper maintenance/modernization of the project	MAL 20. In the event that potential failures are identified, the project operator will be responsible for both addressing them and remedying any potential adverse environmental impacts resulting from them .	
		Minimisation of impacts through the process of monitoring, identification and addressing them	It is recommended that the Environmental Monitoring Program be implemented as specified herein (MAL 9).	
	Geological, tectonic, and soil characteristics	Protection of soil and seabed through proper waste management	Measures MAL11 to MAL19 also apply to minimising the impact on geological, tectonic and soil characteristics.	Impacts related to the physical presence and operation of the project
			MAL 21. Waste must be managed in accordance with the Waste Management Plan and current legislation. There must be a sufficient number (and appropriate size) of waste bins on the project site. Recycling bins should also be placed in clearly marked locations to encourage their use.	Impacts related to waste management.
		Minimisation of impacts on the seabed	MAL 22. The project owner should strictly prohibit the discharge of solid waste from vessels and other project users directly into the sea.	
			MAL 23. Ensure that the maintenance materials for the offshore parts of the Project do not contain the substances referred to in the decision of the Supreme Chemical Council 1100/91/91 (Government Gazette B 1008/12-12-1991) and Ministerial Decisions 475/2002/03 (B 208/2003) and 121/2003/03 (B 1045/2003), as applicable, i.e. mercury compounds, arsenic and organotin compounds, as well as other chemicals considered hazardous under the relevant legislation on hazardous substances and for which restrictions apply to their circulation and use in the marine and aquatic environment in general.	Impacts related to the physical presence and operation of the project
		Protection of soil and seabed through proper waste management	MAL 24. Liquid and solid waste containing hazardous or potentially hazardous substances must be transported immediately in sealed containers, which will be stored (temporarily and for a short period of time) in a covered area with impermeable industrial-grade concrete flooring and the necessary secondary containment systems. Such waste shall be managed in accordance with the Waste Management Plan and applicable legislation.	Impacts related to waste management.

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Operation (CMO)	Potential Significant Impacts to be Avoided/Minimized/Addressed
			Their transport and final disposal or treatment shall be carried out by a specialized and appropriately licensed company, in accordance with best available practices.	
		Minimisation of impacts from improper practices, damage or negligence	**MAL 25.** The operation of the project's offshore facilities is expected to increase the movement of vessels within the bay, thereby increasing the risk of accidental pollution of the marine environment. Therefore, the project owner should implement controls to prevent accidental pollution. All preventive measures should be taken to avoid oil spills due to damage, negligence, etc., and appropriate measures should be taken to minimize such incidents. In addition, the response to accidents (causing environmental impacts, such as fuel spills from vessels) along the entire length of the project should be provided for in the project owner's plan. Thus, the project owner should have a plan and appropriate materials in place to deal with accidental pollution incidents both on land and at sea. The project owner should have the appropriate absorbent materials (e.g., sawdust, sand) in sufficient quantities to absorb and consequently contain and limit the spread of spilled fuels and lubricants. After use, these absorbent materials should be properly managed as hazardous waste in accordance with applicable legislation.	Impacts related to accidental pollution.
			MAL 26. Fuel, machinery, and construction materials should be stored in such a way as to minimize the risk of pollution of soil and water resources. Chemicals, fuels, and lubricants should be stored in appropriately designed and sealed areas away from water bodies. Collection containers should be used on stationary machinery to prevent soil and groundwater contamination from oils and lubricants.	Impacts related to accidental pollution.
		Minimisation of impacts through monitoring, detection and response procedures	It is recommended that the Environmental Monitoring Program be implemented as specified herein, which must include an annual calculation of the project's carbon footprint (**MAL 9**).	Impacts related to the physical presence and operation of the project
	Air Quality	Minimisation of impacts through the use of good practices	To protect against exhaust fumes from project machinery and CO_2transport vehicles, it is recommended that the above measures **MAL 1** to **MAL 8** be implemented.	Impacts related to the physical presence and operation of the project

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Operation (CMO)	Potential Significant Impacts to be Avoided/Minimized/Addressed
		Minimisation of impacts through monitoring, identification and mitigation	It is recommended that the Environmental Monitoring Program be implemented as specified herein (**MAL 9**).	
	Noise and vibrations	Minimisation of impacts through the use of best practices	**MAL 27.** To avoid noise emissions from project equipment, vehicles, and CO_2transport vessels, regular maintenance is required, which is necessary in any case.	Impacts related to the physical presence and operation of the project
			MAL 28. Project machinery, vessels, and CO_2transport vehicles must meet noise emission specifications in accordance with EU standards.	
			MAL 29. Appropriate soundproofing measures shall be applied to equipment inside the compression station to comply with legal limits within residential areas.	
			MAL 30. Operation of equipment on platforms (pumps, electric heaters) based on low noise emission specifications. If the implementation of the Environmental Monitoring Program or complaints from interested parties reveal that noise emission limits have been exceeded, the necessary corrective measures shall be taken, in the form of interventions in the project's operating procedures or through the use of appropriate equipment (e.g., sound barriers).	
			MAL 31. Installation of sound insulation in noisy parts of machinery and equipment on platforms.	
			To avoid noise emissions, it is also recommended that the above measures **MAL 1** to **MAL 8** be implemented.	
		Minimisation of impacts through the process of monitoring, identification and mitigation.	It is recommended that the Environmental Monitoring Program be implemented as specified herein (**MAL 9**).	
	Water	Protection of marine waters through proper waste management	**MAL 32.** The project owner shall be responsible for strictly prohibiting the discharge of liquid waste (untreated sewage, lubricant residues, petroleum	Impacts related to waste management.

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Operation (CMO)	Potential Significant Impacts to be Avoided/Minimized/Addressed
		products, and bilge water) from vessels approaching the project directly into the sea.	
	Minimisation of impacts on water quality through the use of good practices ( ).	**MAL 33.** In the event of liquid waste discharge (untreated sewage, lubricant residues, petroleum products, and bilge water), the Project owner should have a plan and appropriate materials in place to deal with pollution incidents both on land and at sea.	
	Protection of marine waters by preventing leaks	**MAL 34.** Implementation of emergency risk prevention and mitigation measures related to possible CO_2leakage,as included in **Table 10 4**: Measures for the Prevention of Significant Anomalies in this **Chapter**.	Impacts related to project operation and potential accidental pollution.
	Protection of marine waters through good practices	**MAL 35.** Compliance with international guidelines and the IMO's International Safety Management Code (Safety Management Code - ISM) of the IMO, for the safe operation of ships and the prevention of environmental pollution, as well as strict compliance with navigation, communication, and safety procedures.	
		MAL 36. Compliance with MARPOL requirements for waste and sewage, with emphasis on the following: Annex I Regulations for the prevention of pollution by oil, Annex III Regulations for the prevention of pollution by harmful substances carried by sea in packaged form, Annex IV Regulations for the Prevention of Pollution by Sewage from Ships, Annex V Regulations for the Prevention of Pollution by Garbage and Other Solid Waste from Ships.	
		MAL 37. A Chemical Use Plan shall be implemented, which shall include: (i) The chemicals that the operator intends to use during the operations. A list of the ecotoxicity of these substances. (ii) The purpose or purposes for which the operator intends to use the chemicals. (iii) The maximum concentrations of the chemicals that the operator intends to use in any other substances, as well as the maximum quantities intended to be used in any specified period. (iv) The area within which the chemical may escape into the marine environment.	Impacts related to the operation of the project and the implementation of good management practices.
		MAL 38. Approved biocides and anti-fouling agents that meet the requirements of applicable national and EU legislation and comply with international conventions on marine protection, such as the Barcelona Convention, should be used. The substances to be used for the above purposes should be selected from the current version of the OSPAR List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment	

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Operation (CMO)	Potential Significant Impacts to be Avoided/Minimized/Addressed
		(PLONOR). The use of substances included in the OSPAR List of Substances of Possible Concern (LSPC) is not permitted.	
		Ensure that the materials used in the construction and maintenance of the project (paints, insulation, coatings, etc.) do not contain the substances referred to in the decision of the Supreme Chemical Council 1100/91/91 (Government Gazette B 1008/12-12-1991) and in Ministerial Decisions 475/2002/03 (B 208/2003) and 121/2003/03 (B 1045/2003), as applicable, i.e. mercury compounds, arsenic and organotin compounds, as well as other chemicals considered hazardous under the relevant legislation on hazardous substances and for which restrictions on their circulation and use in the marine and aquatic environment in general apply (**MAL 23.**).	Impacts related to the operation of the project and the implementation of good management practices.
	Protection of marine waters through good practices	**MAL 39.** The vessels to be used for the project will comply with the International Regulations for Preventing Collisions at Sea 1972 (COLREG).	Impacts related to accidental pollution during normal operations
		MAL 40. Fuel supply procedures shall be implemented in accordance with applicable national regulations and vessel specifications.	
		MAL 41. Take all necessary measures to prevent marine pollution during the construction phase, as well as any additional measures indicated by the competent Port Authority, in accordance with Law 743/77 (Government Gazette A 319), as codified by Presidential Decree 55/98 (A' 58) and as applicable.	
	Protection of marine waters through proper waste management	**A "Waste Management Plan"** shall be implemented to ensure that the waste produced (hazardous, non-hazardous) is managed properly. (**MAL 21**)	Impacts related to waste management.
	Protection of marine waters through good practices	**MAL 42.** Water pumped from the boreholes will be treated in appropriate systems on the Delta platform, which will have a performance that meets the applicable discharge limits. In particular, the treatment required will be further investigated after water samples from the aquifer in the storage complex have been taken and analyzed.	
		MAL 43. Water from the surfaces of the platforms (cleaning and rainwater) will be discharged through appropriate treatment systems, in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL).	
	Minimization of impacts through monitoring, identification, and mitigation	It is recommended that the Environmental Monitoring Program be implemented as specified herein (**MAL 9**).	Impacts related to the physical presence and operation of the project

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Operation (CMO)	Potential Significant Impacts to be Avoided/Minimized/Addressed
Natural Biotic Environment	Flora, fauna, habitats, and protected areas	Protection of the terrestrial and marine biotic environment	**MAL 44.** Implement **a Biodiversity and Wildlife Management Plan** and **Environmental Monitoring Program (MAK 17),** with specific actions and indicators, frequency and methodology for conducting records/field work/measurements per environmental parameter.	Impacts related to the operation of the project and the implementation of good management practices.
			A Chemical Use Plan (**MAL 35**) shall be implemented and **MAL 23** and **MAL 38** shall be complied with regarding the suitability of the chemicals to be used.	Impacts related to the operation of the project and the implementation of good management practices.
		Protection of the marine environment	**MAL 45.** In the event of a collision between a project vessel and marine mammals, the incident must be reported to the competent Directorate of Natural Environment and Biodiversity of the Ministry of Environment and Energy and to the relevant Management Unit of OFYPEKA/Ministry of Environment and Energy.	Impacts related to construction works and potential accidents.
		Minimisation of impacts on the living environment through the use of good practices	**MAL 46.** Appropriate organization of the surrounding area to prevent the spread of fire (e.g., use of non-flammable building and decoration materials, creation of firebreaks in key locations to prevent the spread of a possible forest fire, installation of fire tanks and other firefighting equipment in accordance with the fire protection studies for the area and the recommendations of the relevant fire department, etc.).	Impacts related to project operating procedures, accident prevention, and the implementation of good management practices.
			MAL 47. Systematic cleaning and maintenance of the surrounding area and facilities within the project site to prevent the outbreak and spread of fire (e.g., systematic cleaning of litter that may be scattered by project workers or occasional visitors to the wider area, systematic cleaning of biomass waste resulting from vegetation management in adjacent areas, systematic control and monitoring of the condition of infrastructure networks, etc.).	
			MAL 48. Development of an effective firefighting system. Legal requirements for fire safety and firefighting may not be sufficient and additional measures may need to be taken. For example, installation of more firefighting water tanks, installation of backup fire extinguishers, etc.	
		Minimising the impact through information/training/communication actions	**MAL 49.** Develop a fire response procedure that includes the organisation of fire safety procedures, training of personnel for emergencies involving fire hazards, and cooperation with the local fire department.	

