

# 1 Introduction

## 1.1 Project Background

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

### 1.1.1 Project History

Since 1981, the Channel has periodically undergone improvement dredging works to address the effects of natural siltation (which was identified at a rate of about 0.2 m per year at that time) in order to meet the operational requirements for safe navigation of coal vessels. Safe navigation requires ensuring adequate depth of the Channel in order to maintain an adequate buffer between the underkeel clearance of the coal vessels and the seabed. The following chronology documents the history of past dredging events within the Channel. Extracts of past bathymetry surveys and dredging extents are shown in **Appendix 1.1**.

#### 1990

This was the first improvement dredging of the Channel, conducted before enactment of the Environmental Impact Assessment Ordinance (EIAO). The whole Channel was re-profiled to a depth of -16.5 mPD.

#### 2003 to 2004

This was the second improvement dredging of the Channel. As this works was conducted after the implementation of the EIAO in 1998, it was conducted as a Designated Project under the EIAO. A statutory Environmental Impact Assessment (EIA) study was completed and approved by Environmental Protection Department (EPD) in March 2003. The whole Channel was re-profiled to a minimum depth of -16.0 mPD with the dredging quantity capped at 2.98 million cubic metres (Mm<sup>3</sup>). At the time of the 2003 EIA study, it was envisaged that with the re-profiling of the entire Channel to a minimum depth of -16.0 mPD, the future recurring dredging would be ad hoc and small scale (tackling high or hot spots) only for a considerable time before another large scale dredging to re-profile the entire channel would be required.

#### 2008

In 2008, Hong Kong Marine Department stipulated the current minimum channel depth for safe marine passage to be no less than 15.5 metres below Chart Datum (-15.5 mCD) or approximately 15.65 metres below Profile Datum (-15.65 mPD). According to the private treaty of land granted for LPS, Hongkong Electric Company Limited (hereafter referred to as “HK Electric”) is responsible for maintaining sufficient water depth in the Channel, and thus needs to carry out improvement dredging operations whenever the required minimum depth is approached. With the advent of this minimum water channel depth requirement in 2008, any high spots exceeding -15.65 mPD would impair vessel navigation safety and would not be acceptable. As the previous 2003-2004 improvement dredging had re-profiled the Channel to only about -16.0 mPD only

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a slight buffer from the minimum water depth of -15.65 mPD was available. Natural siltation within the Channel had, since then, already created localized high spots exceeding -15.65 mPD in 2008. It was thus identified at that time that there was an imminent need for improvement dredging to remove those localized high spots in order to comply with the new Berthing Guidelines to ensure vessel navigation safety. As a result, HK Electric had promptly started the necessary dredging planning and preparation works such as bathymetry surveys, sediment sampling and testing, application for sediment disposal allocation, application for Marine Department Notice, stakeholder engagement, tendering exercise, etc. and the improvement dredging was commenced in May 2009 and completed in February 2010 as described below.

It should be noted that prior to 2008 when there was no specific minimum water depth for the Channel specified in the Berthing Guidelines published by Hong Kong Marine Department, the earlier dredging events in 1990, 1997-2001<sup>1</sup> and 2003-2004 were not required to meet the minimum -15.65 mPD water depth requirement, and high spots accrued from variable siltation rates within the Channel was tolerated until impairment of vessel navigation safety was identified. In the past, a threshold level of around -14.0 mPD was adopted before improvement dredging becomes unavoidable as viewed from historical records, however, vessels available for coal delivery in the past had a smaller draft, whereas the vessels available for coal delivery in recent years have a larger draft and hence the previous threshold level of around -14.0 mPD would no longer have been viable even in the absence of the new berthing guidelines.

