

## 13 ENVIRONMENTAL MONITORING AND AUDIT

### 13.1 INTRODUCTION

This EIA study has focused on the assessment and mitigation of the potential impacts associated with the phased construction and operation of the Project. One of the key outputs has been the identification of mitigation measures to be undertaken so that residual impacts comply with regulatory requirements including the *EIAO-TM*. To confirm effective and timely implementation of the mitigation measures, it is considered necessary to develop Environmental Monitoring and Audit (EM&A) procedures and mechanisms by which the Implementation Schedule (*Annex 13A*) may be tracked and its effectiveness assessed.

### 13.2 OBJECTIVES OF EM&A

The objectives of carrying out EM&A for the Project include:

- Providing baseline information against which any short or long term environmental impacts of the projects can be determined;
- Providing an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- Monitoring the performance of the Project and the effectiveness of mitigation measures;
- Verifying the environmental impacts identified in the EIA;
- Determining Project compliance with regulatory requirements, standards and government policies;
- Taking remedial action if unexpected results or unacceptable impacts arise; and
- Providing data to enable an environmental audit to be undertaken at regular intervals.

The following *Sections* summarise the recommended EM&A requirements for the Project. Further details are provided in the *EM&A Manual*.

### 13.3 AIR QUALITY

#### 13.3.1 Construction Phase

The EIA Study concluded that no adverse fugitive dust impact is anticipated during the construction phase, and so dust monitoring is considered not necessary. However, it is recommended to conduct regular environmental site inspections, i.e. on a monthly basis, at the GRSs at the BPPS and the LPS to

check the implementation of the dust control measures and good site practices as recommended in *Section 4.10.1* throughout the construction phase.

These measures are also summarised in the Implementation Schedule provided in *Annex 13A*.

### **13.3.2**      *Operation Phase*

No adverse air quality impact is anticipated during the operation of the Project. Environmental monitoring and audit during the operation phase is not considered necessary.

## **13.4**            *HAZARD TO LIFE*

### **13.4.1**        *Construction Phase*

This EIA Study concluded that no unacceptable risks are foreseen as a result of the construction of the proposed Project with safety management measures and safety systems outlined in *Section 5.3.3* and *Annex 5B* in place to manage and minimise the external hazards from construction activities.

These safety measures are summarised in the Implementation Schedule provided in *Annex 13A*.

### **13.4.2**        *Operation Phase*

The EIA study concluded that no unacceptable risks are foreseen as a result of the operation of the Project with safety management measures and safety systems outlined in *Section 5.3.3* and *Annex 5B* in place to manage and minimise the external hazards from operational activities. The safety management system developed for the Project will include regular inspections and audits.

These measures are summarised in the Implementation Schedule provided in *Annex 13A*.

## **13.5**            *NOISE*

The EIA study of the Project concluded that no unacceptable impacts will be associated with the construction or operation of the Project. Based on this, no construction or operational noise monitoring is considered necessary.

## **13.6**            *WATER QUALITY*

### **13.6.1**        *Construction Phase*

A number of mitigation measures and standard site practice measures for marine and land-based construction activities have been recommended to reduce potential impacts to water quality sensitive receivers.

These measures are summarised in the Implementation Schedule provided in *Annex 13A*.

Regular site audits will also be carried out throughout the marine-based construction works in order to confirm that these measures are implemented.

The EIA indicated that marine water quality monitoring at selected WSRs will be required for marine dredging and jetting works for the pipeline construction.

The full details of the EM&A programme for water quality are presented in the *EM&A Manual* for this Project.

### **13.6.2**      *Operation Phase*

The EIA indicated that marine water quality monitoring at selected nearby WSRs will be required during the first year of the LNG Terminal operational phase.

Marine water quality monitoring at selected nearby WSRs will also be required for maintenance dredging (if any) during operation phase of the LNG Terminal.

The full details of the EM&A programme for water quality are presented in the *EM&A Manual* for this Project.

## **13.7**      *WASTE MANAGEMENT*

### **13.7.1**      *Construction Phase*

It is recommended that monthly site audits of the waste management practices be carried out at land-based work sites (at the GRSs at the BPPS and the LPS), and at marine-based work sites (on marine vessels) to determine if wastes are being managed in accordance with the recommended good site practices and the Waste Management Plan. The audits will include all aspects of waste management including waste generation, storage, handling, recycling, transport and disposal. The recommended construction phase waste management measures are summarised in the Implementation Schedule provided in *Annex 13A*.

### **13.7.2**      *Operation Phase*

No operation phase EM&A is considered necessary.

## **13.8**      *ECOLOGY*

### **13.8.1**      *Construction Phase*

This EIA Study in *Section 9.11* recommends that mitigation measures are implemented during the construction phase. During the construction phase, the following EM&A measures will be undertaken to verify the predictions in

the impact assessment and ensure the environmental acceptability of the construction works:

- Water quality impacts will be monitored and checked through the implementation of a Water Quality EM&A programme (refer to *Section 13.6.1* for details). The monitoring and control of water quality impacts will also serve to avoid unacceptable impacts to marine ecological resources and marine parks;
- A marine mammal exclusion zone will also be implemented and monitored by qualified observers for the presence of marine mammals during Jetty underwater percussive piling works and dredging and jetting works of the BPPS Pipeline and the LPS Pipeline; and
- Baseline, impact and post-construction monitoring of marine mammal using vessel-based line transect survey and passive acoustic monitoring (PAM) will be undertaken to keep track of potential changes in the usage of waters in the vicinity of the Project's works areas by FP.

Details of the methods for the above monitoring works are elaborated in the *EM&A Manual*.

The recommended construction phase mitigation measures are summarised in the Implementation Schedule provided in *Annex 13A*.

