

Improvement Dredging for Lamma Power Station Navigation Channel

Project Profile for EIA Study Brief Application

December 2014

The Hongkong Electric Company, Ltd.

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The Hongkong Electric Centre, 44 Kennedy Road, Hong Kong

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1 Basic Information

1.1 Project Title

The title of this project is “**Improvement Dredging for Lamma Power Station Navigation Channel**” (hereinafter referred to as the “Project”).

1.2 Purpose and Nature of the Project

The Lamma Power Station Navigation Channel (the “Channel”) was originally formed in 1981 to facilitate the delivery of coal to the existing Lamma Power Station by ocean going vessels. As a mainly coal-fired power station that relies on coal-fired units for base load operations, access for ocean going vessels carrying coal to the Lamma Power Station is essential for ensuring the continuity of electricity supply to Lamma and Hong Kong Islands.

In order to maintain safe clearance of these vessels through the Channel, dredging of naturally accumulating sediment in the Channel is required to maintain a minimum depth between the seabed and sea level to be specified by Hong Kong Marine Department. The Hong Kong Marine Department stipulate the current minimum channel depth for marine passage to be no less than -15.5mCD (approx. -15.65mPD). To ensure this minimum depth is complied, the Channel needs to be dredged and maintained at a level below this depth.

This Project involves improvement dredging of the Channel to meet the requirements for continued safe passage throughout the operation of the Channel. In the past, this has involved dredging of the Channel to a level of between -16.0mPD and -16.5mPD.

1.3 Name of Project Proponent

The Project Proponent is **The Hongkong Electric Company, Ltd. (HEC)**.

1.4 Location and Scale of Project and History of the Site

1.4.1 Location

The Project area is located in the West Lamma Channel near the western coast of Lamma Island, as shown in **Figure 1**.

1.4.2 Project Scale

The Project is located within the existing Channel, which has a gazetted area of approx. 162ha. The proposed improvement dredging works will be conducted entirely within the Channel, and the volume of materials to be dredged each time will vary depending on natural siltation.

It should be noted that the southernmost parts of the Channel lies in naturally deeper seabed (the 2013 bathymetry survey revealed some areas to be as low as -20.7mCD, which is approx. -20.85mPD), hence these naturally deep areas within the Channel would not normally require improvement dredging.

1.4.3 Site History

Since its original formation in 1981, the Channel has been periodically dredged to maintain safe clearance of the seabed for ocean going vessels. Originally, the Channel was dredged to a depth of -15.9mPD, although since this time, the Channel has undergone a number of improvement dredging works to various depths to cope with the operational requirements of vessels and the effects of natural siltation over time. A chronological summary of the previous dredging works in the Channel is presented in **Table 1.1**.

Table 1.1: Summary of Previous Dredging Works in the Channel

Dredging Works	Date	Chronology of Events
1 st Improvement Dredging (pre-EIAO)	1990	Improvement dredging to a depth of -16.5mPD.
Coal Jetty Extension Project (pre-EIAO)	1997 to 2001	Extension of the coal jetty and enlargement of the turning basin of the Channel by extending 250m southward to a depth of -14.1mPD.
2 nd Improvement Dredging (Designated Project under EIAO)	2003 to 2004	Completion of the statutory EIA study and improvement dredging (~2.98Mm ³) over the entire Channel to a minimum depth of -16.0mPD.
3 rd Improvement Dredging (not a Designated Project under EIAO)	2009	Improvement dredging (~0.45Mm ³) to a depth of -16.0mPD to remove high spots within the Channel.

For each of the past improvement dredging activities since the introduction of the Dumping At Sea Ordinance (DASO), sediment sampling and testing has been conducted to determine the sediment quality prior to commencement of dredging, and the findings have consistently shown the sediment to be under Category L and suitable for open sea disposal.

1.4.4 Emergency Dredging Works for 2015

A bathymetry survey conducted in August 2014 revealed some critically high spots (up to -15.1mPD) within the Channel, which already exceed the Marine Department stipulated minimum channel depth. In terms of vessel safety, the berthing guidelines by Marine Department specify a minimum underkeel clearance of 15% of the vessel draft. For the coal vessels (which have a draft of 14.6m), the minimum required clearance is 2.19m. With a seabed depth of -15.1mPD, this means that the sea level must be at +1.69mPD or above in order to enable safe berthing of vessels. Typical tidal levels near Lamma Power Station range between approx. 0.5mPD to 2.1mPD, however, within any given week, there would only be about 2 nos. of 6-hour windows (or 4 nos. of 4-hour windows), which can allow for safe berthing at the Lamma Power Station jetty. Such restricted tidal windows for safe berthing

pose a high risk for vessel operation, thus there is an urgent need to start carrying out emergency dredging works in January 2015 the earliest at those critically high spots to maintain the safe operation of vessels, and to meet HEC's obligations (as the party responsible for maintaining the Channel) under the Particulars and Conditions of Grant by Private Treaty No. 7244 (The Lot for Lamma Power Station). The estimated marine sediment volume to be generated by such critical dredging works is approx. 0.15Mm^3 .

This critically urgent emergency dredging works that aims to meet the imminent need for safety reasons is scheduled for commencement in January 2015 the earliest and does not form part of this Project. Nevertheless, the emergency dredging works will only involve dredging the minimum volume required at the individual high spots identified by the August 2014 bathymetry survey. It should be noted that the volume of dredging (about 0.15Mm^3) required under the emergency dredging works is well below 0.5Mm^3 and the dredging location is not within the prescribed distances from any of the sensitive areas as defined under C.12 of Part I Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO). Therefore, the emergency dredging does not constitute a Designated Project under the EIAO.

Notwithstanding the ongoing emergency dredging works and in view of the fact that improvement dredging works over the navigation channel are needed on a regular basis, HEC, as a responsible and caring Company, proposed to do a comprehensive EIA study to cover the future dredging operations for better environmental performance. The improvement dredging under the proposed Project is thus to meet the on-going needs of the Channel by improvement dredging in order to maintain water depths below the minimum safety requirement, thus ensuring long term safe vessel operation. Due to the anticipated quantities of dredged marine sediment, this Project will constitute a Designated Project under the EIAO and will be conducted in accordance with EIAO requirements.

