

Hong Kong Offshore LNG Terminal - Works associated with the subsea gas pipeline for Lamma Power Station (LPS) and the associated Gas Receiving Station (GRS) in LPS

Pipeline Laying Method Plan

12 January 2021

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Environmental Certification Sheet

FEP-02/558/2018/A

Reference Document/Plan

Document/ Plan to be Certified/ Verified:	Pipeline Laying Method Plan
Date of Report:	12 January 2021
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Reference EP Requirement

EP Condition:	Condition No. 2.9 of FEP-02/558/2018/A
Content:	<i>Pipeline Laying Method Plan</i>
<p>The Permit Holder shall, no later than 1 month before the commencement of construction of the Project, deposit with the Director 3 hard copies and 1 electronic copy of a pipeline laying method plan of the Project. The pipeline laying method plan shall include but not limited to the detailed design of the pipeline trenches for laying and burying the subsea gas pipeline, methods for laying and burying the subsea gas pipeline, dredging and jetting rate for laying the subsea gas pipeline, types and numbers of dredging and jetting plants for construction of the Project. No more than one Trailing Suction Hopper Dredger shall be used for construction of the subsea gas pipeline. No more than one jetting machine shall be used for construction of the subsea gas pipeline. The subsea gas pipeline shall be constructed in accordance with the information as contained in the deposited pipeline laying method plan.</p>	

ET Certification

I hereby certify that the above referenced document/ plan complies with the above referenced condition of FEP-02/558/2018/A.	
Mr Raymond Chow, Environmental Team Leader:	 Date: 12 January 2021

IEC Verification

I hereby verify that the above referenced document/ plan complies with the above referenced condition of FEP-02/558/2018/A.	
Mr Arthur Lo, Independent Environmental Checker:	 Date: 12 January 2021

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1. INTRODUCTION

1.1 Background

To support the increased use of natural gas in Hong Kong from 2020 onwards, Castle Peak Power Company Limited (CAPCO) and The Hongkong Electric Company, Limited (HK Electric) have identified that the development of an offshore liquefied natural gas (LNG) receiving terminal in Hong Kong using Floating Storage and Regasification Unit (FSRU) technology ('the Hong Kong Offshore LNG Terminal Project') presents a viable additional gas supply option that will provide energy security through access to competitive gas supplies from world markets. The Hong Kong Offshore LNG Terminal Project will involve the construction and operation of an offshore LNG import facility to be located in the southern waters of Hong Kong, a double berth jetty, and subsea pipelines that connect to the gas receiving stations (GRS) at the Black Point Power Station (BPPS) and the Lamma Power Station (LPS).

The Environmental Impact Assessment (EIA) Report for the Hong Kong Offshore LNG Terminal Project was submitted to the Environmental Protection Department (EPD) of the Hong Kong Special Administrative Region Government in May 2018. The EIA Report (EIAO Register No. AEIAR-218/2018) was approved by EPD and the associated Environmental Permit (EP) (EP-558/2018) was issued in October 2018. An application for Further Environmental Permits (FEP) were made on 24 December 2019 to demarcate the works between the different parties. The following FEPs were issued on 17 January 2020 and the EP under EP-558/2018 was surrendered on 5 March 2020:

- the double berth jetty at LNG Terminal under the Hong Kong LNG Terminal Limited, joint venture between CAPCO and HK Electric (FEP-01/558/2018/A) ⁽¹⁾;
- the subsea gas pipeline for the BPPS and the associated GRS in the BPPS under CAPCO (FEP-03/558/2018); and
- the subsea gas pipeline for the LPS and the associated GRS in the LPS under HK Electric (FEP-02/558/2018/A) ⁽²⁾.

The location plan for the works associated with the subsea gas pipeline for the LPS and the associated GRS in the LPS ('the Project') is provided in **Figure 1.1**.

1.2 Objectives of the Pipeline Laying Method Plan

This *Pipeline Laying Method Plan* for the Project has been prepared in accordance with Condition 2.9 of the Further Environmental Permit FEP-02/558/2018/A.