### 13.8.2 *Operation Phase*

The assessment presented above has indicated that unacceptable operational phase impacts are not expected to occur to marine ecological resources. Consequently, no marine ecology-specific operation phase EM&A measures are considered necessary. During the operation phase, water quality impacts will be monitored and checked through the implementation of a Water Quality EM&A programme (refer to *Section 13.6.2* for details). The monitoring and control of water quality impacts will also serve to avoid unacceptable impacts to marine ecological resources.

The recommended operational phase mitigation measures are summarised in the Implementation Schedule provided in *Annex 13A*.

## 13.9 *FISHERIES*

This EIA Study concludes that no unacceptable impacts are anticipated to occur during the construction and operation of this Project, therefore, monitoring of fisheries resources during these project phases is not considered necessary.

Monitoring activities designed to detect and mitigate impacts to water quality during construction and operation phases are also expected to serve to protect against impacts to fisheries. The details of the water quality monitoring programme are presented in the *EM&A Manual*.

The recommended construction and operational phase mitigation measures are summarised in the Implementation Schedule provided in *Annex 13A*.

### **13.10**      *VISUAL*

This EIA Study concluded the visual impacts from the Project are acceptable. A number of measures to be implemented during design and construction of the Project are recommended in *Section 11.8*, to further enhance the visual elements associated with the Project. These are summarised in the Implementation Schedule provided in *Annex 13A*.

No construction and operation phase EM&A programme is considered necessary.

### **13.11**      *CULTURAL HERITAGE*

This EIA Study concluded no impacts to archaeological resources are expected, therefore no mitigation measure and environmental monitoring is required.

Annex 13A

## Implementation Schedule

**Table 13A.1 Implementation Schedule of Recommended Mitigation Measures**

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
<b>Air Quality</b>								
S4.10.1	S2.1	Impervious sheet will be provided for skip hoist for material transport.	Land site/ During Construction, particularly dry season	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	The area where dusty work takes place should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after dusty activities as far as practicable.	Land site/ During Construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	All dusty materials should be sprayed with water or a dust suppression chemical immediately prior to any loading, unloading or transfer operation.	Land site/ During Construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	Dropping heights for excavated materials should be controlled to a practical height to minimise the fugitive dust arising from unloading.	Land site/ During Construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	During transportation by truck, materials should not be loaded to a level higher than the side and tail boards, and should be dampened or covered before transport.	Land site/ During Construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	Wheel washing device should be provided at the exits of the work sites. Immediately before leaving a construction site, every vehicle shall be washed to remove any dusty	Land site/ During Construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>