1.5 Designated Projects Covered by this Project Profile

The Project is to carry out improvement dredging to deepen and maintain the seabed level in the Channel to below the minimum depth requirement of -15.5mCD (approx. -15.65mPD) as stipulated by the Hong Kong Marine Department. According to historical dredging records, the previous dredging depth ranged from -16.0mPD to -16.5mPD . The dredged marine sediment volume associated with the dredging works in 2017 is expected to be approx. 2Mm^3 , and the Channel may also be further deepened as part of this construction phase works. For subsequent dredging works during operation phase, the dredging quantity will depend on the time elapsed between each dredging activity and the siltation rates, though this will likely be in the order of 0.5Mm^3 to 2Mm^3 .

The Project is classified as a Designated Project under C.12 of Part I Schedule 2 of the EIAO, *a dredging operation exceeding $500,000\text{m}^3$* .

This Project Profile has been prepared in accordance with Annex 1 of the Technical Memorandum on EIA Process (EIAO-TM) for the application of an EIA Study Brief.

1.6 Name and Telephone Number of Contact Person

The contact person for this Project is provided below:

Name:	Mr C.K. Lau
Address:	The Hongkong Electric Company, Ltd. Hongkong Electric Centre 44 Kennedy Road Hong Kong
Telephone Number:	3143 3882

2 Outline of Planning and Implementation Programme

2.1 Planning and Implementation of the Project

The Project will be implemented by the Projects Division of HEC. An environmental consultant will be appointed to undertake the EIA and a dredging contractor shall be appointed at a later date to carry out the improvement dredging works.

2.2 Project Timetable

An environmental consultant will be engaged to undertake the EIA study, which is targeted to be completed in 2015.

A dredging contractor will be engaged prior to commencement of dredging works. The improvement dredging that may involve deepening of the Channel (i.e., construction phase) is expected to commence in 2017 the earliest. Based on historical dredging records, it is expected that subsequent improvement dredging (i.e., operation phase) would thereafter be conducted once every five to six years as required, depending on natural siltation rates.

2.3 Interactions with Broader Programme Requirements or Other Projects

Based on the proposed implementation programme of the Project, other planned projects in the vicinity with the potential to interface with the Project area have been reviewed and are identified in **Table 2.1**.

Table 2.1: Other Projects in the Vicinity

No.	Project Title	Project Proponent	Current Status	Distance from Project Boundary
1	Agreement No. CE 33/2011 (CE) Planning and Engineering Study on Future Land Use at Ex-Lamma Quarry Area at Sok Kwu Wan, Lamma Island	Hong Kong Island and Islands Development Office	Feasibility Study* EIA Study Brief (ESB-270/2014)	Over 2,000m
2	The Baroque on Lamma	The Baroque on Lamma Ltd.	EIA Study Brief* (ESB-229/2011)	Over 3,000m
3	Development of a 100MW Offshore Wind Farm in Hong Kong	The Hongkong Electric Company, Ltd.	Approved EIA* (AEIAR-52/2010) (EP-394/2010)	Over 500m

*Projects yet to have a confirmed construction programme.

3 Possible Impact on the Environment

3.1 Outline of Processes Involved

Project activities comprise improvement dredging works within the Channel, and disposal of the dredged marine sediment to an appropriate disposal facility. It is anticipated that dredging works will be carried out by grab dredgers or trailer suction hopper dredger (TSHD). The number and types of dredgers are to be determined through the EIA.

3.2 Water Quality

3.2.1 Construction Phase

The main potential water quality impacts during construction phase is the release of suspended solids (SS) into the water column during dredging activities, which may adversely affect nearby water sensitive receivers (WSRs) such as seawater intakes and ecologically important habitats. However, the findings of the 2003 EIA for Lamma Power Station Navigation Channel Improvement (AEIAR-069/2003) have shown that through careful construction phasing and implementation of appropriate mitigation measures such as silt curtains and closed grab dredgers, adverse water quality impacts due to release of SS can be effectively mitigated.

Disturbance of the marine sediment may also lead to oxygen depletion and the release of pollutants, however, previous sediment sampling and testing conducted in 2003¹, 2009² and 2014³ has shown that all sediment samples are below the Lower Chemical Exceedance Level (LCEL) as defined in the Works Bureau Technical Circular No.34/2002, which suggests that the marine sediment has low / negligible concentrations of pollutants such as heavy metals and organic compounds. Thus water quality impacts associated with release of such pollutants during dredging works is not anticipated.

Other potential water quality impacts due to sewage effluent from the workforce and accidental spillage / leakage from the barges can be readily controlled via good site practices, hence are unlikely to have significant impacts to the marine environment.

3.2.2 Operation Phase

The potential water quality impacts during operation phase improvement dredging would be the same as those for construction phase.

¹ Under the 2003 EIA for Lamma Power Station Navigation Channel Improvement (AEIAR-069/2003)

² Under the 2009 improvement dredging works

³ Contract No. 14/8214 Chemical Screening for Determination of Sediment Quality for Improvement of Dredging of Navigation Channel of Lamma Power Station – Preliminary Sediment Quality Report, May 2014

3.3 Marine Ecology

3.3.1 Construction Phase

Dredging works within the Channel will lead to temporary loss of benthic and marine water habitats. However, as the benthic fauna can recolonise the seabed after dredging and Finless Porpoise usage of the project area is generally low over the years, the temporary loss of habitat for these animals is considered to be of low significance.