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Operation (CMO)	Potential Significant Impacts to be Avoided/Minimized/Addressed
			MAL 50. Provide detailed information to employees, both during the construction and operation phases, so that all environmental conditions are met, especially those relating to the natural living environment.	
		Minimisation of impacts through monitoring, identification and response procedures	It is recommended that the Environmental Monitoring Program be implemented as specified herein (**MAL 9**).	Impacts related to the physical presence and operation of the project
Anthropogenic Environment	Spatial Planning - Land Use	Minimisation of impacts on the human environment through the use of good practices	**MAL 51.** Compliance with the requirements of current spatial planning and best practices	Impacts related to project operation and the transport of materials and waste
	Structure and functions of the anthropogenic environment	Minimisation of impacts on the structure and functions of the human environment through the use of good practices	**MAL 52.** Implementation of a Complaints Mechanism (CM) to create strong, constructive, and flexible relationships with stakeholders and build understanding through the active participation of individuals, groups, and organizations in the Project, and appointment of adequately trained personnel (including a person responsible for the complaints mechanism) to manage, monitor, and report on its implementation.	Impacts related to potential pressures on human activities in the area from the operation of the project.
			MAL 53. In accordance with the Grievance Mechanism and grievance management requirements, respond/provide feedback to stakeholders and affected communities and implement appropriate adjustments to the Project as a result of consultations and grievances	Impacts related to potential information gaps regarding the operation of the Project, potential inadequate cooperation with stakeholders, and complaint handling.
	Cultural heritage	Minimisation of impacts on Cultural Heritage – Underwater Cultural Heritage through the use of best practices	**MAL 54.** In the event of findings during construction works, the procedure for accidental findings required by Greek law (Law 3028/2002 as amended and in force, Law 4858/2021 as amended and in force), EU legislation and in accordance with best practices such as ETAA PR8 (Cultural Heritage).	Impacts related to the possible discovery of chance finds of cultural interest

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Operation (CMO)	Potential Significant Impacts to be Avoided/Minimized/Addressed
	Socio-economic environment	Minimisation of impacts on the socio-economic environment through the use of good practices	**MAL 55.** Measures to reduce negative impacts on the socio-economic environment (indirectly from other parameters) are proposed in detail in the relevant fields for noise, air pollution, dust, etc.	Indirect impacts from other environmental parameters related to the operation of the Project
			MAL 56. Utilisation of local labour and technical resources as much as possible and preference for suppliers from the wider project area in order to stimulate local employment and the economy.	Impacts on the local economy and employment related to the operation of the Project
	Health and Safety	Minimisation of health and safety impacts through the use of good practices	**MAL 57.** Implementation of a legal framework for labor and development and implementation of a Project-specific Human Resources Management Plan and Human Resources Policy.	Impacts on human resources and the local community related to the operation of the Project
			MAL 58. Strict compliance with the safety regulations provided for by law.	
			MAL 59. Employment of a Health and Safety Coordinator and provision of the services of a Safety Technician and Occupational Physician	
			MAL 60. Develop a policy for the prevention and treatment of violence and harassment at work and gender-based violence and harassment and include it in the Human Resources Management Plan	
			MAL 61. As part of the Human Resources Management Plan and the complaints mechanism, implementation of a procedure for reporting incidents of violence and harassment.	
			MAL 62. Inform and train employees in accessible formats on the risks, prevention, protection, and obligations related to addressing violence and harassment at work and gender-based violence and harassment.	
			MAL 63. Implementation of internal Occupational Health and Safety policies and actions (e.g., training and certification in safe work practices, "Work Stoppage Policy," "Work Stoppage Order," "Health, Safety, Environmental & Social Responsibility Policy," "Equal Opportunity Policy," "Diversity and Inclusion Policy," "Code of Ethics," etc.)	

10.1.4 Full Operation – Restoration Phase

This chapter presents the proposed measures for preventing and addressing the potentially significant impacts of the proposed interventions, which target the project as a whole (licensed project and proposed modification). For this reason, the following measures incorporate both the provisions of the approved EIA for the licensed project and the corresponding measures dictated by the addition of the proposed amendment to it.

The measures to prevent, minimize, and address potential adverse environmental and social impacts during the decommissioning and dismantling phase of the proposed Project are in most cases similar to the measures proposed for the construction phase of the Project. However, as this phase is scheduled to take place in the medium to long term, the project operator will update the proposed measures at the appropriate time, depending on the environmental conditions, legal obligations, and technological options, so as to achieve the best possible result in terms of the desired outcome, which is the protection of the environment.

The following are the basic principles for addressing potential impacts during the decommissioning and restoration phase:

- Decommissioning should be carried out in a manner that minimises environmental impacts. If this method differs significantly from that described herein, Article 6 of Law 4014/2011, as in force, shall apply.
- The basic equipment and facilities have already been designed to be easy to install and remove with the least possible disruption to the environment.
- All Project equipment that ceases to serve production or support activities is removed from its installation site and either reused elsewhere or disposed of in accordance with the applicable waste management provisions.
- All activities during decommissioning shall be documented in accordance with the requirements and shall be subject to regular inspections and/or monitoring to ensure that health, safety, and environmental issues are minimized and properly managed.
- Cold cutting equipment should be used for cutting metal components and the use of explosives should be avoided.
- After the Project has been decommissioned, the Project area should be restored and returned to its pre-construction condition.
- For infrastructure that is not planned to be dismantled (submarine pipeline and cable) within the scope of this Project, it should be ensured that there is no long-term negative impact on the environment of the area.

Therefore, the following table presents indicative measures for the prevention, minimization, and mitigation of potential adverse environmental and social impacts during the decommissioning and removal phase of the proposed Project.

Table10 –3 : Measures to prevent, minimize, and address potential adverse environmental and social impacts during the decommissioning/dismantling phase of the proposed Project

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
Natural Abiotic Environment	Climatic and Bioclimatic Characteristics	Minimisation of the impact of air emissions (gaseous pollutants and PM) on climate change	**ΜΑΠ 1.** To protect against exhaust fumes from machinery and vehicles working on the decommissioning of the project, regular maintenance is required, which is necessary in any case. It should be noted that maintenance should not be carried out within the work area.	Impacts contributing to climate change due to combustion emissions from machinery, vehicles, and vessels involved in decommissioning/demolition work.
			MAP 2. The machinery, vehicles, and equipment involved in the decommissioning of the project must also meet the exhaust emission specifications in accordance with EU standards for such machinery and must not be old technology that emits increased pollutants.	
			MAP 3. Vessels to be used shall comply fully with the international standards of MARPOL 73/78, Annex VI "Regulations for the Prevention of Air Pollution from Ships." Annex VI regulates emissions of ozone-depleting substances, nitrogen oxides (NOX), sulfur oxides (SOx), and volatile organic compounds (VOCs).	
			MAP 4. Transport of materials: Where technically feasible and practicable, transport of construction materials and waste by sea should be preferred over road transport.	Impacts related to waste management.
	Morphological and landscape characteristics	Minimisation of impacts outside the project area	**MAP 5.** It is proposed that the construction site be located within the designated area within the SIGMA industrial facility. Otherwise, the construction site facilities shall be determined after approval by the relevant TEPEM. Any activity outside the boundaries of the areas designated for the implementation of the works and the construction site, which may cause aesthetic degradation and alteration of the landscape (disposal of waste materials, parking of machinery, etc.) shall be prohibited..	Impacts related to activities outside the project area and minimisation of the impact zone.
		Minimisation of impacts through the use of good practices	**MAP 6.** Prohibit the uncontrolled disposal of surplus materials in the immediate or wider area. Under no circumstances is the disposal of these materials in stream beds or other water bodies permitted. The technical interventions included in the decommissioning of the project and related to the effective drainage of the project site, the hydraulic communication of the areas on either side of the , etc., must be checked, cleaned, and maintained systematically at regular intervals.	Impacts related to the management of waste and surplus materials.

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
		MAP 7. Systematic maintenance of the infrastructure and cleanliness of the project area is required.	
		MAP 8. Collection points for solid waste on the construction site should be designated, and regular collection should be arranged so that the landscape is not degraded.	
		MAP 9. Any storage, even temporary, of demolition materials outside the construction site is prohibited.	Impacts related to the management of demolition materials and the project demolition schedule.
		MAP 10. The work schedule should be designed so that temporary material deposits are removed as soon as possible.	
	Minimization of impacts within the project occupation zone	**MAP 11.** All types of project installations (machinery, structures, all types of waste, etc.) must be removed after the completion of the specific project phase, regardless of the ownership status of the construction site.	Impacts related to the restoration of the project area.
	Minimisation of impacts through the use of good practices	**MAP 12.** Mild levels of work intensity must be maintained.	Impacts related to the extent of the project's occupation zone and minimization of the zone of influence of the impacts.
	Minimization of impacts through the use of good practices	**MAП 13.** All technically feasible measures should be taken to contain airborne materials (installation of filters/curtains to contain suspended solids or other appropriate equipment) in order to reduce the dispersion of the plume during the decommissioning of the offshore parts of the project and the possible disposal of materials at sea. During the decommissioning of the proposed project, it is recommended that, as a minimum, modern equipment be used to contain suspended solids (special floating barriers - debris containment booms, siltation curtains, etc.) around the perimeter of the works being carried out, so that the construction activities do not affect the quality and transparency of the water over a long distance, and so that solid materials do not settle over a large area of the seabed.	Impacts related to decommissioning works.

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
			If the measure proves to be partially adequate during the construction phase of the project, additional measures should be taken in accordance with the findings of the relevant monitoring program.	
		Minimisation of impacts through monitoring, identification and mitigation	**ΜΑΠ 14.** It is recommended that the Environmental Monitoring Program be implemented.	Impacts related to decommissioning works
	Geological, tectonic, and soil characteristics	Minimisation of impacts on soil and seabed	The measures to minimize impacts on morphological and landscape characteristics also apply to minimizing impacts on geological, tectonic, and soil characteristics (**MAP 5** to **MAP 10**).	Impacts related to various influences on a wide range of environmental parameters from the decommissioning of the project.
			MAP 15. Earthworks should be carried out mainly during the period of the year when there is no heavy rainfall or extreme wave conditions, so as to avoid soil erosion and the creation of suspended particles, respectively. The work schedule should include provisions to avoid heavy earthworks during periods of heavy rainfall and rough seas, and to avoid earthworks on days when rain and heavy waves are forecast. In the exceptional case of heavy rainfall or rough seas during the relatively short excavation phase, it is recommended that work be suspended and geogrids be installed on the slopes, if deemed geotechnically necessary.	Impacts related to the removal method and project schedule.
			MAP 16. During the removal phase, methods and techniques should be used to minimize the compaction of uncovered soil, such as restricting access during rainfall and using protective boards and low ground pressure machinery. Suitable water-permeable materials should be used to construct parking areas within the construction site in order to limit rainwater runoff from the construction sites as much as possible.	Impacts related to the project decommissioning method.
		Protection of soil and seabed through proper waste management	**MAP 17.** All waste and debris resulting from construction site activities during project decommissioning (solid and liquid, hazardous or non-hazardous) must be properly managed by the project contractor, in accordance with the law, in order to prevent pollution of the area (soil, subsoil, surface and groundwater) from uncontrolled disposal or any leaks.	Impacts related to the decommissioning method and project schedule.

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
		A "Waste Management Plan" should be implemented during the construction/operation/decommissioning stages, examining all aspects of the project and the waste produced, with the aim of ensuring that the waste produced (hazardous, non-hazardous) is managed properly.	
		ΜΑΠ 18. Construction sites should be equipped with waste bins in which urban waste generated by construction site workers can be collected. This waste should be collected by the competent local authority or collection and transport agency. If this is not possible, the project operator should arrange for the waste to be deposited in the existing collection system of the relevant local authority. It should be noted that special care should be taken to ensure that this solid waste does not include debris or hazardous materials, the disposal of which should be carried out in accordance with the applicable legislation on the respective categories of waste.	Impacts related to waste management.
		MAP 19. For the management of liquid waste from the project's relocation staff, it is proposed to install chemical toilets and transport and dispose of them at the nearest available WWTP and/or use the sanitary facilities of the company's existing facilities in the area.	Impacts related to waste management.
		MAP 20. Liquid and solid waste containing hazardous or potentially hazardous substances should be transported immediately in sealed containers, which will be stored (temporarily for the short period of time required to carry out the relevant work) in a covered area with the necessary secondary containment systems. Their transport and final disposal or treatment shall be carried out by a specialized and appropriately licensed company, in accordance with best available practices.	Impacts related to the management of waste and decommissioning materials from the project.
		MAP 21. The management of any excess excavation products, as well as (non-hazardous) C&D waste produced by the decommissioning works, shall be carried out in accordance with the provisions of Joint Ministerial Decision 36259/1757/E103 (Government Gazette 1312/24-08-2011) "Measures, conditions, and program for the alternative management of waste from excavations, construction, and demolition (AECC)". Materials that cannot be reused/recycled within the project must be delivered to a Collective Alternative Management System (SSED) approved by the EOAN. The management of AECW in the Project area is carried out in accordance with the provisions of Joint Ministerial Decision 36259/1757/E103/2010 through	Impacts related to waste management.