FEP No. FEP-02/558/2018/A, Condition 2.9:

"The Permit Holder shall, no later than 1 month before the commencement of construction of the Project, deposit with the Director 3 hard copies and 1 electronic copy of a pipeline laying method plan of the Project. The pipeline laying method plan shall include but not limited to the detailed design of the pipeline trenches for laying and burying the subsea gas pipeline, methods for laying and burying the subsea gas pipeline, dredging and jetting rate for laying the subsea gas pipeline, types and numbers of dredging and jetting plants for construction of the Project. No more than one Trailing Suction Hopper Dredger shall be used for construction of the subsea gas pipeline. No more than one jetting machine shall be used for construction of the subsea gas pipeline. The subsea gas pipeline shall be constructed in accordance with the information as contained in the deposited

- (1) Application for variation of an environmental permit for FEP-01/558/2018 was undertaken and the latest FEP (FEP-01/558/2018/A) was issued on 6 November 2020.
- (2) Application for variation of an environmental permit for FEP-02/558/2018 was undertaken and the latest FEP (FEP-02/558/2018/A) was issued on 22 December 2020.

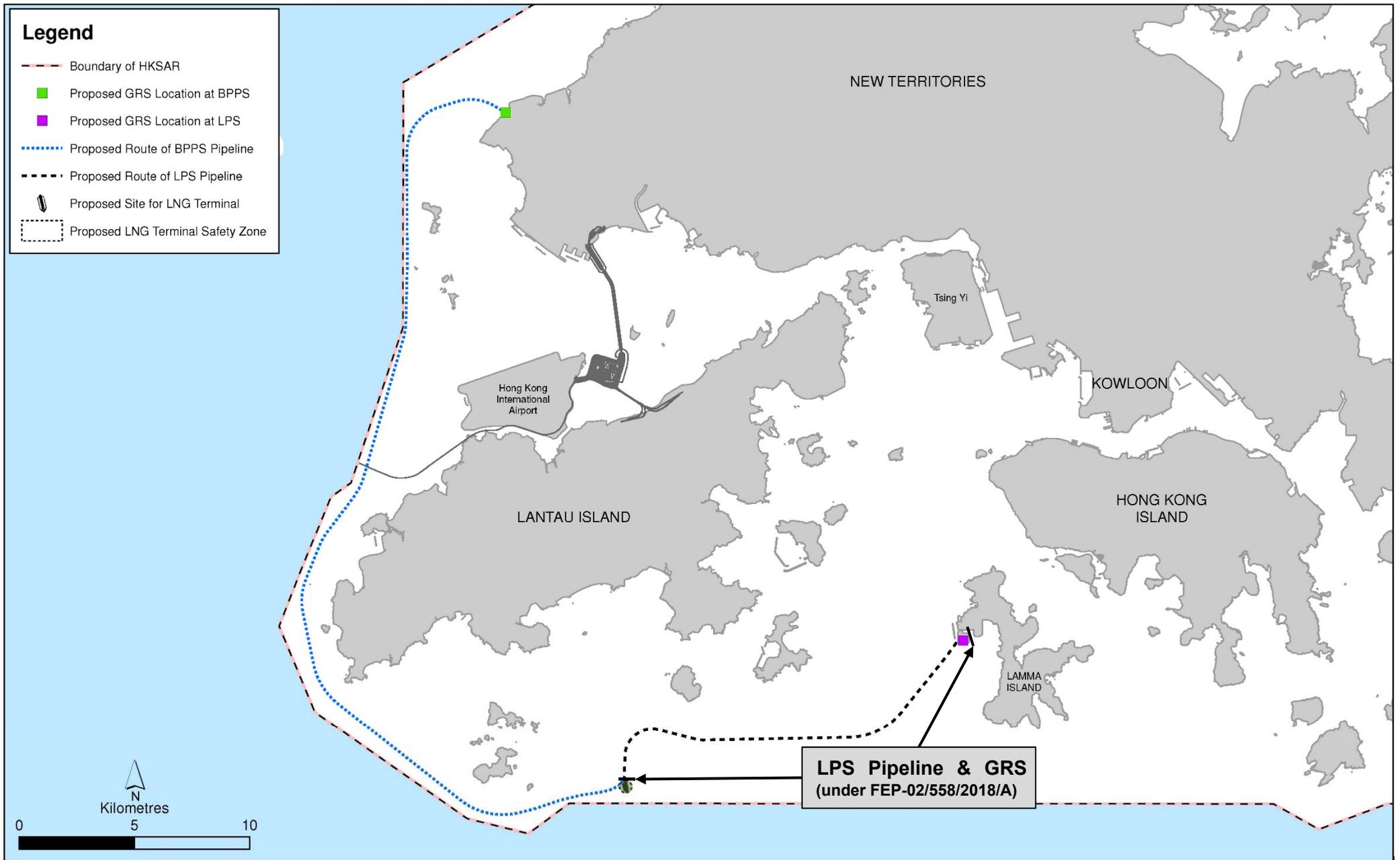


Figure 1.1

Indicative Location of Key Project Components

pipeline laying method plan."