Other indirect impacts which may occur due to the project works include changes in water quality, disturbance to Finless Porpoise and fish species associated with dredging and construction vessels, and sediment deposition. There may also be indirect impacts on recognised species and sites of conservation importance, including the coral communities along western Lamma, the potential Southwest Lamma Marine Park, artificial reefs at Lo Tik Wan Fish Culture Zone (FCZ) and Green Turtle nesting site at Sham Wan Site of Special Scientific Interest (SSSI). However, the findings of AEIAR-069/2003 have shown that the potential disturbance and water quality impacts to these ecologically important areas can be readily mitigated with the implementation of good site practices. With implementation of appropriate mitigation, impacts on marine ecology will be minimised and no adverse impacts are anticipated.

3.3.2 Operation Phase

The potential impacts on marine ecology during operation phase improvement dredging would be the same as those for construction phase.

3.4 Fisheries

3.4.1 Construction Phase

Construction phase impacts that may arise due to project works include loss of fisheries resources / production, destruction and disturbance of nursery and spawning grounds of commercial fisheries resources, and impacts on fishing and aquaculture activities. Due to the short-term, small-scale and restricted nature of the Project works, such impacts are considered to be minor. No adverse water quality impact is anticipated at eastern Lamma, where the Lo Tik Wan FCZ and Sok Kwu Wan FCZ are situated.

3.4.2 Operation Phase

The potential impacts on fisheries during operation phase improvement dredging would be the same as those for construction phase.

3.5 Waste

3.5.1 Construction Phase

The main construction waste that will be generated by the Project is marine sediment associated with the dredging works. Based on the findings of the sediment sampling and testing conducted in early 2014, the sediment is classified as Category L suitable for open sea disposal. The management and disposal of the dredged material will follow the procedures and requirements specified in ETWB TCW No. 34/2002 “Management of Dredged/Excavated Sediment”, and a Marine Dumping Permit will be obtained under the Dumping at Sea Ordinance (Cap. 466).

Other construction wastes, such as general refuse and chemical waste, will be generated in limited quantities and normal waste management practices will be implemented throughout the construction phase.

3.5.2 Operation Phase

The waste arising from operation phase improvement dredging would be the same as those for construction phase.

3.6 Noise

3.6.1 Construction Phase

Potential noise impacts associated with the Project is daytime (and potentially night time) construction noise due to operation of powered mechanical equipment (PME), mainly the construction barges. However, there are no noise sensitive receivers (NSR) identified within 300m of the Project boundary. With reference to the findings of AEIAR-069/2003, the nearest NSRs are to the northeast of the Project area (at Ko Long and Yung Shue Wan) which are at least 1km away. Therefore, the potential construction noise impacts associated with the Project are unlikely to be significant. Marine traffic generated by the Project will be limited to the small number of dredgers and barges operating within the Channel.

3.6.2 Operation Phase

The potential noise impacts during operation phase improvement dredging would be the same as those for construction phase.

3.7 Air Quality

3.7.1 Construction Phase

During construction phase, no dust-generating activity is anticipated as the Project involves only marine dredging activities and due to the high moisture content of the dredged materials, negligible dust impact is anticipated. Other gaseous emissions that may be released during construction phase are restricted to combustion by-products from operation of powered mechanical equipment (i.e. the engines of the dredgers). No odour emissions are anticipated as the marine sediment to be dredged are accumulated sediment from natural siltation and the findings of the sediment sampling and testing conducted in early 2014 show that the sediment is not contaminated. In addition, no air sensitive receivers (ASR) are identified within 500m from the Project boundary. The nearest ASRs are to the northeast of the Project area (at Ko Long and Yung Shue Wan) which are at least 1km away. Thus no construction phase air quality impacts are anticipated.

3.7.2 Operation Phase

The potential air quality impacts during operation phase improvement dredging would be the same as those for construction phase.

3.8 Hazard to Human Life

3.8.1 Construction Phase

Dredging activities associated with the Project are typical and commonly adopted in other similar projects in Hong Kong, and are generally not associated with significant hazard to human life. Nevertheless, there is an existing submarine gas pipeline that traverses part of the Channel, which may pose a potential hazard to the dredging works. It should be noted that this pipeline is located at approx. -20mCD within the Channel area. With the adoption of precautionary measures such as dredging using TSHD (instead of grab dredgers) for areas at and surrounding the submarine pipeline, and careful control of dredging depth, potential hazards associated with dredging near the submarine pipeline can be minimised.

3.8.2 Operation Phase

The potential hazard to human life during operation phase improvement dredging would be the same as those for construction phase.

3.9 Terrestrial Ecology

3.9.1 Construction Phase

The Project area is located entirely within the marine environment and there will be no land-based works. Therefore, no impact on terrestrial ecology is expected during construction phase.

3.9.2 Operation Phase

Same as for construction phase, no impacts on terrestrial ecology is anticipated due to improvement dredging during operation phase.

3.10 Landscape & Visual

3.10.1 Construction Phase

Dredging activities associated with the Project will only affect the seabed and will not change the landscape character of the marine environment, hence no landscape impacts are anticipated during construction phase.

Construction plant located at the Channel during construction phase may pose some visual impact on visually sensitive receivers (VSRs). However, the nearest VSRs are located approx. 2km away and have very broad and alternative views of the western Lamma waters, hence the presence of construction plant at the Channel is likely to form a very minor component of the views available to VSRs. Potential visual impacts associated with the Project are thus considered to be of low significance.

3.10.2 Operation Phase

Same as for construction phase, no landscape impacts are anticipated during operation phase.

The potential visual impacts during operation phase improvement dredging would be the same as those for construction phase.

3.11 Cultural Heritage

3.11.1 Construction Phase

Dredging activities associated with the Project will only affect the seabed, hence no impacts on built heritage and terrestrial archaeology is anticipated.

Potential impacts on marine archaeology is extremely unlikely, given that the Channel has been dredged a number of times in the past, hence is unlikely to contain any items of archaeological value. Thus, no adverse marine archaeological impact is anticipated during the construction phase.

3.11.2 Operation Phase

Same as for construction phase, no impacts on built heritage and archaeology is anticipated due to improvement dredging during operation phase.

