

ENVIRONMENTAL OUTCOMES AND GAINS THROUGH THE STATUTORY ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

法定環境影響評估程序的環境成果與增益

HONG KONG OFFSHORE LNG TERMINAL

香港海上液化天然氣接收站



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環境影響評估報告 (編號：AEIAR-218/2018) 批准日期：2018 年 10 月 5 日

Project Description 工程項目詳情

On behalf of Castle Peak Power Company Limited (CAPCO) and The Hongkong Electric Company (HK Electric), CLP Power Hong Kong Limited (CLP) proposes to develop an offshore Liquefied Natural Gas receiving terminal (LNG Terminal) based on Floating Storage and Regasification Unit (FSRU) technology, which is located in open waters about 4km east of Tau Lo Chau (the closest land mass) near the Soko Islands. The objective of this project is to handle the larger demand of natural gas that will be required to be imported into Hong Kong in order to meet HKSAR Government emissions targets and fuel mix target, as stated in the Hong Kong Climate Action Plan 2030+ Report. It aims at gradually replace the existing coal-fired power generation and replace coal with natural gas by 2030. In long term, to improve the air quality, reduce carbon emission and ensure electricity reliability and security.

Key infrastructure facilities include:

- a FSRU vessel equipped with Liquefied Natural Gas (LNG) storage tanks and regasification equipment;
- a double berth jetty with mooring facilities for the FSRU vessel and LNG carriers;
- two subsea gas pipelines connecting the FSRU facility with the Black Point Power Station (BPPS) and the Lamma Power Station (LPS) respectively; and
- one Gas Receiving Station (GRS) each located entirely within the BPPS and LPS respectively

中華電力有限公司（中電）代表香港電燈有限公司（港燈）及青山發電廠（青電）計劃在索罟群島附近的頭顱洲（最近的陸地）以東約 4 公里的離岸海域興建液化天然氣接收站，採用採用浮式儲存再氣化裝置的技術。本工程項目旨在應付未來對進口天然

氣的大量需求，以達致《香港氣候行動藍圖 2030+》報告中提及的排放與發電燃料組合目標，從而逐步減少燃煤發電，目標在 2030 年前以天然氣取代燃煤發電。長遠而言，以改善空氣質素和減少碳排放量，及確保用電可靠性和安全性。

主要工程項目包括：

- 一艘裝有液化天然氣儲存設施和再氣化裝置的浮式儲存再氣化裝置船
- 一個雙泊位碼頭，並配備為浮式儲存再氣化裝置船和液化天然氣運輸船而設的繫泊設施
- 兩條海底天然氣管道，從海上液化天然氣接收站，分別連接至龍鼓灘發電廠和南丫發電廠；及
- 分別位於龍鼓灘發電廠和南丫發電廠範圍內的天然氣接收站

Nature of the Designated Project under EIA Ordinance

《環境影響評估條例》指定工程項目的性質

The project includes the following designated projects (DPs) under the EIA Ordinance:
本工程項目包含以下《環境影響評估條例》(《環評條例》)的指定工程項目：

Schedule 2, Part I 附表 2 第 I 部分	Item C.12	A dredging operation which is less than 500m from the nearest boundary of an existing or planned marine park
	項目 C.12	挖泥作業距離一個現有的或計劃中的海岸公園或海岸保護區的最近界線少於 500 米
	Item H.2	A submarine gas pipeline
	項目 H.2	海底氣體管道或海底油管
	Item L.2	A storage, transfer and trans-shipment of liquefied natural gas facility with a storage capacity of not less than 200 tonnes
	項目 L.2	貯存量不少於 200 公噸的液化天然氣貯存、輸送和轉運設施

