



土木工程拓展署  
Civil Engineering and  
Development Department

# Agreement No. CE 72/2019 (EP) Contaminated Sediment Disposal Facility at West of Lamma Island - Investigation

Executive Summary for the New  
Contaminated Sediment Disposal Facility to  
the West of Lamma Island

July 2022

Project No.: 0567994

Document details	
Document title	Agreement No. CE 72/2019 (EP) Contaminated Sediment Disposal Facility at West of Lamma Island - Investigation
Document subtitle	Executive Summary for the New Contaminated Sediment Disposal Facility to the West of Lamma Island
Project No.	0567994
Date	18 July 2022
Version	3
Author	IL
Client Name	Civil Engineering and Development Department

#### Document history

Version	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
	0	IL	RC/JN	CAR/RK	7/2/2022	N/A
	1	IL	RC/JN	CAR/RK	23/2/2022	N/A
	2	IL	RC/JN	CAR/RK	7/3/2022	N/A
	3	IL	RC/JN	CAR/RK	18/7/2022	N/A

# Agreement No. CE 72/2019 (EP) Contaminated Sediment Disposal Facility at West of Lamma Island - Investigation

Executive Summary for the New Contaminated Sediment Disposal  
Facility to the West of Lamma Island



---

Craig Reid  
Project Manager



---

Dr Robin Kennish  
Project Director

ERM-Hong Kong, Limited  
2509, 25/F One Harbourfront  
18 Tak Fung Street  
Hung Hom  
Kowloon  
Hong Kong

© Copyright 2022 by ERM Worldwide Group Ltd and / or its affiliates ("ERM").  
All rights reserved. No part of this work may be reproduced or transmitted in any form,  
or by any means, without the prior written permission of ERM.

## CONTENTS

<b>1.</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Project Background .....	1
1.2	Purpose & Nature of Project.....	1
1.3	Purpose and Objectives of the EIA Study .....	2
<b>2.</b>	<b>OBJECTIVES AND BENEFITS OF THE PROJECT AND CONSIDERATION OF ALTERNATIVES .....</b>	<b>3</b>
2.1	Need for Disposal of Contaminated Sediment.....	3
2.2	Consideration of the Different Development Options, Preferred Development Option and Site Selection .....	3
2.3	Objectives and Benefits of the Project .....	4
2.4	Scenarios with and without the Project .....	4
<b>3.</b>	<b>PROJECT OVERVIEW.....</b>	<b>6</b>
3.1	Key Area Identified for Assessment.....	6
3.2	Design of the CMPs.....	6
3.3	Key Construction and Operation Activities of the Project .....	6
3.4	Tentative Implementation Programme .....	7
<b>4.</b>	<b>LEGISLATIVE REQUIREMENTS, EVALUATION CRITERIA AND SENSITIVE RECEIVERS... 9</b>	
4.1	Water Quality .....	9
4.2	Marine Ecology.....	9
4.3	Fisheries .....	10
4.4	Waste Management.....	10
4.5	Cultural Heritage.....	10
4.6	Hazard to Health.....	11
4.7	Air Quality .....	11
4.8	Noise .....	11
<b>5.</b>	<b>SUMMARY OF ENVIRONMENTAL IMPACTS .....</b>	<b>12</b>
5.1	Water Quality .....	12
5.2	Marine Ecology.....	13
5.3	Fisheries .....	14
5.4	Waste Management.....	14
5.5	Cultural Heritage.....	15
5.6	Hazard to Health.....	15
5.7	Air Quality .....	15
5.8	Noise .....	16
5.9	Environmental Monitoring and Audit .....	16
<b>6.</b>	<b>CONCLUSION .....</b>	<b>21</b>

### List of Tables

Table 3.1	Tentative Programme of the Project (Indicative for the first three CMPs) .....	8
Table 5.1	Summary of Environmental Impacts .....	17

### List of Figures

Figure 1.1	Indicative Study Area for the Contaminated Sediment Disposal Facility at West of Lamma Island (WL Facility)
Figure 3.1	Key Area and Preliminary Layout for Contaminated Mud Pits at West of Lamma Island

## 1. INTRODUCTION

### 1.1 Project Background

Since 1992, the Civil Engineering and Development Department (CEDD) of the Hong Kong Special Administrative Region (HKSAR) Government has been managing a number of contaminated sediment disposal facilities in Hong Kong waters, including the contaminated mud pits (CMPs) to the east of Sha Chau (ESC) and the south of The Brothers (SB). These facilities consist of some series of seabed pits, formed by the removal of existing marine sediments, for disposal of contaminated dredged/ excavated sediment generated from works within Hong Kong. When their designed capacities have been reached, the pits would be sealed off from the adjoining environment by a layer of uncontaminated sediment (or naturally excavated materials) of no less than 3 m thick. Operations at these facilities are monitored through the implementation of a purposely designed environmental monitoring and auditing programme. Monitoring results for the existing CMPs at ESC and exhausted CMPs at SB indicate that operations at these facilities are environmentally acceptable.

According to the latest estimate, the total remaining capacity of the existing disposal facility at ESC can only cope with the demand up to 2027 for the disposal of contaminated sediment generated from routine harbour / channel / river maintenance dredging works and future projects. The existing CMPs cannot be expanded further due to the limited usable seabed in the vicinity based on the findings of two previous studies <sup>(1)</sup> <sup>(2)</sup>. A new sediment disposal facility has to be planned for in order to meet the sediment disposal demand after 2027 arising from routine harbour / channel / river maintenance dredging works and other projects.

To address the sediment disposal requirements upon the exhaustion of the existing CMPs, CEDD commissioned a preliminary study in 2017 to assess the potential sites suitable for developing into future CMPs. The study has identified that a portion of the seabed in the West Lamma Channel, between Cheung Chau and Lamma Island, has good potential for developing into a new contaminated sediment disposal facility (“the Project”). Based on the finding of this study, the Government decided in 2017 to take forward the Project.

### 1.2 Purpose & Nature of Project

The Project covers a new marine contaminated sediment disposal facility in the West Lamma Channel, which is capable of disposing of sediments categorized as Type 1 – Open Sea Disposal (Dedicated Sites), Type 2 – Confined Marine Disposal and Type 3 – Special Treatment/ Disposal under the *Environment, Transport and Works Bureau Technical Circular (Works) (ETWB TC(W)) No. 34/2002*, involving:

- Dredging of the seabed for the formation of CMPs;
- Disposal of contaminated sediment <sup>(3)</sup> in the formed CMP; and
- Capping of the exhausted CMP by uncontaminated sediment <sup>(4)</sup> up to the original seabed level.

The following elements of the Project are classified as Designated Projects under the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499) and therefore a statutory environmental impact assessment (EIA) is required.

- Item C.10 of Schedule 2, Part I of the EIAO, which specifies “A marine dumping area”; and

---

(1) Agreement No. CE 105/98 – Strategic Assessment and Site Selection Study for Contaminated Mud Disposal  
(2) Agreement No. CE 12/2002 (EP) – Detailed Site Selection Study for a Proposed Contaminated Mud Disposal Facility within the Airport East/East of Sha Chau Area  
(3) Contaminated sediment refers to sediment categorized as Type 1 – Open Sea Disposal (Dedicated Sites), Type 2 – Confined Marine Disposal and Type 3 – Special Treatment/ Disposal under *ETWB TC(W)) No. 34/2002*.  
(4) Uncontaminated sediment refers to sediment categorized as Type 1 – Open Sea Disposal under *ETWB TC(W)) No. 34/2002*.

Executive Summary for the New Contaminated Sediment Disposal Facility to the West of Lamma Island

- Item C.12 of Schedule 2, Part I of the EIAO, which specifies “A dredging operation exceeding 500,000m<sup>3</sup>”.

The Study Area for the Project is presented in **Figure 1.1**.

In accordance with the requirements of Section 5(1) of the EIAO, application for EIA study brief with the Project Profile for the New Contaminated Sediment Disposal Facility to the West of Lamma Island (No. PP-594/2019) was submitted to the Environmental Protection Department (EPD) on 9 December 2019. The EIA Study Brief of the Project (No. ESB-328/2019) were then issued by EPD on 20 January 2020.

### 1.3 Purpose and Objectives of the EIA Study

The purpose of this EIA Study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the Project and associated works that will take place concurrently. This information will contribute to decisions by the Director of Environmental Protection on:

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

The detailed requirements of the EIA Study are set out in *Clause 3* of the EIA Study Brief. As specified in the EIA Study Brief, the EIA Study has addressed the key environmental issues associated with the construction and operation of the Project.