The key objective of this *Pipeline Laying Method Plan* is to include the detailed design of the pipeline trenches for laying and burying the subsea gas pipeline, methods for laying and burying the subsea gas pipeline, dredging and jetting rate for laying the subsea gas pipeline, types and numbers of dredging and jetting plants for construction of the Project.

The *Pipeline Laying Method Plan* will be reviewed and updated as appropriate, throughout the course of the construction works to confirm that it remains current with the latest detailed information and works practice.

2. DETAILED DESIGN OF PIPELINE TRENCHES

The proposed subsea gas pipeline for the LPS ('LPS Pipeline') will connect the LNG Terminal with the GRS at the LPS and is approximately 20 inches (20") in diameter and 18km in length. It is a requirement that all subsea pipelines in HKSAR waters must be buried below the seabed. Burial depth when considered with rock armour provides the required level of pipeline protection. The actual burial depth below seabed is dependent on the marine and subsoil conditions along the pipeline routes. For areas that are considered to pose a threat to the integrity of the pipeline through anchor drop/drag, additional protective measures are required such as rock armour placement. The pipelines would be externally coated with an anti-corrosion coating and would also be concrete weight coated. Based on the latest engineering development, two types of pipeline trench designs (Type 4 and Type 5) have been developed to provide the range of pipeline protection required for the LPS Pipeline. The detailed design for the two trench types are provided in **Figure 2.1** and **Figure 2.2**, respectively, and is described below:

- **Trench Type 4:** This trench is to be pre-formed by **DREDGING** (see **Figure 2.1**); and
- **Trench Type 5:** This trench is to be post-formed by **JETTING** (see **Figure 2.2**).

Figure 2.1 Trench Design (Type 4)

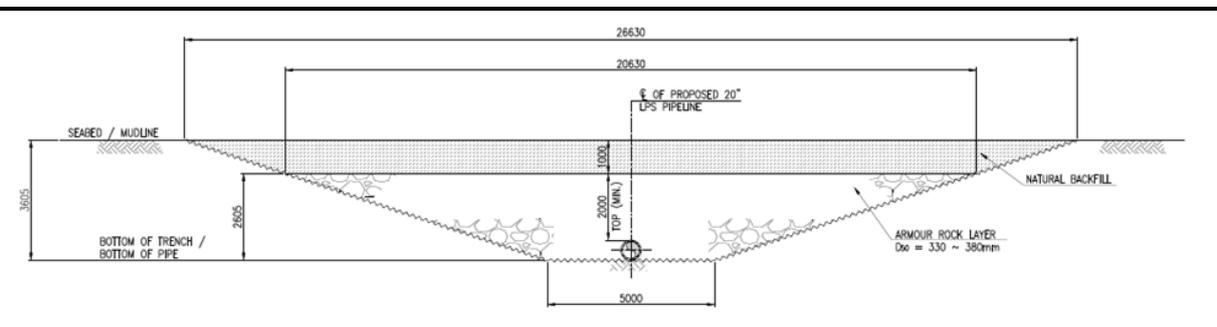
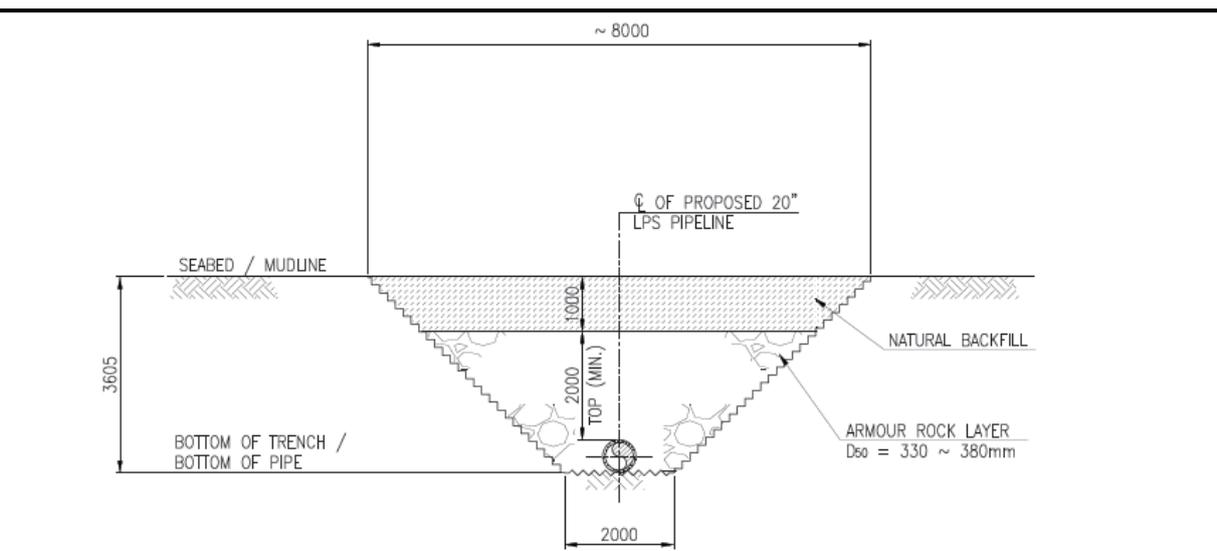