(1) D = Design Phase, C = Construction Phase, O = Operational Phase

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		material from its body and wheels as far as practicable.						
S4.10.1	S2.1	Road sections between vehicle-wash areas and vehicular entrance will be paved.	Land site/ During Construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	Haul roads will be kept clear of dusty materials and will be sprayed with water so as to maintain the entire road surface wet at all times.	Land site/ During construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	Temporary stockpiles of dusty materials will be either covered entirely by impervious sheets or sprayed with water to maintain the entire surface wet all the time.	Land site/ During construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	Stockpiles of more than 20 bags of cement, dry pulverised fuel ash and dusty construction materials will be covered entirely by impervious sheeting sheltered on top and 3-sides.	Land site/ During construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	All exposed areas will be kept wet always to minimise dust emission.	Land site/ During construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	Ultra-low-sulphur diesel (ULSD), defined as diesel fuel containing not more than 0.005% sulphur by weight, will be used for all construction plant on-site.	Land site/ During construction/ During Operation	Contractor(s) / Project Proponent		✓	✓	<i>Environment, Transport and Works Bureau Technical Circular (ETWB-TC(W)) No 19/2005 on Environmental Management on Construction Sites</i>
S4.10.1	S2.1	The engine of the construction equipment during idling will be switched off.	Land site/ During construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
S4.10.1	S2.1	Regular maintenance of construction equipment deployed on-site will be conducted to prevent black smoke emission.	Land site/ During construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S4.10.1	S2.1	All marine vessels fuelled in Hong Kong are required to operate using marine light diesel with sulphur content lower than 0.05%.	Marine site/ During construction/ During Operation	Contractor(s) / Project Proponent		✓	✓	<i>Air Pollution Control (Marine Light Diesel) Regulation</i>
S4.10.1	S2.1	Non-road mobile machinery (NRMMS), e.g. mobile generator and air compressor, shall comply with the prescribed emission standards and approved with a proper label by EPD.	Land and marine site/ During construction	Contractor(s)		✓		<i>Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation</i>
S4.10.1	S2.1	To ensure proper implementation of the recommended dust mitigation measures and good construction site practices during the construction phase of the GRSS and the BPPS and the LPS, environmental site audits on monthly basis is recommended throughout the construction period.	Land site/ During construction	Contractor(s)/ Environmental Team (ET) & Independent Environmental Checker (IEC)		✓		-
S4.10.2	S2.2	LNGCs shall comply with the fuel restriction requirement under the <i>Air Pollution Control (Ocean Going Vessels) (Fuel at berth) Regulation</i> .	Marine site/ During operation	Project Proponent			✓	<i>Air Pollution Control (Ocean Going Vessels) (Fuel at berth) Regulation</i>
<b>Hazard to Life</b>								
S5.3.3	S3	All personnel within the BPPS shall comply with CLP safety policy and requirements.	Land site/ During construction	Contractor(s) / Project Proponent		✓	✓	-
S5.3.3	S3	All personnel within the LPS shall comply with HK Electric safety policy and requirements.	Land site/ During construction	Contractor(s) / Project Proponent		✓	✓	-
S5.3.3	S3	All operation work procedures shall be complied with the operating plant	Land site/ During construction	Contractor(s) / Project Proponent		✓	✓	-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		procedures or guidelines and regulatory requirements.						
S5.3.3	S3	All personnel shall be equipped with appropriate personal protective equipment (PPE) when working at the BPPS and LPS facilities.	Land site/ During construction	Contractor(s) / Project Proponent		✓	✓	-
S5.3.3	S3	Safety training and briefings shall be provided to all personnel.	Land site/ During construction	Contractor(s) / Project Proponent		✓	✓	-
S5.3.3	S3	Regular site safety inspections/ audits shall be conducted.	Land site/ During construction/ During Operation	Contractor(s) / Project Proponent		✓	✓	-
S5.3.3	S3	Method statements and risk assessments shall be prepared and safety control measures shall be in place before commencement of work.	Land site/ During construction	Contractor(s)		✓		-
S5.3.3	S3	Work permit system, on-site pre-work risk assessment and emergency response procedure shall be in place before commencement of work.	Land site/ During construction	Contractor(s)		✓		-
S5.3.3	S3	All construction workers shall be under close site supervision during the construction phase of the GRSs.	Land site/ During construction	Contractor(s)		✓		-
S5.4.1	S3	An emergency response plan will be put in place which fully documents the procedures to be followed in the event of an emergency.	Transit of the LNGC and FSRU Vessel under Emergency Situation/ During operation	Project Proponent			✓	-
S5.3.3	S3	Method statements and risk assessments shall be prepared and safety control measures should be in place before the commencement of construction works	LNG Terminal/ During construction	Contractor(s)		✓		-
S5.3.3	S3	Work permit system, on-site pre-work risk assessment and emergency response	LNG Terminal/ During construction	Contractor(s)		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		procedure shall be in place before commencement of construction works						
S5.3.3	S3	All construction workers shall be under close site supervision during the construction phase of the LNG Terminal	LNG Terminal/ During construction	Contractor(s)		✓		-
S5.3.3	S3	All personnel within the LNG Terminal shall comply with relevant safety policy and requirements	LNG Terminal/ During operation	Project Proponent			✓	-
S5.3.3	S3	All operation work procedures shall be complied with relevant codes and standards (e.g. SIGTTO) and regulatory requirements	LNG Terminal/ During operation	Project Proponent			✓	-
S5.3.3	S3	Work permit system and emergency response procedure shall be in place	LNG Terminal/ During operation	Project Proponent			✓	-
S5.3.3	S3	Robust and extended process control system, safety control system, fire-fighting system and security system shall be provided	LNG Terminal/ During operation	Project Proponent			✓	-
S5.3.3	S3	Sufficient and trained / competent staff shall be provided to operate the LNG Terminal	LNG Terminal/ During operation	Project Proponent			✓	-
S5.3.3	S3	Regular safety inspections/audits shall be conducted	LNG Terminal/ During operation	Project Proponent			✓	-
<b>Noise</b>								
S6.7	S4	N/A						
<b>Water Quality</b>								
S7.9.1	S5	A detailed hydrotesting procedure for subsea pipelines will be developed that will detail how the process will be carried out, how it will be carefully controlled and monitored, and how the intake and subsequent discharge of the sea water will be managed.	LNG Terminal/ During Construction	Contractor(s)		✓		TM Standard under the WPCO, WPCO license requirements, WQO
S7.9.1	S5	Adoption of appropriate dredging and jetting rates, plant numbers and silt curtains at the plant and WSRs, where applicable ( <i>Table 7.18</i> )	Marine Dredging & Jetting/ During construction	Contractor(s)		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		of the EIA Report, reprovided as <i>Table 13A.2</i> below)						
S7.9.1	S5	Grab dredging can be conducted concurrently with one TSHD.	Marine Dredging/ During construction	Contractor(s)		✓		-
S7.9.1	S5	One jetting machine will be working on each pipeline.	Marine Jetting/ During construction	Contractor(s)		✓		-
S7.9.1	S5	Cofferdam construction and removal at landfalls of BPPS and LPS (where required) should not be conducted concurrently with the nearby pipeline dredging sections (BPPS KP44.9 - 45.0 and LPS KP17.4-18.2). Silt curtain surrounding the works areas for cofferdam construction and removal at pipeline landfalls of the BPPS and the LPS should also be implemented.	Pipeline landfalls/ During Construction	Contractor(s)		✓		-
S7.9.1/ S7.9.2	S5	The following measures shall be followed for provision of silt curtain: <ul style="list-style-type: none"> <li>The silt curtain shall be formed and installed in such a way that tidal rise and fall are accommodated, with the silt curtains always extending from the surface to the bottom of the water column and held with anchor blocks.</li> <li>Schematic diagrams on silt curtain deployment are provided in <i>Figures 7.4</i> and <i>7.5</i>.</li> <li>The contractor shall regularly inspect the silt curtains and check that they are moored and marked to avoid danger to marine traffic.</li> </ul>	Marine Dredging & Jetting/ During construction  Marine Maintenance Dredging (LNG Terminal) / During operation	Contractor(s)		✓	✓	-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		<ul style="list-style-type: none"> <li>Regular inspection on the integrity of the silt curtain should be carried out by the contractor and any damage to the silt curtain shall be repaired by the contractor promptly.</li> <li>Relevant marine works shall only be undertaken when the repair is fixed to the satisfaction of the engineer</li> </ul>						
S7.9.1 / S7.9.2	S5	All vessels should be well maintained and inspected before use to limit any potential discharges to the marine environment.	Marine Dredging/ During construction  Marine Maintenance Dredging (LNG Terminal) / During operation	Contractor(s)		✓	✓	-
S7.9.1	S5	All vessels must have a clean ballast system.	Marine Dredging/ During construction	Contractor(s)		✓		-
S7.9.1 / S7.9.2	S5	No overflow is permitted from the trailing suction hopper dredger 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.	Marine Dredging/ During construction  Marine Maintenance Dredging (LNG Terminal) / During operation	Contractor(s)		✓	✓	
S7.9.1 / S7.9.2	S5	Dredged marine mud will be disposed of in a gazetted marine disposal area in accordance with the Dumping at Sea Ordinance (DASO) permit conditions.	Marine Dredging/ During construction  Marine Maintenance Dredging (LNG Terminal) / During operation	Contractor(s)		✓	✓	
S7.9.1 / S7.9.2	S5	Dredgers will maintain adequate clearance between vessels and the seabed at all states of	Marine Dredging/ During construction	Contractor(s)		✓	✓	