Key Environmental Issues 主要環境問題

Impacts 影響	Concerns 關注
<p>Water Quality 水質</p>	<ul style="list-style-type: none"> - Change in water quality, including suspended solids elevation, sedimentation flux, dissolved oxygen depletion, will result during construction phase and maintenance dredging at the jetty (if needed) - Discharge of cooled seawater and total residual chlorine from the regasification process, concentrated seawater freshwater generator, and treated sewage effluent from sewage treatment unit during operation phase - Discharge from subsea pipeline hydrotesting may deteriorate the surrounding water quality - 建造階段的挖泥和沖噴工程和營運期間的維護性疏浚工程（如有）可能會導致懸浮固體提升、沉積量、溶解氧消耗量 - 營運階段產生的各種排放物對水質可能造成影響，包括由再氣化過程所產生的冷卻海水和殘餘含氯量；由制淡水設備產生的濃縮海水，以及污水處理設備所產生的已處理污水 - 水壓試驗所產生的污水，可能對周邊水質造成影響
<p>Ecology 生態</p>	<ul style="list-style-type: none"> - The project is located near the habitat of Chinese White Dolphin and Finless Porpoise (FP), including the waters of Lung Kwu Chau and Sha Chau, West Lantau and between Soko Islands and Shek Kwu Chau - The project is located near sensitive receivers of ecological values, such as corals at Pak Chau and marine parks (Sha Chau and Lung Kwu Chau Marine Park, proposed Southwest Lantau Marine Park and the proposed Third Runway Marine Park) - Underwater percussive piling for jetty construction might cause impacts to marine species through underwater sound generation during construction phase

	<ul style="list-style-type: none"> - Permanent loss of about 2.5ha marine water habitats - Potential impacts on avifauna passing by the vent stack arising from emergency gas venting / flaring - Potential impacts on marine ecological resources due to impingement and entrainment at the seawater intake and cooled water discharge during the regasification process - 本工程項目的部分基礎設施與中華白海豚和江豚的生境所在地重疊，例如龍鼓洲和沙洲、大嶼山西面，以及位於索罟群島和石鼓洲之間的海域 - 工程項目鄰近較高生態價值的生境和敏感受體，例如位於白洲的珊瑚，以及現有和擬議的海岸公園等（沙洲及龍鼓洲海岸公園、擬議的大嶼山西南海岸公園及為香港國際機場三跑道系統擬議的海岸公園） - 建造碼頭時在水底進行撞擊式打樁時所產生的聲音會影響海洋生態資源 - 永久損失約有 2.5 公頃的海洋生境 - 再氣化過程中海水進水所引致的碰撞和抽吸以及冷卻海水的排放對海洋生態資源造成潛在影響 - 緊急氣體排放/燃燒對經過排氣管的鳥類的潛在影響
Fisheries 漁業	<ul style="list-style-type: none"> - Temporary disturbance to fisheries habitats and loss of access to approximately 18ha of potential fishing ground during construction phase - Potential impacts on fisheries resources due to impingement and entrainment at the seawater intake and cooled water discharge during the regasification process - 在建設階段，短暫影響碼頭工程區內約 18 公頃的潛在捕魚區域 - 再氣化過程中海水進水所引致的碰撞和抽吸以及冷卻海水的排放對漁業資源造成潛在影響
Waste Management	<ul style="list-style-type: none"> - Approximately 0.35 million m³ (in situ volume) marine sediments will be generated during the dredging of marine sediment from the BPPS Pipeline and the LPS Pipeline and require offsite

廢物管理	<p>disposal</p> <ul style="list-style-type: none"> - 在鋪設龍鼓灘發電廠和南丫發電廠的海底天然氣管道時，將會有約 35 萬立方米（原位體積）的海洋沉積物需要在工地外處置
<p>Hazard to Life</p> <p>生命危害</p>	<ul style="list-style-type: none"> - Potential hazard may arise from marine transits of LNG carriers and FSRU vessel to the LNG Terminal; LNG Terminal operations, including the FSRU vessel, the Jetty and LNG carrier unloading operations; the subsea pipelines; and the GRSs at the BPPS and the LPS - 液化天然氣運輸船和浮式儲存再氣化裝置船輸送至液化天然氣接收站的海上輸送作業；液化天然氣接收站，包括浮式儲存再氣化裝置船、碼頭和液化天然氣運輸船的卸載作業；海底管道；以及龍鼓灘發電廠和南丫發電廠的天然氣接收站等可能產生生命危害風險

