DREDGING MANAGEMENT PLAN

REV.	DATE (23/12/2014)	DESCRIPTION	PREPARED	CHECKED	APPROVED
1	17/08/2016	Updated based on changes to project configuration	MFC		
				See attachment of reviewer's signature	
0	30/01/2015	Issue For Review	……..	See attachment of reviewer's signature	……..

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ATTACHMENT OF REVIEWER'S SIGNATURE

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REVISION LOG

Rev.	Date (dd/mm/yyyy)	Revised Detail			
		Item	Page	Article	Description
0	30/01/2015	all	all	all	Issue For Review
1	17/08/2016				Updated to reflect project changes

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ACRONYMS

BD	Backhoe Dredger
BOC	Balance of Complex
CSD	Cutter Suction Dredger
CTU	Central Utility
DWT	Deadweight Tonnage
EHS	Environmental, Health and Safety
ESIA	Environmental and Social Impact Assessment
GD	Grab Dredger
GIIP	Good International Industry Practices
HDPE	High Density Polyethylene
HSE	Health, Safety and Environment
HSSE	Health, Safety, Security and Environment
IFC	International Finance Corporation
LLDPE	Liner Low Density Polyethylene
LSP	Long Son Petrochemicals
MONRE	Ministry of Natural Resources and Environment
MP	Management Plan
PP	Polypropylene
PS	Performance Standard
QCVN	National Technical Regulation
TCVN	Tieu Chuan Viet Nam
TSHD	Trailer Suction Hopper Dredger

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this Dredging Management Plan (MP) is to set out the *[insert contractor name here]* approach to manage and mitigate the residual environmental impacts from marine capital dredging, as identified in the project's Environmental and Social Impact Assessment (ESIA) and the Long Son Petrochemical's (LSP) Construction Health, Safety and Environment Management Plan (ref: LSP-1S01-005).

It should be noted that the information in this Dredging MP is based on project activities, relevant regulations, guidelines and standards at the time of writing the updated ESIA, dated September 2016. Should the contractor's activities change or new regulations, guidelines or standards apply, the contractor will review, amend and resubmit this Dredging MP to LSP.

1.2 APPLICABILITY

This MP applies to managing the impacts to marine surface water quality, fisheries and biodiversity during the dredging associated with the construction of the seaport and periodic maintenance dredging.

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2 PROJECT OVERVIEW

The Long Son Petrochemicals Complex Project is located in Hamlet 2 and Rach Gia Hamlet, Long Son Commune, Vung Tau City, Ba Ria – Vung Tau Province, Vietnam. The Complex is spread over 464 ha, including area for its future expansion. The Complex is spread over 464 ha, including area for its future expansion. The Project will be comprised of two (2) main components:

1) The Petrochemical Plant, which consists of the following plants and units:

- Main Production Plants
  - Olefins Plant
  - High Density Polyethylene (HDPE) Plant
  - Linear Low Density Polyethylene (LLDPE) Plant
  - Polypropylene (PP) Plant
- Supporting Units
  - Central Utility Plant (CTU) (contains a Steam Generation Unit and Water Plant)
  - Tank Farm
  - Common Infrastructure

2) The Seaport, which consists of the following components:

- Hydrocarbon Jetty - to transfer feedstock and product for the Petrochemical Plant; and
- Construction Jetty - to import construction materials, including heavy lift modules.

The total land area that will be acquired for the Project is 464 ha, consisting of 398 ha for the Complex, and 66 ha for the specific port. In addition, there is a total water surface area of 194 ha that will be acquired for the seaport

2.1 SEAPORT

The Seaport is designed to transfer feedstock and product for the Petrochemical Plant, as well as import of construction material including heavy lift modules. It will be constructed on an area of about 194 ha, with two berths:

Berth 1

- Berth will be 265 m long and 40 m wide.
- Medium sized vessels between 1,500-20,000 DWT and used for hydrocarbon product transport.

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Berth 2

- Berth will be 325 m long and 55 m wide. And is for large sized vessels between 5,000-100,000 DWT.

The jetty will be connected to the onshore component by a trestle, a bridge-like structure with a lane for vehicles and pedestrians.

The construction of the seaport is scheduled to commence in Q1 of 2017, and is anticipated to last approximately 3 years. The maximum number of personnel required for seaport construction per day is 250 (in peak period). Full details of the layout and marine components at the Seaport are provided in the Project's ESIA.

2.2 DREDGING AND SPOIL DISPOSAL ACTIVITIES

2.2.1 Dredging Requirements

Construction of the Seaport will require dredging to ensure that the access channels and turning basins have sufficient depth. The total required dredged volume is about 14.0 million m^3. Trailer Suction Hopper Dredger (TSHD), Cutter Suction Dredger (CSD), Backhoe Dredger (BD) and Grab Dredger (GD) will be employed for dredging work. In addition, periodic maintenance dredging will be carried out, at quantities of approximately 2.6 – 3.2 million m^3 per two years.

Based on the available soil investigation, most of the dredged material is expected to be very soft bluish, bluish black, organic clay, it is expected a TSHD can be used for this. The dredged material would be discharged either through the bottom doors in the hull or pumped out of the hopper.

Additional details on the anticipated equipment and machinery used for dredging activities is provided in the Project's ESIA**.**

2.2.2 Dredging Disposal Site

During dredging, dredged materials will be transported to a dumping site, Area-A Vung Tau offshore area, located 10 km southeast away from Vung Tau Cape and 20 km from the Project location, with a coverage area of 225 km^2 (with 1 m thickness). The water depth at Area A ranges from approximately 17 to 30 m.

The plan to dispose of the dredged material at Area-A was approved on 23 August 2011, when the Ba Ria - Vung Tau people's Committee issued Decision No. 44/2011/QD-UBND on the approval of the plan to employ Area-A as a disposal site. Its capacity is approximately 67 million m^3.

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All dredging sediment will be dumped at Area-A. As indicated above, it is estimated that the total dredged material will be around 14.0 million m^3, with an additional 2.6 – 3.2 million m^3 per a result of maintenance dredging every two years.

Dredged materials will be transported by trailer suction hopper dredger and barge, taking approximately six (6) trips per day. Up to 24 barges will be employed during the dredging activities and construction phase of the Project.

2.3 DREDGING METHODOLOGY

2.3.1 Capital Dredging

Due to presence of very soft clay at the locations which need to be dredged, it is expected that a TSHD can be used at the Project site. The TSHD is a seagoing vessel equipped with a suction tube, a pump installation and a hopper (the hold for the dredged material) with bottom doors and overflow. The dredged material is discharged either through the bottom doors in the hull or is pumped out of the hopper.

Generally it can be used to dredge ports with sufficient water depth, but it cannot dredge shallow water due to its draft. Where the water depth is to shallow or the clay is too hard for a TSHD then a CSD has to be used. It is expected that half of the dredging works can be executed with a TSHD.

A CSD has a cutter head at the suction inlet, to loosen the sea bed material and transport it to the suction mouth. The cutter can be used for hard surface materials like gravel and stiff clay and it can be used in shallow water. The dredged material is usually sucked up by a wear-resistant centrifugal pump and discharged through a pipe line or to a barge. The CSD delivers dredged material through a pipeline system directly into a disposal or reclamation area or into barges. The maximum pumping distance is around 3km or, if a booster station is added, around 5km. Booster stations should be avoided where possible as they are often the cause of problems. For larger distances the dredged material is transported to the disposal area by barges.