The EIA Report has been produced in accordance with the requirements in the EIA Study Brief (No. ESB-328/2019) and the *Technical Memorandum on Environmental Impact Assessment Process* issued under the EIAO (EIAO-TM) for the Project, the aim being to obtain an Environmental Permit (EP) under the EIAO. The description of the Project presented in the EIA Report has been based on the best available information compiled by CEDD that describes the relevant construction activities, operational details and baseline information describing the conditions relating to the Project and its surrounding environment.

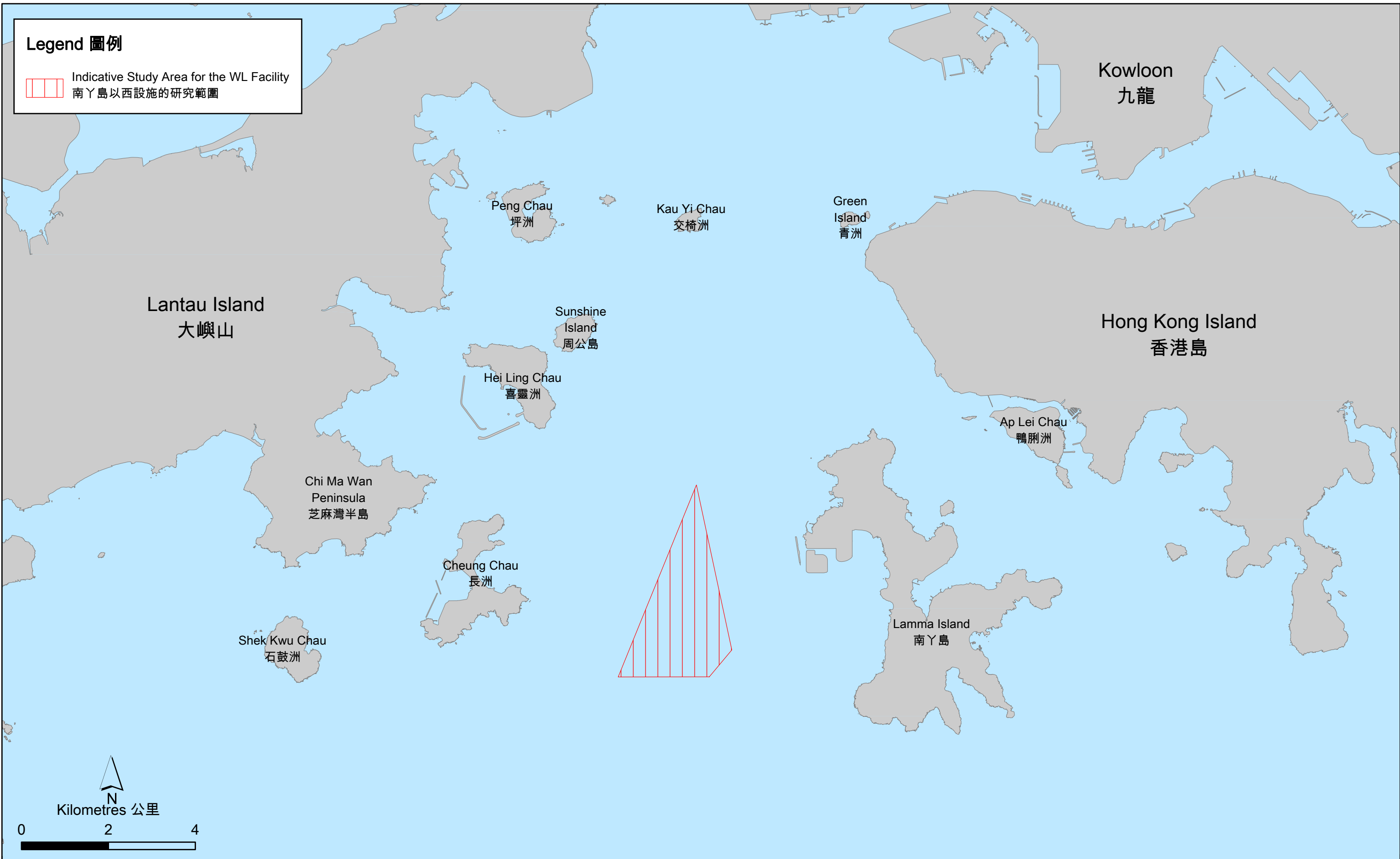


Figure 1.1  
圖 1.1  
Indicative Study Area for the Contaminated Sediment Disposal Facility at West of Lamma Island (WL Facility)  
南丫島以西一帶污染泥卸置設施的指示性研究範圍 (南丫島以西設施)

File: T:\GIS\CONTRACT\0567994\mxd\0567994\_Indicative\_Study\_Area\_bil.mxd  
Date: 30/1/2022

Environmental  
Resources  
Management



## 2. OBJECTIVES AND BENEFITS OF THE PROJECT AND CONSIDERATION OF ALTERNATIVES

### 2.1 Need for Disposal of Contaminated Sediment

As stated in the *Environment, Transport and Works Bureau Technical Circular (Works) (ETWB TC(W)) No. 34/2002*, prior to dredging / excavation of sediments, each project proponent has to provide the rationale for sediment removal. The Marine Fill Committee (MFC) will only consider granting allocation when the need for removal of sediment has been satisfactorily demonstrated. Although non-dredged methods are encouraged for construction of infrastructure projects in Hong Kong, dredging is necessary for essential maintenance works for harbours, fairways, anchorage or drainage channels. According to the latest estimate of the MFC, the annual average contaminated sediment disposal demand is about 0.6 Mm<sup>3</sup>, with major contribution from the maintenance dredging works, even when project proponents are required to avoid, minimise, reduce dredging where practicable, and reuse sediment if possible. It is therefore not possible to completely eliminate the need of sediment disposal and it is important to maintain a disposal facility for contaminated sediment arising from routine harbour / channel / river maintenance dredging works and other projects.

### 2.2 Consideration of the Different Development Options, Preferred Development Option and Site Selection

There are various approaches for management of dredged sediment worldwide. The benefits and dis-benefits of several contaminated mud disposal options including contained aquatic disposal (CAD), confined disposal facility (CDF) and upland disposal have been discussed in **Section 2.4** of the EIA Report.

Upland disposal options were not recommended because of the following reasons:

- The use of an existing landfill was deemed impractical because the large quantities requiring disposal of sediment would result in a significant reduction of capacity for the landfills.
- The technology used in Chemical Waste Treatment Centre and the Sludge Treatment Facility was considered not appropriate for materials that are contaminated with high levels of inorganics (i.e. metals), which is typically the case for contaminated dredged/excavated sediment in Hong Kong.
- Given the apparent suitability of many existing options, and the large land requirement for a new upland facility, development of a new dedicated upland containment facility for contaminated materials was not recommended as suitable.

CAD is preferred over CDF for the contaminated sediment disposal facility with reasons as follows.

- Hong Kong's experience in handling contaminated materials using CAD is among the most extensive and well documented in the world, which provides a sound engineering and environmental basis for continuing with this option. On the other hand, the implementation of the CDF option in Hong Kong would require a formulation, and perhaps testing, of an appropriate design and further trials may be required before full-scale implementation;
- CAD facilities allow more planning flexibility as they can be developed in phases according to the disposal demand, whereas the size of a CDF will be governed in the early planning phase and it will be more difficult to alter at later stage; and
- CAD facilities will result in temporary loss of marine habitats and fishing ground, and benthic recolonisation is expected to take place after completion of capping based on experience from the ESC and SB CMP facilities, whereas CDF development will result in permanent loss of marine habitats and fishing ground.

In addition, identification of available areas, selection of the Study Area and suitability assessment of the Study Area are discussed in **Section 2.5** of the EIA Report. In view of the ecological sensitivities,



seasonal monsoon, water depth and hydrodynamic conditions, the eastern Hong Kong waters are generally not suitable for the development of Contained Aquatic Disposal (CAD) facilities. The western Hong Kong waters, except the waters of the existing CMPs at ESC and SB, are not suitable for the development of CAD facilities due to strong current flow from Pearl River Estuary. The south-western Hong Kong waters are also not suitable for the development of CAD facilities due to the ecological sensitivities and planning of marine parks. The southern and central waters remain to be feasible for CAD development. With reference to the latest available information, there is no other planned development within the portions of southern waters between Cheung Chau and Lamma Island. Therefore, it is considered that area to the west of Lamma Island would have potential for housing a new CAD facility. Constraint mapping, considering environmental, physical and social constraints for the development of CAD facility, was undertaken to identify usable areas for the potential CAD site (i.e. the Study Area). A suitability assessment was also conducted to confirm the suitability of the Study Area for development of CAD facility based on criteria of environmental, engineering and planning factors.

