



**BLOCK 10 (KYPARISSIAKOS) LEASE AREA  
ENVIRONMENTAL REPORT 2022 - 2023**

**Contents**

|        |  |    |
|--------|--|----|
| 1.     | <i>Introduction</i> .....  | 3  |
| 2.     | <i>Applying Best HSE Practices while conducting the 2D Marine Seismic Acquisition ...</i>  | 4  |
| 2.1.   | <i>MMO/PAM effort and final results</i> .....  | 4  |
| 2.1.1. | <i>Executive Summary</i> .....   | 4  |
| 2.1.2. | <i>Project Summary / Mitigations Measures and Results</i> .....  | 4  |
| 2.1.3. | <i>Compliance</i> .....  | 9  |
| 2.2.   | <i>Acoustic Monitoring (Background Noise Measurements and Verification of Exclusion Zone)</i> .....  | 9  |
| 2.2.1. | <i>Executive Summary</i> .....   | 9  |
| 2.2.2. | <i>"Monitoring of the 5 predefined locations with spot measurements – “prestart phase – during seismic – post phase” of the Kyparissiakos Gulf Acoustic Monitoring Project</i> ..... | 10 |
| 2.2.3. | <i>Verification of Exclusion Zone</i> .....  | 11 |
| 2.2.4. | <i>Coastal and Aerial Surveys</i> .....  | 12 |
| 3.     | <i>Environmental Monitoring and Recording of Critical Biodiversity Indicators 2022 final results – 2023 onwards</i> .....  | 14 |
| 3.1.   | <i>2022 Monitoring period - Results</i> .....  | 15 |
| 4.     | <i>Seismicity Monitoring 2022 results and 2023 onwards</i> .....   | 16 |
| 4.1.   | <i>Recorded seismicity from the local network</i> .....  | 17 |
| 5.     | <i>Environmental Studies for the 2<sup>nd</sup> Exploration Phase (EAP preparation, submission and approval for 3D Marine Seismic Acquisition) 2022 -2023 onwards</i> .....          | 18 |
| 5.1.   | <i>Marine Seismic HSE &amp; HSE Seismic Project Plan 3D MSS</i> .....  | 20 |

## **BLOCK 10 LEASE AGREEMENT AREA**

### **ENVIRONMENTAL REPORT 2022 - 2023**

#### **HSE Policies & System, Environmental Studies and Implementation**

##### ***1. Introduction***

Hellenic Petroleum Exploration & Production of Hydrocarbons Kyparissiakos Gulf Single Member S.A. (HELPE Kyparissiakos), 100% subsidiary of HELLENIC PETROLEUM EXPLORATION AND PRODUCTION OF HYDROCARBONS (UPSTREAM) S.A., owns all the rights to explore and produce hydrocarbons deriving from the Lease Agreement with the Greek State in the offshore area of Kyparissiakos Gulf (Block 10), total area 3.420,6 sq. km. HELPE Kyparissiakos Gulf SA (100%, Operator) officially signed the Lease Agreement with the Minister of Environment & Energy on April 9, 2019 and on October 3, 2019, the Greek Parliament ratified (Law 4630/10.10.2019).

HELPE Kyparissiakos, acting as Operator, is fulfilling its commitments and planning of the first phase of the exploration work program by implementing the most up-to-date, safe and environmentally friendly technological methods and practices with the outmost respect to local societies and socioeconomic activities.

According to the Provisions of Article 12 for «Environmental Protection» «The Lessee shall include in each Annual Work Program and Budget to be submitted to the Lessor, an environmental report on the work to be undertaken as provided in that document, as well as on the work undertaken in accordance with the preceding Annual Work Program and Budget».

In the first quarter of 2022 HELPE Kyparissiakos and HELPE Ionian fulfilled their acquisition of 2D seismic data in the two offshore blocks, Kyparissiakos (Block 10) and Ionian. For Kyparissiakos Lease Area, project produced high quality data, in a record time and in a safe manner. Seismic acquisition constitutes one of the main obligations when owning exploration rights in an area and it is the most efficient way to detect what exists in the subsurface. The project lasted almost a month and a total of 1,210km of 2D seismic data was acquired the Gulf of Kyparissiakos.

During the Geophysical Exploration Activities recently conducted in Block 10, were successfully carried out, providing the highest level of protection for the marine environment of the Ionian Sea. Geophysical Surveys are safe for the environment and marine life, while highlighting the importance of the Hellenic Trench for cetaceans and maximally protecting the biodiversity of our lease exploration areas.

## ***2. Applying Best HSE Practices while conducting the 2D Marine Seismic Acquisition***

### ***2.1. MMO/PAM effort and final results***

#### ***2.1.1. Executive Summary***

Marine Fauna Observer (MFO) and Passive Acoustic Monitoring (PAM) mitigation was undertaken during the 2D Seismic Survey on the SW Cook from 20th January to 4th February 2022. The survey was performed in Exploration Block 10, offshore of West Greece in the Ionian Sea. The seismic data acquisition commenced on 21st January and was completed on 4th February 2022. There were 16 soft-starts during daylight, 22 at night and four (4) during dusk or dawn. Seismic operations were conducted over 15 days, during which 30 primary acquisition lines were completed, 6 lines reshot, and 6 source tests were performed.

Weather conditions recorded during the survey consisted of chiefly northerly winds Beaufort 1 to 8, sea states Beaufort 2 to 4 predominating, and low swell heights. The survey applied the ACCOBAMS Guidelines to address the impact of anthropogenic noise on cetaceans in the ACCOBAMS area.

A team of four dedicated Marine Fauna Observers (MFOs) and Passive Acoustic Monitoring (PAM) operators were present on board to implement mitigation measures as required. Acoustic or visual pre-watches were implemented before the start of all operations. A dedicated Marine Fauna Observer was on watch during all daylight hours during the survey, and a 24-hour Passive Acoustic Monitoring watch was maintained. All survey operations were in deep water and preceded by an MFO and PAM pre-watch period of 120 minutes.

Visual monitoring for marine animals resulted in 171:09 hours of observer effort during the survey period. Acoustic monitoring for marine mammals resulted in 345:03 hours of monitoring effort during the course of the survey. There were four (4) visual sightings and no acoustic detections of marine mammals. 61.4 % of monitoring effort took place while the acoustic source was active, and 38.6 % took place while not active. There were 19 combined visual and acoustic pre-watches during daylight and 22 during night, using the PAM system.