In some areas it may be possible to employ a GD, which is suitable for loose materials. A grab dredger basically consists of a conventional cable crane mounted on a pontoon. The seabed material is excavated by the bucket of the crane and raised by the hoisting movement of the cable. The excavated material is then dumped into a transport barge which discharges the material at the disposal site. The accuracy and productivity of a grab dredger is relatively low compared to the TSHD and CSD dredgers and the potential loss of material from the grab during the hoisting

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process can lead to suspended sediments throughout the full height of the water column.

Based on geological condition, about 6.3 mill m^3 sediment will be dredged by TSHD, the remaining will be dredged by CSD, BD and GD.

Signal buoys will need to be deployed around the areas being dredged, the disposal site and operation area of vessels or barges for transporting mud and sand to the disposal site.

2.3.2 Maintenance Dredging

Periodic maintenance dredging will be required to maintain the water depth in the access channel, where sedimentation occurs. Maintenance dredging material is in almost all cases recently deposited non-consolidated material that can be easily dredged. A TSHD is the most common tool for maintenance dredging. The volume of maintenance dredging is about 2.6 – 3.2 mill m^3 per two years.

It is anticipated that maintenance dredging will occur every 2 years and the dredged material will be brought to, and disposed of at, the approved disposal site, Area-A Vung Tau offshore area. The maintenance dredging programme will be subject to a separate dredging management plan but based on the general requirements identified in this document.

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3 POTENTIAL IMPACTS DUE TO DREDGING

As identified in the ESIA, potential impacts from dredging (both capital and maintenance) can affect several resources/receptors, as follows:

- Air Quality
  - Marine vessels required for dredging, including dredgers and barges, will release combustion emissions from the use of diesel engines.
- Noise
  - Marine vessels required for dredging, including dredgers and barges, may create noise/vibration disturbances.
- Seawater Quality
  - Increase in turbidity due to disturbance/re-suspension of bottom sediments during dredging. Increase in turbidity can reduce light penetration, photosynthesis efficiency and saturation of dissolved oxygen in water;
  - Vessels may leak/spill hazardous materials such as oil, fuel, etc; and
  - Improper wastewater management may cause impacts to water quality.
- Biodiversity & Ecosystem Services
  - Seabed disturbance including:
    - physical removal of the substrate and its associated flora and fauna from the dredge site; and
    - smothering of the seabed at the dredge spoil placement site.
  - Translocation of marine pests on dredging plant / machinery;
  - Marine incidents involving vessels, oil or fuel spills, collisions with large marine fauna, or spillage of material in transit to the disposal site;
  - Aquatic habitats and ecosystems near seafloor may be disturbed or destroyed due to dredging; and
  - Marine fauna may be impacted by noise and vibration from vessels used during dredging.
- Fisheries
  - Potential loss of marine habitat including areas of fishery resources;
  - Alteration of the bathymetric marine environment; and
  - Possible impacts on wild capture fisheries resources through physical injury and/or harassment e.g. through entrainment of both pelagic and benthic species.
- Waste Management
  - Spoil will be generated from dredging for the Seaport facilities and be disposed of at an approved offshore site.

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- Socio-Economic
  - Disturbance on fishing and farming due to dredging; and
  - Increased local employment and contribute to taxation revenue from Project activities.
- Marine Traffic
  - Increase in marine traffic due to presence of Project vessels.
- Unplanned and Accidental Events
  - Potential increase in incidence of vessel collisions.
- Cumulative Impacts
  - Potential surface water cumulative impact from adjacent activities.
  - Note that a full assessment of impacts due to dredging was presented in the representative chapters for each resource in the ESIA.

The dredging schedule, as it relates to the capital dredging program for the construction of the Project is shown in Annex A.

[Note to contractor: Contractor to insert Gantt chart of construction schedule in Microsoft Project Office format in Annex A, which should include a breakdown of the tasks related to dredging, as noted above]

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4 APPLICABLE STANDARDS

4.1 DREDGING STANDARDS

The *[insert contractor name here]* shall apply all national standards in force with regards to dredging activity and should apply Good International Industry Practices (GIIP) that are advocated by the IFC and World Bank, including:

- The Equator Principles (June 2013,Version III) as they apply to the Project; and
- The IFC's Performance Standards (IFC's PSs) (2012) and EHS Guidelines (2007 and 2008). In particular:
  - IFC EHS Guidelines for Ports, Harbors, and Terminals guides the disposal of dredged materials in order to prevent soil and groundwater contamination.

4.2 ENVIRONMENTAL LEGISLATION

National environmental and social standards and targets in Vietnam are mainly derived from the *Law of Environmental Protection 2014 (LEP)*. The LEP's associated Decrees, Decisions and Circulars prescribe the various environmental and social regulations'. Some relevant standards and targets are also contained in health and safety legislation.

These regulations refer to the official Vietnamese standards and national technical regulations abbreviated as TCVNs (Tieu Chuan Viet Nam) and QCVNs (Quy Chuan Viet Nam). The national standards and technical regulations generally prescribe maximum permissible levels of pollutants, such as emissions or waste streams. Individual provinces can establish their own standards but these must be more stringent that the national standards.

A summary of key relevant Vietnamese legislation is provided in ***Table 5.1***.

Table 5.1 ***Vietnamese Legislation, Standards, Decrees & Circulars Applicable to the Project***

Legislation, Decrees, Circulars & Standards	Issued by	Issued date	Name/ Description
Legislation			
Law on Environmental Protection	National Assembly	23-June-2014	Framework environmental law
Law on Water Resources	National Assembly	21-Jun-2012	Framework law on the management and protection of water resource

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Legislation, Decrees, Circulars & Standards	Issued by	Issued date	Name/ Description
Law on Biodiversity	National Assembly	13-Nov-2008	Requirement for biodiversity conservation and sustainable development
The Maritime Code 2005	National Assembly	14-Jun-2005	The legal requirements for use of ships and vessels for economic, scientific, technological, cultural, sport, and social purposes.
Labour Code 2012	National Assembly	18-Jun-2012	Framework law on health and safety
Decrees			
Decree No. 201/2013/ND-CP	Government	27-Nov-2013	Detailing the implementation of a number of articles of the Law on Water Resources
Decree No. 45/2013/ND-CP	Government	10-May-2013	Providing the articles of the labor code on hours of work, hours of rest, occupational safety and occupational hygiene
Decision			
Decision 82/2008/QD-BNN	Ministry of Agriculture & Rural Development	July 17, 2008	Providing list of endangered rare aquatic species need to be protected, recovered, and developed
Decision 3733/2002/QD-BYT	The Ministry of Health	Hanoi, 10-Oct-2002	Providing allowed noise values at workplace
Circular			
Circular No. 50/2012/TT-BGTVT	Ministry of Transport	19-Dec-2012	National Management on the treatment of liquid oily waste generated from at Port
Circular No. 36/2015/TT-BTNMT	Ministry of Natural Resources and Environment	30-June-2015	Management of hazardous wastes
Circular 01/2011/TT-BNNPTNT	Ministry of Agriculture & Rural Development	5 – Jan - 2011	Providing list of endangered rare aquatic species need to be protected, recovered, and developed
Circular No. 40/2013/TT-BNNPTNT	Ministry of Agriculture & Rural Development	5-Sep-2013	List of wild fauna and flora in the Annexes of CITES
Circular No. No.27/2014/TT-BTNMT	Ministry of Natural Resources and Environment	30-May-2005	Regulating the registration for groundwater extraction, form of dossier for issue, extension, modification, re-issue of water resource permit