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
		the following Alternative Management Systems (based on data from the Hellenic Recycling Agency (EOAN, https://www.eoan.gr): • SSED "Recycling of Inert Waste of Northern Greece S.A.", with the distinctive title "AN.A.B.E. S.A.". • SSED "Recycling of Central Macedonia SA", with the distinctive title "ANAKEM". • SSED "Central Greece Recycling System Ltd" with the distinctive title "S.A.N.K.E. Ltd". • SSED "PEDMEDE ECO Limited Liability Company", with the distinctive title "PEDMEDE ECO MEPE".	
		MAP 22. If, at the time of decommissioning of the proposed project, it is not within the geographical scope of an Alternative Management System approved by the EEA, the excess material should be disposed of at the nearest approved CASS or in a suitable storage facility, after submission and approval of a Technical Environmental Study (TES) by the competent licensing authority, in accordance with paragraph 2 of Article 7 of Law 4014/2011 (Government Gazette 209/A 21.09.2011). In this case, the land proposed by the contractor shall be approved by the competent authority and in accordance with the provisions of specification ELOT TP 1501-02-05-00-00. When selecting the location of the storage facility, attention should be paid to the following: • The location of the storage chamber must not be within the boundaries of an ecologically sensitive or protected area. • Avoid areas with natural vegetation or wildlife habitats. • Avoid locating the storage chamber on productive land or in areas with surface water bodies. • Avoid locations that would affect the landscape of the area or conflict with existing human uses and activities. Preference should be given to locating the storage chamber in an already disturbed location, which would have a positive impact on the environment of the study area. The method of disposal and the layout of the deposits will be specified in a relevant TEPEM, which will be prepared and submitted to the competent licensing authority before the start of the relevant works, in accordance with paragraph 2 of Article 7 of Law 4014/2011 (Government Gazette 209/A 21.09.2011).	

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
		ΜΑΠ 23. Construction sites should be equipped with recycling bins in which mixed recyclable materials such as paper/cardboard, plastic, metal, and glass can be collected. This waste should be collected by the competent local authority or collection and transport agency. If this is not possible, the project operator should arrange for the waste to be deposited in the local authority's existing collection system (Recyclable Materials Sorting Center - KDAY).	
		MAP 24. Separate collection of specific waste streams such as Waste Electrical and Electronic Equipment (WEEE), Waste Electrical Batteries (batteries) & Accumulators (WBA), Waste Lighting Equipment, Lamps and Small Appliances (WEEE) and their collection by licensed collection, transport and management bodies. If this is not feasible, provision should be made for the disposal of waste by the Project operator at appropriate recycling points of the WEEE.	
		MAP 25. The management of used mineral oils shall be carried out in accordance with the provisions of PD 82/25.2.2004 (Government Gazette 64/A/2.3.04) on "Establishment of measures and conditions for the management of used mineral oils," which replaced KYA 98012/2001/96. Waste lubricating oils (WLO) and liquids of all types shall be collected separately by category so that they can be delivered to a Collective Alternative Management System (CAMS) approved by the EEA.	
		MAP 26. Hazardous waste shall be managed in accordance with the provisions of Joint Ministerial Decision 13588/725/2006 (Government Gazette 383B/28-3-2006) "Replacement of KYA 19396/1546/97 (Government Gazette 604B/18-7-1997)".	
	Protection of soil and seabed through good construction site practices	**MAP 27.** The maintenance of dismantling and material transport machinery shall be carried out in an organized workshop in the area and not in the Works area. The contractor shall ensure that the maintenance schedule for the construction site machinery is properly organized so that oil changes and regular maintenance are carried out in organized workshop areas. Oils, lubricants, and other products from the mechanical parts of earthmoving and other machinery should be collected and disposed of appropriately, as required by law (Presidential Decree 82/2004, Government Gazette 64/A/2.3.2004).	Impacts related to the management of dismantled materials.

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
			MAP 28. Within the construction site, equipment and vehicles will be washed and cleaned frequently in specially designed areas in order to prevent the leakage of hazardous substances through the liquid waste produced. To reduce the volume of liquid waste from this area, it is recommended that vehicles first be cleaned with dry means, e.g., brooms, brushes, etc. In addition, low water consumption rinsing equipment such as pressure systems should be used.	Impacts related to the cleaning and maintenance of vehicles and equipment
			MAP 29. The contractor should implement **controls to prevent accidental pollution** and take all preventive measures to avoid oil spills from damage, negligence, etc., and appropriate measures should be taken to minimize such incidents. In addition, accident response throughout the entire length of the works should be provided for in the manufacturer's program. Thus, the contractor should provide his crew with the appropriate materials to deal with accidental pollution incidents both on land and at sea. The contractor should have the appropriate absorbent materials (e.g., sawdust, sand) in sufficient quantities, which will be used to absorb and consequently contain and limit the spread of spilled fuels and lubricants. After use, these absorbent materials must be properly managed in accordance with current legislation as hazardous waste. In addition, at least one of the vessels participating in the removal work must be equipped with means of containing the spill, as well as with appropriate absorption and chemical dispersion equipment to combat the spill. The above should be explicitly stated in the contractor's contract of obligations and their implementation should be properly supervised during decommissioning.	Impacts related to accidental pollution.
		Minimisation of impacts through monitoring, detection and response procedures	The implementation of the Environmental Monitoring Program (**MAP 14**) is recommended.	Impacts related to decommissioning work.
	Air Quality	Minimizing impacts through the use of good practices	**ΜΑΠ 30.** Wet surfaces and materials to limit dust emissions during earthworks.	Impacts related to dismantling, management, and transport of materials
			ΜΑΠ 31. Machinery operating on site should be handled with care, and trucks should be driven at low speeds to limit dust emissions.	
			ΜΑΠ 32. Cover excavation waste deposits with tarpaulins until they are removed.	

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
			ΜΑΠ 33. Trucks transporting inert materials must have a special cover in accordance with existing provisions, and overfilling of trucks transporting bulk materials must be avoided.	
			MAP 34. In any construction site activity where there is a possibility of dust emissions, suspended particles, or odorous substances, procedures and equipment should be adopted to ensure a significant reduction in these emissions, while the duration of these procedures should be minimized.	
	Noise and Vibrations	Minimising impacts through the use of good practices	**MAP 35.** The contractor should choose the layout and schedule of individual tasks so that multiple machines are not operating simultaneously in close proximity, causing minimal disturbance to the human environment in the immediate vicinity of the project.	Impacts related to the decommissioning method and project schedule.
			MAP 36. The operation of the construction site and the movement of trucks on the urban road network within the settlements of the project area during quiet hours should be avoided as much as possible (Ministerial Decision 1023/2/37/96 (Government Gazette 15/B/12.1.96).	
			MAP 37. The *construction machinery to be used must comply with the provisions of the legislation "on measures and conditions for noise emissions in the environment from equipment for use in outdoor areas"* (Joint Ministerial Decision 37393/2028/2003, Government Gazette 1418/B/2003, as amended by Joint Ministerial Decision 9272/471/2007, Government Gazette 286/B/2007) and bear the CE conformity marking provided for in the above legislation.	Impacts contributing to noise emissions from machinery, vehicles, and vessels involved in the decommissioning work.
		Minimisation of impacts through monitoring, identification and mitigation procedures	**MAP 38.** In any case, it is recommended that noise levels be systematically monitored at the project boundaries during decommissioning (implementation of the Environmental Monitoring Program and, if exceedances are found, additional measures should be taken. In addition, the measured noise emission levels should be taken into account in terms of their impact on project workers, and workers should be provided with appropriate protective equipment (e.g., ear defenders, etc.).	Impacts related to decommissioning works

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
	Minimising impacts through the use of good practices	**MAP 39.** In any case, all activities and works to be carried out shall comply with the provisions of Greek law as set out below: ▪ Ministerial Decision 2640/270 (Government Gazette 689/B/18.8.78) on the use of silenced air hammers. ▪ PD 1180/81 (Government Gazette 293/A/6.10.81), On the regulation of matters relating to the establishment and operation of industries, crafts, all types of mechanical installations and warehouses and the protection of the environment in general, as amended and in force. ▪ Ministerial Decision 56206/1613 (Government Gazette 570/B/9.9.86), Determination of the noise emission of construction site machinery and equipment in accordance with Directives 79/113/EEC, 81/1051/EEC, and 85/405/EEC. ▪ Ministerial Decision 69001/1921 (Government Gazette 751/B/18.10.1988), EEC type approval for the noise level limit of construction site machinery and equipment, in particular motor-driven air compressors, tower cranes, welding and power generators, and portable concrete breakers and jackhammers, as amended. ▪ Ministerial Decision 10399/91 (Government Gazette 359B/91), Determination of the noise level limit for tower cranes, supplementing Ministerial Decision 69001/1921/88 ▪ Ministerial Decision 765/91 (Government Gazette 81B/21-2-91), Determination of noise level limits for hydraulic shovels, cable shovels, earth movers, loaders, and loader-excavators, as amended by Joint Ministerial Decision 11481/523/97 (Government Gazette 295B/97) ▪ Joint Ministerial Decision 37393/2028/01.10.2003, Measures and conditions for noise emissions into the environment from equipment for use outdoors (Government Gazette 1418B), as amended by Joint Ministerial Decision 9272/471/2007 ▪ Presidential Decree 149/06, (159/A/28.7.2006) "Minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (noise) in accordance with Directive 2003/10/EC."	
		ΜΑΠ 40. In addition, the provisions of the following shall be taken into account: ▪ BS 5228 "Code of Practice for noise control on construction and demolition sites" in relation to the determination of the methodology for predicting noise and vibrations during construction works and the applicable indicators and limits.	

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
			▪ BS 6472 Vibration dose value – vdv in relation to the determination of the maximum permissible vibration dose, which concerns human disturbance due to construction activities. ▪ BS 7385 in relation to the determination of the maximum permissible vibration level for the protection of buildings from structural damage. ▪ Ministerial Decision 13586/724/06 (Government Gazette 384/B/28.3.2006) Determination of measures, conditions, and methods for the assessment and management of environmental noise, in compliance with the provisions of Directive 2002/49/EC "relating to the assessment and management of environmental noise" of the Council of 25.6.2002). ▪ Ministerial Decision 211773/2012 (Government Gazette 1367/B/2012), Determination of Assessment Indicators and Maximum Permissible Limits for Environmental Noise Indicators arising from the operation of transport projects, technical specifications for special acoustic studies for the calculation and application (EAMYE) of noise barriers, specifications for environmental noise monitoring, and other provisions.	
		Minimisation of impacts through the use of good practices	**MAP 41.** Inform residents, users, and visitors to the area of the operating hours of machinery that may cause potential disturbance.	Impacts related to the decommissioning method and project schedule.
	Water	Minimization of impacts on the water regime through the use of good practices	**MAP 42.** To meet the project's water needs, commercially bottled water will be used as drinking water for workers. The needs of the construction sites and the wetting of concrete will be met by installing water tanks on site, which will be filled by tankers or from the network of the existing SIGMA industrial facility.	Impacts related to the use of natural resources during project decommissioning.
		Minimisation of impacts on surface and groundwater through the use of good practices	The uncontrolled disposal of surplus materials in the immediate or wider area is prohibited. Under no circumstances is the disposal of these materials in stream beds or other water bodies permitted (**MAP 6**).	Impacts related to the production of surplus materials and their management during project decommissioning.
			Systematic maintenance of the infrastructure and keeping the project area clean is required (**MAP 7**).	Impacts related to project management and the methodology for implementing decommissioning works.