### 2009 to 2010

With the stipulation of the minimum channel depth in 2008 and after completion of the necessary planning and preparation works as mentioned above that took approx. 12 months, the immediate dredging event to bring the Channel depth in compliance with the new minimum channel depth of -15.65 mPD was commenced in May 2009. Bathymetry surveys showed that high spots close to or exceeding -15.65 mPD were primarily around the edge of the turning basin and along the narrow portion of the Channel, which provides the only point of entry for coal vessels to LPS. To facilitate prompt action including clearance of statutory procedures and mobilisation of the dredging works, a decision was made to tackle only those high spots close to or exceeding -15.65 mPD, and to minimise the dredging quantity by dredging to around -16.0 mPD only, despite recognising that this would provide only a very small buffer below the minimum depth requirement and hence would not be adequate to meet the long term maintenance needs of the Channel. The dredging quantity was limited to 0.45 Mm<sup>3</sup> as a result.

As the dredging quantities were below 0.5 Mm<sup>3</sup>, this dredging event did not constitute a Designated Project under the EIAO. Nevertheless, prior to the dredging event, engagement with potentially concerned parties such as fishermen representatives was made by advance written notification of the dredging works, and further engagement was conducted to address fishermen's queries and concerns at that time. A comprehensive water quality monitoring and audit programme was also carried out during the dredging works to ensure no adverse environmental impacts.

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<sup>1</sup> This dredging event was part of a Coal Jetty Extension Project (rather than for maintenance of the Channel) whereby the coal jetty at LPS was extended and the turning basin of the Channel was enlarged and extended 250 m southwards to a depth of -14.1 mPD.

Throughout the planning and preparation for this dredging event, it was recognised that this would be an immediate, short term solution only, and there remains a need to address the issue of long term management and maintenance of the Channel in light of the new minimum channel depth requirements.

#### 2012 to 2014

Since the improvement dredging completed in 2010 only removed localized high spots to around -16.0 mPD, this only allowed a buffer of around 0.35 m from the required minimum water depth at -15.65 mPD to ensure vessel navigation safety. Taking into account the siltation rate of 0.2 m per year as adopted at that time, it was suspected that high spots would re-appear within the Channel due to natural siltation in 2012, and a bathymetry survey completed in 2013 confirmed that certain high spots within the Channel had already exceeded the minimum channel depth requirement of -15.65 mPD.

In view of the high siltation rates in the Channel, it was recognised that maintaining the Channel depth at -16.0 mPD would not be feasible in the long term as the associated recurrent dredging would be required every 1-2 years to ensure marine navigation safety. This high frequency of recurrent dredging causes major issues for long term management of the Channel, as the necessary planning and preparation works require a long lead time, and there would be no flexibility in scheduling of such recurrent dredging operations without creating serious risks to vessel safety, which can have knock-on effects on security of coal supply to the LPS. Such frequent dredging events would also cause frequent disturbance to the marine environment and other marine users. Taking account of these issues, the dredge depth of -16.0 mPD, while adopted for dealing with urgent high spots in 2009, is unable to satisfy future operational requirements of the Channel and is thus not viable to be maintained in the long term.

In light of the above, maintaining the Channel at a depth deeper than -16.0 mPD is necessary, and the proposed dredge depth of -16.5 mPD (which is reverting to the original re-profiled Channel depth in 1990) was investigated. However, the dredged sediment volume estimated from the bathymetry data would be approx. 1.2 Mm<sup>3</sup> at the time, which would constitute a Designated Project under the EIAO and submission under the EIAO would be required. With a long lead time required for preparing a statutory EIA study and obtaining the necessary approvals, an interim solution was required to address the imminent safety risks within the Channel. Hence ad hoc high spot dredging (which was limited to the most critical high spots required to maintain safe navigation within the Channel in order to minimise the dredging quantity) was required prior to completion of the EIA.

