

# Construction Environmental Management Plan (CEMP) for the installation of the 120 m floating dock ERENEOS, at Limassol Port

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Keywords: CEMP, floating dock, monitoring, marine Good Environmental Status

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## Abstract

Multimarine Shipyards Ltd has embarked upon a project to install a 120 m long floating dock at the Limassol Port. For the implementation of this project, a preparatory construction phase was mandatory and included: (1) the dredging of 25,000 m<sup>3</sup> of material from the existing inclined sea-bed level to the level of -13.2 m from the Mean Low Water Still Sea Level (2) the construction of a 42 m long deck of a total area of 1,000 m<sup>2</sup> and the driving of two piles, to facilitate the mooring of the floating dock. This paper provides an overview of the development and implementation of a Construction Environmental Management Plan (CEMP) for the installation of the 120 m floating dock ERENEOS, at Limassol Port in Cyprus.

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## 1 INTRODUCTION

The Cyprus Ship Registry is one of the largest in the world and the third largest in the European Union. Cyprus is considered to be the largest Ship-management Centre in the EU and among the three largest globally (Cyprus Shipping Chamber, 2018). The wider shipping sector in Cyprus employs 4,500 employees ashore and 55,000 seafarers. Shipping constitutes one of the most active and profitable sectors of the economy, estimated at 7% of GOP (Cyprus Shipping Chamber, 2018). According to the International Convention for the Safety of Life at Sea (IMO, 1974) for all merchant vessels a minimum of two inspections of the ship's hull are required during any five year period, and the interval between any such two inspections should not be greater than 36 months. Although these inspections can happen while the vessel is in water, it is much easier, and more common, to perform them at dry docks.

In the last few years, hydrocarbon exploration activities in Cyprus's Exclusive Economic Zone have soared and several international energy companies are active in the area, including Noble Energy, ENI and Total (Deloitte, 2018). Massive discoveries of hydrocarbons in Egyptian and Israeli waters are also being investigated leading to a boom in the presence and growth of the oil and gas industry on the island. The exploration activities are supported by significant infrastructure, including vessels that require maintenance and repairs in nearby ports.

To better serve the needs of the Cypriot shipping industry and the growing oil and gas sector in the Eastern Mediterranean, Multimarine Ltd, a Cypriot company that operates at Limassol Port and specializes in mechanical and marine engineering services to the Marine, Power, and Oil and Gas industries, decided to invest in infrastructure that would provide dry docking services to vessels up to 7100 tonnes. A floating dock design was selected as it has several advantages over alternatives, which include inter alia the fact that (i) it does not require waterfront space, (ii) it can be constructed offsite anywhere in the world where there is expertise, and this makes its acquisition financially preferable as it can be constructed by the lowest bidder, (iii) it has a resale value as it can be sold anywhere in the world, and (iv) it can accommodate vessels that are longer than the dry dock itself (Heger, 2005).