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
		MAP 43. Solid waste collection points should be designated at the construction site, and regular collection should be arranged so as not to degrade the landscape.	Impacts related to the production of solid waste and its management during the decommissioning of the project.
		The work schedule should be designed so that temporary material deposits are used as quickly as possible and material washouts are avoided (**MAP 10**).	Impacts related to the decommissioning method and project schedule.
	Minimisation of impacts on water quality through the use of good practices	**ΜΑΠ 44.** The main factor for the overall protection of the wider area's environment during construction works is the proper organization and smooth operation of the construction site. To protect water quality, it is recommended that the measures mentioned in previous Environmental Parameters be implemented.	Impacts related to the organization and operation of the construction site, and in particular the management of waste and demolition materials.
		MAP 45. To protect water quality from activities involving the management, disposal, and use of construction materials and waste, as well as the cleaning and maintenance of vehicles and equipment, it is recommended that the corresponding measures mentioned in previous Environmental Parameters be implemented.	
	Protection of water quality from improper practices, damage, or negligence.	To protect water quality from improper practices, damage, or negligence, it is recommended that the corresponding measures mentioned in previous Environmental Parameters be implemented.	Impacts related to accidental pollution during normal decommissioning activities
	Minimisation of impacts through monitoring, detection and response	It is recommended that the Environmental Monitoring Program (**MAP 14**) be implemented.	Impacts related to decommissioning works.
	Protection of marine waters	**MAP 46.** Compliance with international guidelines and the IMO's International Safety Management Code (ISM) for the safe operation of ships and the prevention of environmental pollution, as well as strict compliance with navigation, communication, and safety procedures.	Impacts related to decommissioning operations, prevention of accidental pollution, and implementation of best practices.
		MARPOL 47. Compliance with MARPOL requirements for waste and sewage, with emphasis on the following: Annex I Regulations for the Prevention of Pollution by Oil, Annex III Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form, Annex IV Regulations for the Prevention of Pollution by Sewage from Ships, Annex V Regulations for the Prevention of Pollution by Garbage from Ships.	

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
			MAP 48. The vessels to be used for the project will comply with the International Regulations for Preventing Collisions at Sea 1972 (COLREGS).	
		Protection of marine waters through good decommissioning practices	**MAP 49.** Fuel supply procedures shall be implemented in accordance with applicable national regulations and vessel specifications.	
			MAP 50. Take all necessary measures to prevent marine pollution during the construction phase, as well as any additional measures indicated by the competent Port Authority, in accordance with Law 743/77 (Government Gazette A 319), as codified by Presidential Decree 55/98 (A' 58) and as applicable.	
		Protection of marine waters through proper waste management	A "Waste Management Plan" shall be implemented during the construction/operation/decommissioning stages, examining all aspects of the project and the waste produced, with the aim of ensuring that the waste produced (hazardous, non-hazardous) is managed properly (**MAP 17**).	Impacts related to decommissioning works, accident prevention and the implementation of good practices.
		Protection of marine waters	**MAП 51. A Chemical Use Plan** shall be implemented, which shall include: (i) The chemicals that the operator intends to use during the work. A list of the ecotoxicity of these substances. (ii) The purpose or purposes for which the operator intends to use the chemicals. (iii) The maximum concentrations of the chemicals that the operator intends to use in any other substances, as well as the maximum quantities intended to be used in any specified period. (iv) The area within which the chemical may escape into the marine environment.	
Natural Biotic Environment	**Flora, fauna, habitats, and protected areas**	Protection of the terrestrial biotic environment	**MAP 52.** During the decommissioning phase on the land section, which is located in a zone outside Natura sites but with sand dunes, it is recommended that: • (A) Avoid disturbance and interventions in the sand dune zone during the breeding season of turtles and shorebirds. In particular, avoid the period from mid-April to the end of June. This restriction will prevent disturbance during the breeding season and the possible destruction/abandonment of bird or turtle nests. • (B) Do not set up a construction site on the sand dunes to avoid soil compaction and destruction of the flora in the sand dunes.	Impacts related to decommissioning works and the implementation of good practices.
			MAP 53. Implement **a Biodiversity and Wildlife Management Plan** and **Environmental Monitoring Program**, with specific actions and indicators, frequency and methodology for conducting records/field work/measurements per environmental parameter.	Impacts related to decommissioning construction works

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
	Protection of the marine environment	**MAP 54.** The speed of all vessels involved in the Project decommissioning should not exceed 20 knots in order to minimize the possibility of collision with marine mammals and sea turtles.	Impacts related to decommissioning works, accident prevention, and implementation of best practices.
	Protection of the marine environment	**MAP 55.** Two certified marine mammal observers (MMO) shall be on board the support vessel for the decommissioning of the offshore facilities of the project. Before the start of decommissioning operations, the MMOs should check for the presence of marine mammals within 500 m of the activity site. Noisy work should not commence if marine mammals have been detected within this radius or until at least 20 minutes have passed since the last detection. During periods of darkness or poor visibility (such as fog), the PTH should use night vision goggles or passive acoustic monitoring devices.	
		MAP 56. In the event of a collision between a project vessel and marine mammals, the incident should be reported to the competent Directorate of Natural Environment and Biodiversity of the Ministry of Environment and Energy and to the relevant Management Unit of OFYPEKA/Ministry of Environment and Energy.	Impacts related to decommissioning works and potential accidents.
		ΜΑΠ 57. It is recommended that the decommissioning stage in the marine environment be avoided during the breeding season of the cormorant (February-May).	Impacts related to decommissioning and the implementation of best practices.
	Minimisation of impacts on the living environment through the use of good practices	**MAP 58.** All hazardous materials on the construction site must be stored in such a way as to prevent access by wildlife. Containers of oil or fuel must be closed, and deep holes or large pits in the ground must be covered. In addition, during the decommissioning period, special care should be taken to avoid capturing or killing wildlife.	Impacts related to waste and decommissioning material management.
		ΜΑΠ 59. Appropriate organization of the surrounding area to prevent the spread of fire (e.g., use of non-flammable building and decoration materials, creation of firebreaks in key locations to stop the spread of a possible forest fire, installation of fire tanks and other firefighting equipment in accordance with the fire protection studies of the area and the recommendations of the relevant fire department, etc.).	Impacts related to decommissioning, accident prevention, and the implementation of good practices.

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
			MAP 60. Systematic cleaning and maintenance of the surrounding area and facilities within the project site to prevent the outbreak and spread of fire (e.g., systematic cleaning of litter that may be scattered by project workers or occasional visitors to the wider area, systematic cleaning of biomass waste resulting from vegetation management on adjacent land, systematic control and monitoring of the condition of infrastructure networks, etc.).	
			MAP 61. Development of a fire response procedure that will include the organisation of fire safety procedures, training of personnel for emergencies involving fire risk, and cooperation with the local fire service.	
		Protection of the living environment from improper practices, damage, or negligence.	**MAP 62.** Control and prevent potential accidental pollution incidents that would have a direct impact on the soil and, therefore, on the living environment of the area. To protect the quality of the living environment from improper practices, damage, or negligence.	Impacts related to accidental pollution during normal decommissioning activities
		Minimisation of impacts through information/training/communication actions	**MAP 63.** Provide detailed information to employees, both during the decommissioning phase, so that all environmental conditions are complied with, especially those relating to the natural living environment.	Impacts related to decommissioning work
Anthropogenic Environment	Spatial Planning - Land Use	Minimisation of impacts on the anthropogenic environment through the use of good practices	**MAP 64.** Compliance with the requirements of current spatial planning and best practices	Impacts related to decommissioning works and the transport of materials and waste
			MAP 65. Particular attention during the execution of works and the passage of machinery/vehicles near infrastructure and buildings to avoid causing damage.	
			MAP 66. The contractor is obliged to remove all facilities created for the purposes of construction and to restore the site to its condition prior to the commencement of the project.	
	Structure and functions of the man-made environment	Minimising the impact on the structure and functions of the man-made environment through the use of good practices	**MAP 67**. Proper organization and smooth operation of the works will help to limit the disturbance caused to the man-made functions of the area and the temporary visual pollution caused. In addition, the fencing of the construction site and work areas should be done in an aesthetically pleasing manner so as to limit the temporary alteration of the area's appearance.	Impacts related to the decommissioning method and project schedule.

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
			MAP 68. The works should be adjusted in terms of timing so as to avoid intense pressure on productive human activities and the implementation of measures to reduce negative impacts (indirectly from other parameters) proposed in detail in the relevant fields.	Impacts related to possible disturbances to human activities in the area during the decommissioning phase.
	Socio-economic environment	Minimisation of impacts on the socio-economic environment through the use of good practices	Measures to reduce negative impacts on the socio-economic environment (indirectly from other parameters) are proposed in detail in the relevant fields for noise, air pollution, dust, etc.	Indirect impacts from other environmental parameters related to construction works
			MAP 69. Utilisation of local labour and technical resources as much as possible and preference for suppliers from the wider project area in order to stimulate local employment and the economy.	Impacts on the local economy and employment related to decommissioning works
			MAP 70. A particularly effective practice for addressing and avoiding any complaints from local residents is for the supervising authority and the contractor to inform residents about the type and duration of the works before they commence.	Impacts related to possible lack of information about the construction of the Project, possible inadequate cooperation with stakeholders, and handling of complaints.
			MAП 71. Implementation of support measures to find alternative employment for human resources after completion of the relocation, such as: • Internal transfer (identification of other projects within the company where the skills of affected employees can be utilized), • Cross-training (providing a training program that equips employees with the skills needed for other positions within the company or industry), • Outplacement services (providing support in finding employment in cooperation with recruitment agencies, providing training on CV writing and interview techniques to improve the employability of the workforce). A key mitigation measure is the implementation of **a Stakeholder Engagement Plan** to enhance open and transparent communication with stakeholders about the closure and relocation process, timelines, and potential impacts. Regular updates and meetings with employees and members of the local community can help manage expectations, build trust, and mitigate potential negative impacts.	Impacts on the local economy and employment related to decommissioning activities

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
Health and Safety	Minimising health and safety impacts through the use of good practices	**ΜΑΠ 72.** Implement a legal framework for labor and develop and implement a Project-specific Human Resources Management Plan and Human Resources Policy.	Impacts related to decommissioning works
		MAP 73. Strict compliance with safety regulations provided for by law.	
		ΜΑΠ 74. Given that construction work inherently involves the possibility of accidents. It is recommended that: • Strict compliance with the safety regulations for construction sites provided for by law. • Preparation of an Occupational Risk Assessment (ORA) • Establish a Health and Safety Plan and File (HSP and HSF) and strictly comply with the provisions of national legislation and the provisions of PR4 of the ETAA. The SHS and HDS should be updated as work progresses and, in any case, contain accurate and up-to-date information.	
		MAP 75. Employment of a Health and Safety Coordinator and provision of the services of a Safety Technician and Occupational Physician	
		MAP 76. As part of the Human Resources Management Plan and the complaints mechanism, implementation of a procedure for reporting incidents of violence and harassment.	
		ΜΑΠ 77. Informing and training employees in accessible formats on the risks, prevention, protection, and obligations relating to dealing with violence and harassment at work and gender-based violence and harassment.	
		ΜΑΠ 78. Implementation of internal Occupational Health and Safety policies and actions (e.g. training and certification in safe work practices, "Work Stoppage Policy," "Work Stop Order," "Health, Safety, Environmental & Social Responsibility Policy," "Equal Opportunities Policy," "Diversity and Inclusion Policy," "Code of Ethics," etc.)	
		MAP 79. Provision of all necessary protective equipment to staff in accordance with Law 3850/2010 and OHS. Special equipment specified in accordance with the Fire Prevention Plan and Waste Management Plan	

Environmental Parameter		Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
			MAP 80. The construction site must be fenced off so that the public cannot access it and areas where the works are incomplete.	Impacts related to dismantling works
			MAP 81. There should be appropriate signage to inform the public of the dangers and at the same time prevent them from accessing the construction sites.	
	Technical Infrastructure	Ensuring conditions for smooth and safe navigation	**MAP 82.** Cooperation between the proposed Project operator, the competent authorities, and maritime operators to determine safe navigation routes around the demarcated area for the Project's decommissioning. This includes timely notification of the competent port authorities regarding the planned works.	
			MAП 83. Decommissioning works should be planned in such a way as to minimize their impact on existing shipping routes, such as scheduling activities, where possible, during periods of lower maritime traffic to avoid periods of intense fishing, commercial, or tourist activity.	
			MAP 84. Regular checks should be carried out to ensure compliance with the regulations and conditions set, in order to avoid any risks to navigation.	
		Minimising the impact on the road network	**MAP 85.** During transport and movement on the wider road network, special precautions should be taken by machine operators and heavy vehicle drivers to avoid damage to the networks.	
			MAP 86. If necessary, information signs and appropriate road safety signs should be installed in the immediate vicinity of the project and traffic regulations should be implemented, under the responsibility of the contractor. Where possible, real-time updates should be provided via digital platforms (e.g., traffic management applications or GPS) to guide road users.	
			MAP 87. Optimising and minimising vehicle movements, optimising the required time distances and maximising the utilisation rate of vehicles are the principles that apply to vehicles transporting passengers, goods and waste during decommissioning.	
			MAP 88. The transport of bulky items of equipment that has been dismantled across the entire road network shall be carried out after consultation with the competent Traffic Police Departments and after taking into account their recommendations (e.g., escort vehicles, alternative routes, transport schedule, etc.).	