During the survey there were no incidences where seismic operations were delayed/shutdown due to the presence of marine animals within the exclusion zone (EZ). There were no instances of non-compliance with the guidelines during operations. The communication with the Seismic Operators and the mitigation team was professional, efficient, and effective.

#### ***2.1.2. Project Summary / Mitigations Measures and Results***

The marine seismic survey area covered Block 10 in the Kyparissiakos Gulf (Ionian Sea) of Western Peloponnese. The minimum distance between the boundaries of the Concession Area and the coasts of Peloponnese and Zakynthos Island was approximately 6 km and 17 km. The survey area was located within Greek territorial waters in Western Greece, with water depths ranging from 200 meters to approximately 3400 meters.

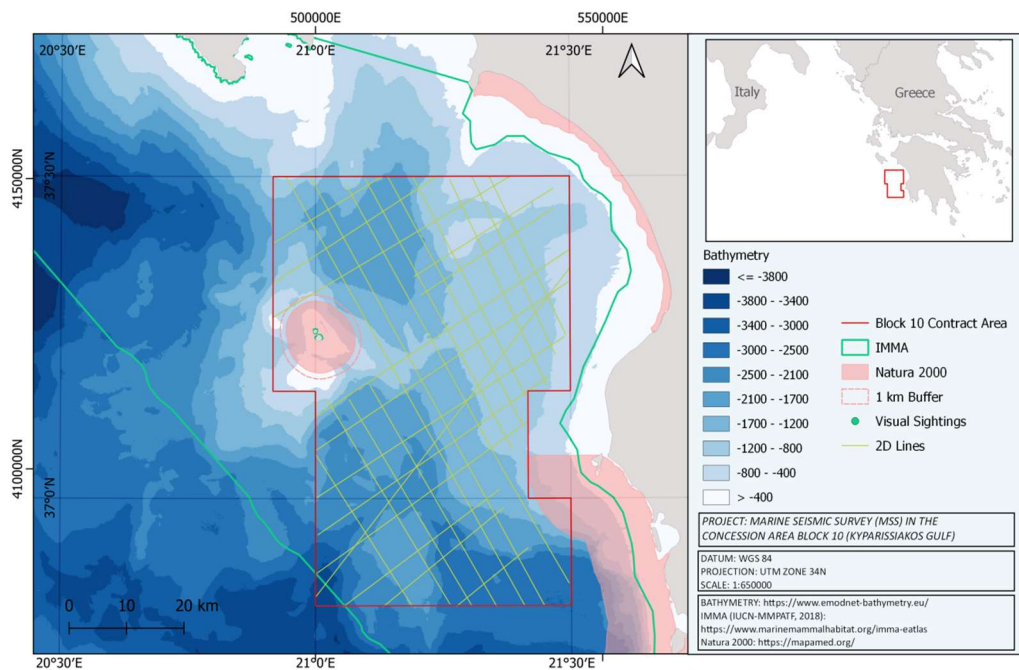


Fig. 1 Map of the Block 10-Kyparissiakos Gulf lease area covered by the seismic survey lines.

The survey followed the Environmental Action Plan (EAP) recommendations, approved by the Directorate of Environmental Licensing in the Greek Ministry of Environment and Energy under license reference number 56786/372 by the competent national regulator body, Ministry of Environment and Energy, General Directorate of Environmental Policy, Environmental Licensing Department, Section C. These were designed to minimize the risk of injury and disturbance to marine mammals and sea turtles from anthropogenic noise in the concession area of Block 10 in Gulf of Kyparissiakos.

The EAP measures for the project were based on the Guidelines from Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) and Joint Nature Conservation Committee (JNCC, 2017).

Table below summarizes the mitigation requirements approved for Block-10.

| <b>MITIGATION PROCEDURES SUMMARY</b> |   |
|--------------------------------------|---|
| <b>MFO &amp; PAM</b>                 | Yes.  |
| <b>Species covered</b>               | Marine mammals and turtles.   |
| <b>Exclusion zone</b>                | 750 m.<br>Extended exclusion zone for sperm whales 1500 m.  |
| <b>Pre-watch period</b>              | 30 minutes in shallow waters (< 200 m).<br>120 minutes in deep waters (> 200 m) due to the presence of deep diving species. |

|                                   |   |
|-----------------------------------|---|
| <b>Soft-start length</b>          | <p>Minimum 20 min.</p> <p>Maximum 40 min from soft-start to start acquisition line.</p>   |
| <b>Soft-start</b>                 | <p>At least one soft-start should be recorded.</p>  |
| <b>Soft-start delays</b>          | <p>30 minutes after last sighting.</p> <p>Extended to 120 minutes after last sighting of Cuvier’s beaked whales and Sperm whales.</p>   |
| <b>Shutdown during production</b> | <p>Immediate shutdown is required if marine mammals or turtles are detected in the EZ.</p> <p>Distress behaviour is observed.</p> <p>Aggregations of Cuvier’s beaked whales or Sperm whales anywhere.</p>   |
| <b>Airgun Testing</b>             | <p>Pre-watch must be carried out before any gun testing.</p> <p>If testing a single gun, no soft-start required.</p> <p>If testing multiple guns, a soft-start (20 min) is required. Guns should be tested in order of volume, smallest first.</p> <p>Test no longer than 20 min.</p>   |
| <b>Operation suspended</b>        | <p>Less than 10 min, ask MFO/PAM for clearance.</p> <p>More than 10 min, a new pre-watch must be undertaken.</p>  |
| <b>Line Turns</b>                 | <p>Longer than 40 minutes, firing is to be terminated at the end of the survey line.</p>  |
| <b>Additional requirements</b>    | <p><b>NIGHT VISUAL MONITORING.</b> In order to increase the potential of detecting marine animals during the hours of darkness, mitigation personnel should be equipped with thermal imaging technology devices to detect marine animals.</p> <p><b>TWO VISUAL OBSERVERS.</b> At least two dedicated Visual Observers should be on continuous watch at the same time during all seismic operations.</p> <p><b>24 hours PAM OPERATOR.</b> At least one operator should be on watch and shifts should be organized to allow 24/24h operation, unless automatic detection/alerting systems with proven effectiveness are available.</p> <p><b>NO SEISMIC ACQUISITION IN PROTECTED AREAS.</b> The seismic vessel could enter Natura areas to perform turning manoeuvres, however no seismic survey activities will take place within the NATURA 2000 protected areas and a buffer of 1000 m around them.</p> <p><b>TURTLE GUARD.</b> Due to presence of sea turtles in the survey area, a turtle protection system (Turtle Guard) should be installed on the towed equipment to prevent any accidents.</p> <p><b>SEABIRDS.</b> To mitigate the impact on the seabirds, the external lighting should be limited. Furthermore, all injure seabirds must be assisted with regaining consciousness and released back into the environment following the appropriate instructions.</p> |