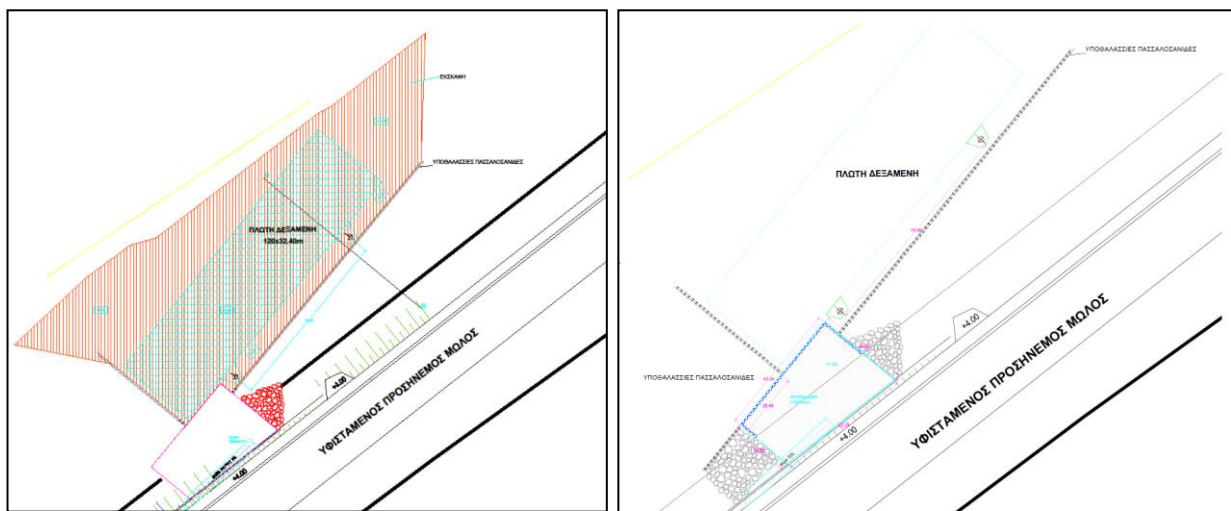
The 'ERENEOS', as the Multimarine dry dock is called, was therefore constructed in the Ukraine by Pallada Ltd and delivered to Cyprus in January 2018. In accordance to relevant legislation (RoC, 2005), an Environmental Impact Assessment was implemented and a relevant Environmental Permit was received by the Department of Environment of the Cypriot Ministry of Agriculture. Additionally, and above the legislative requirements, Multimarine requested ISOTECH to prepare a Construction Environmental Management Plan (CEMP) to ensure that any environmental risks during the construction of the necessary infrastructure for the installation of the floating dock would be minimized, and to put in place procedures to

swiftly mitigate any environmental impacts. This paper provides an overview of the preparation and the implementation of the developed Construction Environmental Management Plan (CEMP).

## 2 METHOD: DEVELOPMENT OF THE CEMP

Prior to the installation of the ERENEOS Floating Dock several preparatory construction activities had to be implemented, specifically:

- Dredging of 25,000 m<sup>3</sup> from the existing inclined sea-bed level to the level of -13.2 m from the Mean Low Water Still Sea Level (Figure 1).
- Construction of an underwater sheet pile wall to form a vertical retention front of the slopes of the excavations.
- Construction of a 42 m long deck and of a total area of 1,000 m<sup>2</sup>.
- Installation of a gangway to provide access to the deck.
- Two exploratory drills and subsequent evaluation prior to the pile-driving.
- Driving of two piles to facilitate the mooring of the dock.



**Figure 1** Left: Schematic of the planned dredging area (orange striped area). Right: Layout of the deck construction area (blue frame)

### 2.1 CEMP Scope of Work

This CEMP is a risk management tool, which has been developed to:

- Provide measures to avoid, minimize, and mitigate potential adverse environmental impacts associated with the proposed construction works.
- Identify roles and responsibilities of key personnel responsible for the implementation of the CEMP.
- Provide guidance for the monitoring, measuring, and reporting of environmental performance of all environmental aspects during the construction phase of the Project.

### 2.2 Environmental Control Plans

An evaluation of the foreseen construction activities, in combination with the environmental baseline at Limassol Port, the outcomes of the Environmental Impact Assessment (ISOTECH, 2017), and the terms of the Environmental Permit by the Cypriot Department of Environment (2017) identified that during the project's construction phase there was the potential for several activities to negatively impact the environment, for example by causing significant vibrations and noise, using limited natural resources, emitting dust etc. For each environmental aspect that could be impacted, an Environmental Control Plan (ECP) was developed. The ECPs are short (2-3 page), stand-alone documents that, for each of the potential environmental impacts, outline the mitigation/ prevention objectives and the relevant legal obligations, and assign roles and responsibilities for monitoring, reporting and the implementation of mitigation measures. The structure of each ECP appears in Table 1. The seven resulting ECPs were developed to facilitate the proper implementation of the CEMP by ensuring that busy staff are able to have a quick and clear reference document regarding concrete mitigation and, if necessary, corrective actions that they have to implement:

- ECP-001: Noise and Vibration

- ECP-002: Waste Management
- ECP-003: Air Quality- Dust Emission
- ECP-004: Use of Natural Resources
- ECP-005: Landscape and Visual
- ECP-006: Heavy Vehicles Requirements
- ECP-007: Emergency Response

**Table 1** Structure of the Environmental Control Plans

ECP Section	Description of Content
Objectives	Goals for each ECP
Legal Limits	Deriving from EU/ National law and/or Environmental Approval
Relevant Literature	List of relevant laws and EIA referrals
Responsible Staff	Person responsible to identify potential impacts and non-conformances to undertake appropriate action
Monitoring	Monitoring requirements for the duration of the Project
Reporting	Responsibilities, format and frequency for reporting
Mitigation Measures	Provides a summary of how environmental objectives are to be achieved through practical actions
Corrective Action	Actions to be undertaken should limits and targets be exceeded
Equipment	Equipment needed to implement mitigation measures

### 2.3 CEMP Structure

The main sections of the CEMP document appear in Table 2. Two noteworthy aspects of the CEMP are the assignment of roles and responsibilities and the development of a communications procedure for all environmental issues during the project’s construction phase. Roles and responsibilities were assigned to the Project Owner (i.e. Multimarine’s Top Management), the Project Manager, the Construction Manager, the site workers, general subcontractors and the Environmental Subcontractor (i.e. ISOTECH Ltd). Awareness-raising and training responsibilities for site workers and other key personnel were clearly defined within this section of the CEMP and an accompanying training schedule was drafted. The Communication Protocol included within the CEMP related particularly to communication of environmental issues arising during the construction phase, including the communication procedures in case of an environmental incident or emergency.

**Table 2** CEMP Structure

Section Title	Description of Content
Project Description	Description of the Project.
Existing Environment and Construction Activities	Existing environment at the Project site and a description of the proposed construction works.
Legislative and Regulatory Requirements	Relevant legislative and regulatory requirements to the Project.
Potential Environmental Impacts	Potential impacts of construction on the existing environment.
Environmental Control Plans	Environmental Control Plans (ECP) on mitigation measures and monitoring requirements for every environmental impact.
Implementation of CEMP	How the CEMP will be implemented and specifies roles and responsibilities of concerned personnel.
Environmental Monitoring Procedure	The environmental monitoring programme to be followed.
Environmental Incident and Emergency Management Procedure	Details the protocol to be followed in the event of an incident or emergency.

### 3 CEMP IMPLEMENTATION: MONITORING AND REPORTING

The implementation of the CEMP consisted in the regular monitoring and reporting of the project’s environmental performance (Table 3). Specifically, the subcontractor responsible for the construction activities completed Daily Environmental Inspection Checklists (Figure 2), which were collected and reviewed on a weekly basis by Multimarine’s Project Manager. An external audit, including a site

walkthrough, was carried out by ISOTECH Ltd on a monthly basis. The audit aimed to gather information on all the potential environmental aspects of the project, and specifically those relating to the Environmental Permit by the Department of Environment. The scope of the audit included, inter alia:

- Status of construction work and site activities.
- The environmental impacts and risks.
- Environmental monitoring programme and management plan; and the overall implementation status.
- Adequacy and effectiveness of the implementation of the proposed environmental controls (through Incident Reporting Form, Corrective Action Request etc.).
- Overall environmental monitoring results.
- Reporting of environmental incidents, complaints, accidents, and emergency.
- Status of closing out all non-conformances and corrective actions.
- Material usage, waste generation and disposal records.
- Environmental training records.
- Environmental complaints.
- Any other environmental issues arise from the implementation of this CEMP.