Environmental Parameter	Objective of Proposed Measure	Countermeasures during Decommissioning (MAP)	Potential Significant Impacts to be Avoided/Minimized/Addressed
		MAP 89. Transport planning to avoid, as far as possible, peak hours or seasons when the road transport network is congested.	
	Minimise the impact on public utility networks	MAP 90. All utility network operators in the immediate area who may be affected should be notified in good time by the contractor.	

10.2 Measures for Risk Prevention and Response

The following are measures for the prevention of significant anomalies (in accordance with Article 173 of Law 4964/2022), as well as measures for the management of the risk of accidents or disasters related to the CO_2storage project.

10.2.1 General

The following are listed as general accident prevention measures:

- Development of robust monitoring and emergency plans for rapid detection and containment of leaks. EnEarth will implement a Monitoring Plan in accordance with Paragraph 2 of Article 14 of Joint Ministerial Decision 48416/2037/E.103/2011, which is prepared in accordance with the requirements of Annex II of the above Joint Ministerial Decision. Monitoring will be carried out on injection wells, the storage complex (including, where possible, the CO_2 plume), and, where appropriate, the surrounding environment (**Annex 12.5**).
- Provision of comprehensive training programs and personal protective equipment to personnel involved in CO_2handling and injection activities.
- Pressure relief systems, regular cleaning, and the use of corrosion-resistant materials are planned for the CO_2 storage project facilities.
- During the design phase, vulnerability in the event of loss of utility services is assessed and the risk is addressed, e.g., with backup equipment and emergency shutdown systems.
- Compliance with relevant national/international standards and best practices (including choice of construction materials, design, use of design standards and equipment).
- Emergency arrangements at the existing Sigma site (including communications with authorities and neighbouring facilities) will be extended to include the Project.
- The new CO_2pipeline will be located as far as possible in the same corridor as the existing natural gas/oil pipelines, so care must be taken to avoid any interaction during both the construction and operation of the Project.
- An exclusion zone for external shipping of 500 m from the Omega offshore platform shall be implemented.
- Develop comprehensive maintenance and emergency plans to respond to failures in a timely manner and minimize operational disruptions.
- All fire safety and firefighting system specifications shall be applied to vessels used during the construction and operation of the Project, including pipeline construction and trench excavation vessels.
- The following are specific measures for the prevention/mitigation of hydrocarbon spills:
  - As part of the Project design, extensive surveys of the underlying geology have been carried out to select the optimal location for drilling, so that there is no interaction with hydrocarbon extraction activities.
  - As part of the Project design, reservoir simulation studies have been carried out to assess the potential impact of CO_2injection on hydrocarbon production zones.

- Implementation of pressure management strategies, such as adjusting injection rates or using barriers to mitigate the risk of CO_2 migration into hydrocarbon reservoirs.
- Implementation of an emergency plan to deal with oil spills (including isolation, communication, deployment of oil spill response measures, such as floating barriers, etc.).

10.2.2 Measures to Prevent Significant Irregularities

Measures to prevent significant irregularities (in accordance with Article 173 of Law 4964/2022) are listed below, based on the risks associated with the Project's facilities and wells as possible routes for CO_2 from the storage site.

Table10 –4 : Measures for the Prevention of Significant Irregularities

AA	Risk description	Potential impacts	Preventive measures
		Facilities	
1	CO_2leakage due to pipe corrosion, impurities in the CO_2stream,or environmental conditions	• CO_2escape into the atmosphere - greenhouse gas emissions • Risks to human health • Environmental damage (soil and/or water pollution)	• Use of corrosion-resistant materials and protective coatings • Installation of monitoring equipment, leak detection systems • Design and construction of facilities in accordance with codes and standards, with third-party certification • The pipeline will be inspected by special equipment (pigging) in accordance with best practices and its wall thickness will be measured.
2	CO_2leakage due to mechanical failure (e.g., poor welding, material deterioration)	• CO_2escape into the atmosphere - greenhouse gas emissions • Risks to human health • Environmental damage (soil and/or water pollution)	• Use of corrosion-resistant materials and protective coatings • Welding in accordance with codes and standards, using non-destructive testing (NDT) methods and hydraulic testing • Monitoring CO_2stream composition to ensure compliance with design specifications
3	CO_2leakage due to accidental damage from external causes (e.g., construction work)	• CO_2escape into the atmosphere - greenhouse gas emissions • Risks to human health • Environmental damage (soil and/or water pollution)	• Clear marking of pipeline routes • Installation of monitoring equipment, leak detection systems • Design in accordance with applicable rules for equipment layout to ensure adequate clearance
4	Partial/total pipeline rupture due to overpressure, equipment failure, or operational errors	• Large-scale CO_2escape (leakage) posing a risk to human and animal safety (potential risk of asphyxiation) • Significant environmental pollution • High repair costs and operational downtime	• Pipeline design with adequate safety margins and pressure relief systems • Implementation of automated pressure control and emergency shutdown systems • Pipeline operation procedure in accordance with flow assurance studies

AA	Risk description	Potential impacts	Preventive measures
5	Partial/total pipeline rupture due to significant corrosion or material defects leading to structural failure	• Large-scale CO_2leak posing risks to human and animal safety (potential risk of asphyxiation) • Significant environmental pollution • High repair costs and operational downtime	• Pipeline design with adequate safety margins and pressure relief systems • Implementation of automated pressure control and emergency shutdown systems (IEC 61508 / 61511) • Pipeline operation procedure in accordance with flow assurance studies
6	Pipeline blockage due to the formation of hydrates or other solid deposits inside the pipeline	• Disruption of CO_2flow leading to inadequate operation. • Possible pressure increase resulting in risk of leaks or explosions. • Increased maintenance and cleaning costs	• Frequent inspection (pigging) and cleaning of pipes. • Continuous monitoring of conditions and supply in the pipeline • Ensuring CO_2stream purity based on specified standards • Pipeline operation procedure in accordance with flow assurance studies
7	Pipeline blockage due to accumulation of impurities or contaminants in the CO_2stream	• Disruption of CO_2flow leading to inadequate operation. • Possible pressure increase resulting in risk of leaks or explosions. • Increased maintenance and cleaning costs	• Frequent inspection (pigging) and cleaning of pipes. • Continuous monitoring of conditions and supply in the pipeline • Ensuring CO_2stream purity based on specified standards • Pipeline operation procedure in accordance with flow assurance studies
8	Hydraulic shock in the pipeline due to rapid valve closure or compressor failure, combined with inadequate design, no safety margin, or no high-pressure protection mechanism	• Possibility of damage to the pipeline due to pressure spikes • Increased wear on pipeline components, leading to failures	• Pipe design with appropriate pressure relief systems • Implementation of automated flow and pressure control systems
9	Accidents during unloading of CO_2cargo (failure during lifting) due to mechanical failure of crane/other lifting equipment, inadequate maintenance	• Falling CO_2 loads, possible structural damage to containers • Risk of container rupture or high-pressure CO_2leakage	• Training and certification of operators for the use of lifting equipment. • Appropriate design to ensure that equipment meets the required lifting specifications
10	Accidents during unloading of CO_2 cargo (failure during lifting) due to mechanical failure of crane/other lifting equipment, inadequate maintenance	Serious injury or death to personnel and damage to infrastructure	Regular inspection and maintenance of lifting equipment
11	Failures during connection (flexible connection/disconnection hoses) due to improper connection/disconnection procedures	Risk of CO_2leakage at connection points, risk to safety and the environment	Use of high-quality connectors and sealing elements suitable for CO_2transport
12	Connection failures (flexible connection/disconnection hoses) due to material incompatibility or deterioration of connectors and sealing elements	• Delayed operation and increased repair costs • Increased risk of equipment damage and injury	Use of high-quality connectors and sealing elements suitable for CO_2transport

AA	Risk description	Potential impacts	Preventive measures
13	Drop in CO_2pressure in pipes and conduits (bulk/load) due to friction losses and resistance caused by the roughness of the conduit's inner surface	Reduced injection rate if pressure is lower than optimal	Continuous pressure monitoring throughout the CO_2transport system for rapid detection and response to pressure drops
14	CO_2pressure drop in pipes and conduits (bulk/load) due to ice accumulation (hydrate formation) or corrosion products in pipes or conduits	Possibility of requiring an additional compressor to compensate for the pressure drop, resulting in higher energy consumption and operating costs.	Design based on flow assurance study to define safe operating limits and appropriate pressure control system
15	CO_2pressure drop in pipes and conduits (bulk/load) due to friction losses and resistance caused by the roughness of the inner surface of the conduit	Delays in operation leading to reduced efficiency	Design based on flow assurance study to determine safe operating limits and appropriate pressure control system
16	CO_2pressure drop in pipes and conduits (bulk/load) during transport due to temperature changes (cooling) in winter, causing salt and ice formation on the outside of the conduits/pipes	• Possibility of requiring an additional compressor to compensate for the pressure drop, resulting in higher energy consumption and operating costs. • Operational delays leading to reduced efficiency	Use of a start-up heater and/or other suitable equipment on the Beta platform to ensure suitable injection conditions
17	CO_2leakage following an accident (overturning or falling object) in trucks	• CO_2leakage into the atmosphere - greenhouse gas emissions • Risks to human health • Environmental damage (soil and/or water pollution)	Implementation of road transport procedures and plans
18	Partial/total pipeline rupture due to fishing/trawling	• CO_2escape into the atmosphere - GHG emissions • Risks to human health • Environmental impact (soil and/or water pollution)	Burial of pipeline to eliminate risk of pipeline rupture from fishing and trawling activities
19	Breakage of lift pipe due to ship collision with platform	• Safety risks, including asphyxiation and extreme cooling caused by rapid decompression of compressed CO_2 • Risks to the ecosystem, including marine acidification • Operational disruption due to leakage and secondary damage to other equipment	Protection of the riser pipe from ship impact
20	Losses due to platform collapse	Rupture of wells, pipeline, riser	• Compliance with operating instructions

AA	Risk description	Potential impacts	Preventive measures
			• Checks and inspection of installations
21	Natural hazards due to weather conditions (strong winds, rain, extreme temperatures) that may affect the facilities	Failure of facilities and risks to personnel	Designing facilities with extreme weather conditions in mind
22	Solidification/formation of dry ice CO2 due to low temperatures from the reduction in volume of the CO_2container during injection	Plant failure and risks to personnel	• Investigation of the effect of CO_2removal from storage containers on operating temperature • Protection of personnel based on the above investigation
23	High temperatures due to heat from compression	• Personnel injury • Exceeding design temperature (multiple exhaust pipe, duct, multiple drilling pipe)	Determine CO_2heating and cooling supply if necessary
24	Fluctuation / adverse environmental conditions	Operational delays or need to disconnect/stop injection	Planning of sea transport with favorable weather conditions
25	Parallel operation of Sigma and Prinos facilities, interaction with the operation of the CO_2storage project	Possibility of delays due to poor synchronization	Design and communication of $CO_{(2)}$ managementoperations, including a full risk assessment (SIMOPs) for all phases (construction, operation, decommissioning) and all modes of operation (e.g., reception, connection, ship transport, compression, etc.)
		Drilling	
1	Poor condition of abandoned wells. After analysis of the integrity of the wells, 12 were deemed unsuitable based on their condition "as abandoned"	CO_2/ oil / water leakage through wells into formation layers or onto the surface	• Interventional drilling to install a deeper barrier along suitable formations • Monitoring of wells with DTS (distributed temperature sensing) and DAS (distributed acoustic sensing) fiber optic sensors
2	Drilling of intervention wells. Failure of interventional wells and inability to install barriers at greater depths in high-risk wells	CO_2/ oil / water leakage through wells in the formation layers or on the surface	• Use of proven intervention well technology • Interventional well design by qualified personnel. • Investigation of options for dealing with possible failure of intervention wells
3	Abandoned inaccessible wells - 29 abandoned wells have not been abandoned in accordance with modern industry standards, e.g. special marking of cement plugs, pressure testing, placement on a mechanical base	CO_2/ oil / water leakage through wells into formation layers or onto the surface	• Detailed investigation of the integrity of all abandoned wells and wells where barriers have not been installed in accordance with current standards. Qualitative risk analysis for each barrier. • An independent geological study has confirmed that the salt formations within the evaporite sequence will move around the casing with incomplete cement coating and