Key Environmental Mitigation Measures 主要環境緩解措施

Impacts 影響	Mitigation Measures 緩解措施
<p>Water Quality</p> <p>水質</p>	<ul style="list-style-type: none"> - Adoption of appropriate dredging and jetting rates, plant numbers and silt curtains where appropriate during construction phase and maintenance dredging - Grab dredging can be conducted concurrently with one Trailer Suction Hopper Dredger (TSHD) - Only one jetting machine can be working on each pipeline - Cofferdam construction and removal within silt curtain and not conducted concurrently with the nearby pipeline dredging - Implement standard measures and good site practices - Develop a detailed hydrotesting procedure - Implement restriction for cooled seawater discharge including the maximum discharge flow rate, level of total residual chlorine and allowable change in seawater temperature - 在建造階段及維護性疏浚時，採用適當的挖泥和沖噴速度及數

	<p>量、隔泥幕</p> <ul style="list-style-type: none"> - 抓斗式挖泥機可與一隻艘吸式挖泥船同時進行 - 每一條管道只可使用一台沖噴機 - 在隔泥幕內建造及拆除圍堰時不可與附近的管道挖泥工程同時進行 - 實施標準管理措施及良好工地管理方法 - 建立詳細管道水壓測試程序 - 對冷卻海水排放實施限制，包括最大排放流量、總餘氯水平和允許海水溫度的變化
Ecology 生態	<ul style="list-style-type: none"> - Use of predefined and regular routes, optimized piling method with ramp-up procedures, marine mammal exclusion zone, restriction of percussive piling works during night-time and peak season of FP and control of dredging / jetting rates - Use of hydraulic hammering with noise reduction system, use of bubble curtain, avoidance of marine percussive piling during the peak season of FP (December to May), avoidance of night-time working, adopting ramp-up procedures and strictly controlled marine mammal exclusion zones - Restrictions on vessel speed and avoid stopping or anchoring within marine parks - May deploy alarm system to scare off birds before emergency gas venting / flaring - Develop a design plan with details of seawater intake of FSRU including design, rate and location of seawater intake during regasification process - Implement the water quality mitigation measures for cooled seawater discharge from regasification process - 使用預先設定及慣用的航線、使用優化打樁方式及程序、設置海洋哺乳類動物管制區並進行監察、在晚間和江豚出沒高峰期限制打樁工程，以及控制挖泥和沖噴速度 - 採用有減音系統的油壓錘、使用氣泡幕簾、避免在江豚出沒高峰

	<p>期（十二月至五月）進行水底撞擊式打樁、避免在夜間進行水底撞擊式打樁、採用逐步增加的水底撞擊式打樁法，以及嚴緊監控海洋哺乳類動物管制區</p> <ul style="list-style-type: none"> - 限制船隻的航行速度，以及不能在現有和擬議海岸公園範圍內停留或下錨 - 可在緊急氣體排放/燃燒之前部署警報系統以驅趕鳥類 - 建立營辦工程項目期間浮式儲存再氣化裝置抽取海水的設計方案，包括抽取海水的設計、速率及位置。 - 實施再氣化過程中冷卻海水排放的水質緩解措施
Waste Management 廢物管理	<ul style="list-style-type: none"> - Use of non-dredge method for jetty and pipeline construction avoids bulk removal and disposal of any dredged materials - 建造碼頭及管道時盡量使用非挖泥方式，以減少移除大量沉積物
Hazard to Life 生命危害	<ul style="list-style-type: none"> - With safety management systems in place, including safety inspection and audits, potential hazard arises from the operation of the LNG Terminal will comply with relevant risk criteria - 如實施了安全管理措施，包括安全檢查和審核，液化天然氣於營運期間可能產生生命危害風險將符合相關的風險準則

Environmental Outcomes and Gains 環境成果與增益

1. Reducing the Footprint 減低足跡

Offshore LNG terminal is adopted instead of a land-based one. A land-based LNG terminal would occupy a footprint of approximately 41 ha and require a construction time of 36 to 39 months. By comparison, an offshore LNG terminal would occupy a lessen footprint of approximately 2.5 ha and require a construction time of 21 months. Offshore LNG terminal will distance away from the populated areas, and hence bring no land footprint or habitat loss.