3.12 Land Contamination

3.12.1 Construction Phase

Dredging activities associated with the Project will only be carried out on the seabed and there will be no land-based activities, hence no land contamination impact is anticipated during the construction phase.

3.12.2 Operation Phase

As there would be no disturbance to terrestrial areas due to improvement dredging during operation phase, no land contamination impact is expected.

4 Major Elements of the Surrounding Environment

4.1 Outline of Major Elements of the Surrounding Environment

The Project is located entirely within the marine environment. The Channel and surrounding marine waters are frequented by coal vessels travelling to / from the Lamma Power Station, as well as passing ocean-going vessels to the west of the Channel. Aside from the village areas at Yung Shue Wan, Long Tsai Tsuen / Hung Shing Ye and Lo So Shing, the western coastline of Lamma Island is largely natural and undisturbed. The existing Lamma Power Station is the only major active industrial operation located in the vicinity of the Project. Other facilities located on Lamma Island include a disused quarry at Sok Kwu Wan, and refuse transfer facilities at Yung Shue Wan and Sok Kwu Wan. There are also two helipads located on Lamma Island, one adjacent to the Lamma Power Station and one located on reclaimed land at Kam Lo Hom (North) in Yung Shue Wan, for emergency use only. However, none of these facilities located on Lamma Island will be affected by the Project.

Sensitive receivers and elements of the surrounding environment that may be affected by the Project are presented below.

4.2 Water Quality

The Project Area is situated to the west of the Lamma Island, within the existing Lamma Power Station Navigation Channel. WSRs identified in the vicinity include:

Gazetted Bathing Beaches

- Hung Shing Ye Beach
- Lo So Shing Beach

Seawater / Cooling Water Intakes

- HEC Power Station Intake

Fish Culture Zones

- Lok Tik Wan
- Sok Kwu Wan

Areas of Ecological Value

- Pak Kok (coral communities)
- Shek Kok Tsui (coral communities)
- Luk Chau (coral communities)
- South Lamma (including areas such as Sham Wan SSSI (Green Turtle nesting site), coral communities at southwest Ha Mei Tsui, Sham Wan, Luk Chau Wan, Sok Kwu Wan and Pak Kok, Finless Porpoise habitat and potential Southwest Lamma Marine Park).

The location and proximity of these WSRs to the Project area are shown in **Figure 2**. WSRs located further afield, such as seawater intakes along the southwest of Hong Kong Island are

unlikely to be affected by the Project, given the large separation distance (over 5km) and the findings of the 2003 EIA for Lamma Power Station Navigation Channel Improvement (AEIAR-069/2003), which showed minimal elevation of SS (<0.3mg/l) under maximum dredging rates. As the dredging activities associated with this Project are very similar to the previous dredging under AEIAR-069/2003, the findings of the previous EIA is considered to be relevant to this Project.

4.3 Marine Ecology

The coasts of western Lamma consist of artificial seawall, rocky shores, sandy shores and wave cut platforms, while the sediments within the navigation channel are soft mud.

Based on literature review and recent field surveys conducted between May and June 2014, bivalves and polychaetes were the most abundant benthic fauna within the navigation channel. Intertidal fauna recorded along western Lamma coasts were mostly common and widespread species. Species of conservation importance in the vicinity of the Project area include Finless Porpoise and coral communities. Although Finless Porpoise usage of the Project area is generally low over the years,⁴ suitable environmental protection measures will be proposed for their protection. Hard coral communities were recorded along western Lamma coasts in patchy distribution and generally of low coverage.

Sites of conservation importance around Lamma Island include potential Southwest Lamma Marine Park, artificial reef site at Lo Tik Wan FCZ, and Green Turtle nesting site at Sham Wan SSSI. These are all outside the Project area and hence no direct impact from the Project works is anticipated.

4.4 Fisheries

The Project area is moderately used by fishing vessels (100 – 400 vessels/ha/year) and with moderate to high fisheries production (200 – 600 kg/ha/year).⁵ It also lies within previously identified spawning grounds and nursery areas of commercial fisheries resources.⁶ The closest FCZs are in Lo Tik Wan (> 5 km away) and Sok Kwu Wan (> 7 km away).

⁴ Hung, S.K.Y. (2014) AFCD/SQ/138/12. Monitoring of Marine Mammals in Hong Kong waters - Final Report (2013 – 2014). Submitted to AFCD of the HKSAR Government

⁵ AFCD (2014) Capture fisheries – latest status. Available at http://www.afcd.gov.hk/english/fisheries/fish_cap/fish_cap_latest/fish_cap_latest.html

⁶ ERM, (1998) Fisheries Resources and Fishing Operations in Hong Kong Waters – Final Report for Agriculture, Fisheries and Conservation Department

4.5 Waste

The sediment at the Project area would be dredged and transferred to barges for subsequent disposal. With reference to the sediment quality study completed in early 2014⁷, the marine sediment samples collected at the Channel were all classified as Category L sediment which is suitable for Type 1 – Open Sea Disposal. The study highlighted the fact that the sediment quality is unlikely to change over time as the results of the sediment quality over a period of 20 years⁸ showed all samples were Category L. It is therefore expected that the marine sediment dredged from this Project is also suitable for Type 1 – Open Sea Disposal.

4.6 Noise

No NSRs are identified within a 300m radius from the boundary of the dredging works. With reference to the findings of AEIAR-069/2003, the nearest NSRs with partial line of sight to the Project works area include village houses at Ko Long, Yung Shue Wan, Long Tsai Tsuen / Hung Shing Ye and Tai Wan San Tsuen, which are at least 1km away from the works areas (see **Figure 2**). The Hong Kong Federation of Youth Groups Lamma Youth Camp and village houses at Lo So Shing are at least 1.8km away from the works areas. Other NSRs such as the North Lamma Clinic and Northern Lamma School are greater than 1km away and are shielded from the works area by the intervening hills immediately north of Lamma Power Station, hence are very unlikely to be affected by the Project.