AA	Risk description	Potential impacts	Preventive measures
			create a seal with resistance to the expected $CO_{(2)}$
4	Abandoned inaccessible old-style boreholes - Seventeen boreholes have been abandoned where the base of their internal barrier is located within the evaporite sequence and, therefore, the borehole has been abandoned at depths of impermeable formations. However, it has been found that there are permeable layers within the evaporite sequence below the bases of these internal barriers. Over time, the pipes could corrode and the sandstones could be exposed to $CO_{(2)}$.	CO_2/ oil / water leakage through boreholes in the formation layers - secondary containment	Study to confirm whether the evaporite sand layers are suitable as a secondary containment reservoir and that they are not characterized as leakage pathways.
5	Use of Portland cement in the construction and abandonment of (abandoned) wells. Portland cement can react with the carbonic acid of CO_2 .	Leakage of CO_2 / oil / water through wells into the formation layers - secondary containment	• According to extensive research, the effect of CO_2 on Portland cement is extremely slow and limited to 0-10 m over 10,000 years, provided that good installation practices are followed. The integrity analysis of the boreholes has assessed the risks of cement works as a barrier. • An independent geological study has confirmed that salt formations within the evaporite sequence will move around the casing with incomplete cement coating, thus reducing the need for Portland cement in certain wells .
6	No data is available for the P-6 exploratory well, so the status "as abandoned" is unknown	CO_2/ oil / water leakage through wells in the formation layers or on the surface	• The location of P-6 on the seabed is known from older survey data. A program should be designed to confirm the location and monitor the well, e.g., acoustic monitoring or real-time camera monitoring • The other 5 exploration and appraisal wells have been abandoned with a cement plug and there is no indication of non-compliance with procedures.
7	The accessible wells on the Alpha and Beta platforms that remain active were not designed for exposure to an acidic CO_2/ water mixture.	CO_2/ oil / water leakage through wells into formation layers or onto the surface	• Reservoir modeling can predict when the CO_2plume will reach each well. Before this "CO_2 wetting" occurs, the wells will be abandoned to prevent integrity issues. Based on the integrity analysis of these wells, they can be abandoned in accordance with current OEUK industry standards. • Determination of CO_2concentration during oil production through sampling.
8	In new water production wells, there is a possibility of damage to the pumps (ESP).	Reduction in CO_2storage capacity	• Plan for periodic equipment replacement, availability of spare pumps. The current budget provides for replacement every 3 years.

AA	Risk description	Potential impacts	Preventive measures
			• Use of a Hydraulic Workover Unit (HWU) to change the pumps. • Use of proven technology pumps. • Design of pumps and water wells by qualified personnel.
9	The new injection wells have not been constructed to supply CO_2 for storage	Leakage of CO_2 / oil / water through wells into the formation layers or to the surface	• Use of materials with specifications suitable for CO_2atmosphere (25Cr Super Duplex steel or similar material) • Use of the best available cement slurry to prevent the effects of CO_2 • Good practices for the installation and lining of casings and liners, including post-installation logging to verify cement quality prior to CO_2injection • Use of proven drilling technology. • Drilling design by qualified personnel. • The Prinos field is mature, with over 70 wells, so it is unlikely that there will be any unforeseen conditions that could seriously jeopardize the construction of new wells
10	Abandonment of CO_2wells	CO_2/ oil / water leakage through wells into formation layers or onto the surface	• The wells will be constructed in accordance with modern standards and the cement rings will be logged to verify the quality of the annular cement, allowing the location of the abandonment barrier to be selected. • The abandonment plan will be known in advance and will be specified in the closure plan. This means that the construction plan may include the abandonment plan and ensure that it is feasible. • Apply best practices for abandonment, including cement types. • Use of the best available cement slurry to avoid CO_2effects. • Good practices for the installation and lining of casings and liners, including post-installation logging to verify cement quality prior to CO_2injection. • Use of proven drilling technology. • Drilling design by qualified personnel.

11 CODIFICATION OF RESULTS AND PROPOSALS FOR THE AMENDMENT OF THE AEPO

This **chapter** presents the codification of the proposed amendment to the current Environmental Terms of the project, in accordance with the interventions of the proposed amendment to the project, the assessment of the potential adverse impacts they may cause (as analysed in detail in **Chapter 9**) and the proposed measures to avoid/minimise/address them (as described in detail in **Chapter 10**).

The proposed amendments to the current Environmental Terms of the project are listed below, describing the existing environmental term, the proposed amendment, and relevant documentation for the amendment. Similarly, after the end of the tabulated proposed amendments to the current Environmental Terms of the project, there is a table with new additional Environmental Terms, which are proposed to be included in the AEPO due to the interventions of the proposed amendment.

1. ET 4.2
A. Existing environmental condition
"4.2. Conditions for the design of the facilities ***4.2.1.*** *The final design of the project must consider the complete separation of offshore facilities with CO_2 from the facilities with hydrocarbon extraction wells in Prinos, in order to minimise any potential for unforeseen incidents due to the coexistence of these wells. For this reason, the offshore part of the project needs to be reviewed so that the CO_2 equipment can be developed on an independent offshore platform, if possible at a distance of 500 m or more from the existing platforms, and the route of the relevant CO_2 and power supply cables, taking into account the existing routes between the coastline and the existing platform complex, so as to minimise any additional impact.* ***4.2.2.*** *For the siting of the new independent offshore platform, a suitable location should be selected based on geological characteristics for the implementation of the required drilling, soil characteristics of the seabed for the installation of the platform, as well as characteristics of the natural and man-made environment, in order to limit potential adverse effects.* ***4.2.3.*** *In this context, the project promoter shall prepare and submit to the licensing authority an appropriate environmental study for the amendment of the AEPO of the project in question, documenting the appropriateness of the amendment to the project design based on the requirements of clause 4.2.1 and the criteria of condition 4.2.2.* ***4.2.4.*** *In addition, the above environmental study should include appropriate provisions so that:* ***4.2.4.1****. The feasible mechanism for driving the piles between the pulsed (which is preferable) and the percussive methods, based on the soil conditions of the seabed, is selected.* ***4.2.4.2****. Minimise work in the area of the offshore platform and the associated environmental impacts by providing for its assembly in as few and as short steps as possible.* ***4.2.4.3****. Ensure that the piles can be extracted from the seabed and removed during the decommissioning phase of the platform.* ***4.2.4.4****. When designing the connections between the new platform and onshore facilities, appropriate provisions shall be made to ensure that:*

4.2.4.4.1*. Surface equipment and subsea pipelines have a strength suitable for the maximum closed-head pressure of the wells, in order to limit the possibility of corrosion when operating under normal conditions and the consequent possibility of loss of integrity and therefore leakage of CO(2) into the environment.*

4.2.4.4.2. *The new platform shall be connected to the existing Delta platform or to the project's onshore facilities via an underwater power cable in order to avoid the installation of an autonomous oil-fired generator.*

4.2.4.4.3*. The water produced by the extraction will be sent for treatment in appropriate systems, which will have a performance that meets the applicable discharge limits. Water from the surfaces of the platforms (cleaning and rainwater) will be discharged through appropriate treatment systems, in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL).*

B. Proposed environmental condition

4.2. Conditions for the design of the facilities

4.2.1. *The final definitive location of the new Omega platform to be specified in the Final Design Compliance File submitted to the competent environmental authority, as specified in paragraph 7 of Article 11 of Law 4014/2011. A prerequisite for this is the location of the Omega platform (and the implementation of the corresponding drilling operations) within the* **Omega Platform Potential Location Area,** which consists of a marine area *with a radius of 300 metres from the coordinates of the specified central point that is the indicative location of the Omega platform (*latitude (B) 40° 47.38327' and longitude (A) 24° 29.92146'), *as described in the MT AEPO*

4.2.2. *The final choice of the method for driving the piles between the pulsed and the percussive, documented on the basis of technical and environmental criteria, shall be included in the Final Design Compliance File (as specified in paragraph 7 of Article 11 of Law 4014/2011), as described in the case of condition 4.1.1.*

C. Documentation of the proposed change

The term is adjusted:

A. This MT AEPO (in accordance with the requirements of PO ***4.2.3***) concerns the modification of the licensed project so as to include *"the complete separation of offshore facilities with CO_2injection wells from the facilities with hydrocarbon extraction wells in Prinos, in order to minimise any potential for unforeseen incidents due to the coexistence of these wells",* as required by PO 4.2**.1**. For this reason, it is proposed to install a new offshore platform (Omega platform) at a distance of more than 500 metres from the existing platforms of the Prinos hydrocarbon extraction complex and to modify the relevant networks (CO_2transfer pipeline and power supply cable) so as to satisfy the requirement of PO 4**.2.1.** *"...the offshore part of the project needs to be reviewed so that the drilling equipment for CO(2) drilling equipment for CO_2 and power supply cables, taking into account the existing routes between the coastline and the existing platform complex, so as to minimise any additional footprint.*

B. The installation of the new offshore platform (Omega platform), as proposed herein, has been researched and designed by the company's technical design teams with the aim of locating it in a suitable area, based on PO 4**.2.2,** which requires *that "For the location of the new independent offshore platform, a suitable location should be selected based on geological characteristics for the implementation of the required drilling, soil characteristics of the seabed for the installation of the platform, as well as characteristics of the natural and man-made environment, in order to limit potential adverse effects*." For this reason, the new Omega platform will be located within a specific area, which is initially assessed as suitable for the location of the Omega platform (**Potential Location Area for the Omega Platform)**, as it has suitable soil characteristics, no undulations on the seabed, is a flat zone with no surface or underground obstacles, and the geological conditions are similar to those of the existing offshore installations. This area extends within a radius of 300 metres from the coordinates of the designated central point, which is the indicative location of the Omega platform, as described above (latitude (B) 40° 47.38327' and longitude (A) 24° 29.92146'). The final location of the Omega platform will be determined after investigating and

evaluating the exact technical and soil characteristics to find the most appropriate technical solution, which is carried out as the first step in the construction methodology for each new platform. The entire **Omega Platform Potential Location Area** is included in the study/influence area of the project under consideration in the context of the EIA MT, and any potential impacts from the location of the Omega platform (and the implementation of the corresponding drilling operations) have been assessed in the relevant sections of the EIA MT. The assessment of potential impacts showed that these are low and do not differ significantly from the location of the platform at any point in **the Omega Platform Potential Location Area, thus** satisfying the requirement of the PO for the installation of the platform in an area with suitable "*...characteristics of the natural and man-made environment, in order to limit potential adverse impacts."*

Therefore, as the requirements of the specific PO are satisfied in principle, the final definitive location of the new Omega platform will be specified in the context of the submission **of the Final Design Compliance File** to the competent environmental authority, as specified in paragraph 7 of Article 11 of Law 4014/2011. A prerequisite for this is the location of the Omega platform (and the implementation of the corresponding drilling operations) within a radius of 300 metres from the coordinates of the specified central point, which is the indicative location of the Omega platform, as described above, for which area the relevant potential P&K impacts have been assessed and evaluated within the framework of the MT AEPO.