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		the tide and reduce operations speed to ensure that excessive turbidity is not generated by turbulence from vessel movement or propeller wash.	Marine Maintenance Dredging (LNG Terminal) / During operation					
S7.9.1 / S7.9.2	S5	Marine works shall not cause foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the works site. Wastewater from potentially contaminated area on working vessels should be minimised and collected. These kinds of wastewater should be brought back to port and discharged at appropriate collection and treatment system.	Marine Dredging/ During construction & During operation	Contractor(s)		✓	✓	-
S7.9.1 / S7.9.2	S5	No soil waste is allowed to be disposed overboard.	Marine Dredging/ During construction & During operation	Contractor(s)		✓	✓	-
S7.9.1	S5	Appropriate infiltration control, such as cofferdam wall, should be adopted to limit groundwater inflow to the excavation works areas in the Project site. Groundwater pumped out from excavation area should be discharged into the storm system via silt removal facilities.	Land site & drainage/ During construction	Contractor(s)		✓		
S7.9.1	S5	Silt removal facilities such as silt traps or sedimentation facilities will be provided to remove silt particles from runoff to meet the requirements of the TM standard under the WPCO. The design of silt removal facilities will be based on the guidelines provided in ProPECC PN 1/94. All drainage facilities and erosion and sediment control structures will be inspected on a regular basis and maintained to confirm proper and efficient operation at all times and particularly during	Land site & drainage/ During construction	Contractor(s)		✓		ProPECC PN 1/94, TM Standard under the WPCO

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		rainstorms. Deposited silt and grit will be removed regularly.						
S7.9.1	S5	Earthworks to form the final surfaces will be followed up with surface protection and drainage works to prevent erosion caused by rainstorms.	Land site & drainage/ During construction	Contractor(s)		✓		-
S7.9.1	S5	Appropriate surface drainage will be designed and provided where necessary.	Land site & drainage/ During construction	Contractor(s)		✓		-
S7.9.1	S5	The precautions to be taken at any time of year when rainstorms are likely together with the actions to be taken when a rainstorm is imminent or forecasted and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94.	Land site & drainage/ During construction	Contractor(s)		✓		ProPECC PN 1/94
S7.9.1	S5	Oil interceptors will be provided in the drainage system where necessary and regularly emptied to prevent the release of oil and grease into the storm water drainage system after accidental spillages.	Land site & drainage/ During construction	Contractor(s)		✓		-
S7.9.1	S5	Temporary and permanent drainage pipes and culverts provided to facilitate runoff discharge, if any, will be adequately designed for the controlled release of storm flows.	Land site & drainage/ During construction	Contractor(s)		✓		-
S7.9.1	S5	The temporary diverted drainage, if any, will be reinstated to the original condition when the construction work has finished or when the temporary diversion is no longer required.	Land site & drainage/ During construction	Contractor(s)		✓		-
S7.9.1	S5	Appropriate numbers of portable toilets shall be provided by a licensed contractor to serve	Land site & drainage/ During construction	Contractor(s)		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		the construction workers over the construction site to prevent direct disposal of sewage into the water environment. No onsite discharge from these chemical toilets would be allowed.						
S 7.9.2	S5	Mitigation measures for maintenance dredging at the LNG Terminal in form of controlled dredging rate (maximum of 5,500m <sup>3</sup> day <sup>-1</sup> ) as well as silt curtain should be implemented for the control of sediment dispersion and the protection of the nearby WSRs.	Marine Maintenance Dredging (LNG Terminal) / During operation	Contractor(s) / Project Proponent			✓	-
S 7.9.2 / S9.11.3	S5 / S7	A project-specific contingency plan (including protocols for avoidance, containment, remediation and reporting accidental fuel spill event) will be prepared and implemented to contain and clean up the spilled or leaked fuels or chemicals at the LNG Terminal, surrounding waters and marine parks.	Fuel spillage / During operation	Contractor(s) / Project Proponent			✓	
S7.12.1	S5.2-S5.5	Marine water quality monitoring at selected WSRs is recommended for marine dredging and jetting works for the pipeline construction.	Designated monitoring stations as defined in EM&A Manual/During marine construction period	Environmental Team (ET)		✓		-
S7.12.1	S5.2-S5.5	To ensure proper implementation of the recommended mitigation measures and good construction site practices during marine-based construction works, environmental site audits on a regular basis is recommended throughout the construction period.	Marine site/ During construction	Contractor(s)/ Environmental Team (ET) & Independent Environmental Checker (IEC)		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
S7.12.2	S5.2-S5.5	Water quality monitoring at the selected nearby WSRs is recommended for first year of operation of the LNG Terminal.	During operation	Environmental Team (ET)/ Project Proponent			✓	TM Standard under the WPCO, WPCO license requirements, WQO
S7.12.2	S5.2-S5.5	During maintenance dredging at the LNG Terminal, water quality monitoring at the selected nearby WSRs would be required.	Marine Maintenance Dredging (LNG Terminal)/ During operation	Contractor(s) / Project Proponent			✓	TM Standard under the WPCO, WPCO license requirements, WQO
<b>Waste Management</b>								
S8.5	S6.2	The contractor(s) will nominate approved personnel to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site.	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-
S8.5	S6.2	Good waste management practices should be implemented: <ul style="list-style-type: none"> <li>• Training of site personnel in proper waste management and chemical handling procedures;</li> <li>• Separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Centre;</li> <li>• Encourage collection of aluminium cans and waste paper by individual collectors during construction with separate labelled bins provided to segregate these wastes from other general refuse by the workforce;</li> <li>• Any unused chemicals, and those with remaining functional capacity, be recycled as far as possible;</li> <li>• Prior to disposal of C&amp;D materials, wood, steel and other metals will be separated, to the extent practical for re-use and/or recycling to reduce the</li> </ul>	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		<p>quantity of waste to be disposed in a landfill;</p> <ul style="list-style-type: none"> <li>• Proper storage and site practices to reduce the potential for damage or contamination of construction materials; and</li> <li>• Plan and stock construction materials carefully to reduce amount of waste generated and avoid unnecessary generation of waste.</li> </ul>						
S8.5	Table 6.1	The contractor(s) must provide sufficient waste disposal points. Wastes will be collected and removed from site in a timely manner.	All areas/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S8.5	Table 6.1	The contractor(s) will have appropriate measures to reduce windblown/ floating litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers.	All areas/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S8.5	Table 6.1	The contractor(s) will take and keep records of quantities of wastes generated, recycled and disposed of and the disposal sites.	All areas/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S8.5	Table 6.1	The contractor(s) must segregate and store different types of waste in different containers, skips or stockpiles to enhance reuse and recycling of material and proper disposal of waste.	All areas/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S8.5	S6.2	The contractor(s) will use reusable non-timber formwork to reduce the amount of C&D materials.	All areas/ During construction	Contractor(s)		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
S8.5	Table 6.1	The contractor(s) must ensure that all the necessary waste disposal and marine dumping permits or licences are obtained prior to the commencement of the construction works.	During construction	Contractor(s)		✓		-
S8.5	S6.2	The contractor will open a billing account with EPD in accordance with the <i>Waste Disposal (Charges for Disposal of Construction Waste) Regulation</i> for the payment of disposal charges.	During construction	Contractor(s)		✓		<i>Cap 354N Waste Disposal (Charges for Disposal of Construction Waste) Regulation</i>
S8.5	S6.2	A trip-ticket system will be established in accordance with <i>DEVB TC(W) No. 6/2010</i> to monitor the reuse of surplus excavated materials off-site and disposal of construction waste and general refuse at transfer facilities/ landfills, and to control fly-tipping.	During construction	Contractor(s)		✓		<i>DEVB TC(W) No. 6/2010, Trip Ticket System for Disposal of Construction &amp; Demolition Materials</i>
S8.5	S6.2	A WMP as stated in the <i>PNAP ADV-19</i> for the amount of waste generated, recycled and disposed of (including the disposal sites) will be established and implemented during the construction phase as part of the Environmental Management Plan (EMP). The Contractor will be required to prepare the EMP and submits it to the Architect/ Engineer under the Contract for approval prior to implementation.	All area/ During construction	Contractor(s)		✓		<i>PNAP ADV-19</i>
S8.5	Table 6.1	The management of dredged marine sediment requirement from <i>PNAP ADV-21</i> will be incorporated in the Contract for the construction and maintenance dredging during the operation of the Project.	Marine works/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	<i>PNAP ADV-21 and Dumping at Sea Ordinance (DASO)</i>