4.7 Air Quality

No ASRs are identified within a 500m radius from the boundary of the dredging works. The nearest ASRs to the north and northeast of the Project include village houses at Long Tsai Tsuen / Hung Shing Ye and Ko Long, and Hans Andersen Club Lamma Island Centre which are at least 1km away from the works areas (see **Figure 2**). To the east and southeast, the nearest ASRs include the Hong Kong Federation of Youth Groups Lamma Youth Camp and village houses at Lo So Shing, which are at least 1.8km away from the works areas.

4.8 Hazard to Human Life

There is an existing submarine gas pipeline that traverses part of the Channel, which may pose a potential hazard to the dredging works. This pipeline is located at approx. -20mCD within the Channel area, and is buried beneath rock armour. No other submarine installations are located within the Channel.

⁷ Contract No. 14/8214 Chemical Screening for Determination of Sediment Quality for Improvement of Dredging of Navigation Channel of Lamma Power Station – Preliminary Sediment Quality Report, May 2014

⁸ Separate sediment sampling and testing were undertaken within the Channel in 1994, 1997, 1998, 2003 and 2008 as part of previous works within the Lamma Power Station Navigation Channel

Dredging activities associated with the Project are typical and commonly adopted in other similar projects in Hong Kong, and are generally not associated with significant hazard to human life.

4.9 Terrestrial Ecology

Terrestrial habitats in Lamma consist of artificial island, grassland, shrubby grassland, mixed shrubland and lowland forest.⁹

There are two Sites of Special Scientific Interests (SSSIs) on Lamma Island, including the South Lamma Island which was designated as a SSSI in 1980 to protect the habitat of bird species including White-bellied Sea Eagle *Haliaeetus leucogaster* and Bonelli's Eagle *Hieraaetus fasciatus*; and Sham Wan which was designated as a SSSI in 1999 with the aim to protect the Green Turtle *Chelonia mydas* nesting site.

However, as the proposed dredging work is entirely within the marine environment and there is no land-based works, no impact on terrestrial ecology is expected.

4.10 Landscape & Visual

The Project is located within the coastal waters to the west of Lamma Island. Nearby landscapes within 500m of the Project area include the Lamma Power Station landscape and coastal upland and hillside landscape.

VSRs located in the vicinity of the Project include the residents at Lo So Shing, beach users at Hung Shing Ye and the hikers along the western hiking routes of Lamma Island. All VSRs are over 1km away from the Project boundary and generally have distant, but unobstructed views of the western Lamma waters. Residents located in Yung Shue Wan do not have direct views of the Project area (views are obscured by the high terrain to the north of the Lamma Power Station) hence are not VSRs for this Project.

4.11 Cultural Heritage

Owing to the extensive dredging works conducted at the Channel since its formation in the 1980s, the Channel is considered to have nil archaeological potential.

⁹ ERM (2008). Ref SD 08-056. Update of Terrestrial Habitat Mapping and Ranking Based on Conservation Value. Report submitted to SDU of Hong Kong SAR Government

4.12 Land Contamination

Project activities are entirely within the marine environment. As there are no land-based works involved in this Project, there are no historical land contamination issues associated with the Project area.

5 Environmental Protection Measures and Implications

5.1 General

The dredging activities associated with this Project is very similar to the activities undertaken in the 2003 EIA for Lamma Power Station Navigation Channel Improvement (AEIAR-069/2003), hence the severity, distribution and duration of environmental impacts is also likely to be very similar, and many of the recommended mitigation measures adopted in the 2003 EIA can be applicable to this Project. Based on the experience of past dredging works within the Channel, the implementation of the recommended mitigation measures have been effective in preventing adverse environmental impacts to nearby sensitive receivers.

The exact mitigation measures to be implemented for this Project will depend on the findings of the detailed environmental assessments to be undertaken in the EIA study. Nevertheless, potential mitigation measures that may be applicable to this Project are specified in the following sections.

5.2 Water Quality

5.2.1 Construction Phase

Water quality impacts due to the Project are anticipated to be generally localised and short term (during active dredging works only). Similar to AEIAR-069/2003, mitigation measures to minimise the potential water quality impacts associated with the proposed dredging works include:

- Careful management and scheduling of the number and type of dredgers used throughout the dredging programme
- Cap daily dredging rates
- If grab dredgers are deployed, use closed grab and cage-type silt curtains surrounding the grab dredgers
- Implement good site practices for operation of barges

With the implementation of good site practices (for sewage effluent by the construction workforce and operation of marine vessels) and specific mitigation measures to minimise SS release, potential water quality impacts associated with the Project can be effectively mitigated.

5.2.2 Operation Phase

For operation phase water quality impacts due to improvement dredging, the potential mitigation measures would be similar to those for construction phase.

5.3 Marine Ecology

5.3.1 Construction Phase

Potential impacts on marine ecology are anticipated to be short term (during active dredging works only). To minimise potential impacts on Finless Porpoises, the following mitigation measures (taking into consideration applicable measures adopted in AEIAR-069/2003) may be implemented:

- Avoid dredging the southern-most parts of the Channel from February to April, which is the most critical period for Finless Porpoise calves
- Avoid construction vessels passing through key Finless Porpoise habitats
- Impose a vessel speed limit in areas where Finless Porpoise are likely to occur
- Implement a marine mammals exclusion zone around the Project area

Other mitigation measures to minimise the indirect disturbance on marine ecology include implementation of good site practices and water quality mitigation measures. With appropriate mitigation measures implemented, no adverse residual impacts on marine ecology is anticipated.

5.3.2 Operation Phase

For operation phase impacts to marine ecology due to improvement dredging, the potential mitigation measures would be similar to those for construction phase.

5.4 Fisheries

5.4.1 Construction Phase

With proper implementation of good site practices and mitigation measures for water quality, it is expected that residual impacts associated with water quality change are negligible and no fisheries-specific mitigation measures are required during proposed dredging works.