#### 2015

After completion of the necessary planning and preparation works were initiated in 2013 and high spot dredging was conducted at critical high spots within the Channel from January to May 2015. Similar to the 2009-2010 dredging event, the 2015 dredging event only focused on selected critical high spots and aimed to minimise the dredging quantity by dredging to -16.0 mPD only. While this limited the dredging quantity to below 0.15 Mm<sup>3</sup>, such small scale high spot dredging events nevertheless require a long lead time for planning and preparation works which, coupled with a higher recurrence frequency associated with the dredged depth to -16.0 mPD only, poses an unacceptably high risk on safe operation of the Channel. Such minimalistic dredging also does not address the overall siltation situation of the Channel at that time (which

has been building up since the last re-profiling conducted in 2003-2004), thus is not viable for long term maintenance of the Channel. Despite that this dredging event did not constitute a Designated Project under the EIAO, engagement with potentially concerned parties such as fishermen representatives was made by advance written notification of the dredging works, who did not raise particular comments. Nevertheless, a comprehensive water quality monitoring and audit programme was carried out during the dredging works to ensure no adverse environmental impacts.

Completion of the emergency dredging event in 2015 provided a temporary reprieve, however a long term approach for addressing the maintenance needs of the Channel is still required. Hence, this EIA study was initiated.

### The EIA Study

The project profile for the Improvement Dredging for LPS Channel (hereafter referred to as “the Project”) was submitted to the Environmental Protection Department (EPD) on 15 December 2014 under Section 5(1)(a) of the Environmental Impact Assessment Ordinance (EIAO). On 27 January 2015, EPD issued a Study Brief for an Environmental Impact Assessment (EIA) for the Project (ESB-282/2014). Since then, the project area as referred in the project profile and Study Brief has been modified to take into account the long term operational needs of the Lamma Power Station navigation channel. Confirmation that the Study Brief remains valid was sought with the Director of Environmental Protection on 26 May 2016, and confirmation was granted on 11 July 2016.

HK Electric has commissioned Mott MacDonald Hong Kong Limited to undertake an EIA report for the Project, and this document provides the EIA study findings.

## **1.2 Purpose and Objectives of the Project**

The purpose of the Project is to provide and maintain safe clearance for ocean going marine vessels delivering coal shipments to LPS via the Channel, through the dredging of naturally accumulating sediment from the seabed.

Hong Kong Marine Department stipulate the current minimum channel depth for safe marine passage to be no less than -15.5 mCD (approximately -15.65 mPD). In order to ensure this minimum depth is met, the Channel must be dredged and maintained at an adequate level below this depth.

## **1.3 Location and Scale of the Project**

The Project area is approx. 262 ha and covers the main part of the Channel as well as the immediate area surrounding the Channel. The Project area is indicated in **Figure 1.1**. It should be noted that while areas immediately surrounding the Channel need to be dredged to form stable slopes, the existing Channel boundaries will not be widened as a result of the Project.

The proposed improvement dredging works will be conducted entirely within the Project area, and the volume of materials to be dredged each time will vary depending on natural siltation.

## **1.4 EIA Study Brief Requirements**

### **1.4.1 Designated Project under the EIA Ordinance**

As stated in the Project Profile and the EIA Study Brief, the Project is classified as a Designated Project (DP) under Item C.12 of Part I Schedule 2 of the EIAO, a *dredging operation exceeding 500,000 m<sup>3</sup>*.

### **1.4.2 Purpose of the EIA Study**

The EIA Study Brief issued for the Project (ESB-282/2014) details the key requirements of the EIA study. In accordance with Clause 1.6 of the EIA Study Brief, the purpose of the EIA study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the Project and related activities that take place concurrently. This information will contribute to decisions by the Director on:

- i. the overall acceptability of any adverse environmental consequences that are likely to arise as a result of the Project;
- ii. the conditions and requirements for the detailed design, construction and operation of the Project to mitigate against adverse environmental consequences wherever practicable; and
- iii. the acceptability of residual impacts after the proposed mitigation measures are implemented.