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Legislation, Decrees, Circulars & Standards	Issued by	Issued date	Name/ Description
Standards			
QCVN 08-MT:2015/BTNMT	Ministry of Natural Resources and Environment	21-Dec-2015	National Technical Regulation on Surface Water Quality for Protection of Aquatic Life
QCVN 27:2010/BTNMT	Ministry of Natural Resources and Environment	16-Dec-2010	National Technical Regulation on Vibration
QCVN 26:2010/BTNMT	Ministry of Natural Resources and Environment	16-Dec-2010	National Technical Regulation on Noise
QCVN 07:2009/BTNMT	Ministry of Natural Resources and Environment	16-Nov-2009	Defining the threshold value of hazardous waste contents
QCVN 06:2009/BTNMT	Ministry of Natural Resources and Environment	7-Oct-2009	National Technical Regulation on Hazardous Substances in Ambient Air
QCVN 05:2013/BTNMT	Ministry of Natural Resources and Environment	25-Oct-2013	National Technical Regulation on Ambient Air Quality
QCVN 14:2008/BTNMT	Ministry of Natural Resources and Environment	31-Dec-2008	National Technical Regulation on Domestic Wastewater Discharge
QCVN 10-MT:2015/BTNMT	Ministry of Natural Resources and Environment	21-Dec-2015	National technical regulation on marine water quality
TCVN 6705:2009	Ministry of Science and Technology	21-Dec-2009	Normal solid wastes. Classification

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5 ROLES AND RESPONSIBILITIES

5.1 INTRODUCTION

Having an appropriate organisational structure in place, with all people having defined roles and responsibilities, is essential to ensuring the overall success of this Dredging MP. This section provides details of LSP's and the contractor's organisational structure with regards to onsite delivery of the LSP project, and the various roles and responsibilities of those people in relation to delivering the clients EHS expectations, including meeting the requirements of the Construction Health, Safety and Environment Management Plan.

5.2 LSP CONSTRUCTION HSSE TEAM

LSP's health, safety, security and environmental (HSSE) team will lead the management of HSSE issues concerned with dredging activities. The LSP organisational chart to implement the requirements of this Dredging MP during construction is shown in ***Figure 5.1***. The specific roles and responsibilities are shown in Chapter 5 of the LSP Construction Health, Safety and Environment Management Plan (ref: LSP-1S01-005).

5.3 LSP OPERATION HSSE TEAM

LSP's operational health, safety, security and environmental (HSSE) team will lead the management of HSSE issues concerned with dredging impacts. The LSP organizational chart to implement the requirements of this Dredging MP is shown in ***Figure 5.2***

5.3.1 HSSE Manager

It is the responsibility of the HSSE Manager to implement this Dredging MP. Specific roles and responsibilities include:

- Ensure that LSP's corporate and project level policies are being applied by all workers on site, regardless of whether they are a LSP employee, contractor, subcontractor or visitor;
- Ensure that the necessary surveys are undertaken by suitably qualified personnel, at the appropriate times, and that the results are compared to the appropriate baseline in order to assess impacts due to dredging;
- Review all monitoring reports, incident reports and annual review documents to assess the impacts of dredging during the operational phase and, where necessary, evaluate, implement and monitor any corrective actions; and

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- Lead, facilitate or assist with the investigation of HSE incidents and development and implementation of corrective and preventive actions for impacts due to dredging.

Figure 5.1 Organisation of HS&E Management Team during Construction

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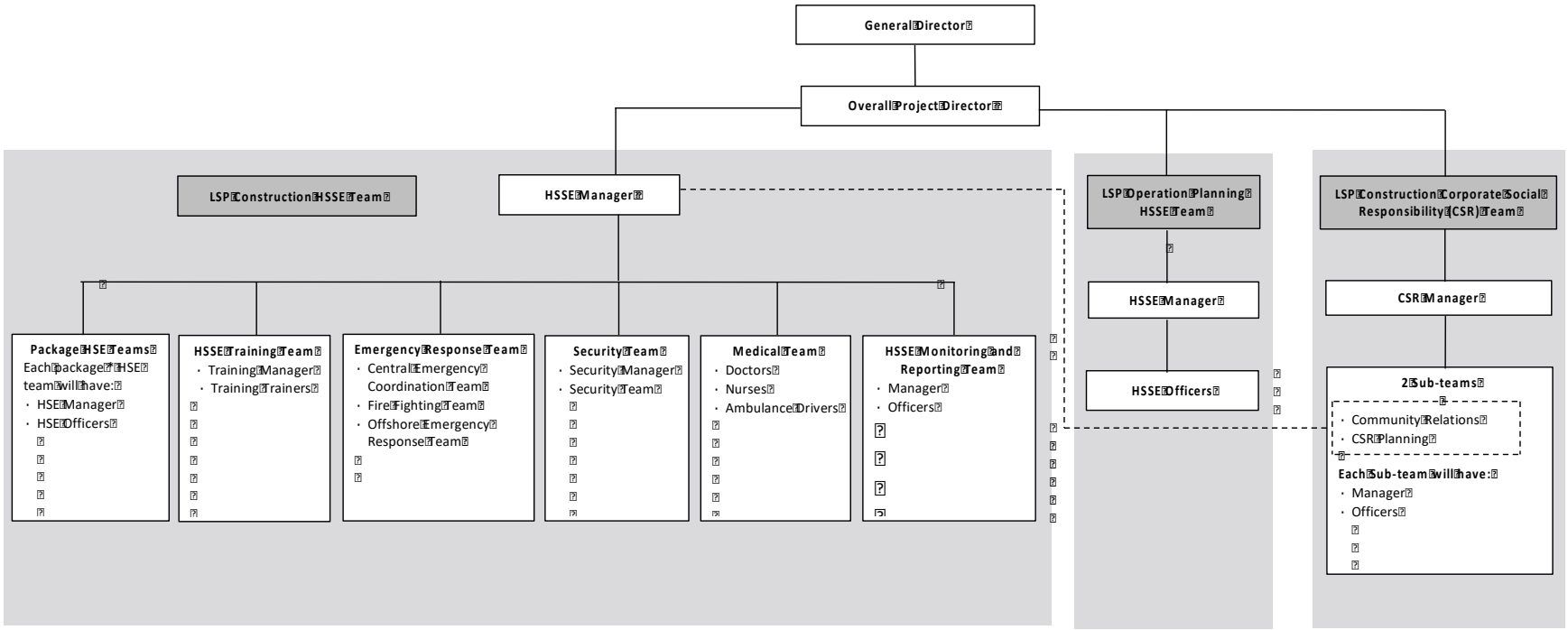

Note:

Package A: Olefins Plant, Tank farm, Complex interconnecting pipelines/pipe racks, Land development of tank farm area, Topside facilities of hydrocarbon jetties, Complex Wastewater Treatment Unit and HP Flare/LP Flare System