A total of 171:09 hours of dedicated marine animal watches were carried out by the MFOs and 345:03 hours of dedicated marine mammal acoustic monitoring by the PAM Operators between 20th January and 4th February 2022. Out of the total 516:12 hours of the monitoring effort, 316:45 hours (61.4 %) were completed whilst the acoustic sources were active and 199:27 hours (38.6 %) were completed whilst the acoustic sources were silent. On 27th January 2022, due to source recovery of array 3 and re-deployment, PAM was brought on board to avoid entanglement. Acoustic monitoring was discontinued for 03:45 hours and recommenced immediately on deployment of PAM cable after the airgun array was re-deployed. From the first day of the 2D seismic survey on the 21st January until 4th February 2022, when the project was completed, a total number of 41 pre-watches were conducted. There were 19 combined visual and acoustic pre-watches during the day/dawn/dusk and 22 acoustic pre-watches during the night. A total of 41 pre-watches were conducted in deep waters (> 200 m) with 120 minutes duration each.

#### Marine mammal mitigation effort summary

| EFFORT MONITORING SUMMARY (20 <sup>th</sup> January to 4 <sup>th</sup> February 2022) |   |        |
|---|---|--------|
| <b>MONITORING EFFORT</b>  | Total visual observation (hrs/min)      | 171:09 |
|   | Total acoustic monitoring (hrs/min)     | 345:03 |
|   | Total monitoring (hrs/min)              | 516:12 |
| <b>MONITORING EFFORT &amp; SOURCE ACTIVITY</b>  | Total effort whilst source was inactive | 316:45 |
|   | Total effort whilst source was active   | 199:27 |
| <b>PRE-WATCH EFFORT</b>   | Nº of day/dawn/dusk Pre-watch periods   | 19     |
|   | Nº of night Pre-watch periods           | 22     |
|   | Total Nº of Pre-watches                 | 41     |
|   | Nº of Pre-watches in shallow waters     | 0      |
|   | Nº of Pre-watches in deep waters        | 41     |
| <b>SIGHTINGS &amp; DETECTIONS</b>   | Nº of cetaceans sightings               | 4      |
|   | Nº of seals sightings                   | 0      |
|   | Nº of turtle sightings                  | 0      |
|   | Nº of acoustic detections               | 0      |
| <b>MITIGATION ACTION</b>  | Nº of mitigation actions initiated      | 0      |
| <b>NON-COMPLIANCE</b>   | Nº of incidences of non-compliance      | 0      |

The survey was conducted in the Ionian Sea, West coast of Greece, where depths varied between 200 m and over 3400 m, allowing for the possibility of encountering both deep-water and shallow-water species. In total, there were four marine mammal sightings, comprising three different species. These included two positive species identification of cetaceans,

Striped dolphin (*Stenella coeruleoalba*) and Sperm whale (*Physeter macrocephalus*). Furthermore, a cetacean could not be identified due to the distance from the vessel.

All species had been recorded previously in the area. Species identification was also confirmed by reference to a field guide (Svensson et al. 1999). Table below provides a selection of the data collected during each sighting, including species, range to source and source status at the time of the sightings.

List of the sightings recorded by the MFO during the survey

| No | Common Name        | Species                       | Latitude (DDM) | Longitude (DDM) | Time (UTC) | Source Activity at Initial Detection | Closest Approach to Source (m) | Mitigation Action |
|----|--------------------|-------------------------------|----------------|-----------------|------------|--------------------------------------|--------------------------------|-------------------|
| 1  | Striped dolphin    | <i>Stenella coeruleoalba</i>  | 36° 59,21 N    | 20° 56,89 E     | 11:55      | Not Active                           | Source not in the water        | None required     |
| 2  | Unidentified whale | -                             | 37° 03,20 N    | 20° 52,67 E     | 13:17      | Not Active                           | Source not in the water        | None required     |
| 3  | Sperm whale        | <i>Physeter macrocephalus</i> | 37°27.64' N    | 21°17.95' E     | 13:01      | Full power                           | 6000                           | None required     |
| 4  | Sperm whale        | <i>Physeter macrocephalus</i> | 37°29.79' N    | 21°22.53' E     | 14:02      | Full power                           | 3000                           | None required     |



Fig.2 A flock of dolphins in the Kyparissiakos Gulf, as they play with the waves.



### **2.1.3. Compliance**

For the entire duration of the 2D seismic survey, the seismic crew were diligently performing with all mitigation requirements, and the procedures were in full compliance with the EAP approved by the regulator.

- No source was active, including soft-starts, within the Natura 2000 protected areas.
- Good communication was maintained between the MFO/PAM team and seismic crew throughout the survey to ensure that all guidelines were implemented effectively concerning the protection of marine mammals and sea turtles within the exclusion zones.
- Turtle guards, a structure welded to the underside of tail buoy designs, aims to exclude sea turtles from becoming fatally entrapped in gaps at the front of the tail buoy undercarriage. In the event of turtle entrapment in seismic equipment, the Contractor's appropriately trained staff must intervene immediately to remove the trapped animal, weather permitting.
- There was 24-hour acoustic monitoring as required.

As per approved EAP Mitigation Measures and compliance with the ACCOBAMS Guidelines, in order to avoid any inconsistency with measures addressed and prior to the commencement of the survey, the following point regarding mitigation procedures was confirmed.

- ✓ One (1) MFO was conducting visual monitoring at the time, and one (1) MFO was 'floating on stand-by', assisting the MFO on watch during critical events such as a sighting. Also in charge of retrieving/deploying the PAM cable when Seismic Crew needed to pick-up the gears, avoid entanglements, and attend the meetings or meal breaks, always available with a UHF radio. Meanwhile, one (1) was performing the PAM role and the other was resting.
- ✓ The EAP established 20 minutes as the maximum and minimum time for the soft-start duration. This was found technically non-possible to achieve. A JNCC standard, of minimum 20 minutes soft-start and 40 minutes for the period from soft-start commencement and the start of acquisition line, was applied as a best practice approach.