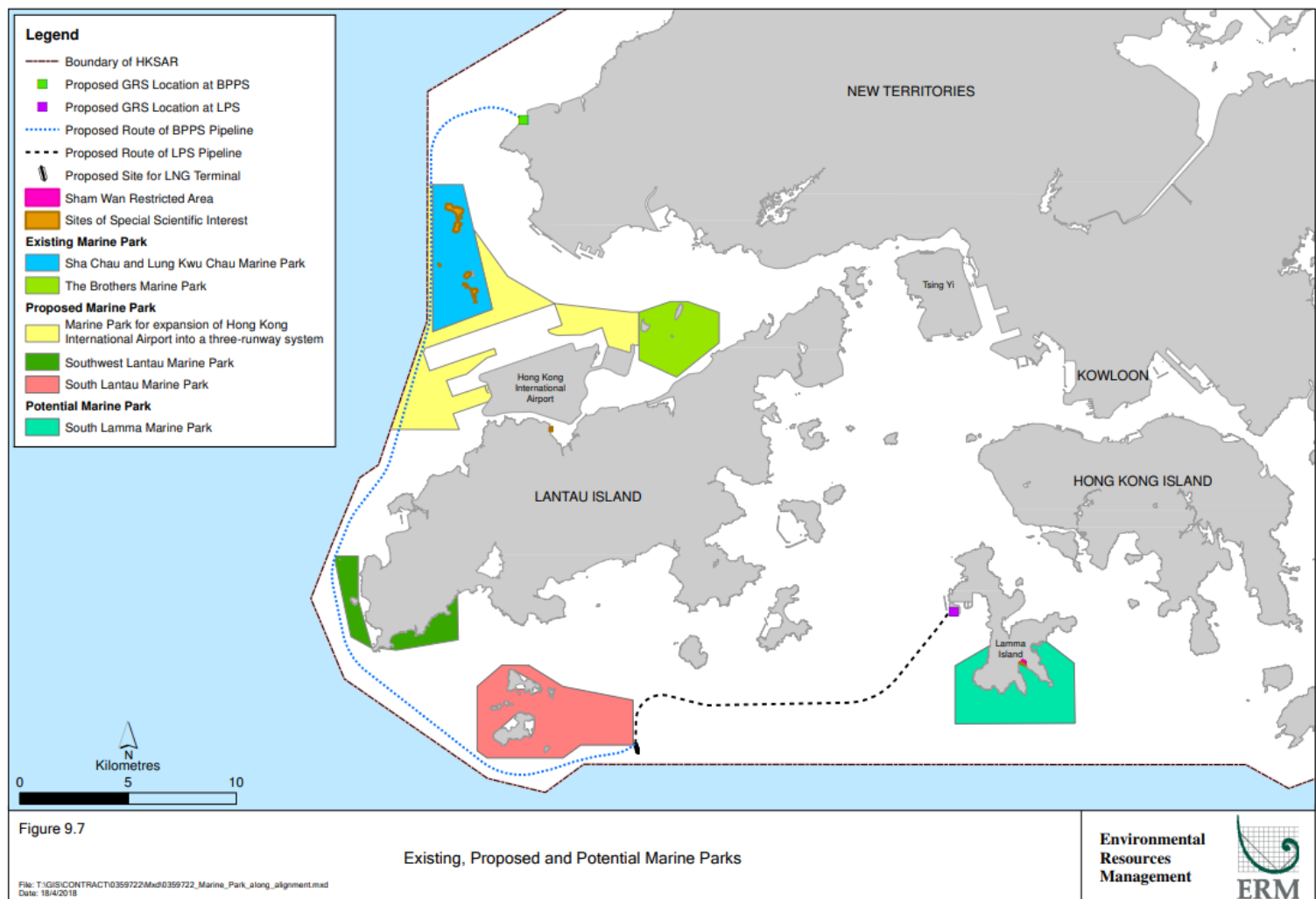
對比陸上天然氣接收站，本項目採用海上天然氣接收站。陸上天然氣接收站預計需要佔用 41 公頃土地及長達 36 至 39 個月的建造時間。而海上天然氣接收站則僅需要 2.5