Package B/C/D: Polyolefins Plant (HDPE/PP/LLDPE)

Package F: Sea Port (excluding Top side of the Hydrocarbon Jetties and construction Jetty which are under the Scope of the Contractor Package A and Package E respectively)

Package G: Central Utility Plants (including Steam Generation Unit and Water Plant)

Package H: Common Infrastructure of the Complex (including Administration Building, Laboratory Building, Canteen Building, Emergency Center, First Aid Center and Polyolefins Product warehouse)

Package I: Complex road including drainage, Street lighting, CCTV, Green area, Top site for construction Jetty, Complex truck scale, and Blown film System

Package L: Land development work of the whole complex except tank farm area

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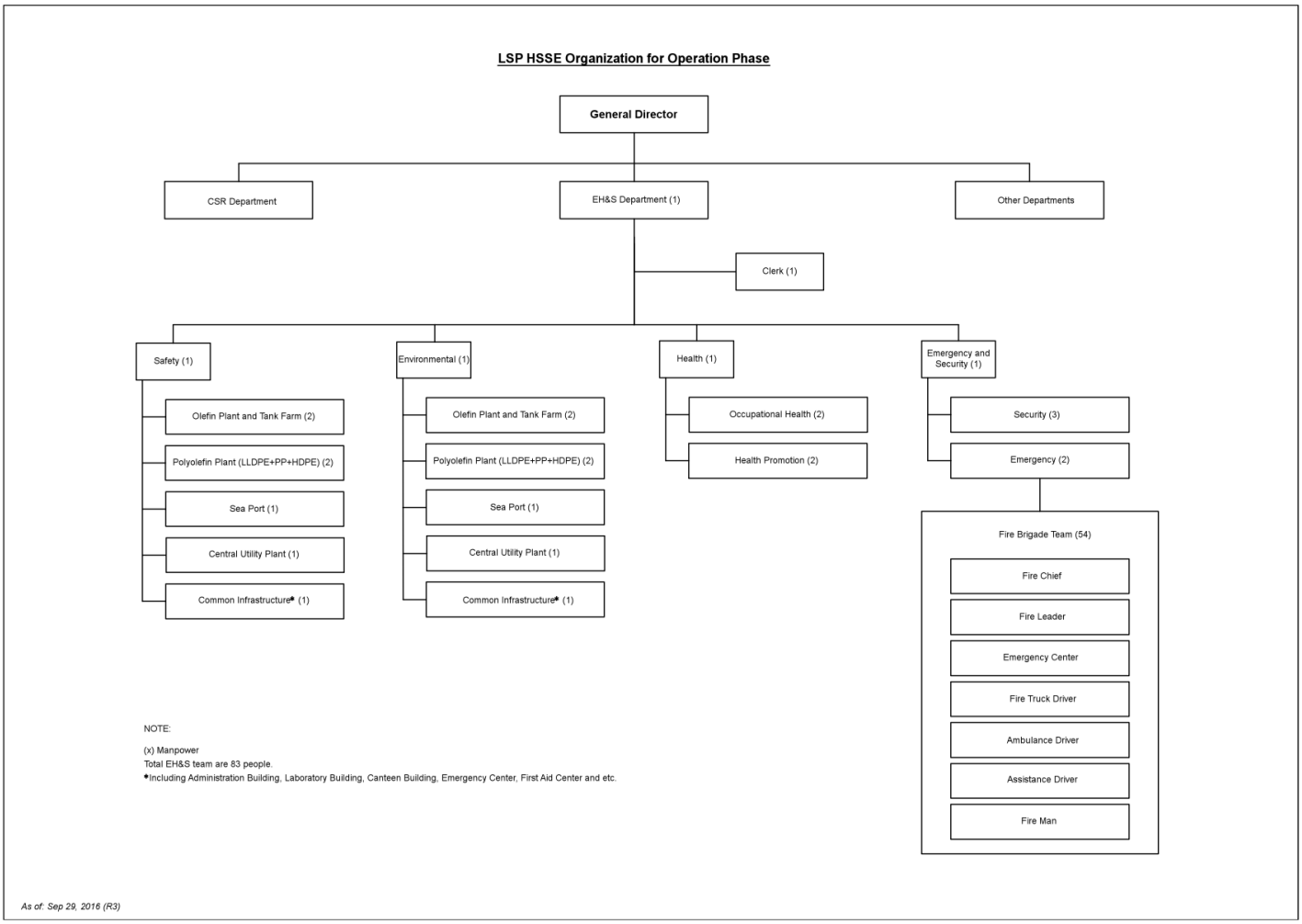
Figure 5.2 Organisation of HS&E Management Team during Operation



5.4 CONTRACTOR'S HSSE TEAM

The contractor's HSSE team has established this Dredging MP in accordance with the applicable standards. The contractor's HSSE team will manage their subcontractors and suppliers in accordance with this Dredging MP and liaise with the appropriate personnel within LSP's HSSE to ensure compliance with the overall aims of LSP's Construction Health, Safety and Environment Management Plan (LSP-1S01-005).

5.4.1 Description of Roles and Responsibilities

The contractor has committed to providing the necessary human resources to ensure that the organisational structure noted above can work to implement this Dredging MP and achieve compliance with all relevant standards. A description of the key roles and their responsibilities is outlined below, including the primary communication channel between LSP and contractor HSE teams.

Employee contact details for each role associated with this Dredging MP are provided in ***Annex C***.

5.4.2 Contractor's Project Manager for Capital Dredging Works

The Contractors Project Manager for the capital dredging works will:

- Ensure control measures in accordance with this procedure are implemented for all work under his control;
- Audit and monitor compliance with this procedure. Record the results and report to LSP's HSSE Manager;
- Ensure personnel are competent to perform their assigned role and provided with adequate training to perform their job scope;
- Submit the incident reports in the first instance to LSP's HSSE Manager;
- Ensure equipment checklists (as referred in Section 7) are prepared and submitted to LSP's HSSE Manager prior to commencement of works; and
- Daily report information is completed (as referred to in Section 7).

5.4.3 Contractor's Supervisors for Capital Dredging Works

All Supervisors under the control of the Dredging Contractor will:

- Conduct regular workplace inspections and ensure compliance with this procedure;
- Conduct daily pre start meetings as required;

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- Verify the daily dredging operations are in accordance with Project specifications and LSP site requirements;
- Verify daily that pre-start check sheets are being completed, and where required equipment is removed from service for all non-conforming items identified;
- Arranging competency and verification of competency training for personnel; and
- Ensure daily inspection of equipment with pre-prepared checklists and report noncompliance, to the Dredging Contractor's Project Manager within 24 hours. Depending on the severity of non-conformity, such reports can be made through the radio/mobile phones, as applicable, immediately upon observation.

5.4.4 Contractor's Personnel for Capital Dredging Works

All employees of the Dredging Contractor will:

- Comply with the requirements of this procedure;
- Conduct daily pre start inspections and periodic inspections of all equipment and work places to ensure efficient and safe daily operations; and
- Apply "Stop Work" authority if any conditions are observed to be unsafe or non-compliant and report any deficiencies to their Supervisor.