The Study Area for CAD development is located in the West Lamma Channel to the west of Lamma Island and to the east of the recommended Traffic Separation Scheme (TSS) between south of Kau Yi Chau (KYC) and Fan Lau (route via south of Cheung Chau), in the order of approximately 600 hectares, with decreasing seabed levels from -8 metres above Chart Datum (mCD) to -14 mCD from north to south (**Figure 1.1**). The Study Area has been selected to avoid key marine ecological habitats, including marine mammals and areas with high fisheries production.

## 2.3 Objectives and Benefits of the Project

The Project aims to plan and design the new contaminated sediment disposal facility at the west of Lamma Island (WL Facility). The proposed WL Facility aims to meet the sediment disposal demand upon the anticipated exhaustion of the existing CMPs at ESC in 2027, arising from routine harbour / channel / river maintenance dredging works and other projects. The WL Facility is intended to cater for an estimated annual average disposal demand of 0.6 Mm<sup>3</sup> of contaminated sediment within the Study Area.

The environmental benefits of the Project have been considered in detail in **Section 2.2** of the EIA Report and are summarised as follows:

- Following the spirit of the "Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter" (commonly known as the "London Convention", to which China is a signatory), a centralised management and monitoring scheme has been set up to provide overall control over the disposal of marine mud in Hong Kong.
- Dedicated marine contaminated mud disposal facilities adopting CAD design has been implemented at ESC and SB since 1990s, and the associated environmental monitoring and audit programmes have demonstrated that the operation of the facilities did not cause adverse environmental impacts to the surroundings.
- The WL Facility would adopt a similar CAD design and continue to serve as a centralised facility in Hong Kong, providing an overall control for the disposal of contaminated sediment in an environmentally acceptable manner.
- Based on the previous experience from the ESC and SB facilities, benthic recolonisation occurs after the completion of the final capping layer with uncontaminated sediments and/or natural uncontaminated soil and the site is expected to return to the pre-dredged state within a relatively short period of time.

## 2.4 Scenarios with and without the Project

The existing CMPs at ESC are anticipated to be exhausted by 2027 and they cannot be expanded further due to the limited usable seabed in the vicinity. If new disposal facility is not developed in time

to meet the forecasted disposal demand, flood protection works, harbour maintenance dredging works, and the implementation of on-going and planned building/ infrastructure projects will either come to a halt or not be able to proceed. It will also result in navigation risks to marine traffic due to insufficient water depth along the channel if maintenance dredging work could not be carried out in time.

With the Project in place, sediments could be disposed of at the WL Facility after the existing CMPs at ESC are exhausted by 2027. Given the Project is the only sediment disposal facility for disposal of contaminated sediment after the exhaustion of the existing CMPs, it is crucial to have such facility in place taking into account the usage of existing CMPs and the anticipated disposal demand of contaminated sediment in the coming years. To cater for possible surge of disposal demand which may expedite the exhaustion of existing CMPs and any unforeseeable interruption to the project progress, it is necessary to have the new facility ready for disposal by 2025, allowing a transitional period of about two years before the anticipated exhaustion of the existing CMPs. An uninterrupted disposal service could therefore be maintained and flood protection works, harbour maintenance dredging works and the implementation of the on-going and planned building/ infrastructure projects will be able to proceed.

### 3. PROJECT OVERVIEW

#### 3.1 Key Area Identified for Assessment

As the Study Area of approximately 600 ha is relatively large, the area for potential CMP development has been refined with reference to the site investigation and other baseline information of the Study Area. The key area identified for potential CMP development (“**the Key Area**”) is presented in **Figure 3.1**. The Key Area has a size of ~ 235 ha with water depth ranged from -8 mCD to -10 mCD from north to south. There is no submarine gas pipeline/ utilities within and in the vicinity of the Key Area and thus no impacts to these facilities are expected from the Project. The proposed sediment disposal facility will consist of individual CMPs within the Key Area. The impact assessment discussed in the EIA Report focuses on the Key Area where the CMPs will be located.

#### 3.2 Design of the CMPs

The preliminary layout of the CMPs for the WL Facility is illustrated in **Figure 3.1**. Each CMP has an area ranged from ~23 ha to ~33 ha and each of them is able to handle ~2-4 Mm<sup>3</sup> contaminated sediments. The total maximum capacity for contaminated sediment disposal of the proposed CMPs within the Key Area is 20 Mm<sup>3</sup>. A total of about 24 Mm<sup>3</sup> uncontaminated sediment is estimated to be dredged for the construction of proposed CMPs within the Key Area. The pit walls will have a shallow slope gradient and each CMP will be separated from each other for at least 50 m. The detailed layout and configurations of the proposed CMPs will be subject to review and optimisation in the design and implementation stage.

#### 3.3 Key Construction and Operation Activities of the Project

The CMPs will be formed and used one by one taking into consideration of the latest forecasted demand of sediment disposal, and no more than three pits will be active (dredging / backfilling / capping) at any one time. Details of the construction and operation of the Project are discussed in **Section 2.6.4** of the EIA Report. A summary of key construction and operation activities of the Project is presented below.

- **Construction activities – dredging of the seabed for the formation of CMP:** Either one trailing suction hopper dredger (TSHD) with a maximum working rate of 256,200 m<sup>3</sup>/week, or up to two grab dredgers with a total maximum working rate of 100,000 m<sup>3</sup>/week, would be deployed. Each CMP will be dredged down to ~15-20 m below seabed to form a pit with a disposal capacity of about 2-4 Mm<sup>3</sup>. The construction of each CMP would take about 1 - 2 years, depending on the dredging rate. It should be noted that the WL Facility will be implemented in phases. Timing of dredging the next CMP would depend on the actual contaminated sediment disposal demand. Given the long service lifetime of the WL Facility, the dredging schedule / rate in reality could be adjusted in view of the interface with other concurrent activities / projects as appropriate to minimise potential environmental impacts. Depending on the sediment quality based on the chemical and biological test results, the dredged sediments will be disposed of at open sea or confined marine disposal sites. Based on the available sediment quality data from the ground investigation works, it is expected the dredged sediments would require Type 1 open sea disposal and the sediments could be disposed at the South of Cheung Chau, the South of Tsing Yi, the East of Ninepin, the East of Tung Lung Chau, ESC as capping materials, as well as within WL Facility as capping materials when any CMP of the WL Facility reached its capacity in receiving contaminated sediments. The dredged sediment will be transported to the disposal sites using TSHD or hopper barges with tug boats.
- **Operation activities – disposal of contaminated sediment in the formed CMP:** With reference to the typical arrangement of the existing CMP, disposal barges are typically instructed to dispose of sediments within the CMP area and located at least 50 m away from the CMP boundaries. The actual disposal location will depend on the water current speed and direction,