## **2.2. Acoustic Monitoring (Background Noise Measurements and Verification of Exclusion Zone)**

### **2.2.1. Executive Summary**

Underwater monitoring was carried out by means of survey, allowing for:

- verify the actual presence of mammals;
- define the background noise level and verify the anticipated Exclusion Zone (EZ)

A research vessel was used to carry out the acoustic survey and separate portable systems provided to monitor the ambient noise on predefined locations and close to critical environmental components such as the Protected Areas of the Natura 2000 Network either/or the shores of Kyparissiakos Gulf. The objectives of this acoustic study were to measure ambient sound levels as a function of sound frequency components, time and position as well as correlate acoustic anomalies to major acoustic sources within the survey areas:

1. Prestart: In general, exhibit high ambient sound levels concentrated on the top (or above) limit of the bibliographic prevailing ambient noise.
2. Post Completion: To identify significant differences in the ambient noise between the pre-start and the post completion stages of the 2D seismic survey.

3. Seismic noise monitoring & Verification of Exclusion Zone: The aim of the acoustic survey at that stage was to assess the sound pressure level of the noise induced by the air-gun seismic source to the predefined sampling locations. Additionally, field measurement of noise levels around the seismic source (air-guns) taken place and carried out during the acquisition activities in order to record and study the seismic noise attenuation levels and validate the specified mitigation zone.
4. Coastal Zone Inspection as well as Aerial Surveys and Control for marine mammals stranding.

During the marine geophysical surveys (seismic acquisition) the recording of the levels of the produced sound was carried out by an auxiliary vessel that executed the monitoring program both in remote measuring stations (5km - 60km) and closer (500m - 4km) as well as the verification of the Exclusion Zone (750m) from the seismic vessel. The acoustic monitoring was done with a special recording system that has hydrophones of different levels of sensitivity and dynamic range and which sinks to 20m below sea level. The auxiliary boat during the recordings at the measuring stations remains at a distance from the hydrophone and puts its engines out of operation so as not to produce additional noise.

The immersion of the recording system takes place with special floats and an elastic rope in order to minimize any artificial noises of the platform (self-noises) which can be indicative of: flow noise, cable support noise. In order to minimize hydrodynamic noises, the boat does not anchor so that it moves in parallel with the sea currents and the prevailing winds. In the above way the sea currents that pass through the submerged hydrophones have a lower relative speed since the whole platform (auxiliary boat) moves in the same direction. The results of the noise simulation models show that the sound propagates in good direction to the bottom and attenuates significantly both horizontally and vertically.

At a vertical distance at the depth of 100m, the noise levels are close to those of the source (210dB), but a marine mammal will have already been detected by Passive Acoustic Monitoring (PAM) and geophysical works stopped immediately. At greater depths, due to the pressure, the propagated sound is reduced very quickly at values far below those that could cause any acoustic nuisance to marine mammals. At horizontal distances of less than 1km (750m) from the source according to real-time acoustic measurements, the sound is reduced below threshold values that may cause any probable acoustic nuisance to marine mammals. It is noted that the normal levels of environmental noise (ambient noise) are of the order of 110-140 dB).

For more information regarding final reports please follow link below.

<https://www.helpe-kyparissiakos.gr/en/environment/programmad.html>

***2.2.2. "Monitoring of the 5 predefined locations with spot measurements – "prestart phase – during seismic – post phase" of the Kyparissiakos Gulf Acoustic Monitoring Project.***

The Kyparissiakos Gulf Acoustic Monitoring Project planned and carried out by the Oceanus-Lab (Laboratory of Marine Geology and Physical Oceanography) of the Geology Department

of the University of Patras. The prestart phase (ITEM 1-A) last five (5) days from January 14-16th and 19-20th 2022.

One portable system was used for the monitoring of the ambient noise on the five predefined stations. Each unit included a four-channel digital recorder, two hydrophones and a laptop carrying the interfaces for recording and visualizing the data. On the hydrophone were attached a high sensitivity and a low sensitivity hydrophone. Using dual sensitivity hydrophones assures that all dynamic ranges and amplitudes will be successfully recorded without any signal clipping.

Monitoring included (1) Ambient noise measurements (prestart and post completion of seismic activities) and (2) Seismic noise monitoring, at the proximity of the five (5) predefined locations.

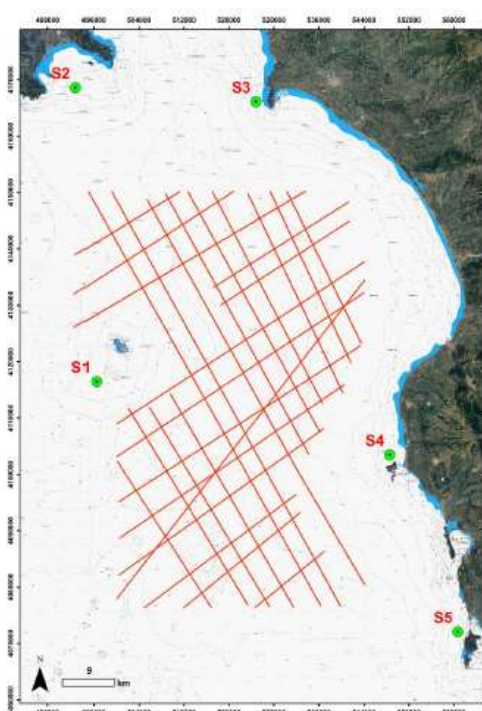


Fig.3 Map includes the location of 5 predefined stations of acoustic monitoring program.