Question		Yes	No	Partial	Comments- Additional Information
<b>Air and Dust</b>					
1.	Is the site dusty?				
2.	Observation of any air polluting emissions from site relevant activities-sources?				
3.	Observation of any dust emissions from site relevant activities?				
4.	What is the Mean Air speed?				
5.	Presence of gusts or air speeds over 4 beaufort?				
6.	Formation of new piles?				
7.	Any action on piles and roads to minimize fugitive dust?				
8.	Presence of any uncovered vessel or container?				
9.	Any overfilling of vehicles during transportation of bulk materials?				
10.	Water reservoir full and water dispersion system operating properly?				
11.	Are all vehicles covered during transportation of aggregates?				
<b>Noise</b>					
12.	Any operation with excess noise?				
13.	Any noisy activity outside working hours (7:00am -5pm)?				
<b>Waste Management</b>					
14.	Bins and skips present for all waste streams?				
15.	All bins and skips covered, in good condition and with enough space for next day?				
16.	Any Wastes outside designated areas?				
<b>Community Annoyance</b>					
17.	Any environmental related complain from third party?				
<b>Training</b>					
18.	Any special need for training/informative note based on the work of the day?				
19.	Daily briefing for each phase of the project, regarding dust and noise emission, waste management, accident prevention and procedure?				

**Figure 2** Daily Inspection Checklist

**Table 3** Summary of CEMP Monitoring and Reporting Requirements

Report	Frequency	Responsibility
Daily Inspection Checklist	Daily	Construction Subcontractor
File with Daily Inspection Checklists	Weekly	Project Manager
External Audit	Monthly	ISOTECH Ltd
Waste Management Register (transfer notes)	Whenever waste leaves site	Project Manager
Induction and Training Log	Prior to personnel starting activities on site	Construction Subcontractor
Environmental Incident Report	When a significant incident occurs on site	Construction Subcontractor
Corrective Action Request	When a significant incident occurs on site	Construction Subcontractor

The development and implementation of the CEMP not only secured the environmentally responsible performance of the construction activities necessary for the installation of the ERENEOS floating dock, but also provided Multimarine with a proof of environmental performance, which could be provided to the relevant authorities at any time upon request. It could therefore act as a 'best practice' example to be replicated and applied in all construction activities that have the potential to significantly impact the environmental status of sensitive receivers.

## **References**

Cyprus Shipping Chamber (2018) Annual Report 2017. Limassol, Cyprus

Deloitte (2018) Oil & Gas in Cyprus: Where Potential Lies. [https://www2.deloitte.com/content/dam/Deloitte/cy/Documents/energy-resources/oil-and-gas/CY\\_EnergyAndResources\\_OilAndGas\\_Noexp.pdf](https://www2.deloitte.com/content/dam/Deloitte/cy/Documents/energy-resources/oil-and-gas/CY_EnergyAndResources_OilAndGas_Noexp.pdf)

Department of Environment (2017) Environmental Approval 167/8, 93A/16, 80/7, 154/2. [http://www.moa.gov.cy/moa/environment/environmentnew.nsf/All/DB2EDED0367B001FC22580F1003BED69/\\$file/GN20170560101.pdf?OpenElement](http://www.moa.gov.cy/moa/environment/environmentnew.nsf/All/DB2EDED0367B001FC22580F1003BED69/$file/GN20170560101.pdf?OpenElement)

Heger R (2005) Dockmaster Training Manual. Heger Dry Dock, Inc. [http://www.hegerdrydock.com/dockmaster\\_training\\_manual.pdf](http://www.hegerdrydock.com/dockmaster_training_manual.pdf)

IMO (1974) International Convention for the Safety of Life at Sea (SOLAS), 1974. [http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-\(SOLAS\),-1974.aspx](http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx)

ISOTECH (2017) EIA for the construction of a 42 m long deck and the installation and operation a floating dock at the Limassol Port, by Multimarine Shipyards Ltd. Nicosia, Cyprus. [http://www.moa.gov.cy/moa/environment/environmentnew.nsf/All/DB2EDED0367B001FC22580F1003BED69/\\$file/MP20170560101.pdf?OpenElement](http://www.moa.gov.cy/moa/environment/environmentnew.nsf/All/DB2EDED0367B001FC22580F1003BED69/$file/MP20170560101.pdf?OpenElement)

Republic of Cyprus (2005) Law N(140(I)/2005-2014 of the Republic of Cyprus for the Environmental Impact Assessments of certain projects.

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