公頃土地及 21 個月的建造時間。同時，海上天然氣接收站較遠離稠密地區。因此，此項目不會帶來土地足跡或棲息地損失。

2. Conservation of Marine Parks 保育海岸公園

The selection of project site is determined by conducting site search studies to avoid location of high ecological value. The project site is located at south west Hong Kong waters which is relatively less environmental sensitive and away from existing and proposed marine parks.

本工程項目的選址經過了全面的選址研究，盡可能避免選取具高生態價值的生境。工程項目選用了香港西南面的海域，該水域對環境的敏感性較低，亦遠離現有和擬建的海岸公園。



The Location of Marine Park

3. Support to the Government's Objective of Improving Air Quality 支持政府改善空氣質素的目標

Natural gas produces virtually no particulates, negligible sulphur dioxide and less nitrogen oxides than other fossil fuels during combustion to produce energy. Gradual replacement of the existing coal-fired power generation units with gas-fired units will help reduce air pollutant emissions from the power plants in Hong Kong.

與其他化石燃料相比，天然氣在燃燒以產生能量的過程中幾乎不產生微粒、可忽略的二氧化硫和較少的氮氧化物。逐步以燃氣發電機組取代現有的燃煤發電機組，有助減少香港發電廠的空氣污染物排放。

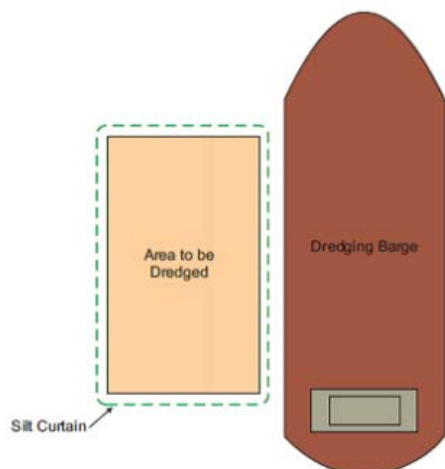
4. Contribution to Hong Kong's Climate Change Commitments of Reducing Carbon Emissions 配合香港對氣候變化承諾以減少碳排放量

Local electricity generation is the biggest contributor to Hong Kong's carbon emissions, accounting for about 70% in total. Natural gas is a fossil fuel with the lowest carbon content. The plan of phasing down coal for electricity generation and replacing coal with natural gas by 2030, as one of the major carbon reduction measures in the Hong Kong's Climate Action Plan 2030+, will enable Hong Kong to reduce carbon emissions significantly in the medium term.

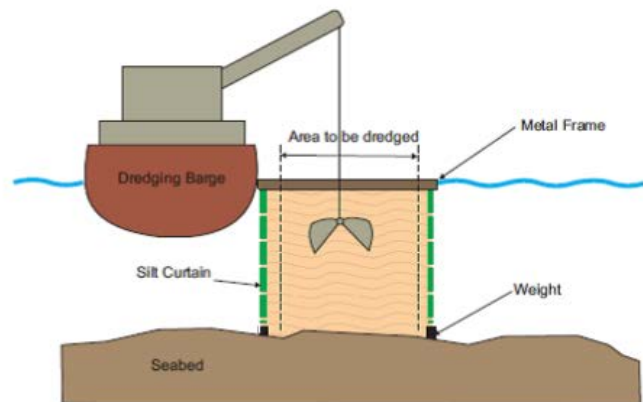
本地發電是香港最大的碳排放源，約佔總量 70%，天然氣是一種含碳量最低的，天然氣是一種含碳量最低的化石燃料。在 2030 年前逐步淘汰煤炭發電，並以天然氣代為 2030 年前逐步淘汰煤炭發電，並以天然氣代為《香港氣候行動藍圖 2030+》的主要減碳措施，本工程項目將使香港在中期大幅減少碳排放。

5. Minimize the impact on water quality 減低對水質的影響

Reduce the potential impacts on water quality and marine ecology by deployment of silt curtain and restriction on maximum allowable work rates during construction phase in building stage adopting appropriate dredging and jetting speed and quantity, silt curtain, to minimize the impact on water quality and ecology.