Figure 2.2 Trench Design (Type 5)



3. METHODS FOR LAYING AND BURYING THE LPS PIPELINE

The sequences and procedures for laying and burying the LPS Pipeline are discussed separately in the Pipeline Construction Plan in accordance with Condition 2.8 of the FEP. In general, the following procedures will be conducted for laying and burying the LPS Pipeline:

- Pre-installation inspection and obstruction removal along the pipeline route;
- Pre-trenching works by grab dredging to form the required trench design profile;
- De-burial of about 100m of existing pipeline end section east of LPS Pipeline KP17.4 by mass flow excavator (MFE) ⁽³⁾.
- Pipelaying using a conventional pipeline laybarge;
- Post-trenching works by jetting to form the required trench design profile to install the pipeline to the required depth;
- Rock armour placement by a conventional derrick barge or side dump vessel to cover the installed pipeline with the required rock armour; and
- Hydrotesting to ensure the integrity of the installed pipeline.

A summary of the LPS Pipeline construction methods together with the dredging and jetting lengths are shown in **Table 3.1** below and **Figure 3.1**.

Table 3.1 Overview of Pipeline Construction Methods and Trench Designs

Description	Section Length [km]	KP (km)		Anchor Size for Trench Protection (MT)	Proposed Trench Type	Construction Method
		From	To			
LPS Pipeline Riser	0.1	0.0	0.1	<23.6	Type 4	Dredging
Jetty Approach to South of Shek Kwu Chau	4.9	0.1	5.0	<5	Type 5	Jetting
South of Shek Kwu Chau to West Lamma Channel	9.5	5.0	14.5	<5	Type 5	Jetting
West Lamma Channel	2.9	14.5	17.4	<5	Type 5	Jetting
Alternative Shore Approach	Latest information suggests this alternative route will not be required ^(Note 1) .					

Note 1: Based on the latest design, the pre-installed pipeline at KP 17.4 will be used for the LPS Pipeline tie-in for the LPS Pipeline shore approach.

(3) Mass flow excavator is a variance of jetting machine.