### **1.4.3 Objectives of the EIA Study**

In accordance with Clause 2.1 of the EIA Study Brief, the objectives of the EIA study are as follows:

- i. to describe the Project and associated works together with the requirements and environmental benefits for carrying out the Project and the types of designated projects to be covered by the Project;
- ii. to identify and describe elements of community and environment likely to be affected by the Project and/or likely to cause adverse impacts to the Project, including natural and man-made environment and the associated environmental constraints;
- iii. to present the consideration of alternatives to avoid and minimise the potential adverse environmental impacts including the choice of smaller coal vessels, alternative alignment of channel, etc.;
- iv. to identify and quantify emission sources (including air quality, noise, water quality and waste, etc. as appropriate) and determine the significance of impacts on sensitive receivers and potential affected uses;
- v. to identify and quantify any potential losses or damage and other potential impacts to ecology, flora, fauna and natural habitats and to propose measures to mitigate these impacts;
- vi. to propose the provision of mitigation measures so as to minimize pollution, environmental disturbance and nuisance during construction and operation of the Project;

- vii. to investigate the feasibility, practicability, effectiveness and implications of the proposed mitigation measures;
- viii. to identify, predict and evaluate the residual environmental impacts (i.e. after practicable mitigation) and the cumulative effects expected to arise during the construction and operation phases of the Project in relation to the sensitive receivers and potential affected uses;
- ix. to identify, assess and specify methods, measures and standards, to be included in the detailed design, construction and operation of the Project which are necessary to mitigate environmental impacts and cumulative effects and reduce them to acceptable levels;
- x. to investigate the extent of secondary environmental impacts that may arise from the proposed mitigation measures and to identify constraints associated with the mitigation measures recommended in the EIA study, as well as the provision of any necessary modification; and
- xi. to design and specify the environmental monitoring and audit requirements to ensure the effective implementation of the recommended environmental protection and pollution control measures.

#### **1.4.4 Scope of the EIA Study**

The EIA study addresses all likely key issues associated with the construction and operation (including operation dredging) of the Project, as well as those identified under Clause 3.2.1 of the EIA Study Brief:

- i. the potential water quality impacts arising from the dredging and other associated activities during the construction and operation of the Project;
- ii. the potential impacts to marine ecology (especially Finless Porpoise) arising from the dredging and other associated activities during the construction and operation of the Project;
- iii. the potential impacts on fisheries arising from the dredging and other associated activities during the construction and operation of the Project;
- iv. the potential hazard to life arising from the dredging and other associated activities in the vicinity of the existing submarine gas pipeline that is connected to the Lamma Power Station, during the construction and operation of the Project;
- v. the potential waste management implications arising from the construction and operation of the Project;
- vi. potential noise impact on the sensitive receivers due to the dredging and associated activities, including impact from construction equipment during construction and operation of the Project;
- vii. the recurrent environmental implications arising from the operation dredging associated with the operation of the Project; and
- viii. the cumulative environmental impacts of the above arising from the dredging and other associated activities of the Project together with other construction activities that are taking place concurrently.

#### **1.5 Structure of this EIA Study Report**

Following this introductory chapter, the EIA report is structured as follows:

**Chapter 2 – Project Description** introduces the project need, consideration of alternative options and concurrent projects.

**Chapter 3 – Water Quality Impact Assessment** provides the approach, findings and recommendations of the project-related water quality aspects.

**Chapter 4 – Marine Ecological Impact Assessment** presents the approach, findings and recommendations from the marine ecology impact assessment.

**Chapter 5 – Fisheries Impact Assessment** presents the approach, findings and recommendations from the fisheries impact assessment.

**Chapter 6 – Hazard to Life Assessment** presents the approach, findings and recommendations from the hazard to life assessment.

**Chapter 7 – Noise Impact Assessment** presents the approach, findings and recommendations from the noise impact assessment.

**Chapter 8 – Waste Management Impact Assessment** presents the approach, findings and recommendations from the waste management impact assessment.

**Chapter 9 – Conclusion** summarises the findings and recommendations from the EIA.

**Chapter 10 – Environmental Monitoring and Audit** summaries the environmental monitoring and audit requirements specified in technical Chapters 3 to 8.

**Chapter 11 – Implementation Programme** summarises the schedule for implementation of mitigation measures specified in the technical assessments in Chapters 3 to 8.