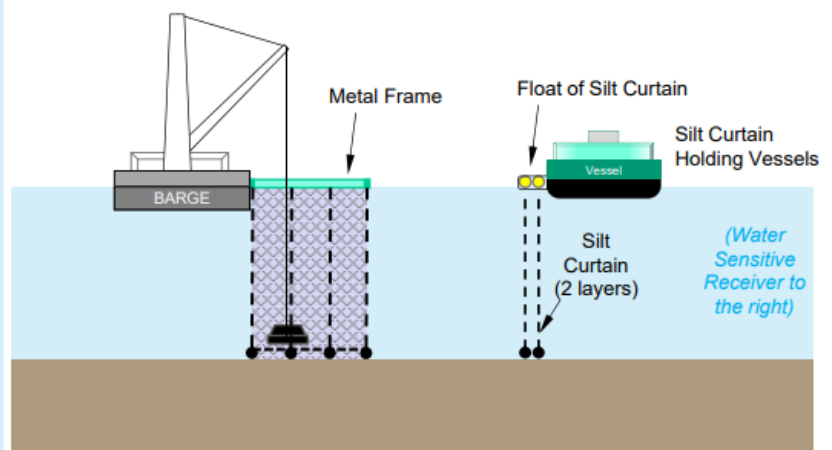
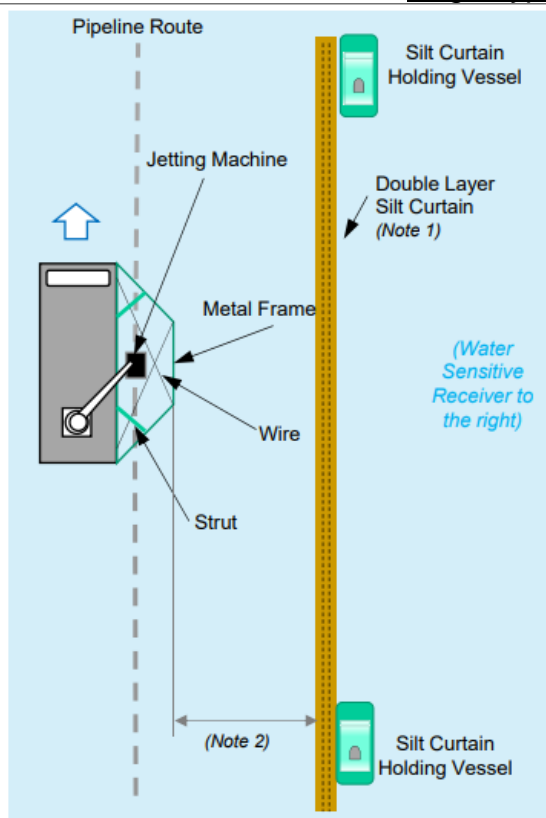