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
S8.5/ S7.9	S6.2 / S5	Disposal vessels will be fitted with tight bottom seals in order to prevent leakage of material during transport.	Dredged areas/ During Construction	Contractor(s)/ Project Proponent		✓	✓	<i>Dumping at Sea Ordinance (DASO)</i>
S8.5/ S7.9	S6.2 / S5	Barges will be filled to a level, which ensures that of marine sediment and marine sediment laden water does not spill over during loading or transport to the disposal site and that adequate freeboard is maintained to ensure that the decks are not washed by wave action.	Dredged areas/ During Construction	Contractor(s)/ Project Proponent		✓	✓	<i>Dumping at Sea Ordinance (DASO)</i>
S8.5/ S7.9	S6.2 / S5	After dredging, any excess materials will be cleaned from decks and exposed fittings before the vessel is moved from the dredging area.	Dredged areas/ During Construction	Contractor(s)/ Project Proponent		✓	✓	<i>Dumping at Sea Ordinance (DASO)</i>
S8.5/ S7.9	S6.2 / S5	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 clean in a way that permits material to be released overboard.	Dredged areas/ During Construction	Contractor(s)/ Project Proponent		✓	✓	
S8.5	S6.2	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.	Dredged areas/ During Construction	Contractor(s)/ Project Proponent		✓	✓	
S8.5	Table 6.1	C&D materials will be segregated on-site into public fill and non-inert C&D materials and stored in different containers or skips to facilitate reuse of the public fill and proper	During construction	Contractor(s)		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		disposal of the construction waste. Specific areas of the land and marine-based construction sites will be designated for such segregation and storage if immediate use is not practicable. Prefabrication will be adopted as far as practicable to reduce the construction waste arisings.						
S8.5	Table 6.1	The contractor(s) will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the <i>Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i> .	All area/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i>
S8.5	Table 6.1	Containers used for storage of chemical wastes will: <ul style="list-style-type: none"> <li>• Be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed;</li> <li>• Have a capacity of less than 450 L unless the specifications have been approved by the EPD; and</li> <li>• Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations.</li> </ul>	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i>
S8.5	Table 6.1	The storage area for chemical wastes will: <ul style="list-style-type: none"> <li>• Be clearly labelled and used solely for the storage of chemical waste;</li> <li>• Be enclosed on at least 3 sides;</li> <li>• Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the</li> </ul>	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i>