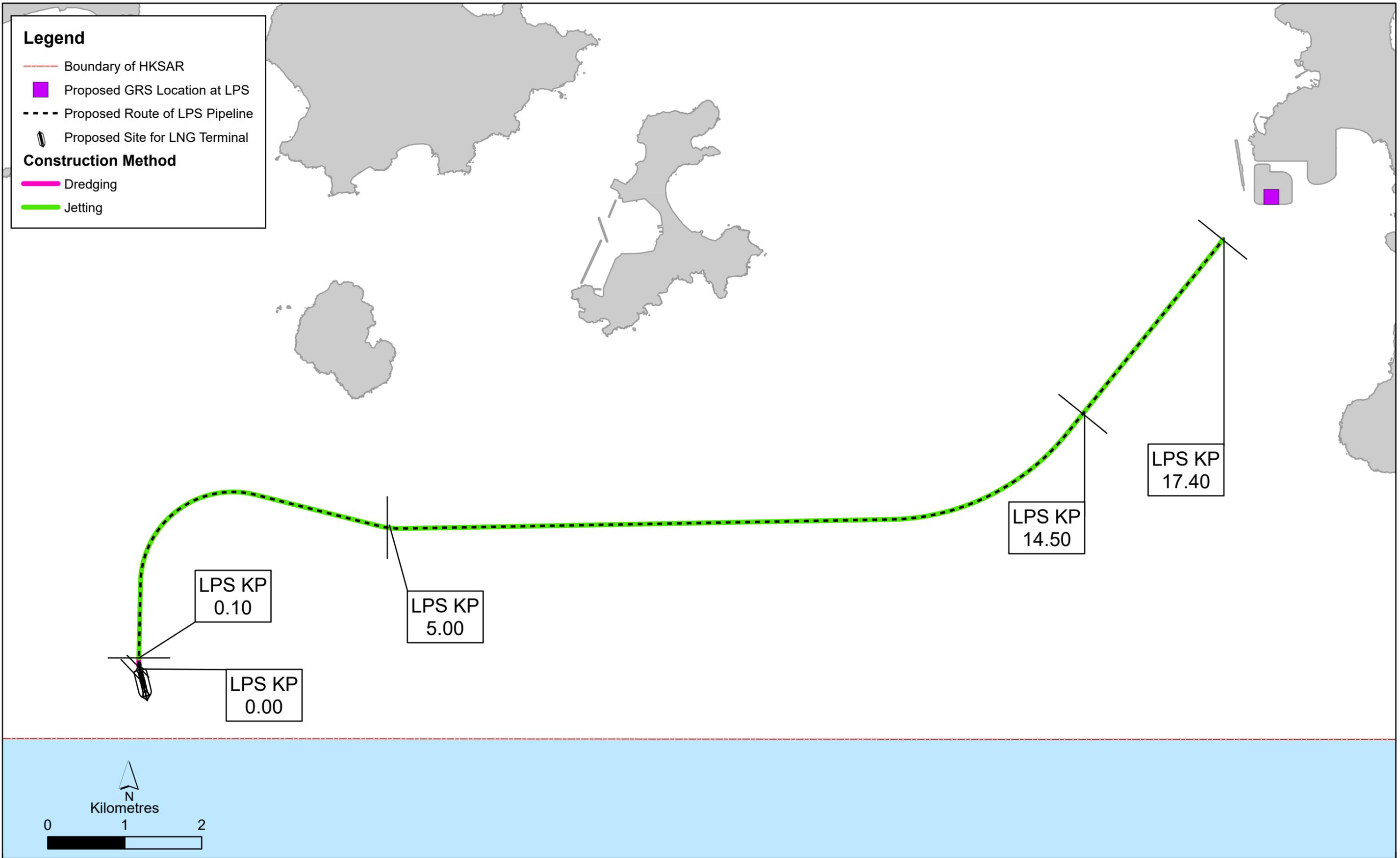


Figure 3.1

Construction Methods for the LPS Pipeline

4. DREDGING AND JETTING OPERATIONS FOR THE LPS PIPELINE

4.1 Dredging and Jetting Rates, Types and Numbers of Dredging and Jetting Plants

Appropriate dredging and jetting rates, types and numbers of dredging and jetting plants for the LPS Pipeline will be adopted to minimise potential water quality impacts from elevated suspended solids following the mitigation measures as stated in Table A.2 of the Updated EM&A Manual of the Project and are summarised in **Table 4.1** below. The types of dredging and jetting plants are indicated in the sub-sections below.

4.1.1 Dredging Plants

The following three types of dredging plants will be adopted for the construction of the LPS Pipeline:

- Grab dredger for dredging operations (see indicative grab dredger in **Figure 4.1**);
- Split hopper barge to be berthed adjacent to the grab dredger to contain the dredged materials from the grab dredger (see indicative split hopper barge in **Figure 4.2**); and
- Motor tug for moving the grab dredger and split hopper barge (see indicative motor tug in **Figure 4.3**).

Figure 4.1 Indicative Grab Dredger



Figure 4.2 Indicative Split Hopper Barge



Figure 4.3 Indicative Motor Tug



4.1.2 Jetting Plants

The following two jetting plants will be adopted for the construction of the LPS Pipeline:

- Jetting machine for jetting / MFE operations (see indicative jetting machines in **Figures 4.4a-c**); and
- Support vessel for the positioning of trencher (see indicative support vessel in **Figures 4.5a-c**).