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6 MITIGATION / MANAGEMENT PROCEDURES

The mitigation / management procedures noted in this section provide the approach to managing impacts to specific environmental resources/receptors that may be affected by dredging and marine disposal of sediment.

Individual management strategies have also been prepared for the following aspects, based on the assessment of potential impacts from the ESIA:

- Air Quality from diffuse and point sources;
- Noise and Vibration;
- Water Quality;
- Waste Management for hazardous and non-hazardous waste;
- Hazardous Materials;
- Marine Traffic;
- Occupational Health and Safety Management;
- Worker Training;
- Worker Accommodation;
- Community Grievance;
- Cultural Heritage Chance Finds;
- Emergency Preparedness and Response; and
- Site Security.

The Dredging Contractor is expected to implement and adhere to all HSSE management plans where relevant to his operations, activities and employees.

The management strategies in this section may be revised and updated by the EPC Contractors based on their plans and experience. It is intended that specific work instructions be prepared for staff and contractors as the details of dredging methods and conditions of approval for the project are finalised.

The contractor is committed to implementing the identified mitigation / management procedures in order to not cause exceedance of the applicable standards, and to avoid impacts on the local community.

The mitigation / management measures that are relevant to the Capital Dredging activities, are shown in ***Table 6.1***. Note that mitigation measures applied during Capital Dredging (during the Construction Phase) and Maintenance Dredging (during the Operation Phase) will be nearly identical.

The mitigation / management procedures were identified within the ESIA as being appropriate for the environmental impacts resulting from the anticipated dredging

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activities. Should impacts arise from the contractors dredging activities, following the implementation of the procedures noted in ***Table 6.1***, the contractor will review the need for additional measures to be taken and update this Dredging MP accordingly.

Note to contractor: Delete mitigation / management measures which are not applicable or outside of your control. Insert the name of the responsible party from your organisation for each mitigation / management measure.

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Table 6.1 Mitigation / Management Procedures for Impacts due to Dredging during Construction Phase

Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
1. General					
	1.1	The Subcontractor shall apply all national standards in force with regards to dredging activity and should apply Good International Industry Practices (GIIP) that are advocated by the IFC and World Bank, including but not limited to: a) Prior to initiation of dredging activities, materials should be evaluated for their physical, chemical, biological, and engineering properties to inform the evaluation of dredge materials reuse, should this option arise later in the project e.g. for wetland creation or enhancements, habitat restoration, or creation of public access / recreational facilities. b) Excavation, dredging methods, vessels and equipment should be selected to minimize suspension of sediments, minimize destruction of benthic habitat, increase the accuracy of the operation, and maintain the density of the dredge material, especially if the dredge material includes contaminated areas. c) Inspection and monitoring of dredging activities should be conducted to evaluate the effectiveness of impact prevention strategies, and re-adjusted where necessary. d) Use of submerged discharges should be considered for hydraulic disposal of dredged material.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	1.2	The Dredging Contractor will develop, implement and maintain a Dredging Plan and provide to LSP prior to the works commencing, which details, amongst other things: a) Mobilisation and demobilization of vessels and equipment. b) Procedures for gaining approval from LSP for major equipment entering or leaving the project area and the reasons for its mob/demob, e.g. repairs, replacement, damage, etc. c) Scope of work, methodology, resources, safe working practices and risk assessments.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
		d) Hazards involved in specific components of the dredging activity, e.g. H2S in fine sediments, close proximity to subsea features, weather restrictions, oceanographic conditions and critical equipment, etc. e) The use of survey techniques and GPS tracking and recording to ensure an auditable record of work activity, including disposal at the authorised site is maintained throughout the project.			
	1.3	Prior notice of dredging plans will be reported to the Department of Nature and Resource Environment (DONRE) of Ba Ria – Vung Tau Province.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	1.4	All workers to be properly trained on the operation of vessels and equipment used during dredging. The training programme for the crew must be outlined in the aforementioned Dredging Plan.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Worker Training Management Plan (Ref: LSP-1S01-0003)
2. Air Quality					
	2.1	Equipment and vessels will be maintained and operated to ensure that air emissions will be minimized.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Air Quality Management Plan (Diffuse Sources) (Ref: LSP-1S01-0007) Air Quality Management Plan (Point Sources) (Ref: LSP-1S01-0008)

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
	2.2	Implement all relevant measures from Air Quality Management Plan, from both diffuse and point sources.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Air Quality Management Plan (Diffuse Sources) (Ref: LSP-1S01-0007) Air Quality Management Plan (Point Sources) (Ref: LSP-1S01-0008)
	2.3	In the event that a complaint is received, the relevant details will be recorded on the Complaints/Query Report Form as per Community Grievance and Management Plan.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Community Grievance Management Plan (Ref: LSP-1S03-0001)
3. Noise					
	3.1	Contractor will be required to use noise abatement controls which may include whisper valves, sound-absorbing materials, mufflers for engines, or isolation of noise sources from cumulative noise production where noise levels at receptor locations exceed current noise standards.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Noise and Vibration Management Plan (Ref: LSP-1S01-0009)
	3.2	Ensure that noisy operations are not carried out on Sundays or public holidays.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Noise and Vibration Management Plan (Ref: LSP-1S01-0009)