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		<p>chemical waste stored in that area, whichever is the greatest;</p> <ul style="list-style-type: none"> <li>• Have adequate ventilation;</li> <li>• Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and</li> <li>• Be arranged so that incompatible materials are appropriately separated.</li> </ul>						
S8.5	Table 6.1	<p>Chemical waste will be disposed of:</p> <ul style="list-style-type: none"> <li>• Via a licensed waste collector; and</li> <li>• To a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility which also offers a chemical waste collection service and can supply the necessary storage containers.</li> </ul>	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i>
S8.5	Table 6.1	<p>General refuse (including the floating refuse collected) will be stored in enclosed bins separately from C&amp;D materials and chemical wastes. Floating refuse will be collected on an 'as needed' basis for disposal as general refuse. Workers will be prohibited from throwing rubbish into the sea and adequate bins will be provided on both land and marine-based sites and marine vessels. General refuse will be delivered separately from C&amp;D materials and chemical wastes for offsite disposal on a regular basis to reduce odour, pest and litter impacts. General refuse from the marine vessels will be collected and disposed on shore.</p>	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-
S8.5	Table 6.1	<p>Recycling bins will be provided at strategic locations within the land and marine-based construction site and marine vessels to</p>	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		facilitate recovery of recyclable materials (including aluminium can, waste paper, glass bottles and plastic bottles) from the Project Site. Materials recovered will be sold for recycling.						
S8.5	S6.2	To avoid any odour and litter impact, appropriate number of portable toilets will be provided for workers on-site.	All areas/ During construction/ During operation	Contractor(s)		✓		-
S8.5	S6.2	At the commencement of the construction works and operations, training will be provided to workers on the concepts of site cleanliness and on appropriate waste management procedures, including waste reduction, reuse and recycling. In particular, the training will emphasize no dumping of waste into the sea is allowed, particularly at marine-based work sites and on marine vessels.	All areas/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-
S8.5	S6.2	Industrial waste arising from maintenance activities will be segregated. Scrap metals and recyclables will be sent for recycling to reduce the overall quantity of waste disposed from these activities.	All areas / During operation	Project Proponent			✓	-
S8.7	S6.1	It is recommended that monthly audits of the waste management practices be carried out during the construction phase land-based work sites (at the GRSs at the BPPS and the LPS), and at marine-based work sites (on marine vessels and Jetty) to determine if wastes are being managed in accordance with the recommended good site practices and WMP. The audits will include all aspects of waste management including waste	All areas/ During construction	Contractor(s)/ Environmental Team (ET) & Independent Environmental Checker (IEC)		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		generation, storage, handling, recycling, transportation and disposal, to prevent any dumping of waste into the sea or malpractice of waste disposal.						
<b>Ecology</b>								
S9.11.2	S7	The vessel operators will be required to control and manage all effluent from vessels. These kinds of wastewater shall be brought back to port where possible and discharged at appropriate collection and treatment system to prevent avoidable water quality impact.	Marine works/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-
S9.11.2	S7	A policy of no dumping of rubbish, food, oil, or chemicals will be strictly enforced. This will also be covered in the contractor briefings.	Marine works/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S9.11.2	S7	Only well-maintained and inspected vessels would be used to limit any potential discharges to the marine environment	Marine works/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S9.11.2	S7	Standard site practices outlined in <i>ProPECC PN 1/94 "Construction Site Drainage"</i> will be followed as far as practicable in order to reduce surface runoff, minimise erosion, and also to retain and reduce any SS prior to discharge.	Marine works/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	<i>ProPECC PN 1/94</i>
S9.11.3	S7	Pipeline dredging/ jetting works between North of Tai O and Fan Lau (BPPS KP21.3 to 15.6) will avoid the peak months of Chinese White Dolphin (CWD) calving (May and June).	Marine works (Dredging/ jetting works between North of Tai O and Fan Lau along the BPPS Pipeline)/ During construction	Contractor(s)		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
S9.11.3	S7	Pipeline dredging/ jetting works between South of Soko Islands and the LNG Terminal (BPPS KP8.9 to 0.0) will be restricted to a daily maximum of 12 hours with daylight (0700 – 1900) operations.	Marine works (Dredging/ jetting works between South of Soko Islands and the LNG Terminal along the BPPS Pipeline) / During construction	Contractor(s)		✓		-
S9.11.3	S7	Pipeline dredging/ jetting from LNG Terminal to South of Shek Kwu Chau (LPS KP0.0 to 5.0) will be restricted to a daily maximum of 12 hours with daytime (0700 – 1900) operations.	Marine works (Dredging/ jetting works between from LNG Terminal to South of Shek Kwu Chau along the LPS Pipeline) / During construction	Contractor(s)		✓		-
S9.11.3	S7	Use of vibratory/ hydraulic pushing method to vibrate / push the open-ended steel tubular pile for the upper layer of the seabed and only use hydraulic hammer (if needed) to install the remainder of the pile length through the lower layer of the seabed. During underwater percussive piling works: <ul style="list-style-type: none"> <li>• Quieter hydraulic hammers should be used instead of the noisier diesel hammers;</li> <li>• Use of Noise Reduction System for hydraulic hammering;</li> <li>• Acoustic decoupling of noisy equipment on work barges should be undertaken;</li> <li>• Using ramp-up piling procedures. This comprises of low energy driving for a period of time prior to commencement of full piling. This will promote avoidance of the area by marine mammals when sounds levels are not injurious. Blow frequency during this</li> </ul>	Marine works (Piling at the LNG Terminal) / During construction	Contractor(s)		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		<p>ramping up period should replicate the intensity that would be undertaken during full piling (e.g. one blow every two seconds) to provide cues for marine mammals to localize the sound source. Pile blow energy should be ramped up gradually over the 'soft start' period. Activities will be continuous without short-breaks and avoiding sudden random loud sound emissions;</p> <ul style="list-style-type: none"> <li>• Underwater percussive piling should be conducted inside a bubble curtain so as to ameliorate underwater sound level transmission;</li> <li>• The percussive pile driving will be conducted during the daytime (0700 - 1900) for a maximum of 12 hours, avoiding generation of underwater sounds at night time; and</li> <li>• Underwater percussive piling works for the Jetty construction will avoid the peak season of FP (December to May).</li> </ul>						