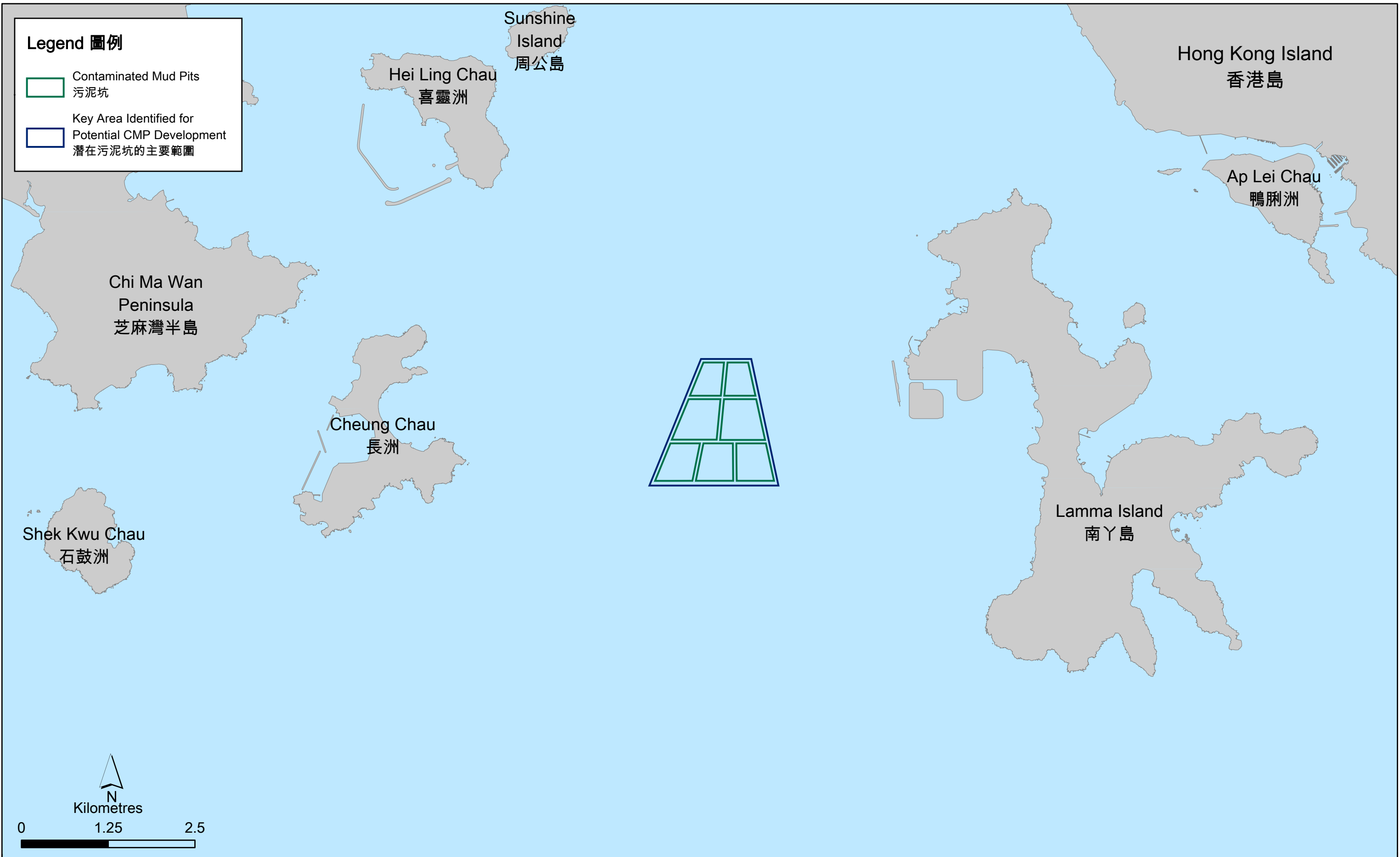


Figure 3.1  
圖 3.1

Key Area and Preliminary Layout for Contaminated Mud Pits at West of Lamma Island  
南丫島以西一帶污染泥卸置設施的主要範圍及初步設計

as well as the sub-area usage to ensure an even backfill level. With reference to the disposal arrangement at the CMPs to ESC and SB, the maximum disposal rate for the Project is assumed to be 26,700 m<sup>3</sup>/day using TSHD or hopper barges with tug boats. It should be noted that the maximum working rate used in the assessment adopts a conservative approach. Assuming the estimated annual average contaminated sediment disposal demand of 0.6 Mm<sup>3</sup> (equivalent to an average of ~1,650 m<sup>3</sup>/day) for future operation, the actual working rate under normal situation can be much lower throughout most of the service lifetime of the WL Facility. The disposal procedures follows the same procedures that were introduced in 1997 during the backfilling of CMP III d at ESC as well as the recent CMP at SB and CMP V at ESC.

- **Operation activities - capping of the exhausted CMP by uncontaminated sediment up to the original seabed level:** Once the CMP of the WL Facility is backfilled with contaminated sediments to 3 m below original seabed level, the CMP will be capped with uncontaminated sediments using the same disposal procedure for backfilling as disposal of contaminated sediment, until the CMP is capped to the original seabed level. With reference to the capping arrangement at the CMPs to ESC and SB, the maximum capping rate for the Project is assumed to be 26,700 m<sup>3</sup>/day using TSHD or hopper barges with tug boats. It should be noted that the maximum working rate used in the assessment adopts a conservative approach. The actual working rate under normal situation is expected to be much lower throughout most of the service lifetime of the WL Facility depending on the availability of uncontaminated sediments for capping.

### 3.4 Tentative Implementation Programme

The first CMP of the Project is planned to start construction in 2024 for operation by 2025/2026, allowing a transitional period of about two years before the anticipated exhaustion of the existing CMPs at ESC in 2027. Each CMP is expected to provide disposal service for approximately 3 years. The tentative programme as shown in **Table 3.1** demonstrates the typical construction and operation cycle for the first three CMPs of the proposed WL Facility, which covers a total period of about 10 years (including dredging, backfilling and capping). As the CMPs will be constructed and operated sequentially depending on the disposal demand, the duration for dredging, backfilling and capping of a CMP is estimated for presentation purpose only. Overall, subject to future disposal demand, the proposed WL Facility is expected to have a service lifetime for up to 20 years. The remaining CMPs are anticipated to follow a similar implementation programme for use upon exhaustion of the first three CMPs. It should be noted that no more than three CMPs will be active (dredging / backfilling / capping) at any one time. While backfilling of contaminated sediment is expected to be carried out throughout the operation of the Project, the exact schedule/ working rates of dredging and capping works would be adjusted to minimise potential environmental impacts in view of actual disposal demand of contaminated sediment, availability of uncontaminated sediment for capping and the interface with concurrent projects/ activities, etc.

Executive Summary for the New Contaminated Sediment Disposal Facility to  
 the West of Lamma Island

**Table 3.1 Tentative Programme of the Project (Indicative for the first three  
 CMPs)**

Pit	Construction/ Operation	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
1st	Dredging													
	Backfilling													
	Capping													
2nd	Dredging													
	Backfilling													
	Capping													
3rd	Dredging													
	Backfilling													
	Capping													

## 4. LEGISLATIVE REQUIREMENTS, EVALUATION CRITERIA AND SENSITIVE RECEIVERS

### 4.1 Water Quality

The EIA Study has described the potential impacts associated with the construction and operation activities of the Project on water quality that have been identified and analysed for compliance with the prevailing Water Quality Objectives (WQOs) stipulated under the *Water Pollution Control Ordinance (WPCO)* and the *Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-ICW)*, and the criteria and guidelines stated in the *EIAO-TM Annexes 6 and 14*, and *Practice Note for Professional Persons, Construction Site Drainage (ProPECC PN1/94)*, respectively.

The Assessment Area for water quality impact assessment covers the Southern Water Control Zone (WCZ), Western Buffer WCZ and Victoria Harbour WCZ. Water Sensitive Receivers (WSRs) were identified in the Assessment Area, including fish culture zone (FCZ), existing/ potential marine parks, coral communities, Site of Special Scientific Interest (SSSI), Green Turtle nesting ground, secondary contact recreation subzones, habitat for Finless Porpoise (FP), nursery area and spawning ground for commercial fisheries resources, gazetted and non-gazetted bathing beaches, seawater intakes, typhoon shelters and Water Supplies Department (WSD) flushing intakes (see **Section 3 of the EIA Report** for further details). The potential impacts arising from the construction and operation activities of this Project to these WSRs have been evaluated.

### 4.2 Marine Ecology

The potential impacts of the construction and operation activities of this Project on marine ecology have been assessed in this EIA Report. The impacts have been identified and analysed for compliance with the criteria and guidelines stated in the *Annexes 8 and 16* of the *EIAO-TM* respectively.

The Assessment Area and sensitive receivers for marine ecology are the same as those identified in **Section 4.1**. Known important habitats and species for marine ecology within the Assessment Area include coral and benthic communities, FP, Green Turtle, as well as the potential South Lamma Marine Park.