C. PO ***4.2.4.1***. *requires "The feasible mechanism for driving the piles between the pulsed (which is preferable) and the percussive methods, based on the soil conditions of the seabed, shall be selected."* For this reason, both methodologies are included and described in the MT AEPO (**Sections 3.4.2.1.1.3** and 3**.4.2.1.1.3**, respectively). However, the final choice of pile driving method cannot be made at this stage, as the final choice of driving mechanism is a decision that will be determined during the detailed design, following detailed analyses of the specific soil and geological characteristics of the exact location of the new platform (as described in the case of field B of this **Table).** Consequently, the final choice of the pile driving method should be included in **the Final Design Compliance File** (as specified in paragraph 7 of Article 11 of Law 4014/2011), as described in field B of this **Table**

D. The installation method for the new Omega offshore platform, based on the detailed description provided in **Section 3.4.2.1.1,** minimises the work in the area of the platform's offshore location and the associated environmental impacts, by providing for its assembly in as few and as short steps as possible, based on the requirements of PO 4**.2.4.2.**

E. The installation method for the new Omega offshore platform, based on the detailed description provided in **Section 3.4.9.3,** ensures that the piles can be extracted from the seabed and removed during the platform decommissioning phase, based on the requirements of PO **4.2.4.3.**

F. Based on the analysis provided in **the** relevant **Sections** of **Chapter 3.4.2.1**, the requirements of PO **4.2.4.4.**1 are satisfied, which states *"Surface equipment and subsea pipelines shall have a strength suitable for the maximum closed-head pressure of the wells, in order to limit the possibility of corrosion when operating under normal conditions and the consequent possibility of loss of integrity and therefore leakage of $CO_{(2)}$ into the environment."*

H. The new Omega platform will be supplied with electricity via an undersea cable connecting it to the existing Delta platform (as described, inter alia, in **Section 3.4.1.7**) so as to meet the requirements of PO ***4.2.4.4.2***, which states *"The new platform shall be electrically connected to the existing Delta platform or to the project's onshore facilities via an underwater power cable in order to avoid the installation of an autonomous oil-fired generator."*

G. *The water produced by* the new Omega platform will be transported via an underwater pipeline to the existing Delta platform (as described, inter alia, in **Section 3.4.1.6**), where it will be treated and discharged in accordance with the Environmental Permit for the existing offshore platform complex at Prinos, so as to meet the requirements of PO ***4.2.4.4.3***, which states *"The water produced from mining will be sent for treatment in appropriate systems, which will have a performance that meets the applicable discharge limits. Water from the surfaces of the platforms (cleaning and rainwater) shall be discharged through appropriate treatment systems, in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL)."*

2. PO 4.3.3.14.1
A. Existing environmental condition
4.3.3.14.1 *The primary section of each well will be 16 inches and will be drilled from approximately 350 m to a depth of 2,200 m. In this section, a seawater-based, biodegradable lime mud will be used as the drilling fluid, without any negative impact on the environment. The geological formation in this section is uniform and consists of sandstone and clay layers, and from all the wells that have been drilled in the area, no traces of hydrocarbons have ever been observed at these depths. Therefore, considering that the components of water-based muds are not harmful to the environment, after separating the material of the specific cuttings in accordance with clause 4.3.3.14, the material in question may be returned to the seabed, after sampling to confirm that its chemical properties are harmless to the marine environment and consistent with the natural soil layer.*
B. Proposed environmental condition
4.3.3.14.1 *The initial section of each well shall be 26 inches and shall be drilled from approximately 120 m to a depth of 450 m. The next section will be 26 inches and will be drilled from approximately 450 m to a depth of 2600 m. In these sections, a seawater- and lime-based drilling fluid will be used, which will be biodegradable and have no negative impact on the environment. The geological formation in this section is uniform and consists of sandstone and clay layers, and from all the drilling that has been carried out in the area, no traces of hydrocarbons have ever been observed at these depths. Therefore, considering that the components of water-based muds are not harmful to the environment, after separating the material of the specific cuttings in accordance with clause 4.3.3.14, the material in question may be returned to the seabed, after sampling to confirm that its chemical properties are harmless to the marine environment and consistent with the natural soil layer.*
C. Justification of the proposed change
It is proposed that the PO be reworded to bring it into line with the slight variation in the technical characteristics of the wells, as required by their relocation. This variation is described in detail in the relevant paragraphs of **Section 3.4.2.1.2** 'Injection Wells and Water Producing Wells'.

3. PO 4.3.5.3
A. Existing environmental condition
4.3.5.3 *For the construction of the CO_2pipeline, marine fuel (Marine Gasoil DMA ISO 8217:2012) with a maximum sulphur content of 0.1 % (M/M) shall be used on the construction vessel and auxiliary vessels.*
B. Proposed environmental condition
4.3.5.3 *For the construction of the $CO_{2pipeline}$,the construction of the pipeline for transporting the produced water and the installation of the submarine cable, marine fuel (Marine Gasoil DMA ISO 8217:2012) with a maximum sulphur content of 0.1 % (M/M) shall be used on the construction vessel and auxiliary vessels. (Marine Gasoil DMA ISO 8217:2012) with a maximum sulphur content of 0.1% (M/M) shall be used on the construction vessel and auxiliary vessels.*
C. Documentation of the proposed change
It is proposed that the PO be reworded to include the corresponding new interventions relevant to this PO.

4. PO 4.7.6.2.2.
A. Existing environmental condition
4.7.6.2.2*. Monitoring of seawater quality at three locations (in water samples from the bottom and surface of the water column), as described in section 12.2.2 of the EIA-CCS-PR, on a weekly basis during Phases 3 and 5 of the offshore pipeline installation and burial works and on a bimonthly basis during the implementation of the remaining works within the marine environment.*
B. Proposed environmental condition
4.7.6.2.2 *Monitoring of marine water quality at five locations (in water samples from the bottom and surface of the water column), as described in section 12.2.2 of the EIA-CCS-PR and in the MT AEPO, on a weekly basis during Phases 3 and 5 of the offshore pipeline installation and burial works and the Omega offshore platform installation works, and on a bimonthly basis during the implementation of the remaining works within the marine environment.*
C. Documentation of the proposed change
It is proposed that the PO be reworded to include monitoring of the impacts of the installation of the new Omega offshore platform and related equipment. Therefore, it is proposed to add two more sampling points (in addition to those provided for in section 12.2.2 of the EIA-CCS-PR) in the immediate vicinity of the new Omega platform, for the comprehensive environmental monitoring of the potential impacts of the installation of the new Omega offshore platform and related project equipment.

5. PO 4.7.6.3.1.
A. Existing environmental condition

4.7.6.3.1. *Analysis of benthic communities as an indicator of the ecological status of the marine environment (ecological indicators BENTIX, AMBI, BIPO or equivalent updated indicators), every three (3) months at three locations, as described in section 12.2.2 of the EIA-CCS-PR.*
B. Proposed environmental condition
4.7.6.3.1. *Analysis of benthic communities as an indicator of the ecological status of the marine environment (ecological indicators BENTIX, AMBI, BIPO or equivalent updated indicators), every three (3) months at five locations, as described in section 12.2.2 of the EIA-CCS-PR and in the MT AEPO.*
C. Documentation of the proposed change
It is proposed that the PO be reworded to include monitoring of the impacts of the installation of the new Omega offshore platform and related equipment. Therefore, it is proposed to add two more sampling points (in addition to those provided for in section 12.2.2 of the EIA-CCS-PR) in the immediate vicinity of the new Omega platform, for the comprehensive environmental monitoring of the potential impacts of the installation of the new Omega offshore platform and related project equipment.

6. PO 4.7.6.3.2.
A. Existing environmental condition
4.7.6.3.2. *Monitoring of the quality of marine sediments every three (3) months at the three locations where samples will be taken for the analysis of benthic communities in paragraph 4.7.8.1. The analysis of the parameters in the sediment samples should include the following parameters: total organic carbon (TOC), total nitrogen (TN), total phosphorus (TP), Polycyclic Aromatic Hydrocarbons (16 USEPA PAHs) and heavy metals (Arsenic (As), Cadmium (Cd), Manganese (Mn), Lead (Pb), Iron (Fe), Copper (Cu), Chromium (Cr), Zinc (Zn), Cobalt (Ci), Molybdenum (Mo), Nickel (Ni)).*
B. Proposed environmental condition
4.7.6.3.2. *Monitoring of the quality of marine sediments every three (3) months at the five locations where samples will be taken for the analysis of benthic communities referred to in paragraph 4.7.8.1. The analysis of the parameters in the sediment samples should include the following parameters: total organic carbon (TOC), total nitrogen (TN), total phosphorus (TP), Polycyclic Aromatic Hydrocarbons (16 USEPA PAHs) and heavy metals (Arsenic (As), Cadmium (Cd), Manganese (Mn), Lead (Pb), Iron (Fe), Copper (Cu), Chromium (Cr), Zinc (Zn), Cobalt (Ci), Molybdenum (Mo), Nickel (Ni)).*
C. Documentation of the proposed change
It is proposed that the PO be reworded to include monitoring of the impact of the installation of the new Omega offshore platform and related equipment. Therefore, it is proposed to add two more sampling points (in addition to those provided for in section 12.2.2 of the EIA-CCS-PR) in the immediate vicinity of the new Omega platform, for the comprehensive environmental monitoring of the potential impacts of the installation of the new Omega offshore platform and related project equipment.

7. PO 4.7.6.3.3.1
A. Existing environmental condition

4.7.6.3.3.1. *Continuous monitoring during Phase 3 and Phase 5 of the offshore pipeline installation and burial works.*
B. Proposed environmental condition
4.7.6.3.3.1. *"Continuous monitoring during Phase 3 and Phase 5 of the offshore pipeline installation and burial works, during the installation of the Omega offshore platform and the drilling of wells.* *Particular emphasis should be placed during the installation of the Omega platform piles, where, in addition to monitoring, Marine Mammal Observers will also visually scan the area for at least 20 minutes before the start of pile installation and impulse or pulse sound generation, in order to avoid the presence of marine mammals within a range of at least 500 metres from the source of the impulse or pulse sound emission.*
C. Documentation of the proposed change
It is proposed that the PO be reworded to include monitoring of the impact of the installation of the new Omega offshore platform and related equipment. More specifically, the amendment to the PO is proposed in order to address the potential adverse impacts on marine mammals from the emission of impulsive or pulsed sound, as analysed and documented in this document and in the EIA, which forms an integral part thereof.

8 PO 4.7.8.3.2.
A. Existing environmental condition
4.7.8.3.2. *Monitoring of marine water quality will be carried out every three years at three locations (in water samples from the bottom and surface of the water column), as described in section 12.2.2 of the EIA-CCS-PR.*
B. Proposed environmental condition
4.7.8.3.2. *The quality of marine waters will be monitored every three years at five locations (in water samples from the bottom and surface of the water column), as described in section 12.2.2 of the EIA-CCS-PR and in the MT AEPO.*
C. Documentation of the proposed change
It is proposed that the PO be reworded to include monitoring of the impact of the installation of the new Omega offshore platform and related equipment. Therefore, it is proposed to add two more sampling points (in addition to those provided for in section 12.2.2 of the EIA-CCS-PR) in the immediate vicinity of the new Omega platform, for the comprehensive environmental monitoring of the potential impacts of the installation of the new Omega offshore platform and related project equipment.

9. PO 4.7.8.4.
A. Existing environmental condition
4.7.8.4. *The quality of marine sediments will be monitored every three years at three locations, as described in section 12.2.2 of the EIA-CCS-PR. The analysis of parameters in sediment samples should include the following parameters: total organic carbon (TOC), total nitrogen (TN), total phosphorus (TP), polycyclic aromatic hydrocarbons (16 USEPA PAHs) and heavy metals (arsenic (As), cadmium (Cd),*

manganese (Mn), lead (Pb), iron (Fe), copper (Cu), chromium (Cr), zinc (Zn), cobalt (Ci), molybdenum (Mo), nickel (Ni)).
B. Proposed environmental condition
4.7.8.4. *Monitoring of the quality of marine sediments every three years at the five locations described in section 12.2.2 of the EIA-CCS-PR. The analysis of the parameters in the sediment samples should include the following parameters: total organic carbon (TOC), total nitrogen (TN), total phosphorus (TP), polycyclic aromatic hydrocarbons (16 USEPA PAHs) and heavy metals (arsenic (As), cadmium (Cd), manganese (Mn), lead (Pb), iron (Fe), copper (Cu), chromium (Cr), zinc (Zn), cobalt (Ci), molybdenum (Mo), nickel (Ni)).*
C. Documentation of the proposed change
It is proposed that the PO be reworded to include monitoring of the impact of the installation of the new Omega offshore platform and related equipment. Therefore, it is proposed to add two more sampling points (in addition to those provided for in section 12.2.2 of the EIA-CCS-PR) in the immediate vicinity of the new Omega platform, for the comprehensive environmental monitoring of the potential impacts of the installation of the new Omega offshore platform and related project equipment.