Figure 4.4a Indicative Jetting Machine



Figure 4.4b Indicative Jetting Machine

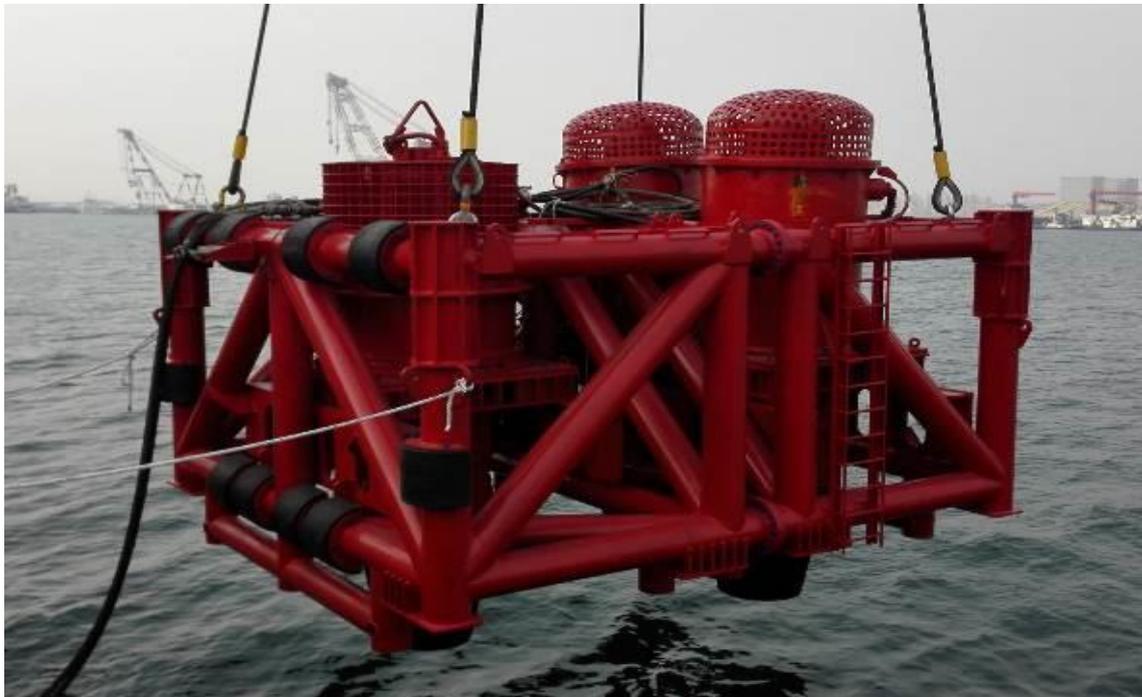


Figure 4.4c **Indicative Jetting Machine**



Figure 4.5a **Indicative Support Vessel**



Figure 4.5b Indicative Support Vessel



Figure 4.5c Indicative Support Vessel



Table 4.1 Summary of Dredging and Jetting Operation and Mitigation Measure for Pipeline Construction Works

Work Location	Types and No. of Plant Involved	Allowed Maximum Work Rate	Silt Curtain at Plants	Silt Curtain at Water Sensitive Receivers (WSRs)	Other Measures
Existing pipeline end section east of LPS pipeline (LPS KP17.3-17.4)	1 MFE Machine	1,000m day ⁻¹ for 24 hours each day	Yes	Not required	
West Lamma Channel (LPS KP14.5-17.4)	1 Jetting Machine	1,000m day ⁻¹ for 24 hours each day	Yes	Not required	
South of Shek Kwu Chau to West Lamma Channel (LPS KP5.0-14.5)	1 Jetting Machine	7,000m day ⁻¹ for 24 hours each day	Yes	Not required	
Double Berth Jetty to South of Shek Kwu Chau (LPS KP0.1-5.0)	1 Jetting Machine	720m day ⁻¹ for 24 hours each day	Yes	Two layers at Eastern Boundary of the Proposed South Lantau Marine Park (KP0.1-5.0)	Daily maximum of 12 hours with daylight (0700 – 1900)
Pipeline Riser (LPS KP0.0 – 0.1)	1 Grab Dredger	8,000m ³ day ⁻¹ for 24 hours each day	Yes	Not required	Daily maximum of 12 hours with daylight (0700 – 1900)