Marine ecological surveys, which include coral, subtidal benthos and marine mammal surveys, were conducted during the dry and wet seasons of 2021 to fill the identified data gap and update the latest ecological conditions of marine habitats and assemblages in the Assessment Area. Findings from the surveys confirmed the findings of the literature review, and are presented below:

- Recognized sites of conservation importance – these include the potential South Lamma Marine Park, Sham Wan Site of Special Scientific Interest (SSSI) and the Sham Wan Restricted Area.
- Coral communities – the survey results indicated that common and widespread species, including hard corals, ahermatypic hard corals and octocorals, were recorded in low percentage cover (< 10%) in the Assessment Area.
- Subtidal benthos assemblages – subtidal benthos species reported are common and widespread in Hong Kong with no species of conservation importance. Overall, the abundance and diversity of infauna within the Study Area is similar to other areas in west of Lamma and southern waters of Hong Kong in other studies.
- Finless Porpoise (FP) – FP are present in South Lantau waters year-round and their occurrence is greater and more widespread in these waters in the dry season (December to May). FP use a broad swathe of South Lantau waters, particularly extending across the waters between the Soko Islands and Shek Kwu Chau, with the proposed CMP to be located at the east of their main habitat, where FP densities are recorded to be low from the literature review and the field

surveys. The area within and in the vicinity of the Study Area is not a key occurrence habitat for FP.

- Green Turtles – the literature review suggested the presence of Green Turtle *Chelonia mydas* in the Assessment Area. Very occasional records of a few animals were reported previously and no opportunistic sightings of Green Turtle occurred during the marine ecological surveys for this EIA study. The major nesting site for Green Turtle in Hong Kong is at Sham Wan, southern Lamma Island, which is more than 5 km from the Key Area for potential CMP development.

Based on the baseline data, the ecological importance of subtidal soft benthos assemblages and marine waters of the Study Area, as well as the subtidal hard bottom habitat in the vicinity of the Project are considered low. Although FPs are present in the Assessment Area, the area within and in the vicinity of the Study Area is not a key occurrence habitat for FP. Potential South Lamma Marine Park, and Sham Wan SSSI and Restricted Area are considered to range between moderate and high ecological importance. The potential impacts arising from the construction and operation phases of this Project to these sensitive receivers have been evaluated.

### 4.3 Fisheries

The potential impacts to fisheries caused by the construction and operation activities of this Project have been assessed in this EIA Report. The impacts have been identified and analysed for compliance with the criteria and guidelines stated in the *EIAO-TM Annexes 9 and 17* respectively.

The Assessment Area and sensitive receivers for fisheries are the same as those identified in **Section 4.1** above. A review of baseline information on commercial fisheries resources, habitats and fishing operations surrounding the waters of the proposed Project from available literature and field surveys has been undertaken. Results from the review indicate that the Study Area falls within an area with moderate to high level of fishing operations and provides low to moderate capture fisheries production. Sensitive receivers, including spawning ground and nursery area of commercial fisheries resources in southern waters, FCZs in Sok Kwu Wan, Lo Tik Wan, Cheung Sha Wan and Ma Wan, and artificial reefs in the Lo Tik Wan FCZ have been identified. The potential impacts arising from the construction and operation activities of this Project to these sensitive receivers have been evaluated.

### 4.4 Waste Management

The potential waste management implications caused by construction and operation activities of this Project have been assessed in this EIA Report. The impacts have been identified and analysed for compliance with the criteria and guidelines stated in the *Annex 7 and Annex 15* of the *EIAO-TM* respectively.

A review of sediment quality data and further sediment sampling were undertaken as part of this EIA Study to investigate sediment quality along the vertical profile of the Key Area. The sediment testing results were compared against the relevant sediment quality criteria specified in *ETWB TCW No. 34/2002 – Management of Dredged/ Excavated Sediment*. All the marine sediments to be dredged within the Key Area were found to be uncontaminated.

### 4.5 Cultural Heritage

The potential impacts to cultural heritage, in particular marine archaeology, associated with the construction and operation activities of this Project have been assessed in this EIA Report. The impacts have been identified and analysed to be in compliance with the criteria and guidelines stated in the *Annexes 10 and 19* of *EIAO-TM* respectively.

A Marine Archaeological Investigation (MAI), including a desktop review supplemented with marine geophysical survey, has been undertaken. The MAI confirmed that the Key Area identified for potential CMP development under the Project has no sites of archaeological potential. The potential



impacts on cultural heritage arising from the construction and operation activities of this Project have been evaluated.

#### 4.6 Hazard to Health

The potential hazards arising from the construction and operation activities of the Project have been evaluated with reference to the guidelines of the US Environmental Protection Agency (EPA) and incorporated a four-step approach involving problem formulation, characterisation of exposure, characterisation of human health effects, and risk characterisation. The intent of this evaluation is to determine the potential risks to the various populations of Hong Kong, resulting from contaminated sediment disposal at the proposed WL Facility. The exposure pathway is assumed to be consumption of food by members of the various populations in the assessment including Hong Kong people in general, Hong Kong fishermen, and WL fishermen. Evaluation of carcinogenic risk and an estimate of the hazard (i.e. non-carcinogenic risk) to the three populations through the consumption of contaminated seafood have been conducted in the EIA Report.

#### 4.7 Air Quality

This EIA Study has examined the impacts to air quality during construction and operation activities of the Project. The impacts have been identified and analysed for compliance with the prevailing Air Quality Objectives (AQOs) stipulated under the *Air Pollution Control Ordinance (APCO)* and the criteria and guidelines stated in the *Annexes 4 and 12* of the *EIAO-TM* respectively.

The Assessment Area for air quality is defined as an area within 500 m from the boundary of the Project (i.e. Key Area identified for potential CMP development). No existing or planned Air Sensitive Receiver (ASR) have been identified within the Assessment Area. A total of seven representative ASRs beyond the Assessment Area (at least 2.5 km away) have been identified. The potential impacts arising from the construction and operation activities of this Project have been evaluated.

#### 4.8 Noise

The potential impacts of noise from the construction and operation activities of the Project have been assessed in this EIA Report. The impacts have been identified and analysed for compliance with the criteria and guidelines stated in the *Annexes 5 and 13* of the *EIAO-TM* respectively and the applicable criteria stipulated under the *Noise Control Ordinance (NCO)*.

The Assessment Area for noise covers a distance of 300 m from the boundary of the Project (i.e. the Key Area identified for potential CMP development). No existing or planned Noise Sensitive Receiver (NSR) was identified within the Assessment Area. The nearest existing NSR is located at more than 2.8 km from the Project site. The potential impacts arising from the construction and operation activities of this Project have been evaluated.

## 5. SUMMARY OF ENVIRONMENTAL IMPACTS

### 5.1 Water Quality

Computational modelling has been conducted to predict various potential water quality impacts from the proposed marine dredging during construction, as well as backfilling and capping during operation under this Project, and relevant concurrent projects. The construction activities (dredging) could overlap with operation activities (backfilling and capping). Key water quality issues, including changes in water quality due to construction and operation activities, marine vessel discharges and changes in flow regime have been assessed. Cumulative impacts arising from relevant concurrent projects has also been taken into account during the assessment.

Full compliance is predicted at all identified WSRs for all parameters in both dry and wet seasons. Key results are outlined below:

- The sediment loss rates under the construction and operation activities were assumed at the respective maximum, and all the identified concurrent marine works would be conducted with their maximum allowed sediment loss rates. The maximum suspended solid (SS) elevation of 1.1 mg L<sup>-1</sup> is predicted to occur at MP1-C (Potential South Lamma MP) for dry season, and the maximum of 0.8 mg L<sup>-1</sup> was predicted at MP1-B (Potential South Lamma MP) and CR01 (corals at Cheung Chau) for wet season, of which are well below their respective WQO criteria. The predicted sedimentation flux at nearby coral locations are also well below the corresponding assessment criterion of 100 g/m<sup>2</sup>/day and thus no unacceptable impacts to coral communities are expected due to sediment deposition from the Project.
- As sediment samples collected within the Key Area was identified as uncontaminated sediment, risk of release of sediment-bounded contaminant from dredging works of the Project is minimal.
- The maximum predicted dissolved oxygen (DO) depletion level based on conservative assumptions using maximum SS elevation is around 0.03 mg L<sup>-1</sup> (at MP1-C), which is considered to be insignificant. No unacceptable water quality impact from DO depletion is anticipated.
- Results of water quality modelling also indicated the predicted release of sediment-bounded contaminants as well as nutrients would be limited at the identified WSRs and are below the corresponding assessment criteria. No unacceptable water quality impact associated with release of sediment-bounded contaminants as well as nutrients is anticipated.
- Considering the relatively small scale of operation and vessel movements, standard site practices as well as the suitable collection and disposal of wastewater / sewage, no unacceptable water quality impact associated with marine vessel discharges is expected.
- Results of hydrodynamic modelling indicated that the change in flow regime would be minimal. No unacceptable change in flow regime on the surrounding water would be expected due to the presence of the Project.