S9.11.3	S7	The vessel operators of this Project will be required to use predefined and regular routes (that do not encroach into existing and proposed marine parks), make use of designated fairways to access the works areas, and would avoid traversing sensitive habitats such as existing and proposed marine parks (with the exception of the FSRU Vessel which will need to transit through the proposed SLMP during manoeuvring to the Jetty and after typhoon event due to its safe operational requirement).	Marine works/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
S9.11.3	S7	Any anchoring/ anchor spread requirements during Project construction will avoid encroachment into the existing and proposed marine parks.	Marine works (on existing, planned and potential marine parks)/ During construction	Contractor(s)/ Project Proponent		✓		-
S9.11.3	S7	Silt curtain deployment during Project construction and maintenance dredging will avoid encroachment into the existing and proposed marine parks.	Marine works (on existing, planned and potential marine parks)/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-
S9.11.3	S7	No stopping over or anchoring activity of vessels related to the Project should be conducted within existing and proposed marine parks, even before, during and after typhoon.	Marine works (on existing, planned and potential marine parks)/ During construction/ During operation	Contractor(s)/ Project Proponent		✓	✓	-
S9.11.3	S7	Use of appropriate dredging and jetting rates with the use of silt curtain where needed as recommended in the Water Quality section ( <i>Section 7</i> of the EIA Report) to reduce potential water quality impacts from elevated suspended solids (SS) due to the proposed marine works.	Marine works/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S9.11.3	S7	Silt curtain will be checked and maintained to ensure its effectiveness in mitigating water quality impacts on existing, planned and potential marine parks.	Marine works/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S9.11.3	S7	All vessel operators working on the Project will be given a briefing, alerting them to the locations of the existing, proposed and potential marine parks and the regulations for marine parks, the possible presence of dolphins and porpoises in the marine works areas, and the guidelines for safe vessel	Marine works/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		operation in the presence of cetaceans. The vessels will avoid using high speed as far as possible. By observing the guidelines, vessels will be operated in an appropriate manner so that marine mammals will not be subject to undue disturbance or harassment.						
S9.11.3	S7	All vessels used in this Project will be required to slow down to 10 knots around the Project's marine works areas and areas with high dolphin and porpoise usage, including existing and proposed marine parks. With implementation of this measure, the chance of vessel strike resulting in physical injury or mortality of marine mammals will be extremely unlikely.	Marine works/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-
S9.11.3	S7	During underwater percussive piling works, a marine mammal exclusion zone within a radius of 500m radius will be implemented during underwater percussive piling works. Qualified observer(s) will scan an exclusion zone of 500m radius around the work area for at least 30 minutes prior to the start of piling. If a marine mammal is observed in the exclusion zone, piling will be delayed until they have left the area. This measure will ensure the area in the vicinity of the underwater percussive piling work is clear of marine mammals prior to the commencement of works and will serve to reduce any disturbance to marine mammals. When a marine mammal is spotted by qualified personnel within the exclusion zone, piling works will cease and will not resume until the observer confirms that the zone has been continuously clear of the marine mammal for	Marine works/ During construction	Contractor(s) / Project Proponent		✓		-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		a period of 30 minutes. This measure will ensure the area in the vicinity of the piling is clear of the marine mammal during works and will serve to reduce any disturbance to marine mammals.						
S9.11.3	S7	During marine dredging or jetting operations, a marine mammal exclusion zone within a radius of 250m from dredger or jetting machine will be implemented. Qualified observer(s) will scan an exclusion zone of 250m radius around the work area for at least 30 minutes prior to the start of dredging or jetting. If cetaceans or other megafauna are observed in the exclusion zone, dredging or jetting will be delayed until they have left the area. This measure will ensure the area in the vicinity of the dredging or jetting work is clear of marine mammals prior to the commencement of works and will serve to reduce any disturbance to marine mammals. When a marine mammal is spotted by qualified personnel within the exclusion zone, dredging or jetting works will cease and will not resume until the observer confirms that the zone has been continuously clear of the marine mammal for a period of 30 minutes. This measure will ensure the area in the vicinity of the works is clear of the marine mammal during works and will serve to reduce any disturbance to marine mammals. If necessary, for night-time works, exclusion zone monitoring for FP by underwater acoustic means would be explored to supplement the exclusion zone monitoring by trained observers. A site trial will be conducted to demonstrate its	Marine works/ During construction/ During operation	Contractor(s) / Project Proponent		✓	✓	-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		practicability/ effectiveness before actual implementation during the night-time works.						
S9.11.3	S7	Implementation of a contingency plan to contain and clean up the spilled or leaked fuels or chemicals at the LNG Terminal, surrounding waters and marine parks.	Marine site/ During operation	Contractor(s) / Project Proponent			✓	-
S9.15.1	S7	Baseline, impact and post-construction monitoring of marine mammal using vessel-based line transect surveys and passive acoustic monitoring (PAM) will be undertaken to keep track of potential changes in the usage of waters in the vicinity of the Project's works areas by FP. Prior to the commencement of monitoring, methods will be agreed with the AFCD.	Marine site/ During construction	Contractor(s) / ET/ Project Proponent		✓		-
<b>Fisheries</b>								
S10.8	S8	The mitigation measures designed to mitigate impacts to water quality to acceptable levels (compliance with assessment criteria) and marine ecological impacts are expected to mitigate impacts to fisheries resources.	During construction and operation	Contractor(s) / Project Proponent / Environmental Team (ET) & Independent Environmental Checker (IEC)		✓	✓	-
S10.8	S8	Impingement and entrainment of fisheries resources will be reduced through appropriate design of the intake screens on the cooling water intake.	During operation	Contractor(s) / Project Proponent			✓	-
<b>Visual</b>								
S11.8	S9	Sensitive architectural design of the new facilities. This should take into account material texture, colour, finished to structure and the context of the site to ensure the GRSs at the BPPS and LPS blend into the existing context, cause least disturbance to the	All areas/ Detailed design/ During operation	Design Contractor / Project Proponent	✓	✓	✓	-