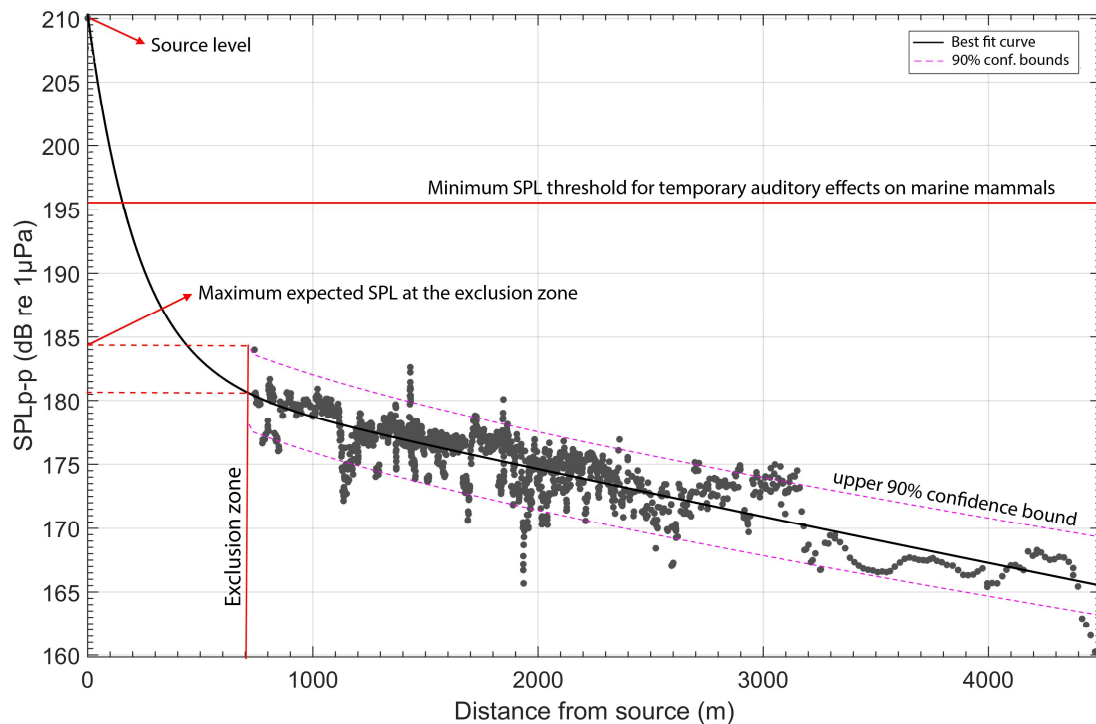
In general, high ambient sound levels due to induced high levels of anthropogenic noise (marine traffic) and other commercial activities.

### ***2.2.3. Verification of Exclusion Zone***

The following describe the data collection, data processing methods, and the results of ITEM 2 "Verification of exclusion zone" regarding the Kyparissiakos Gulf Acoustic Monitoring Project. The ITEM2 project survey aimed to monitor the propagation and attenuation rate of the impulse sounds around the seismic source (Airgun arrays) to validate the geometry of the predefined exclusion zone. The Kyparissiakos Gulf Acoustic Monitoring Project planned and carried out by the Oceanus-Lab (Laboratory of Marine Geology and Physical Oceanography) of the Geology Department of the University of Patras. Results presented in this report refer to acoustic data collected during January 26th and 28th of 2022.

The objective of ITEM 2 was to measure impulse sound pressure levels around the seismic source (Airguns) to record and study the seismic noise attenuation levels and validate specified mitigation zones.

During Marine 2D Seismic Survey a) Sound Pressure Levels never exceed and well below marine mammal’s threshold values for temporary acoustic trauma and b) Real time monitoring verified the Simulated Exclusion Zone of 750 meters. Following figure shows the comparison of these limits to the average and maximum expected SPL at the limits of the exclusion zone, making clear that they are well below the specified risk levels.



#### **2.2.4. Coastal and Aerial Surveys**

From the 9th to the 14th of March 2022 an inspection for marine mammals’ presence was carried out by the Laboratory of Marine Geology & Physical Oceanography, Department of Geology, University of Patras, at the coastal zone of the two study areas. The coastal areas, where the access was not possible, were approached and filmed by the team using the “Sea Master” vessel, while the remaining were inspected by car. Throughout the inspection, no marine mammal was detected along the coastal zone.

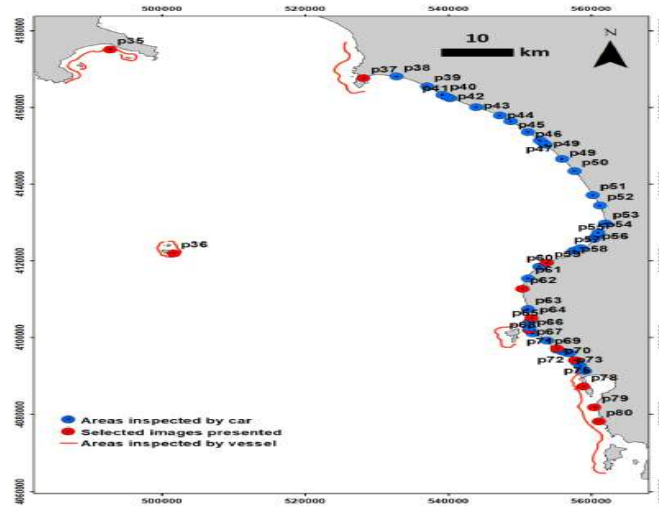


Fig.4 Map of the Kyparissiakos Gulf survey area showing the visually inspected coastal areas.

In addition, aerial surveys were carried for possible presence of strandings. An aerial inspection of the Kyparissiakos Gulf entire coastline was conducted on the 11th of February 2022, following seismic surveys conducted in the Gulf’s wider marine area. The aim of the inspection was to record the existence of any stranded animal/s and especially cetaceans along the coastline of western Peloponnese.

The aerial investigation was conducted on the 11th of February 2022, between 11:50 (take-off time) and 15:30 (landing time) local time. A total of 289 km of coastline were inspected twice, covering a zone of about 2 nautical miles from the shoreline to the open sea. During the survey no cetaceans were recorded (swimming/floating in the marine zone or stranded ashore) as well as no other species of marine megafauna (monk seals, sea turtles) along the entire coastline inspected.

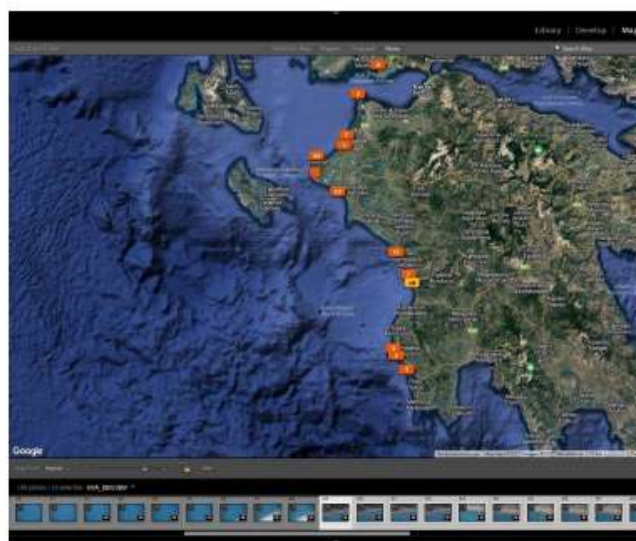


Fig. 5 Geographical distribution of photographs taken during the survey

### ***3. Environmental Monitoring and Recording of Critical Biodiversity Indicators 2022 final results – 2023 onwards***

In the context of Environmental Monitoring and Recording of Critical Environmental Indicators of Biodiversity such as marine mammals (cetaceans and monk seals), marine turtles and seabirds, it is proposed that the company, Nature Conservation Consultants -NCC Ltd, in collaboration with the scientifically specialized NGO MOm (the Hellenic Society for the Study and Protection of the Mediterranean Monk Seal) and the highly experienced in the marine field research company BIOTOPIA, as well as world known marine turtle experts, set up an expert's project team.