(a) Cage Type Silt Curtain Arrangement for Grab Dredging



(b) Cross-section of Cage Type Silt Curtain Arrangement

Cage Type Silt Curtain for Grab Dredging



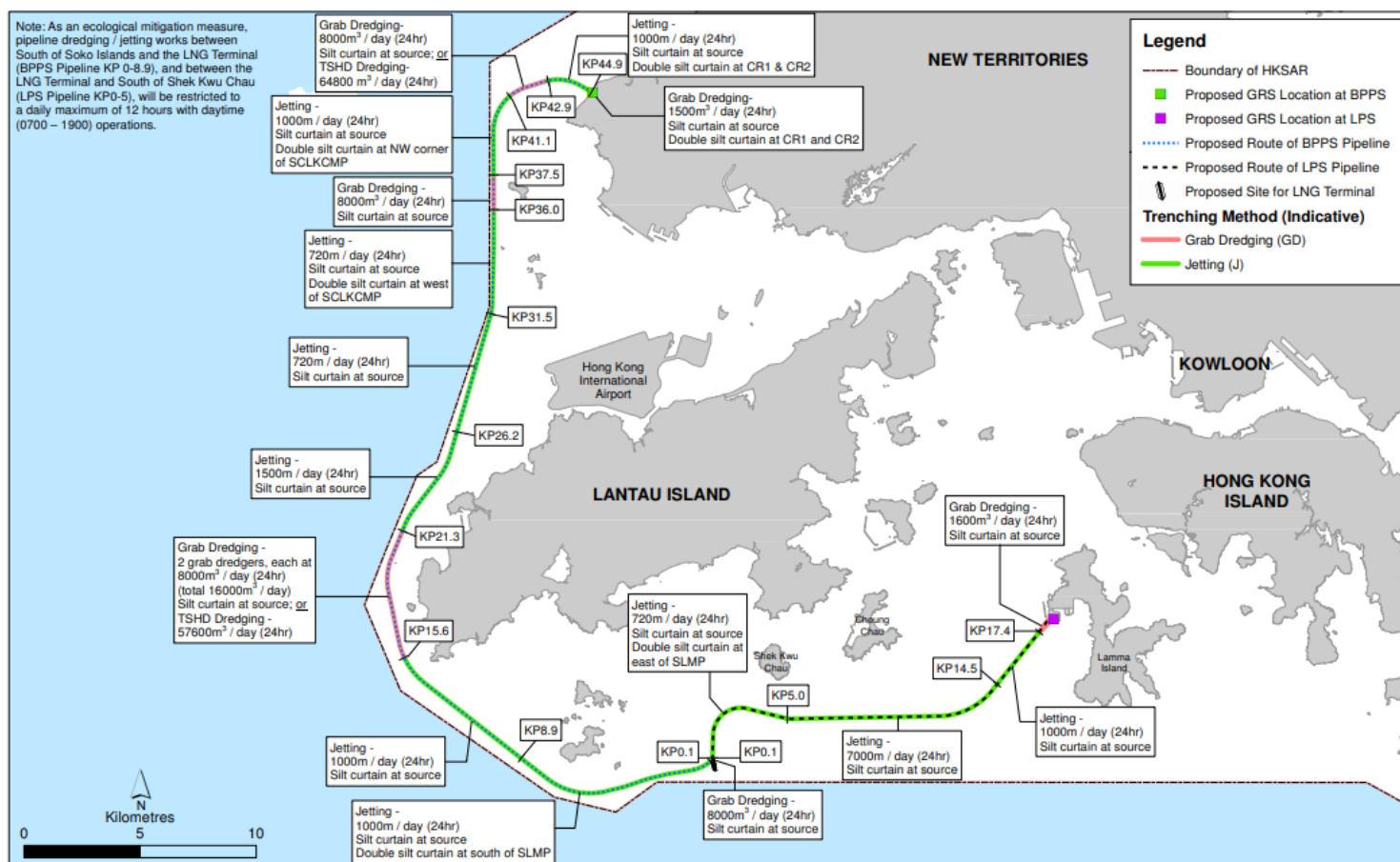
(b) Cross-Section of Silt Curtain Arrangement

Note:

1. Preliminarily 1000m length, subject to site conditions and trial
2. Distance between silt curtain and metal frame will be subject to site conditions and trial
3. The proposed silt curtain arrangement is indicative and subject to adjustment to suit the actual site conditions, and the contractor's working methods

o Scale (a) Plan of Silt Curtain Arrangement

Cage Type and Floating Type Silt Curtains for Jetting



Maximum Allowable Work Rates and Proposed Mitigation Measures

Links and Reference 連結與參考

- [Executive Summary 行政摘要](#)
- [Environmental Impact Assessment Report 環境影響評估報告](#)
- [Advisory Council on the Environment - Environmental Impact Assessment Subcommittee 環境諮詢委員會-環境影響評估小組會議文件 \(ACE-EIA Paper 1/2018\)](#)
- [Hong Kong Offshore LNG Terminal 香港海上液化天然氣接收站](#)