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage <sup>1</sup>			Relevant Legislation & Guidelines
					D	C	O	
		existing land. LNG Terminal will be designed for marine safety and operations, in accordance with relevant standards and regulations and sensitive architectural design will be considered where practicable.						
S11.8	S9	Pre-construction and construction period for the GRSs and LNG Terminal should be reduced as far as practical to lower visual impact.	All areas/ During construction	Contractor(s)		✓		-
S11.8	S9	Following construction, land areas temporarily affected by the construction works, will be reinstated to their former state.	Land site/ During construction	Contractor(s)		✓		-
S11.8	S9	Light intensity and beam directional angle should be controlled at the GRSs and the LNG Terminal at the design stage to reduce light pollution and glare (e.g. hooded lights, specific directional focus, etc.).	All areas/ Detailed design/ During operation	Design Contractor / Project Proponent	✓		✓	-
S11.8	S9	Any plants to be affected by the GRSs at the BPPS and the LPS should be preserved and care taken to ensure the existing health status of the vegetation is maintained or enhanced after construction.	All areas/ During construction	Contractor(s)		✓		-
<b>Cultural Heritage</b>								
S12.7	S10	N/A						

**Table 13A.2 Summary of Mitigation Measures for Pipeline Construction Works**

Work Location	Plants Involved	Allowed Maximum Work Rate	Silt Curtain at Plants	Silt Curtain at WSRs	Other Measures <sup>(1)</sup>
<b>LPS Pipeline</b>					
Pipeline shore approach at LPS (KP17.4-18.2)	1 Grab Dredger	1,600m <sup>3</sup> day <sup>-1</sup> for 24 hours each day	Yes	Not required	
West Lamma Channel (KP14.5-17.4)	1 Jetting Machine	1,000m day <sup>-1</sup> for 24 hours each day	Yes	Not required	
South of Shek Kwu Chau to West Lamma Channel (KP5.0-14.5)	1 Jetting Machine	7,000m day <sup>-1</sup> for 24 hours each day	Yes	Not required	
Double Berth Jetty to South of Shek Kwu Chau (KP0.1-5.0)	1 Jetting Machine	720m day <sup>-1</sup> for 24 hours each day	Yes	Two layers at Eastern Boundary of the Proposed South Lantau MP (KP0.1-5.0)	Daily maximum of 12 hours with daylight (0700 - 1900)
<b>Pipeline Riser Sections at Double Berth Jetty</b>					
Pipeline Riser (KP0.0 - 0.1 for both pipelines)	1 Grab Dredger	8,000m <sup>3</sup> day <sup>-1</sup> for 24 hours each day	Yes	Not required	Daily maximum of 12 hours with daylight (0700 - 1900)
<b>BPPS Pipeline</b>					
Jetty Approach (KP0.1 - 5.0)	1 Jetting Machine	1,000m day <sup>-1</sup> for 24 hours each day	Yes	Two layers at Southern Boundary of the Proposed South Lantau MP (KP0.1-8.9)	Daily maximum of 12 hours with daylight (0700 - 1900)
South of Soko Islands (KP5.0 - 8.9)	1 Jetting Machine	1,000m day <sup>-1</sup> for 24 hours each day	Yes	Not required	
Southwest of Soko Islands (KP8.9 - 12.1)	1 Jetting Machine	1,000m day <sup>-1</sup> for 24 hours each day	Yes	Not required	
Adamasta Channel (KP12.1 - 15.6)	1 Jetting Machine	1,000m day <sup>-1</sup> for 24 hours each day	Yes	Not required	
Southwest Lantau (KP15.6 - 21.3)	2 Grab Dredgers	Total 16,000m <sup>3</sup> day <sup>-1</sup> for 24 hours each day 8,000m <sup>3</sup> day <sup>-1</sup> for each plant	Yes	Not required	Avoid the peak months of Chinese White Dolphin (CWD) calving (May and June)
	1 TSHD (Alternative)	57,600m <sup>3</sup> day <sup>-1</sup> for 24 hours each day	Not required	Not required	
West of Tai O to West of HKIA (KP21.3 - 31.5)	1 Jetting Machine	1,500m day <sup>-1</sup> for 24 hours each day from KP KP26.2 to 21.3 720m day <sup>-1</sup> for 24 hours each day from KP31.5 to 26.2	Yes	Not required	

Work Location	Plants Involved	Allowed Maximum Work Rate	Silt Curtain at Plants	Silt Curtain at WSRs	Other Measures <sup>(1)</sup>
Sha Chau to Lung Kwu Chau (KP31.5 - 36.0)	1 Jetting Machine	720m day <sup>-1</sup> for 24 hours each day	Yes	Two layers at Western Boundary of the Sha Chau and Lung Kwu Chau MP (KP31.5-36.0)	
Sha Chau to Lung Kwu Chau (KP36.0 - 37.5)	1 Grab Dredger	8,000m <sup>3</sup> day <sup>-1</sup> for 24 hours each day	Yes	Not required	
Lung Kwu Chau to Urmston Anchorage (37.5 - 41.1)	1 Jetting Machine	1,000m day <sup>-1</sup> for 24 hours each day	Yes	Two layers at NW corner of Sha Chau and Lung Kwu Chau MP (KP37.5-41.1)	
Urmston Road (KP41.1 - 42.9)	1 Grab Dredger	8,000m <sup>3</sup> day <sup>-1</sup> for 24 hours each day	Yes	Not required	
	1 TSHD (Alternative)	64,800m <sup>3</sup> day <sup>-1</sup> for 24 hours each day	Not required	Not required	
West of BPPS (KP42.9 - 44.9)	1 Jetting Machine	1,000m day <sup>-1</sup> for 24 hours each day	Yes	Two layers at CR1, CR2	
Pipeline shore approach at BPPS (KP44.9 - 45.0)	1 Grab Dredger	1,500m <sup>3</sup> day <sup>-1</sup> for 24 hours each day	Yes	Two layers at CR1, CR2	

Notes:

(1) See **Table 13A.1** for full list of applicable measures.