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
	3.3	Notify all nearby businesses and residences of the planned working hours, and give a point of contact for any questions or complaints.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Noise and Vibration Management Plan (ref: LSP-1S01-0009)
	3.4	Equipment and vessels will be maintained and operated to ensure that unnecessary noise will be prevented.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Noise and Vibration Management Plan (ref: LSP-1S01-0009)
	3.5	Implement all relevant measures from Noise and Vibration Management Plan.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Noise and Vibration Management Plan (ref: LSP-1S01-0009)
	3.6	In the event that a complaint is received, the relevant details will be recorded on the Complaints/Query Report Form as per Community Grievance and Management Plan.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Community Grievance Management Plan (ref: LSP-1S03-0001)
4. Seawater Quality					
	4.1	Minimise the extent of the area dredged and therefore the direct disturbance to the seabed and subsequent generation of a turbidity plume at the seabed.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
	4.2	Minimise the release of turbid effluent from the dredging ship.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.3	It should be determined early in the planning phase, whether silt curtains are necessary for the dredging activity and dredged material disposal sites. Silt curtains should, however, be used when utilizing a grab dredger or where fine silt could be transported on prevailing currents toward sensitive biotopes. The results of this assessment should be provided in the Dredging Plan.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.4	Where silt curtains are deployed, the following must be undertaken: a) Vigilant maintenance of silt curtains to confirm that no entanglement of marine mammals or other creatures is occurring, no break-away has occurred during storms, no shifting has occurred that could impact sensitive habitats, and placement is having success in preventing turbid plumes from impacting nearby marine resources. b) Properly flag silt curtains with appropriate marker buoys to prevent entanglement with marine vessels. c) Silt curtains will be extended from the seabed to the surface of the water column. Upon completion, the silt barriers including sinkers or anchor blocks will be completely removed from site. d) Careful retrieval of silt curtains should be made such that trapped sediment does not disperse toward sensitive biotopes.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.5	No overflow is permitted from the Trailing Suction Hopper Dredger (TSHD) and the Lean Mixture Overboard (LMOB) system will only be in operation at the beginning and end of the dredging cycle when the drag head is being lowered and raised.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
	4.6	Dredged marine mud will be disposed of only in the designated disposal area in accordance with the approval conditions.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.7	Disposal vessels will be fitted with tight bottom seals in order to prevent leakage of material during transport.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.8	Barges will be filled to a level which ensures that material does not spill over during transport to the disposal site, and that adequate freeboard is maintained to ensure that the decks are not washed by wave action.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.9	After dredging, any excess materials will be cleaned from decks and exposed fittings before the vessel is moved from the dredging area.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.10	When the dredged material has been unloaded at the disposal areas, any material that has accumulated on the deck or other exposed parts of the vessel will be removed and placed in the hold or a hopper. Under no circumstances will decks be washed in a way that permits material to be released overboard.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.11	Ensure quick release of dredged sediment from the hopper to minimize the turbidity plume.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
	4.12	Ensure dredge material is spread evenly over the disposal area to avoid mounding.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.13	Use of cap containment sediments with clean materials should be considered. Level bottom capping or a combination of borrow pits / dikes with capping reduces the underwater spread of contaminated material.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.14	The contractor(s) will ensure that the works cause no visible foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the dredging site.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.15	If installed, degassing systems will be used to avoid irregular cavitations within the pump.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.16	Monitoring and automation systems will be used to improve the crew's information/knowledge regarding the various dredging parameters, which can be used to improve dredging accuracy and efficiency.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.17	Control and monitoring systems will be used to alert the crew to leaks or any other potential risks.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
	4.18	Dredgers will maintain adequate clearance between vessels and the seabed at all states of the tide and reduce operations speed to ensure that excessive turbidity is not generated by turbulence from vessel movement or propeller wash.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.19	Plan the dredging campaign in such a way as to limit the risks of generating a significant turbidity plume near marine habitats present in the vicinity of the dredging operations. The result of this should be provided in the Dredging plan.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.20	Use of Low Turbidity Valve (environmental valve) in trailer suction dredgers (if used) reduces turbidity in the overflow system.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.21	Subcontractor shall only use certified, low toxicity lubricants in any dredge equipment that has contact with marine waters or has the potential to leak into marine waters	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Hazardous Materials Management Plan (Ref: LSP-1S01-0016)
	4.22	Contractors will supervise disposal of the dredged material. Details of the volume of material dredged and disposed of; the coordinates of the disposal site; and the date and time of disposal will be recorded and reported to ensure equal spread of sediment.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	4.23	Dredging shall not be carried out under strong waves and currents condition that will make unsafe working.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
	4.24	Where there is an overlap in dredging activities between the Project and the adjoining shipyard, appropriate boundaries between the two sites will be defined and communicated to all contractors. A monitoring programme will also be established to track changes in water quality near the interface between the two dredging sites and determine the sources of any exceedances in allowable limits.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
5. Biodiversity & Ecosystem Services					
	5.1	Implement measures for Impacts from maintenance dredging activities, indicated in the Biodiversity Action Plan (Operation Phase), specifically Mitigation Reference 1.2 – 1.10. These measures are also applicable to the construction phase.	HSSE Manager and LSP's Marine Specialist (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Biodiversity Action Plan (Operation Phase) (Ref: LSP-1S01-0023)
	5.2	Implement measures for the Control and Protection from Imported Marine Pests, Marine Pests Inspection, and Corrective Action, as indicated in the Biodiversity Action Plan (Operation Phase), specifically Mitigation Reference 5.1 – 5.11. These measures are also applicable to the construction phase.	HSSE Manager and LSP's Marine Specialist (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Biodiversity Action Plan (Operation Phase) (Ref: LSP-1S01-0023)
	5.3	Relevant measures from IFC's EHS Guidelines for Ports, Harbors, and Terminals should be followed and incorporated into the Dredging Plan, including, but not limited to: e) Areas sensitive for marine life such as feeding, breeding, calving, and spawning areas should be identified. Where sensitive species are present, dredging (and blasting) should be conducted in a manner so as to avoid fish migration or spawning seasons, routes, and grounds. f) Use techniques (e.g. silt curtains), to minimize adverse impacts on aquatic life from the re-suspension of sediments. g) Use of lateral containment in open water disposal should be considered, such as the use of borrow pits or dikes to reduce the spread of sediments and effects on benthic organisms.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
6. Fisheries					
	6.1	Dredging will be carried out at times specified to any locally affected population (e.g. near shore fishers, oyster farmers and net fishers). The [*insert contractor name here*] will collaborate with local authorities to communicate with fishing communities in advance of commencing the dredging activities. Affected communities should be informed and supported for relocation prior to commence of this activity.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	6.2	The implementation of mitigation and management measures suggested to control water quality and noise during dredging will also help alleviate adverse dredging impacts that may indirectly affect fisheries.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
7. Waste Management					
	7.1	Develop, implement and maintain a Waste Management Plan for all vessels, in line with LSP's Waste Management Plans, which addresses waste minimization, safe storage and appropriate disposal of both hazardous and non-hazardous waste. The Waste Management Plan should include, but not be limited to, the following: a) No waste will be disposed of overboard. b) Housekeeping procedures, including spillage control, will be implemented to minimise the generation of waste. c) Wastes will be separated as far as practically possible. d) All waste awaiting disposal will be stored appropriately to prevent its escape to the marine environment. e) Areas for solid and liquid waste storage will be defined on each vessel and waste will not be stored outside these areas. f) Waste will be removed from vessels and disposed of at an approved facility. g) Any waste fuels, oils or other chemicals will be collected in separate drums and transported to an approved facility for disposal.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Waste Management Plan (Hazardous Waste) (Ref: LSP-1S01-0014) Waste Management Plan (Non-Hazardous Waste) (Ref: LSP-1S01-0015)
	7.2	All vessels will met the requirements of MARPOL for ship sanitation and waste collection/disposal. This will apply when vessels are operating outside near shore coastal waters. Ref MARPOL Annex IV and V respectively).	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	7.3	Oily effluent generated by vessel may not be discharged into the sea, only clean ballast water (clean ballast meaning that the effluent does not create a visible film or the oil content exceed 15ppm) – MARPOL Annex I. For smaller vessels (<400 dwt) oil and oily mixtures must be retained on board for onshore disposal.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
8. Hazardous Materials					

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
	8.1	All refueling is to be done by licensed fuel suppliers in accordance with their Standard Operating Procedures.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	8.2	Refuelling will take place in appropriate designated areas only.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	8.3	Minimise the stored volumes of fuel, lubricants and oil in discrete containers on board vessels. When required they will be stored in a secure area and any spills will be cleaned immediately.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Hazardous Materials Management Plan (Ref: LSP-1S01-0016)
	8.4	Implement all relevant measures from Hazardous Materials Management Plan.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Hazardous Materials Management Plan (Ref: LSP-1S01-0016)
9. Socio-Economic					
Impacts on Cultural Heritage during the Construction Phase	**9.1**	Implement all relevant measures from the Cultural Heritage Chance Finds Procedure.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Cultural Heritage Chance Finds Procedure (Ref: LSP-1S03-0003)