The activities described herein are a continuation of the ongoing project *“Survey of the Status of Important Fauna Species in the Kyparissiakos Lease area”*, implemented during the last three years (2020, 2021 and 2022) by HELPE Upstream and more specifically by HELPE Kyparissiakos S.A.

During 2022, the project team implemented field surveys in the Lease Area Block 10 but also at the wider area of Kyparissiakos Gulf (marine and coastal areas of adjacent Natura sites), using appropriate field sampling techniques, in order to provide sufficient and documented data on the status of marine mammals, seabirds and sea turtles in the project area, as well as other sensitive elements and locations that should be prioritized by a future monitoring program.

The following Work Packages involve field surveys and reports combined with the existing bibliographic information on the presence of marine turtles, cetaceans, seals, and seabirds in the wider project area, and identification and mapping of the most sensitive areas, including also the adjacent protected Natura 2000 sites. These reports are further updating the Baseline Report for the project area, supplemented by the project Geodatabase, Sampling Protocols and the Monitoring Plan.

WPI. Pelagic Surveys for marine mammals, seabirds, sea turtles, nearshore and in the open sea in the period April - May 2022 and September 2022, totaling 4 field days per survey using an open water RIB vessel, a single engine aircraft, in combination with drone surveys. More specifically, two (2) aerial surveys, one with a 2-engine aircraft involving 3 observers (3 field days) and the second with a one engine aircraft involving one observer (2 field days each) also carried out (spring 2020 and summer 2021) to improve the efficiency of the pelagic surveys for marine turtles, cetaceans and seabirds.

WPII. Coastal surveys for monk seals, Scopoli's Shearwater and Mediterranean shag breeding sites in the coastal zones of the adjacent Natura 2000 sites: During the period February – March and August-October 2022, using inflatable RIB boats. Special emphasis was given during a 2 weeks period before the HELPE's marine geophysical surveys, the period during the surveys and one week after the surveys. Total duration 6 weeks, a crew of 2 marine mammals and turtles' experts and 2 ornithologists. Special emphasis has been given to the important monk seal breeding area within the NATURA 2000 area DYTIKES KAI VOREIOANATOLIKES AKTES ZAKYNTHOU (SiteCode: GR2210001)

WP III. Telemetry survey for the marine turtles by putting 3 transmitters including depth sensors for the first time in Greece, to record the adult turtle distribution in the lease area, during inter-nesting intervals, as well as their occurrence in the wider region. A well-known international species expert recommended by the NGO Archelon has been involved to plan the tagging expedition and train the project field team in surveying and monitoring of the species. This activity includes: 1) post-nesting tracking of breeding turtles (males and females) for seasonality of turtles transiting through the region, 2) tracking of turtles found inside Block 10 outside the breeding season to see if sea turtles remain there in any number from autumn to spring, 3) aerial surveys (using drones based on the boat and also using the small aircraft of WP II) across the region to identify individuals' occurrence, population and distributions as snap surveys. The action will take place in the period September April – August 2022.

WP IV. Telemetry survey/exercise for the Scopoli's Shearwater breeding at Strofades islets. The ongoing telemetry effort for the Scopoli's Shearwater has been continue in 2022, by putting GPS/GSM transmitters to 10 breeding individuals in aim to assess their seasonal distribution/occurrence within the Block 10 area, the use of this area as foraging habitat, the interaction with adjacent lease areas and with fisheries activities, as well as the overall sensitivity of the Strofades islets breeding population to the potential impacts of the hydrocarbon research/exploration activities. It is the largest telemetry effort for the species in Greece and is expected to further extend in the following years to provide state of the art biodiversity monitoring.

### ***3.1. 2022 Monitoring period - Results***

The results of the pelagic and coastal surveys, that took place in 2022 in the Wider Project of the Block 10 Lease Area in the offshore area of South Ionian Sea (include:

- Modern, innovative field methods, such as the use of drones for aerial surveys and the use of thermal cameras to monitor the bird behavior at seabirds' colonies, were tested with very promising results. In combination with telemetry, aerial surveys, bioacoustics surveys and the more conventional boat surveys, the field work methods provide a solid basis to gather meaningful, biodiversity data for the project area.
- The presence of cetaceans in the area seems to be in low densities. During the boat and aerial surveys, a single group of striped dolphins was spotted at a 1000m depth. was confirmed in the area. Although Sperm whales and Cuvier's Beaked Whales have been reported in the area in previous studies, the presence of these species was not detected during the present project.
- The telemetry of Loggerhead turtles suggest that adult female turtles are not long-term residents of the area, but instead specifically migrate to and from Kyparissia Bay for the purpose of reproduction. The Project Area is an important site is for migrating turtles prior to and at the end of the breeding season.
- One important additional finding from this study, not relating to the Wider Project Area was that a turtle was tracked to the northwest of the Aegean Sea. Very few turtles nesting in Greece have been tracked into the Aegean Sea and most of those have not migrated as far as the north. Thus, this project has also highlighted a previously unknown, potentially important, area for adult loggerhead turtles in the northern Aegean Sea.

- The telemetry of Scopoli's Shearwaters revealed that the feeding grounds of the species, are located mostly north of the project area, at Patraikos Gulf and Central/Northern Ionian Sea. The most important concentrations of the species within the Project Area, are found at Strofades Islands, where the largest breeding colony of the species in Greece, is located.
- The breeding colony of the Scopoli's shearwaters on Strofades Islands is considered the most important for the species at national level and one of the most important in the Mediterranean.
- The data collected on the monk seal presence/activity in the wider project area confirmed: a) the great importance for the species of the adjacent to the project area (and within the wider project area) island of Zakynthos and b) the scarce presence of the species along the coast of Peloponnese, a fact that is easily explained due to the lack of suitable habitat (marine caves). Despite this fact it should be underlined the importance of Kyparissiakos bay as it acts as a "genetic bridge" for Mediterranean monk seals between the populations of the Ionian and the Aegean Seas.
- Considering all the above, we can draw the conclusion that the Project Area hosts significant numbers of marine mammals, seabirds and marine turtles. Further monitoring of the species seasonal distribution and population trends is needed to provide a more concrete assessment of their status in the Project Area.