10. PO 4.7.8.5.1.
A. Existing environmental condition
4.7.8.5.1. *Analysis of benthic communities as an indicator of the ecological status of the marine environment (ecological indicators BENTIX, AMBI, BIPO or equivalent updated indicators) at three locations.*
B. Proposed environmental condition
4.7.8.5.1. *Analysis of benthic communities as an indicator of the ecological status of the marine environment (ecological indicators BENTIX, AMBI, BIPO or equivalent updated indicators) at five locations*
C. Documentation of the proposed change
It is proposed that the PO be reworded to include monitoring of the impacts of the installation of the new Omega offshore platform and related equipment. Therefore, it is proposed to add two more sampling points (in addition to those provided for in section 12.2.2 of the EIA-CCS-PR) in the immediate vicinity of the new Omega platform, for the comprehensive environmental monitoring of the potential impacts of the installation of the new Omega offshore platform and related project equipment.

11. New additional environmental terms	
A. Environmental condition	**Documentation**
4.3.6.16. During the installation of the pillars for the new Omega offshore platform, the following shall apply: **4.3.6.16.1** Install deterrent devices (pingers) for marine mammals and activate them for at least 10 minutes (in addition to 20 minutes of monitoring by MMOs) before starting pulsed or impulsive noise production.	As discussed extensively in this EIA, the installation methodologies for the piles of the new Omega offshore platform generate levels of underwater noise (**Section 3.4.2.9.2** Noise Emissions from the Installation of the Omega Platform), which may have adverse effects on marine mammals in the study area (**Section**

11. New additional environmental terms	
A. Environmental condition	**Documentation**
4.3.6.16.2 Apply the slow start method with reduced sound production for the first 30 minutes of operations to allow time for remaining marine mammals to safely disperse. **4.3.6.16.3** Bubble curtains that limit noise propagation should be deployed in accordance with the recent ACCOBAMS guidelines on underwater sound. (https://accobams.org/wp-content/uploads/2022/11/MOP8.Inf44_Methodological-guide-noise-V3.1.pdf or the most recent update). **4.3.6.16.4** Consider the possibility of using pile sleeves to further mitigate noise propagation in the area.	**9.3.8.1.2** of the EIA Report and relevant Sections of the EIA). Given the importance of the area for marine mammals, as evidenced by its designation as an environmentally protected area (**Section 6.9** of the EIA Report and relevant Sections of the EIA), it is recommended that measures be implemented to avoid and minimise any impacts so that they are eliminated or reduced to negligible and, in any case, manageable levels. In this context, it is recommended that the specific POs be included in the project's EIA.

12 APPENDICES

This Chapter includes the following Appendices:

- Photographic Documentation Appendix (**Section 12.1**)
- Appendix of Documents (**Section 12.2)**
- Maps – Plans Appendix (**Section 12.3**)
- Special Ecological Assessment Study (SEAS) (**Section 12.4**)
- CO_2Monitoring Plan and Corrective Measures Plan (**Section 12.5**)
- Waste Management Plan (**Section 12.6**)

However, it should be noted that additional Plans have been drawn up and are being implemented for the licensed project, which also apply to the overall project (licensed project with the proposed amendment incorporated) as included in the approved EIA of the licensed project and are in force. More specifically, these Plans are as follows:

- Draft Plan for the Participation of Interested Parties (**Section 16.4** of the approved EIA)
- Chemical Use Plan (**Section 16.5** of the approved EIA)
- Construction Management Plan (**Section 16.6** of the approved EIA)

12.1 PHOTOGRAPHIC DOCUMENTATION ANNEX

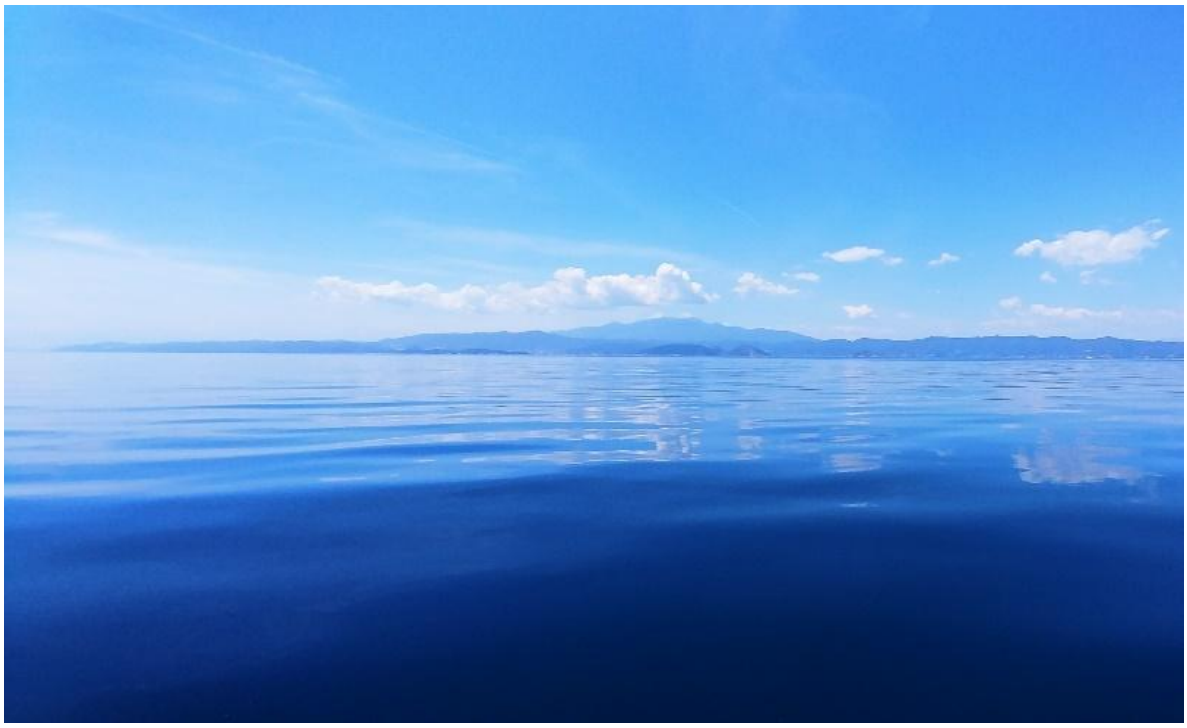


Photo 1: Gulf of Kavala, wider area of the proposed modification

Photo 2: Land and coastal section of the Sigma factory

Photo 3: View of the Sigma factory from south to north

Photo 4: Existing offshore mining facilities of YG Prinos

Photo 5: Existing offshore mining facilities of YG Prinos

Photo 6: Alpha platform

Photo 7: Beta platform

Photo 8: Delta platform

12.2 APPENDIX OF DOCUMENTS

No	Protocol No.	Document title
1	Ref. no. 213450/05-12-2013 (ADA: ΒΛΓΨ0-ΒΦ7)	AEPO industrial unit Sigma
2	Ref. no. ΔΙΠΑ/8413/24.04.2018 (ΑΔΑ: ΨΓΛ14653Π8-Ζ79)	AEPO for the Prinos Offshore Development project concerns the existing offshore oil and natural gas extraction facilities located in the Gulf of Kavala, in the north-eastern Aegean Sea.
3	xxx	xxx

12.3 APPENDIX OF MAPS – PLANS

LIST OF MAPS

No	TITLE	SCALE
EIA - 1	Orientation Map	1:100,000
EIA - 2	Study Area Map	1:50,000
EIA - 3	Bathymetric Map	1:75,000
EIA - 4	General Layout Map	1:30,000
EIA - 5	Map of Protected Areas & Marine Uses	1:50,000
EIA - 6.1	Map of Impacts During Construction	1:20,000 | 1:50,000 | 1:100,000
EIA - 6.2	Map of Impacts During Operation	1:10,000 | 1:20,000 | 1:50,000 | 1:60,000
EIA - 6.3	Map of Impacts During Decommissioning	1:10,000 | 1:20,000 | 1:50,000 | 1:60,000
EIA - 7.1	Map of Proposed Environmental Monitoring Programme During Construction	1:100,000
EIA - 7.2	Map of Proposed Environmental Monitoring Programme During Operation	1:100,000

LIST OF PLANS

No	TITLE
EPS-TEC-STR-DWG-50001_	Jacket General Assembly
EPS-TEC-STR-DWG-50009	Jacket Main Structure - Plate at El.+6000
EPS-TEC-STR-DWG-50010	Jacket Main Structure - Plan at El. -7000
EPS-TEC-STR-DWG-50011	Jacket Main Structure - Plan at El. -23000
EPS-TEC-STR-DWG-50012	Jacket Main Structure - Plan at El. -34500
EPS-TEC-STR-DWG-50019	Foundation piles - assembly and details
EPS-TEC-STR-DWG-51001	Deck main structure – Assembly 3D

12.4 Special Ecological Assessment Study (MEOA)

12.5 CO_2 MONITORING PLAN AND CORRECTIVE MEASURES PLAN

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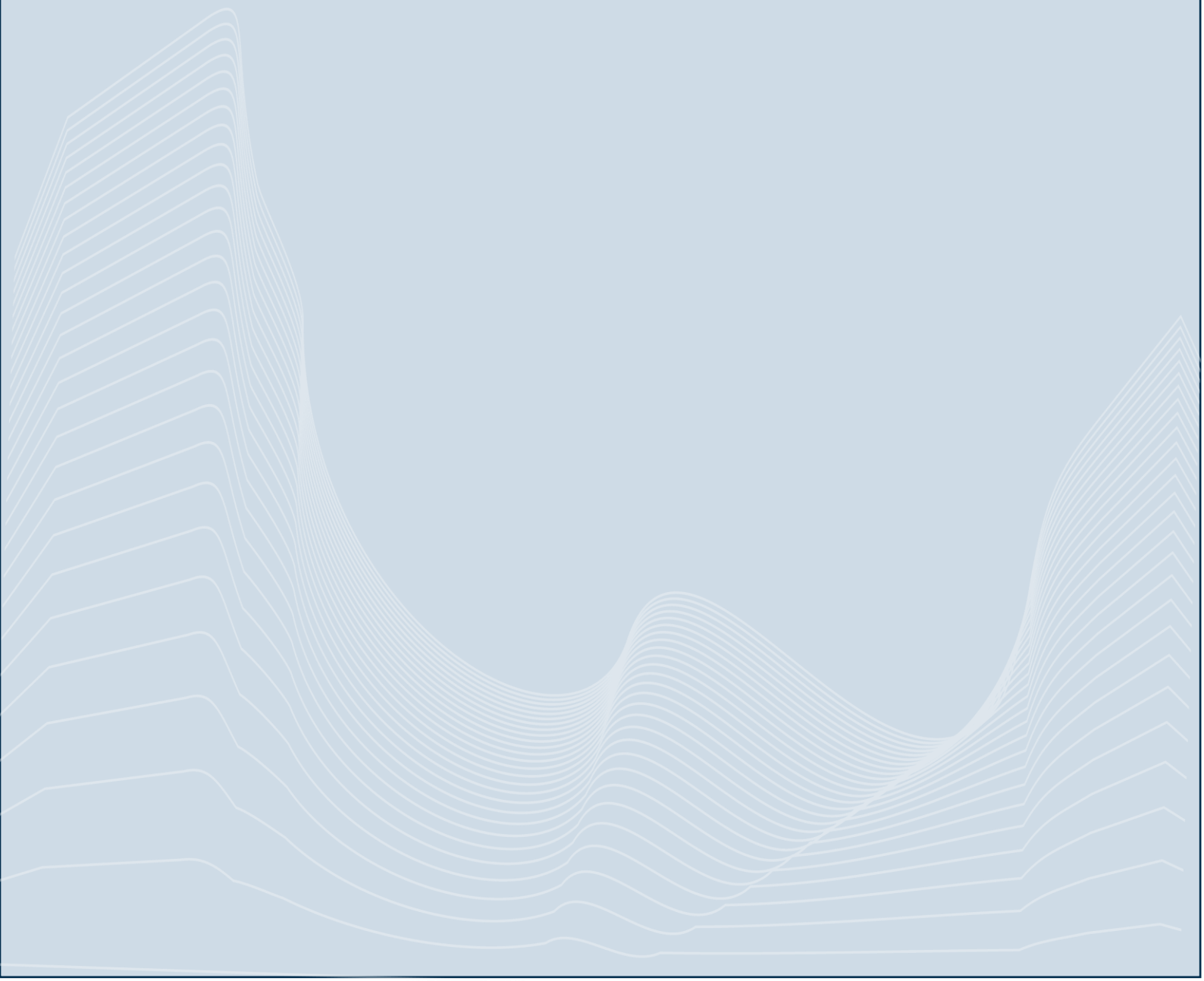

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