5.4.2 Operation Phase

For operation phase impacts to fisheries due to improvement dredging, the potential mitigation measures would be similar to those for construction phase.

5.5 Waste

5.5.1 Construction Phase

The management and disposal of the dredged material will follow the procedures and requirements specified in ETWB TCW No. 34/2002 "Management of Dredged/Excavated

Sediment”, and a Marine Dumping Permit will be obtained under the Dumping at Sea Ordinance (Cap. 466).

Similar to AEIAR-069/2003, recommendations for good site practices during construction phase of this Project include:

- Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facilities, of all wastes generated at the site;
- Training of site personnel in proper waste management and chemical handling procedures;
- Prohibit dumping of wastes into the marine environment (except at licensed disposal areas);
- Regular collection and removal of general refuse and chemical waste from the construction vessels.

During transportation and disposal of the dredged marine sediments, measures that can be implemented to minimise potential impacts include:

- Bottom opening of barges will be fitted with tight fitting seals to prevent leakage of material;
- Excess material shall be cleaned from the decks and exposed fittings of barges and dredgers before the vessel is moved;
- Delivery programme for sediment disposal should be well planned to avoid any adverse environmental impact from transporting sediment material;
- Monitoring of the barge loading should be conducted to ensure that loss of material does not take place during transportation. Transport barges or vessels should be equipped with automatic self-monitoring devices (ASMD) as specified by the EPD;
- Barges or hopper barges should not be filled to a level that would cause the overflow of materials or sediment laden water during loading or transportation;
- Barges filled with dredged sediments shall be towed away immediately for disposal; and
- All conditions stipulated in the dumping permit should be strictly followed.

5.5.2 Operation Phase

For operation phase waste arising due to improvement dredging, the potential mitigation measures would be similar to those for construction phase.

5.6 Noise

5.6.1 Construction Phase

Given that the Project is located far away from the potential NSRs, and taking into account the findings of AEIAR-069/2003, it is not anticipated that adverse noise impact will occur during construction phase. Subject to the findings of the detailed EIA study, special arrangement on

the use of PME can be implemented to minimise the noise impact. If the dredging works are required to be conducted during night-time or restricted hours, the Contractor should apply and follow the conditions as illustrated in the Construction Noise Permit (CNP) under Noise Control Ordinance (NCO).

5.6.2 Operation Phase

For operation phase noise impacts due to improvement dredging, the potential mitigation measures would be similar to those for construction phase.

5.7 Air Quality

5.7.1 Construction Phase

Given that the Project is located far away from the potential ASRs and the dredging activities are marine based, it is anticipated that adverse fugitive dust impact will not occur during construction phase. Therefore, no specific mitigation measures are required.

5.7.2 Operation Phase

For operation phase air quality impacts due to improvement dredging, the potential mitigation measures would be similar to those for construction phase.

5.8 Hazard to Human Life

5.8.1 Construction Phase

To minimise the risk of damage to the submarine gas pipeline during dredging works, precautionary measures that may be adopted include:

- Use of TSHD (instead of grab dredgers) for areas at and surrounding the submarine pipeline;
- Careful control of dredging depth and dredging rates;
- Impose a buffer zone around the submarine pipeline area and prohibit any temporary anchorage of construction vessels within the buffer zone.

With the adoption of appropriate precautionary measures, the risk of damage to the submarine gas pipeline during dredging works is unlikely to be significant.

5.8.2 Operation Phase

For operation phase hazard to human life due to improvement dredging, the potential mitigation measures would be similar to those for construction phase.

5.9 Terrestrial Ecology

As the Project will not impact on terrestrial ecology, no mitigation measures are required.

5.10 Landscape & Visual

5.10.1 Construction Phase

The dredging works will not impact on the landscape, hence no landscape mitigation measures are required.

Potential visual impacts associated with the Project are unlikely to be significant given the large separation distance and short-term nature of the dredging works. Nevertheless, measures that can be implemented to further minimise visual impacts include:

- Minimise the number of concurrent construction vessels operating simultaneously;
- Require all non-active construction vessels and filled barges to leave the area immediately upon completion of works.

5.10.2 Operation Phase

Operation phase improvement dredging will not impact on the landscape, hence no landscape mitigation measures are required.

For operation phase visual impacts due to improvement dredging, the potential mitigation measures would be similar to those for construction phase.

5.11 Cultural Heritage

No adverse cultural heritage impact is anticipated due to this Project. Therefore, no specific mitigation measures are required.

5.12 Land Contamination

As dredging activities will only be carried out on the seabed with no land-based activities, no land contamination impact is anticipated. Therefore, no specific mitigation measures are required.

5.13 Environmental Monitoring & Audit

Environmental Monitoring and Audit (EM&A) should be implemented in order to ensure compliance with the recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or

remedial action. Detailed procedures and guidelines for the EM&A will be presented in the EM&A Manual as part of the EIA report.

5.14 Any Further Environmental Implications

This Project is for improvement dredging of an existing navigation channel that has already been previously dredged several times in the past, and the findings of past environmental monitoring and audit has shown that no significant environmental impacts have resulted. As this Project does not deviate significantly from the past dredging activities, it is unlikely that this Project will give rise to any further environmental implications not already listed in **Sections 5.2 to 5.12** above.

As part of AEIAR-069/2003 and the 3rd improvement dredging conducted in 2009 (the latter was not a Designated Project under EIAO), consultations with the public and concern groups such as local fishermen were conducted. Similar to the previous dredging works, consultations with local fishermen and stakeholders will be conducted prior to commencement of construction phase of the Project.