To further minimise potential water quality impact associated with the Project, mitigation measures such as installation of cage-type silt curtain around closed grab, no overflow from TSHD, the Lean Mixture Overboard (LMOB) system of TSHD will only be in operation at the beginning and end of the dredging cycle when the drag head is being lowered and raised, control of dredging / backfilling / capping rates, as well as other standard measures and good site practices are recommended to be implemented.

Marine water quality monitoring at selected WSRs is recommended for marine dredging, backfilling and capping of the Project. Sediment quality monitoring is also recommended for backfilling of the CMPs. Regular site audit would also be conducted throughout the Project.

## 5.2 Marine Ecology

Potential impacts to marine ecological resources that may arise from the construction and operation activities are assessed. The temporary habitat loss and disturbance within and in the vicinity of the Key Area throughout the construction and operation activities of the Project is expected. Considering the low ecological value of the associated benthic assemblages, and the recolonization of similar organisms following completion of capping works of the CMP, unacceptable impacts on the benthic communities are not expected.

Considering the temporary nature of the disturbance on the non-key FP occurrence habitat and with controlled work rates for dredging, backfilling and capping works, impacts on FP are expected to be of minor significance. Upon cessation of the disturbance, no significant change in marine mammal distribution, abundance and usage pattern in the wider Hong Kong waters is expected. Considering the major nesting site (Sham Wan) for Green Turtles in Hong Kong is located > 5 km away from the Key Area for potential CMP development, and given the occurrence of Green Turtles is highly opportunistic, it is unlikely that the waters within and in the vicinity of the Key Area represent unique habitats that the species would rely on. Unacceptable impacts on Green Turtles are not expected.

Dredging, backfilling and capping works of the CMPs are expected to result in a minor increase in underwater sound. The waters within the Assessment Area and its vicinity is subject to relatively high levels of marine traffic by similar types of vessels. It is reasonable to assume the marine invertebrates and Green Turtles in these waters are habituated to a relatively high background level of underwater sound. FP would be expected to respond to sound generating activities by avoiding a localised works area near the CMPs and the effect would be limited to behavioural disturbance impacts on affected individuals only without affecting the functionality of key habitats such as the waters between the Soko Islands and Shek Kwu Chau. No significant long-term change in marine mammal distribution, abundance and usage pattern in the wider Hong Kong waters is expected. Unacceptable adverse impacts of increased underwater sound level on FP are not anticipated.

Unacceptable impacts to the marine ecological resources including coral and benthic communities, Green Turtles, FP and the potential South Lamma Marine Park are not expected due to the changes in water quality from construction and operation activities, including SS elevation, DO depletion, release of sediment-bounded nutrients as well as contaminants.

The risk of marine mammals being killed or injured by vessel collisions in Hong Kong is mainly associated with high-speed vessels such as high-speed ferries. Given the slow-moving nature of the relatively small number of works vessels involved in the Project, unacceptable adverse impacts of increased marine traffic on FP are not anticipated. A small increase in vessel activity associated with the construction and operation activities of this Project is not anticipated to result in unacceptable impacts on these marine ecological resources.

The lighting on works vessels for the CMPs is expected to be similar to the nearby marine traffic travelling around the Project area through the nearby fairways. Unacceptable adverse impacts from increased marine traffic, glare effect of light sources of construction and operation activities on Green Turtles are not anticipated.

With the small quantities of chemicals and fuel used in works vessels and construction plants, and with implementation of precautionary measures, unacceptable impacts on marine ecological resources, including coral and benthic communities, Green Turtles, FP and the potential South Lamma Marine Park, due to accidental spillage or leakage of fuel/ chemicals are not expected.

The mitigation measures designed to reduce impacts to water quality to acceptable levels and complying with WQOs during construction and operation activities of the Project are also expected to mitigate impacts to marine ecological resources, FP, Green Turtles and the potential South Lamma Marine Park. Other mitigation and precautionary measures designed to reduce impacts include site selection to avoid impacts to ecologically sensitive habitats as far as practicable, proper planning and design of the CMPs, control of work rates for dredging, backfilling and capping, briefing to vessel

operators and the use of predefined and regular routes. With the implementation of mitigation and precautionary measures during construction and operation activities of the Project, potential impacts on marine ecological resources will be further minimised.

### 5.3 Fisheries

Potential sources of impacts to fisheries resources and fishing operations arising from the Project may occur during both construction (dredging) and operation (backfilling and capping) activities. The construction and operation activities are expected to result in a temporary loss of access to potential fishing ground of up to 120 ha within the Key Area at any one time. It should be noted that only a relatively small number of works vessels will occupy the active CMP areas, and the frequency/ trip of works vessels would also be relatively low in general depending on the sediment disposal demand. It is expected that the disturbance to fisheries habitats will be temporary at discrete work locations of the active CMPs. Once dredging, backfilling and capping works for a CMP of the Project are completed, the seabed and hydrodynamic regime is expected to restore to their original condition. Recolonisation of benthos is expected to occur at the capped pits and the habitats are expected to return to pre-dredged conditions. Considering the temporary and reversible nature of the disturbance, small extent of the area affected at any one time which is of low to moderate fisheries production despite the moderate to high level of fishing operation, impacts are considered to be of minor to moderate significance and unacceptable impacts on fisheries resources, habitats and fishing activities are not expected.

The water quality modelling results have indicated that predicted levels of SS, DO, contaminant and nutrient concentrations as a result of dredging, backfilling and capping works of this Project are anticipated to be in compliance with the relevant assessment criteria. Impacts are considered to be of minor significance. Unacceptable indirect water quality impacts from sediment release on fisheries resources, habitats (including spawning ground and nursery area) and fisheries sensitive receivers are not expected to occur.

The underwater sound generated by a small increase in vessel activity associated with the construction and operation of this Project is not anticipated to result in unacceptable impacts on fisheries resources in the Assessment Area.

The construction and operation of the Project have been designed to reduce potential impacts on water quality which will, in turn, reduce impacts on fisheries resources. Water quality mitigation measures (e.g. deployment of cage-type silt curtain during dredging works by grab dredgers, good site practices) will be implemented to further avoid/reduce potential impacts. Safety / precautionary measures such as issuance of Marine Department Notice or other notifications is expected to reduce the risk of collision of increased marine traffic and fishing vessels to within acceptable levels. During construction and operation of the CMPs, works area will be established within and in the vicinity of the active CMP(s) within Key Area only to minimize the actual extent of fisheries habitats and fishing ground affected at any one time.

### 5.4 Waste Management

During construction and operation of the Project, the main activities that generate wastes will be the marine dredging of the seabed for the formation of the proposed CMPs. The typical waste types associated with the construction and operation activities include dredged marine sediment from the formation of the proposed CMPs, chemical waste from maintenance of plant and equipment (e.g. dredgers), and general refuse from marine-based workforce.

It is estimated that about 24 Mm<sup>3</sup> *in situ* volumes of uncontaminated sediment will be dredged under the Project. It is expected the dredged sediments would require Type 1 open sea disposal. Possible on-site reuse will also be explored to dispose of the dredged sediments within the WL Facility as capping materials when any CMP of the WL Facility reached its capacity in receiving contaminated sediments. Generation of other wastes, including chemical waste, and general refuse are anticipated

Executive Summary for the New Contaminated Sediment Disposal Facility to  
the West of Lamma Island

to be small. With the implementation of the mitigation measures recommended, no adverse environmental impacts, and hazards from storage, handling, collection, transport and disposal of these wastes are expected.

During dredging works of the Project, site audits will be undertaken by the Project Proponent and the Contractor regularly to determine if wastes are being managed in accordance with the recommended good site practices in this EIA Report. Waste monitoring and audit programme for the operation activities of the Project will not be required. Adverse environmental impacts arising from the management and disposal of waste during the construction and operation activities of the Project are not anticipated.

## 5.5 Cultural Heritage

The desktop review supplemented with the results of geophysical survey conducted for the Project concluded that there are no sites of archaeological potential in the Key Area for potential CMP development for the Project. Further marine archaeological investigations are considered not necessary. No marine archaeological impact is identified during the Project construction and operation. No marine archaeological mitigation measure is required.

## 5.6 Hazard to Health

Loss of contaminated sediment will occur during disposal activities, and as the area serves as fishing grounds, seafood originated within and in the vicinity of the Study Area where the CMPs are located could bioaccumulate contaminants and in turn represents a potential hazard to human health by way of ingestion of organisms with contaminant residues. The carcinogenic risk assessment has indicated that the lifetime risks associated with consumption of seafood are below the acceptability criterion for both the WL Facility and the reference areas. Results of the hazard (i.e. non-carcinogenic risk) assessment indicated that risks associated with consumption of seafood were low for both the WL and reference areas.