The surveys carried out during 2022 and the results in each Work Package of the project "Survey of the Status of Important Fauna Species in the Kyparissiakos Lease area" are being presented in detail in the Final Progress Report that could be found in the relevant website of the Environmental Unit of HELPE Kyparissiakos:

[Environmental Monitoring Program for Critical Habitats - Biodiversity \(helpe-kyparissiakos.gr\)](http://helpe-kyparissiakos.gr)

[Πρόγραμμα Περιβαλλοντικής Παρακολούθησης Κρίσιμων Ενδιαιτημάτων - Βιοποικιλότητας \(helpe-kyparissiakos.gr\)](http://helpe-kyparissiakos.gr)

#### ***4. Seismicity Monitoring 2022 results and 2023 onwards***

Given the high seismic activity in the broader area of Western Greece, and especially in the Kyparissiakos Gulf, and aim at the safety of the future planned research, HELLENIC PETROLEUM EXPLORATION AND PRODUCTION OF HYDROCARBONS KYPARISSIAKOS GULF SINGLE MEMBER S.A. cooperated with the Geodynamic Institute of the National Observatory of Athens (CONTRACT AGREEMENT 2022013/06.05.2022) regarding the monitoring of the existing seismic activity in the area of interest. The monitoring of seismicity, even at the level of microseismicity (microseismicity), was decided to be carried out in "real time" conditions by installing a local network of seismographs. The data, which will result at the end of the project, will also be particularly useful for identifying the active faults in the research area

The National Observatory of Athens (NOA) undertook the installation of a local network consisting of twenty-two (22) portable seismographs, as well as the operation of a local



seismic array in the area of Pylos, in order to make denser the already existing national seismograph network, used by the Institute of Geodynamics of NOA for the continuous monitoring of the daily seismic activity of the Greek area. The 22 new stations are in continuous operation with simultaneous (real-time) data transmission to the Institute of Geodynamics. The installation of the stations was performed in such a way as to achieve the maximum density of the network using, where possible, even the smallest islands of the Ionian (e.g. Strofades islands). Besides the geometry of the network, the selection of the station locations considered, both the soil conditions and the noise level of each location. He also considered the coverage of the mobile telephony, so that the direct transmission of the data is possible.

For the completion of the installations, nine (9) visits by technical and scientific staff were made to the areas of interest, during the period June - September 2022. The objective was to ensure optimal azimuthal coverage of the area with the portable seismographs and to combine them with the array of seismographs installed in the Kynigos area of Pylos. It is expected that with the addition of the microseismicity, which was identified after visual inspection of the waveforms, the magnitude of completeness will be greatly reduced. Since the microearthquakes have a limited number of recorded phases, they have not yet been implemented to the figures.

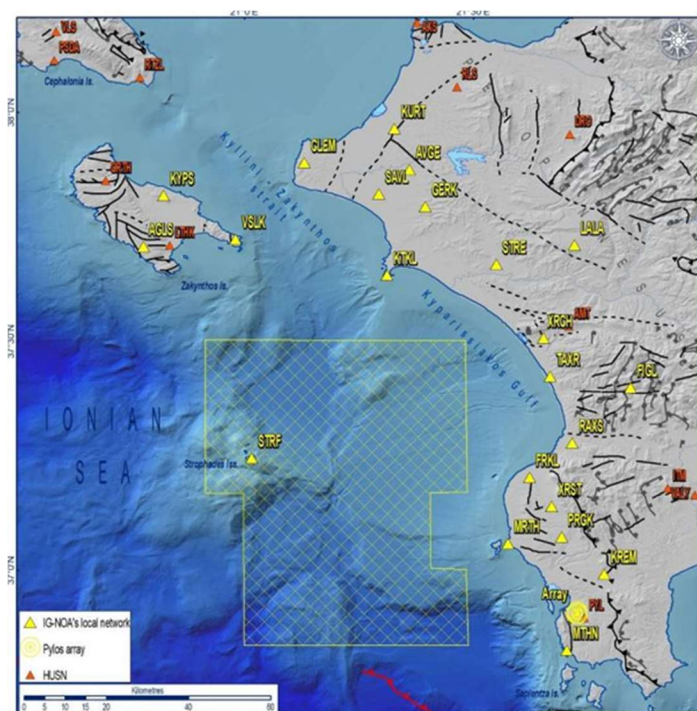


Fig. 6 The locations of the new stations of the local network that were installed for the needs of the project (with a yellow symbol) and operate with the stations of the permanent network (with a red symbol)

#### ***4.1. Recorded seismicity from the local network***

Although the installation and operation of the local network started on May 2022, it was completed at the end of July 2022 and therefore seismicity monitoring under the same conditions practically started from August 2022.

The distribution of the earthquake magnitudes that have been analyzed so far show that the magnitude of completeness (Mc) has already been drastically reduced from M2.0 to M1.6 within the region of interest. It should be noted that the magnitude of completeness (Mc) of a seismicity catalogue is the minimum magnitude above which all earthquakes within a specific area are recorded. Even outside of the region of interest, however, the magnitude of completeness was reduced to M2.0 by the new seismographs.

It is expected that with the addition of the microseismicity, which was identified after visual inspection of the waveforms, the magnitude of completeness will be greatly reduced. Since the microearthquakes have a limited number of recorded phases, they have not yet been implemented to the figures. Once the local velocity model is calculated, they will then be included and the Mc will be calculated again. In the first months of recording, low seismicity is observed in the area of interest. However, a cluster of earthquakes has also been recorded, south of Katakolo and within the area, which will be further monitored.

#### ***5. Environmental Studies for the 2<sup>nd</sup> Exploration Phase (EAP preparation, submission and approval for 3D Marine Seismic Acquisition) 2022 -2023 onwards***

The objectives of the Environmental Action Plan (EAP) are the following:

- Detailed and documented compliance of the proposed activities with all the requirements of the applicable environmental legislation, including the provisions concerning the protection of marine species and sensitive habitats and the avoidance of any kind of pollution due to exploration activities.
- Avoiding any impact of the proposed activities on critical elements of marine ecology, such as marine mammals (cetaceans and monk seals), sea turtles (Caretta Caretta) and seabirds.
- Impact minimization of the MSS activities on critical elements of marine ecology, such as marine mammals (mainly cetaceans and seals) and sea turtles (mainly Caretta caretta).
- Implement all necessary measures and methods related to the prevention of any incident of marine pollution, including solid and liquid waste management methods.
- Implementation of all necessary measures and methods related to the prevention of any marine pollution incident, including at least solid waste and wastewater treatment methods and accident and chemical use mitigation.
- Effective limitation of any potential disturbances on the existing maritime activities such as fisheries.
- Assess and evaluate the effects of the proposed activities on all individual environmental elements.
- Assess and evaluate the environmental risks for the proposed activities.
- Propose prevention and mitigation measures to minimize risks and impacts and execute an environmental monitoring program during project activities.