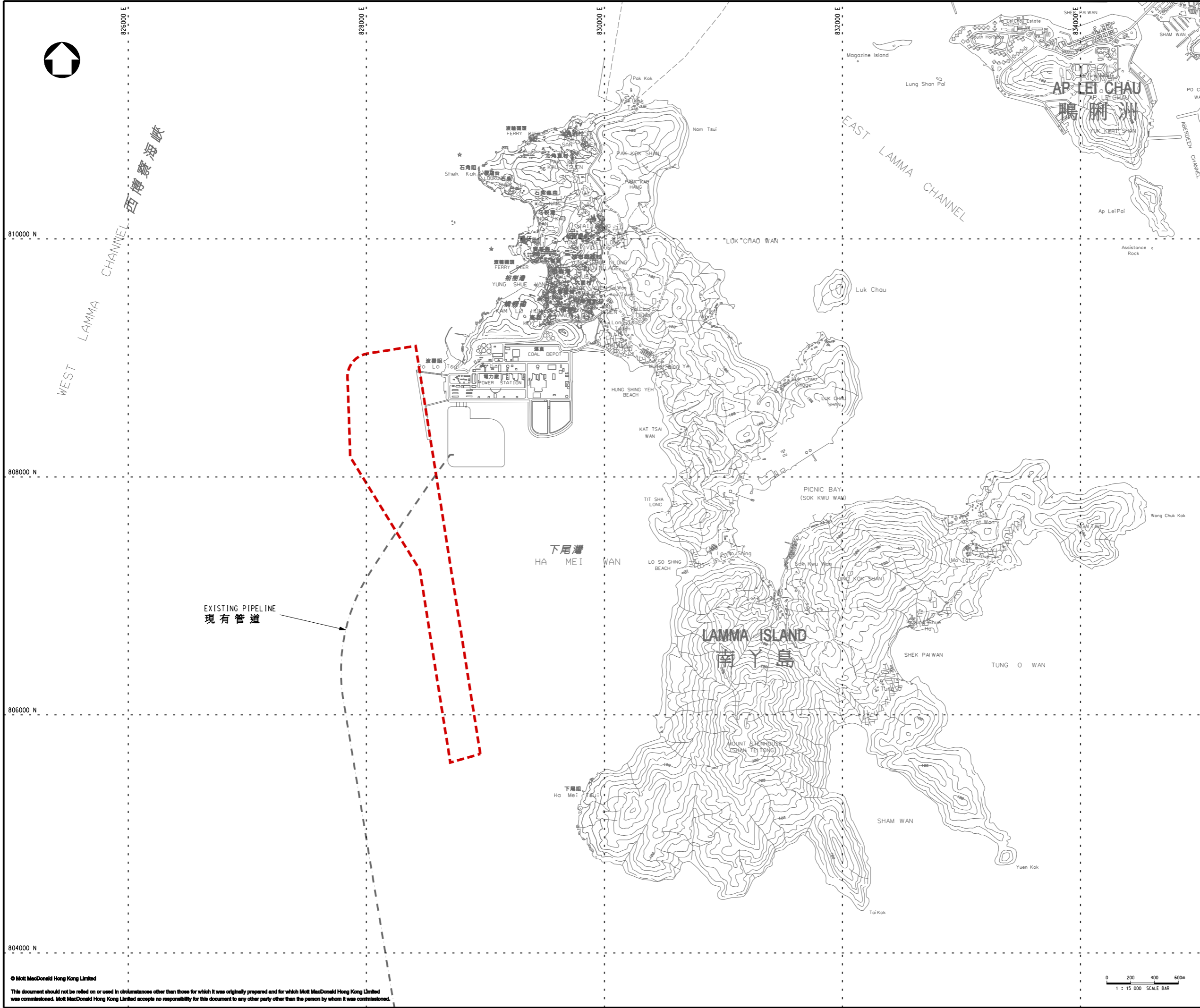
6 Use of Previously Approved EIAs

Previous approved EIA studies that are relevant to this Project include:

- AEIAR-069/2003 – Lamma Power Station Navigation Channel Improvement
- AEIAR-010/1999 – 1,800 MW Gas-fired Power Station at Lamma Extension

The AEIAR-069/2003 addressed the environmental aspects of water quality, ecology, fisheries, construction noise, and waste management, while AEIAR-010/1999 addressed the environmental aspects of air quality, water quality, noise, landscape and visual, waste management, land contamination, marine ecology, fisheries and hazards to life.

Relevant findings and measures recommended in the approved EIA reports that are also considered to be applicable to this Project are referred in relevant sections of **Chapter 3 to 5** of this Project Profile.




EXISTING PIPELINE
現有管道

Notes

Key to symbols
--- PROJECT BOUNDARY
工程項目邊界

Reference drawings

Rev	Date	Drawn	Description	Ch'kd	App'd
P1	NOV 14	MING	FIRST ISSUE	EY	AFK



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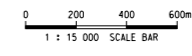