## 5.7 Air Quality

The major construction activities of the Project involve dredging of marine sediment to form CMPs. Dredging activities are marine based and thus dust emissions from the dredged sediment would be minimal. The dredged marine sediment will also be transported away from the Project site immediately after excavated. Adverse fugitive dust impact during construction phase is not anticipated. Considering the transient nature of any potential odour emissions, the large separation distance between the Project site and the identified ASRs (more than 2.5 km apart), sufficient separation distance between the vessel routes and ASRs along the vessel routes, as well as between the sediment disposal facilities (SDFs)/ CMPs and nearby ASRs (more than 500 m apart), adverse odour impact during construction phase is not expected. In view of the limited number of vessel trips per day, the sufficient separation distance from the ASRs, and the transient nature of the marine emissions, adverse air quality impact due to marine emissions during the construction phase of the Project is not anticipated. Air quality monitoring is considered not necessary for the construction phase of the Project. Regular site audits are recommended to check implementation of the specific mitigation measures throughout the construction phase.

The major operation activities of the Project involve disposal of contaminated sediment in the formed CMPs (i.e. backfilling) and capping of the exhausted CMPs by uncontaminated sediment up to the original seabed level. As the contaminated / uncontaminated sediment in transportation to the formed CMPs for backfilling and capping will be generally wet before its disposal, adverse fugitive dust impact during operation phase is not anticipated. Considering the transient nature of any potential odour emissions, the large separation distance between the Project site and the identified ASRs (more than 2.5 km apart), sufficient separation distance between the vessel routes and ASRs along the vessel routes, adverse odour impact during operation phase is not expected. In view of the limited number

of vessel trips per day, the sufficient separation distance from the ASRs, and the transient nature of the marine emissions, adverse air quality impact during the operation phase of the Project is not anticipated. Air quality monitoring is considered not necessary for the operation phase of the Project. Regular site audits are recommended to check implementation of the specific mitigation measures throughout the operation phase.

## 5.8 Noise

No existing or planned NSR was identified within the Assessment Area for the Project. Since the nearest NSR is located at least 2.8 km away from the Project site, quantitative noise assessment for the construction and operation of the Project is considered not necessary. Due to large separation distance, adverse noise impact associated with the construction and operation of the Project is not anticipated.

Mitigation measures and noise monitoring are therefore considered not necessary during both the construction and operation phases of the Project.

## 5.9 Environmental Monitoring and Audit

A summary of the environmental impacts is presented in **Table 5.1**. The EIA Study of the Project has been demonstrated to comply with the *EIAO-TM* requirements. Actual impacts during the construction works will be monitored through a detailed EM&A programme. Full details of the programme are presented in the EM&A Manual associated with the EIA Report. This programme will provide management actions and supplemental mitigation measures to be employed should any impacts arise, thereby ensuring the environmental acceptability of the construction and operation of this Project.

Marine water quality monitoring at selected WSRs will be necessary to assess the effectiveness of measures implemented to mitigate potential construction and operation impacts for dredging, backfilling and capping of CMPs. Sediment quality monitoring is also recommended for backfilling of the CMPs.

A benthic recolonisation monitoring programme is recommended to verify the expected recolonisation of the natural benthic assemblage on the capped CMPs.

Monitoring of fisheries resources and biomonitoring programme are recommended to address stakeholders' concerns on the level of fisheries resources and contamination of seafood in the vicinity of the Project.

During construction and operation of the Project, regular site inspections and audits will be conducted to confirm the effective and timely implementation of the recommended mitigation measures. Regular waste audits will be conducted to determine if wastes are being managed in accordance with the recommended good site practices.

**Table 5.1 Summary of Environmental Impacts**

Sensitive Receivers/ Assessment Points	Relevant Standards and Criteria	Results of Impact Predictions	Extents of Exceedances Predicted	Impact Avoidance Measures Considered	Mitigation Measures Proposed	Residual Impacts (After Mitigation)
<b>Water Quality</b>						
Water Sensitive Receivers (WSRs) within: <ul style="list-style-type: none"> <li>■ Southern WCZ</li> <li>■ Western Buffer WCZ</li> <li>■ Victoria Harbour WCZ</li> </ul>	<ul style="list-style-type: none"> <li>■ Annexes 6 and 14 of the EIAO-TM</li> <li>■ Water Pollution Control Ordinance</li> <li>■ Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters</li> <li>■ Practice Note for Professional Persons, Construction Site Drainage</li> <li>■ WQOs for: <ul style="list-style-type: none"> <li>○ Southern WCZ</li> <li>○ Western Buffer WCZ</li> <li>○ Victoria Harbour WCZ</li> </ul> </li> </ul>	<p>With implementation of mitigation measures, potential impacts due to construction and operation activities of CMPs:</p> <ul style="list-style-type: none"> <li>■ Changes in water quality due to construction and operation activities of CMPs - SS dispersion and sedimentation; DO depletion; release of sediment-bounded contaminants; release of sediment-bounded nutrients - No unacceptable impacts</li> <li>■ Marine Vessel Discharges - No unacceptable impacts</li> <li>■ Changes in Flow Regime - No unacceptable impacts</li> </ul>	No	<ul style="list-style-type: none"> <li>■ Location of the Project is selected to avoid existing, proposed and potential marine parks as far as practicable</li> <li>■ Adoption of appropriate work rates for dredging/ backfilling/ capping works</li> </ul>	<ul style="list-style-type: none"> <li>■ Cage-type silt curtain will be installed around closed grab to control sediment loss from grab dredging</li> <li>■ No overflow is permitted from TSHD.</li> <li>■ The LMOB system of TSHD will only be in operation at the beginning and end of the dredging cycle when the drag head is being lowered and raised.</li> <li>■ Dredging should be conducted by either one TSHD at a maximum rate of 256,200 m<sup>3</sup>/week or no more than two grab dredgers at a total maximum rate of 100,000 m<sup>3</sup>/week</li> <li>■ Maximum rate of backfilling is 26,700 m<sup>3</sup>/day</li> <li>■ Maximum rate of capping is 26,700 m<sup>3</sup>/day</li> <li>■ Standard measures and good site practices</li> </ul>	No adverse residual impacts are anticipated.
<b>Marine Ecology</b>						
Marine Ecological Sensitive Receivers within: <ul style="list-style-type: none"> <li>■ Southern WCZ</li> <li>■ Western Buffer WCZ</li> <li>■ Victoria Harbour WCZ</li> </ul>	<ul style="list-style-type: none"> <li>■ Annexes 8 and 16 of the EIAO-TM</li> <li>■ EIAO Guidance Notes No. 6/2010, 7/2010, 10/2010 and 11/2010</li> <li>■ Marine Parks Ordinance</li> <li>■ Wild Animals Protection Ordinance</li> <li>■ Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)</li> <li>■ Town Planning Ordinance (Cap. 131)</li> <li>■ Hong Kong Planning Standards and Guidelines Section 10 (HKPSG)</li> <li>■ United Nations Convention on Biological Diversity (CBD)</li> <li>■ The Convention on International Trade in Endangered Species of Wild Fauna and Flora of Wild Fauna and Flora (CITES)</li> <li>■ The International Union for Conservation of Nature (IUCN) Red List of Threatened Species</li> <li>■ Peoples' Republic of China (PRC) Regulations and Guidelines</li> </ul>	<ul style="list-style-type: none"> <li>■ Ecological impacts to Marine Ecological Resources (Excluding FP) <ul style="list-style-type: none"> <li>○ Temporary habitat loss and disturbance on coral and benthic communities, and Green Turtles – Minor significance</li> <li>○ Underwater sound from construction and operation activities on marine invertebrates, Green Turtles, and potential South Lamma Marine Park – Minor significance</li> <li>○ Changes in water quality from construction and operation activities on coral and benthic communities, Green Turtles, and potential South Lamma Marine Park – Minor significance</li> <li>○ Increased marine traffic from construction and operation activities on Green Turtles – Minor significance</li> <li>○ Effects of glare from light sources of construction and operation activities on Green Turtles – Minor significance</li> <li>○ Accidental spillage/leakage of fuels/chemicals on coral and benthic communities, Green Turtles and potential South Lamma Marine Park – Negligible significance</li> </ul> </li> <li>■ Ecological impacts to FP <ul style="list-style-type: none"> <li>○ Temporary habitat loss and disturbance due to construction and operation activities of the CMPs – Minor significance</li> <li>○ Underwater sound from construction and operation activities – Minor significance</li> </ul> </li> </ul>	No	<ul style="list-style-type: none"> <li>■ Location of the Project is selected to avoid ecologically sensitive habitats as far as practicable</li> <li>■ Proper planning and design of the CMPs, e.g. CMPs to be developed within Key Area, CMPs to be constructed and operated sequentially and no more than three pits will be active at any one time</li> <li>■ Adoption of appropriate work rates and mitigation measures for dredging, backfilling and capping to confirm compliance with the assessment criteria at sensitive receivers and control water quality impacts to within acceptable levels</li> </ul>	<ul style="list-style-type: none"> <li>■ Water quality mitigation measures as stated above.</li> <li>■ Other precautionary measures to further reduce impacts: <ul style="list-style-type: none"> <li>○ Vessel operators will be required to control and manage all effluent from vessels. These kinds of wastewater shall be brought back to port where possible and discharged at appropriate collection and treatment system to prevent avoidable water quality impacts</li> <li>○ A policy of no dumping of rubbish, food, oil, or chemicals will be strictly enforced</li> <li>○ Only well-maintained and inspected vessels would be used to limit any potential discharges to the marine environment</li> <li>○ Safe storage, handling and disposal of chemicals and oils to prevent the release into the marine environment</li> <li>○ Bunding of machinery areas and availability of spill clean-up kits would be in place to prevent spillage or leakage of fuel/chemical to reach the marine environment</li> <li>○ The vessel operators for the construction activities of this Project will be required to use predefined and regular routes, make use of designated fairways to access the active CMPs, and would avoid traversing sensitive habitats such as existing and proposed marine parks. This measure will further serve to minimise disturbance to Green Turtles and FP due to vessel movements</li> </ul> </li> </ul>	No adverse residual impacts are expected.