In order to select the time of the survey implementation, it should be stated that the winter season is preferable, considering the fact that marine species (marine mammals, sea turtles, seabirds) populations are much less present in the area during that period and consequently the possibility of occurrence of any potential impact on them is considerably decreasing.

Especially, the EAP study considered whether the measures proposed for the protection of cetaceans, in accordance with the above condition, are adequate to avoid any potential impacts on the population, habitats and reproduction rate of the protected species of the Ionian Sea, by providing relevant documentation and/or specialization of these measures.

The potential impacts of the project activities were identified, with regard to abiotic, biotic and human environment. Particular attention was given to marine noise levels, the marine ecology and the socioeconomic environment. The impact of marine noise was evaluated based on the results of noise propagation modelling. Identified effects of the seismic acquisition program, were focused on the impact on marine mammals due to noise produced during the survey that, considering the scheduled period and the limited duration of the activity, can be considered moderate for the areas of special importance for cetaceans and due to the possible behavioral response of marine mammals to noise produced due the seismic acquisition program.

In aim to protect the marine fauna, with particular regard to the marine mammals, mitigation measures will be implemented during the survey in accordance to ACCOBAMS Agreement and the JNCC Guidelines, and more specifically about the following:

- presence on board of qualified Marine Mammals Observers (MMO) and technicians for Passive Acoustic Monitoring (PAM);
- adoption of the soft-start technique and establishment of an Exclusion Zone around the seismic vessel where visual and acoustic monitoring of the presence of marine mammals will be continuously carried out and confirmed in the field;
- establishment of Exclusion zones of normal operation of airguns within environmentally sensitive areas as well as within a distinct buffer zone around the sensitive areas.

The initial EAP has been submitted by HELPE Kyparissiakos for review and approval to Competent Authorities (Hellenic Hydrocarbons Resources Management – HHRM) on 12<sup>th</sup> of October 2020.

These points are summarized as follows:

***Key remarks addressed and complied***

- ✓ A compliance table with ACCOBAMS Guidelines and mitigation measures.
- ✓ West Patraikos Marine Seismic Survey Case Study mitigation measures applied and environmental results.
- ✓ Citation and comparison of cases and environmental results from previous Marine Seismic Surveys in Greece as well as from other countries (Croatia and Italy) acquiring similar Marine Seismic Surveys during hydrocarbons exploration.
- ✓ Commitment for increasing Exclusion Zone from 750m up to 1500m in case sperm whales are entering the Exclusion Zone during Seismic Acquisition activities in Block 10.

- ✓ Apply Sea Turtles (*Caretta caretta*) Telemetry for the very first time in Greek territorial waters.

***Recommendations addressed and complied***

- ✓ As part of Underwater Noise Simulation, categorization of frequency sensitivity to be applied on each marine species instead of categorizing them under low, medium and high frequency regardless Cetaceans species.
- ✓ Ballast water treatment on the vessel and mitigation measures to be applied in order to avoid entering into Greek territorial waters of invasive alien marine species.
- ✓ Clear statement of HELPE Kyparissiakos that they will carry out the Marine Seismic Acquisition Survey during the Winter period and avoiding breeding periods for the Cetaceans (May to October most dominant periods)

***5.1. Marine Seismic HSE & HSE Seismic Project Plan 3D MSS***

HELPE Kyparissiakos being the Operator, desire to acquire 2500 km<sup>2</sup> 2D Seismic Data in the Block-10 Lease Area by executing a towed streamer 3D Marine Seismic Survey (MSS) which shall fulfil the minimum exploration work program agreed under the Lease Agreement for the 2<sup>nd</sup> exploration phase (3 years duration). The new 3D MSS data will cover an area of approximately 2540 square kilometers (sq.km).

During 2022, HELPE Kyparissiakos directly awarded the provision of HSE marine consulting services by experienced professional(s) for the 3D Marine Seismic Survey Acquisition Program in Block 10. Main aspects covered from this tender are to provide Project management, Contract and Bids evaluation (i.e. preparing and reviewing tenders, bid reviews, participate in Contract finalization etc.) and Technical auditing services as well as assist in the development/improvement of an effective safety & environmental management systems and processes including support to develop HSE Bridging Documentation and HSE Plans. More analytically HSE Consultancy Services are focused on the following items:

**Item 1:** Assist to the preparation of the Invitation to Tender document (including form of contract) for selecting the MSS contractor. The specific services include the drafting of the HSE aspects of the project to enable the contractors to submit a tender that will provide a crew that can fulfill the requirements efficiently and operate with an expectation of zero HSE incidents. In addition, selection criteria and check lists and questionnaires for evaluating HSE aspects of each bidder shall be prepared. **COMPLETED**

**Item 2:** Participate in the evaluation of the bids submitted for the 2D MSS in relation to the HSE aspects of each bid. Recommend preferred contractor(s) on HSE aspects. Review final proposal. **COMPLETED**

**Item 3:**

**3.1** - Provide support to develop HSE Bridging Documentation between HELPE and the selected contractor and participate in the contract finalization, which is the acceptance of an HSE management process that all parties have agreed to apply.

**3.2** - Provide support to develop Project HSE Plan (including emergency response plans, Shipboard Oil Prevention Emergency Plan-SOPEP) in cooperation with the selected seismic contractor prior to the arrival of the survey vessel and other equipment. The Project HSE Plan will be initially drafted by the selected seismic contractor. **ONGOING Q4 2022**

**Item 4:**

Perform HSE Vessel Audits while the vessel is at the initial port of call in Greece and before the commencement of work (including but not limited to a compilation of an environmental audit report and a full environmental statement of the vessel's environmental performance, impacts and management). **ONGOING 4Q 2022**

**Item 5 (contingent) 4Q 2022 - 1Q 2023 ONWARDS:**

- Perform HSE audits while the MSS is progressing,
- Investigate accidents, incidents, near misses or other unforeseeable events,
- Review of the HSE plan.