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
10. Marine Traffic					
Increase in marine traffic due to presence of dredging vessels	**10.1**	Implement all relevant measures from Traffic Management Plan (Marine).	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Traffic Management Plan (Marine) (Ref: LSP-1S01-0018)
11. Unplanned and Accidental Events					
	11.1	All vessels involved in the dredging operations will adhere to the Contractors Maritime Safety Management Plan, Maritime Safety Assurance Plan and Marine Traffic Management Procedure, which should incorporate the dredging area, disposal site and route between the two.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Traffic Management Plan (Marine) (Ref: LSP-1S01-0018)
	11.2	Dredging vessels will use satellite GPS systems or equivalent to maintain sufficient accurate position within the permitted dredging area. For the safety of vessels navigating through the channel, the contractor shall provide and install marine signalling system and (lighted or un-lighted) marker buoys within the dredging area. The signalling and buoy system shall comply with local Vietnamese regulations.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Traffic Management Plan (Marine) (Ref: LSP-1S01-0018)
	11.3	Maintain an Emergency Contact List with an up to date copy retained onboard vessels.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	11.4	Vessel crew are to regularly check equipment for evidence of leaks and fitness of hydraulic hoses and seals, and conduct maintenance or repairs as necessary to prevent drips, leaks or likely equipment failures.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
	11.5	For minor spills, provide spill kit including; bilge socks, heavy duty absorbent polypropylene pads, floating booms and blowback refuelling collars on vessels for use in the event a substance is spilled either on deck or to waters to handle a spill of up to 160 litres.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	11.6	For major spills, undertake actions as specified in the Emergency Preparedness and Response Plan.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Emergency Preparedness and Response Plan (Ref: LSP-1S01-0002)
	11.7	A register of Materials Safety Data Sheets (MSDS) relating to all hazardous substances on board, will be maintained.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	Hazardous Materials Management Plan (Ref: LSP-1S01-0016)
	11.8	The Dredging Contractor shall ensure that all vessels are equipped with adequate fire prevention and fire fighting equipment in accordance with SOLAS Chapter II-2, 2002, including the provision of: a fixed fire detection and fire alarm system; portable fire extinguishers; and fixed fire-extinguishing systems.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	11.9	The Dredging Contractor shall periodically monitor and test fire safety equipment in accordance with SOLAS guidelines.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	11.10	The Dredging Contractor shall carryout emergency fire drills on a regular basis, not less than quarterly. Records of Drills conducted, lessons learnt and improvement actions generated and implemented based of Fire Drill exercises shall be kept and made available for review.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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Aspect, Potential Impact / Issue	Mitigation Reference	Mitigation and / or Management Procedures	LSP Responsibility	Contractors Responsibility	Related Plans
	11.11	The Dredging Contractor shall ensure that Crew members receive instruction on fire safety on board the ship. Parties responsible for fire extinguishing shall be organized. These parties shall have the capability to complete their duties at all times while the ship is in service.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	11.12	Crew members shall be trained to be familiar with the arrangements of the ship as well as the location and operation of any fire-fighting systems and appliances that they may be called upon to use.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	11.13	Training in the use of the emergency escape breathing devices shall be considered as part of on-board training.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	
	11.14	A training manual for emergency response shall be provided in each crew mess room and recreation room or in each crew cabin.	HSSE Manager (responsible for supervision)	EPC Contractor Construction Manager (responsible for implementation)	

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7 MONITORING

7.1 LSP HSSE TEAM

A environmental monitoring plan has been developed to track the effectiveness of the mitigation measures during construction. Details of LSP's environmental monitoring plan are provided in Chapter 7 of LSP's Construction Health, Safety and Environment Management Plan (ref: LSP-1S01-005).

LSP may request additional monitoring if the monitoring programme records show non-compliance with this MP.

7.2 CONTRACTORS TEAM

In order to assess the effectiveness of the mitigation / management measures and identify the need for further action, the contractors dredging monitoring programme outlined in ***Table 7.1*** will be followed.

Should the monitoring programme note any non-compliances with the MP, corrective action will be taken to ensure the relevant activity returns to compliance in a timely manner and that any corrective action is appropriate and effective. Any corrective actions undertaken must be recorded on the daily report against the relevant activity.

Note to contractor: Delete rows that are not applicable or outside of your control and, in the second column, only include the reference to relevant mitigation / management measures. Insert the name of the responsible party from ***Table 2-1*** *for each of the separate monitoring requirements.*

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Table 7.1 Monitoring Programme

Aspect, Potential Impact / Issue	Reference of Relevant Mitigation Measure *	Sampling Location	Sampling Parameters	Sampling Frequency	Applicable Standards	Responsibility	Reporting
Impacts From Dredging	1.1, 1.2, 1.3, 1.4, 4.3, 4.19, 5.3, 6.1, 11.1, 11.12, 11.13	n/a	Prepare and review Dredging Plan and submit to LSP and DONRE	Prior to commencement of work and when there is a significant change to the Dredging Plan		Dredging Contractor	Dredging Plan
	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.2, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.20, 4.21, 4.22, 4.23, 4.24, 5.1, 5.2, 7.1, 7.2, 7.3, 8.1, 8.2, 8.3, 8.4, 9.1, 10.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.14	On Vessels	Visual Inspection	Weekly	Maritime Safety Management Plan, Maritime Safety Assurance Plan, Maritime Traffic Management Procedure, Dredging Plan, Waste Management Plan	Dredging Contractor	Weekly (refer to Annex D for report example)
	4.0 Water Quality	Dredging site, seabed at dredging site	Coastal water quality (particularly, Turbidity, Suspended Solids, pH, Salinity, Conductivity, and Temperature) at dredging site and dumping site.	Quarterly	National Technical Regulation on Surface Water Quality (QCVN 10:2008/BTNMT)	Dredging Contractor	Quarterly Laboratory Results and Report
	1.2e	Dredging area and disposal site	Seabed level and seabed topography after dredging.	Pre and post dredging works or on instruction		Dredging Contractor	On an as required basis

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Aspect, Potential Impact / Issue	Reference of Relevant Mitigation Measure *	Sampling Location	Sampling Parameters	Sampling Frequency	Applicable Standards	Responsibility	Reporting
				from LSP			
	5.0 Biodiversity	Within final dredging boundaries	Visual inspection for any sign of marine flora and fauna	Ongoing during dredging activities	IFC Performance Standard 6	Dredging Contractor	Weekly (refer to Annex D for report example)
		Within final dredging boundaries	Number of dead fish, marine mammals and marine reptiles	Ongoing during dredging activities	IFC Performance Standard 6	Dredging Contractor	Weekly (refer to Annex D for report example)
		3 sampling sites at the maintenance dredging areas	Benthic and pelagic species and density	Monthly during capital dredging	Shannon-Weiner Diversity Index and Berger-Parker Dominance Index	Dredging Contractor	Bi-annually
		3 sampling sites at the same locations of benthic and pelagic survey	Invasive marine pests species and density	Monthly during capital dredging	Shannon-Weiner Diversity Index and Berger-Parker Dominance Index	Dredging Contractor	Bi-annually
	11.9, 11.10	On Vessels	Fire Drills and Equipment Tests	Quarterly	SOLAS Chapter 11-2, 2002	Dredging Contractor	Report on findings and any corrective actions taken

** See **Table 3-1** for mitigation measure.*

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8 AUDITING AND REPORTING

An Auditing and Reporting Programme is required to ensure that the mitigation / management measures are appropriate in controlling the identified impacts from dredging.