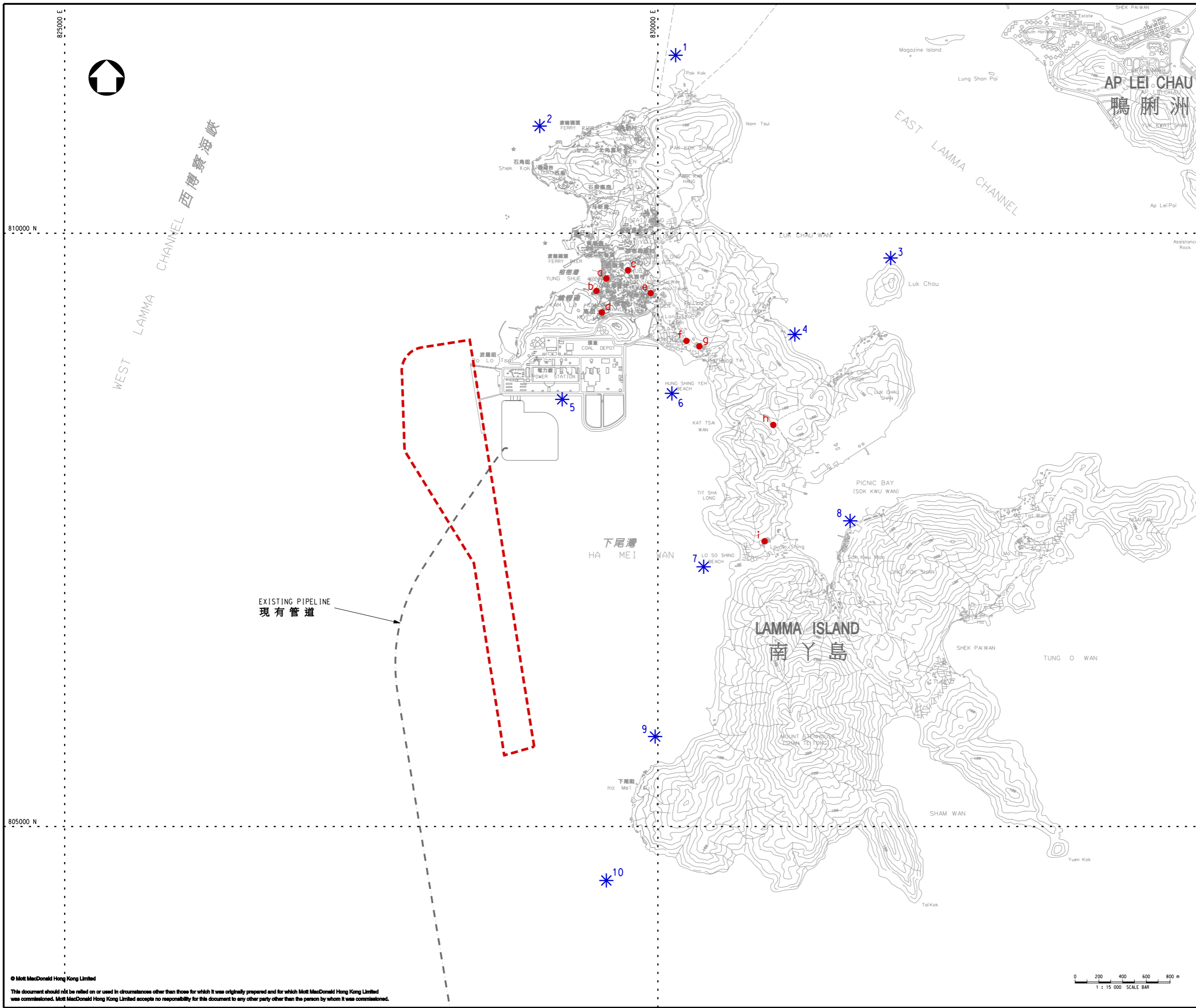
港燈
HK Electric

Project
IMPROVEMENT DREDGING FOR LAMMA
POWER STATION NAVIGATION CHANNEL
南丫發電廠航道挖泥改善工程

Title
PROJECT AREA
工程項目範圍

Designed	EY	Eng check	EC
Drawn	MING	Coordination	EC
Dwg check	EY	Approved	AFK
Scale at A1	1:15000	Status	PRE
Drawing Number	FIGURE 1	Rev	P1





Key to symbols

- PROJECT BOUNDARY
工程項目邊界
- * WATER QUALITY SENSITIVE RECEIVER
水質敏感受體
- AIR & NOISE SENSITIVE RECEIVER
空氣及噪音敏感受體

- KEY WATER SENSITIVE RECEIVERS:**
主要水質敏感受體:
1. PAK KOK (CORAL COMMUNITIES) 北角 (珊瑚羣落)
 2. SHEK KOK TSUI (CORAL COMMUNITIES) 石角咀 (珊瑚羣落)
 3. LUK CHAU 鹿洲
 4. LO TIK WAN FISH CULTURE ZONE 蘆荊灣魚類養殖區
 5. HEC POWER STATION INTAKE 香港電燈有限公司發電廠進水口
 6. HUNG SHING YEH BEACH 洪聖爺灣泳灘
 7. LO SO SHING BEACH 蘆荊城泳灘
 8. SOK KWU WAN FISH CULTURE ZONE 索苦灣魚類養殖區
 9. SOUTH LAMMA 1 (KEY FINLESS PORPOISE HABITAT) 南丫島南面一 (主要江豚生境)
 10. SOUTH LAMMA 2 (KEY FINLESS PORPOISE HABITAT) 南丫島南面二 (主要江豚生境)

- POTENTIAL AIR & NOISE SENSITIVE RECEIVERS:**
潛在空氣及噪音敏感受體:
- a. VILLAGE HOUSES AT YUNG SHUE WAN 榕樹灣村屋
 - b. NORTH LAMMA CLINIC 北南丫診所
 - c. NORTHERN LAMMA SCHOOL 南丫北段公立小學
 - d. VILLAGE HOUSES AT KO LONG 高壘村屋
 - e. TAI WAN SAN TSUEN 大灣新村
 - f. HANS ANDERSON CLUB LAMMA ISLAND CENTRE (POTENTIAL ASR ONLY) 安徒生會南丫島中心 (只屬潛在空氣敏感受體)
 - g. VILLAGE HOUSES AT LONG TSAI TSUEN / HUNG SHING YE 龍仔村 / 洪聖爺村屋
 - h. HONG KONG FEDERATION OF YOUTH GROUPS LAMMA YOUTH CAMP 香港青年協會南丫青年營
 - i. VILLAGE HOUSES AT LO SO SHING 蘆荊城村屋

P1	NOV 14	MING	FIRST ISSUE	EY	AFK
Rev	Date	Drawn	Description	Ch'k'd	App'd

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HK Electric

Project
IMPROVEMENT DREDGING FOR LAMMA POWER STATION NAVIGATION CHANNEL
南丫發電廠航道挖泥改善工程

Title
KEY SENSITIVE RECEIVERS (WATER, NOISE & AIR)
主要敏感受體 (水質、噪音及空氣)

Designed	EY	Eng check	DC
Drawn	MING	Coordination	DC
Dwg check	EY	Approved	AFK
Scale at A1	1:15000	Status	PRE
Rev			P1
Drawing Number		FIGURE 2 圖二	