8.1 LSP HSSE TEAM

To ensure compliance with the requirements of this Dredging MP, internal inspections and audits will be undertaken by LSP. The LSP auditing and reporting programme is shown in Chapter 9 of the LSP Construction Health, Safety and Environment Management Plan (ref: LSP-1S01-005).

8.2 CONTRACTORS TEAM

The programme will comprise of the following:

- Internal Audit and Reporting Programme to be undertaken by the subcontractor's EHS Officer; and
- External Audit and Reporting Programme, to be conducted by the LSP's representative.

The scope of the internal auditing and reporting programme to be undertaken by the contractor is shown in ***Table 8.1***.

Note to contractor: In the second column, only include the reference to relevant mitigation / management measures. Ensure the job title for the responsible party is correct for your organisation.

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Table 8.1 Auditing and Reporting Programme

Inspection / Auditing Interval	Reference of Relevant Mitigation Measure*	Responsibility	Scope of Inspection / Audit	Report Submission / Record Keeping
Weekly Inspection (Internal)	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.2, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.20, 4.21, 4.22, 4.23, 4.24, 5.1, 5.2, 7.1, 7.2, 7.3, 8.1, 8.2, 8.3, 8.4, 9.1, 10.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.14	Contractor's Onsite EHS Officer	Review the submitted weekly monitoring reports to assess the compliance status of relevant operations that may give rise to impacts from dredging and provide support to identifying appropriate corrective actions and ensuring they are: introduced in a timely manner; appropriate; and effective	Archive Weekly Monitoring Report in an orderly manner for external auditing All reports are to be maintained at the project site for as long as the Contractor is working at the site
Monthly Review of Weekly Inspection Reports (Internal)	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.0, 4.1, 4.2, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.20, 4.21, 4.22, 4.23, 4.24, 5.0, 5.1, 5.2, 7.1, 7.2, 7.3, 8.1, 8.2, 8.3, 8.4, 9.1, 10.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.09, 11.10, 11.14	Contractor's General Manager	A monthly report is to be provided to the Contractor's Onsite General Manager, which is to include: the compliance status of relevant operations that may give rise to impacts from dredging; identifying any non-compliances that have arisen over the previous months monitoring program; detailing the corrective actions that have been taken when a failure has been noted; and noting the appropriateness and effectiveness of any corrective actions	Archive Monthly Report in an orderly manner for external auditing All reports are to be maintained at the project site for as long as the Contractor is working at the site
Dredging Plan	1.1, 1.2, 1.2e, 1.3, 1.4, 4.3, 4.19, 5.3, 6.1, 11.1, 11.12, 11.13	Contractor's General Manager	Review Plans prior to submission to relevant stakeholders to ensure plans are in accordance with the relevant	Maintain up-to-date copies of the Plan, including correspondence with the stakeholders, for internal and

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Inspection / Auditing Interval	Reference of Relevant Mitigation Measure*	Responsibility	Scope of Inspection / Audit	Report Submission / Record Keeping
			guidelines and to review content on a monthly basis and amend where necessary, based on audit findings	external auditing Superseded Plans and Procedures to be maintained at the project site for as long as the Contractor is working at the site
Biannual Inspection (External)	1.1, 1.2, 1.2e, 1.3, 1.4, 2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 5.0, 5.1, 5.2, 5.3, 6.1, 7.1, 7.2, 7.3, 8.1, 8.2, 8.3, 8.4, 9.1, 10.1, 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.09, 11.10, 11.1, 11.12, 11.13, 11.14	LSP's Representative	LSP's Representative will review the contractor's onsite activities to assess compliance with the management plan and review all records of the Contractor's internal audit programme to review historic compliance and the use of appropriate corrective actions	A copy of the External Audit Report is to be provided to the contractor for reference and, where necessary, implementation of any identified corrective actions All reports are to be maintained at the project site for as long as the Contractor is working at the site

** See **Table 3-1** for mitigation measure.*

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ANNEX A – CONSTRUCTION SCHEDULE

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ANNEX A – CONSTRUCTION SCHEDULE shall be followed Annex G - Execution Plan and Project Schedule of the PACKAGE F – PORTS's Contract

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ANNEX B – RELEVANT ENVIRONMENTAL STANDARDS

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QCVN 10-MT:2015/BTNMT: National Technical Regulation on marine water quality

National Technical Regulation on Coastal Water Quality specifies the standards for different coastal water quality parameters in the ambient environment. The standards are presented in the below table.

No.	Parameter	Unit	ALLOWABLE LIMITS		
			Aquaculture & aquatic reservation area	Swimming & aquatic sport area	Others
1	Temp.	◦C	30	30	-
2	pH	-	6.5-8.5	6.5-8.5	6.5-8.5
3	TSS	mg/l	50	50	-
4	DO	mg/l	≥5	≥4	-
5	COD	mg/l	3	4	-
6	NH_4^+ as N	mg/l	0.1	0.5	0.5
7	Fluor (F^-)	mg/l	1.5	1.5	1.5
8	Sulphide (S^{2-})	mg/l	0.005	0.01	0.01
9	Cyanide (CN^-)	mg/l	0.005	0.005	0.01
10	Arsenic (AS)	mg/l	0.01	0.04	0.05
11	Cadmium (Cd)	mg/l	0.005	0.005	0.005
12	Lead (Pb)	mg/l	0.05	0.02	0.1
13	Chromium III (Cr^{3+})	mg/l	0.1	0.1	0.2
14	Chromium VI (Cr^{6+})	mg/l	0.02	0.05	0.05
15	Copper (Cu)	mg/l	0.03	0.5	1.0
16	Zinc (Zn)	mg/l	0.5	1	2
17	Manganese (Mn)	mg/l	0.1	0.1	0.1
18	Iron (Fe)	mg/l	0.1	0.1	0.3
19	Mercury (Hg)	mg/l	0.001	0.002	0.005
20	Hydrocarbon	mg/l	ND	0.1	0.2
21	Total Phenol	mg/l	0.001	0.001	0.002
22	Coliform	MPN/100ml	1000	1000	1000

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ANNEX C – EMPLOYEE CONTACT DETAILS ASSOCIATED WITH MANAGEMENT PLAN

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Role	Responsibilities	Contact Details*
General Manager (Contractor)		• Mobile Number: • Email:
Senior Site Engineer (Contractor)		• Mobile Number: • Email:
Site Supervisor / Foreman (Contractor)		• Mobile Number: • Email:
Site EHS Officer (Contractor)		• Mobile Number: • Email:
Emergency Response Co-ordinator (Contractor)		• Mobile Number: • Email:
[Other]		
[Other]		

*Any change in respect to employees, the contact details will need to amended as soon as the role has been reassigned.

[Note to Contractor: Insert a description of the responsibilities of each role, with regards to the management of EHS and Air Quality (Diffuse Sources). Delete roles that are not appropriate. Include additional roles where required.]

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ANNEX D – WEEKLY REPORTING FORM

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[Note to contractor: The below table provides an example of the details to be included on a Weekly Reporting Form.]

Date of Observation	Contact Details / Role of Individual Undertaking Monitoring	Details of Observation / Location	Mitigation Action to be Taken	Date Mitigation Action was Implemented

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