Sensitive Receivers/ Assessment Points	Relevant Standards and Criteria	Results of Impact Predictions	Extents of Exceedances Predicted	Impact Avoidance Measures Considered	Mitigation Measures Proposed	Residual Impacts (After Mitigation)
		<ul style="list-style-type: none"> <li>○ Increased marine traffic from construction and operation activities – Minor significance</li> <li>○ Changes in water quality from construction and operation activities – Minor significance</li> <li>○ Accidental spillage/leakage of fuels/chemicals – Negligible significance</li> </ul>			<ul style="list-style-type: none"> <li>○ The vessel operators working on the construction activities of the Project will be given a briefing, alerting them to the possible presence of FP in the active CMP areas, and the guidelines for safe vessel operation in the presence of these animals. The vessels will avoid using high speed as far as possible. By observing the guidelines, vessels will be operated in an appropriate manner so that FP will not be subject to undue disturbance or harassment</li> </ul>	
<b>Fisheries</b>						
Fisheries Sensitive Receivers within: <ul style="list-style-type: none"> <li>■ Southern WCZ</li> <li>■ Western Buffer WCZ</li> <li>■ Victoria Harbour WCZ</li> </ul>	<ul style="list-style-type: none"> <li>■ Annexes 9 and 17 of the EIAO-TM</li> <li>■ Fisheries Protection Ordinance</li> <li>■ Marine Fish Culture Ordinance</li> <li>■ Water Pollution Control Ordinance</li> </ul>	<ul style="list-style-type: none"> <li>■ Direct disturbances of fisheries habitat and loss of access to fishing ground – Minor to moderate significance</li> <li>■ Perturbations to key water quality parameters from marine construction and operation activities – Minor significance</li> <li>■ Underwater sound – Minor significance</li> </ul>	No	<ul style="list-style-type: none"> <li>■ Relevant avoidance measures as detailed above for the water quality and ecology aspects</li> <li>■ Avoid areas of high fisheries importance through site selection</li> <li>■ Proper planning and design of the CMPs, with phased implementation</li> <li>■ Adoption of appropriate work rates and mitigation measures for dredging, backfilling and capping to confirm compliance with the assessment criteria at sensitive receivers and control water quality impacts to within acceptable levels</li> <li>■ Appropriate notification, communications, site protection and marking would be adopted to reduce navigation risks with fishing vessels</li> </ul>	<ul style="list-style-type: none"> <li>■ Water quality mitigation measures as stated above</li> <li>■ Marine ecological mitigation measures as stated above</li> <li>■ Issuance of Marine Department Notice or other notifications is expected to reduce the risk of collision of increased marine traffic and fishing vessels to within acceptable levels as safety / precautionary measures</li> <li>■ During construction and operation of the CMPs, works area will be established within and in the vicinity of the active CMP(s) within Key Area only to minimize the actual extent of fisheries habitats and fishing ground affected at any one time</li> </ul>	No adverse residual fisheries impacts are expected
<b>Waste</b>						
Key Area identified for potential CMP development under the Project	<ul style="list-style-type: none"> <li>■ Annexes 7 and 15 of the EIAO-TM</li> <li>■ Waste Disposal Ordinance (WDO)</li> <li>■ Waste Disposal (Chemical Waste) (General) Regulation</li> <li>■ Land (Miscellaneous Provisions) Ordinance</li> <li>■ Public Health and Municipal Services Ordinance - Public Cleansing and Prevention of Nuisances Regulation</li> <li>■ Dumping at Sea Ordinance</li> <li>■ Merchant Shipping (Prevention and Control of Pollution) Ordinance</li> </ul>	<ul style="list-style-type: none"> <li>■ Dredged marine sediment – total about 24Mm<sup>3</sup> (<i>in situ</i> volume) of Category L sediment</li> <li>■ Chemical waste – a few litres per month</li> <li>■ General refuse – about 32.5 kg per day</li> </ul>	No	<ul style="list-style-type: none"> <li>■ On-site reuse to be explored to dispose the dredged sediments within WL Facility as capping materials</li> </ul>	<ul style="list-style-type: none"> <li>■ Standard measures and good site practices</li> </ul>	Adverse environmental impacts arising from the management and disposal of waste are not anticipated
<b>Cultural Heritage</b>						
Key Area identified for potential CMP development under the Project	<ul style="list-style-type: none"> <li>■ Annexes 10 and 19 of the EIAO-TM</li> <li>■ Antiquities and Monuments</li> </ul>	<ul style="list-style-type: none"> <li>■ No marine archaeological potential within the Project's impact area – No marine archaeological impact is expected</li> </ul>	No	<ul style="list-style-type: none"> <li>■ No marine archaeological resources identified</li> </ul>	<ul style="list-style-type: none"> <li>■ No mitigation measure is required</li> </ul>	No adverse residual impacts are expected



Sensitive Receivers/ Assessment Points	Relevant Standards and Criteria	Results of Impact Predictions	Extents of Exceedances Predicted	Impact Avoidance Measures Considered	Mitigation Measures Proposed	Residual Impacts (After Mitigation)
<b>Hazard to Health</b>						
Members of various populations of Hong Kong	<ul style="list-style-type: none"> <li>■ Guidelines of the US Environmental Protection Agency (EPA)</li> </ul>	<ul style="list-style-type: none"> <li>■ Risks associated with exposure to carcinogens – lifetime risks are below the acceptability criterion</li> <li>■ Hazards to human health associated with exposure to non-carcinogens – risks were low</li> </ul>	No	<ul style="list-style-type: none"> <li>■ Relevant avoidance measures as detailed above for the water quality, ecology, and fisheries aspects</li> <li>■ Adoption of appropriate work rates and mitigation measures for dredging, backfilling and capping to confirm compliance with the assessment criteria at sensitive receivers and control water quality impacts to within acceptable levels</li> </ul>	<ul style="list-style-type: none"> <li>■ No mitigation measure is required</li> </ul>	No adverse residual impacts are expected
<b>Air Quality</b>						
Air Sensitive Receivers (ASRs) within 500m from the Key Area	<ul style="list-style-type: none"> <li>■ Annex 4 of EIAO-TM</li> <li>■ Air Pollution Control Ordinance (APCO)</li> <li>■ Air Quality Objective (AQO)</li> </ul>	<ul style="list-style-type: none"> <li>■ Adverse fugitive dust or odour impact during construction and operation phase is not anticipated</li> <li>■ Adverse air quality impact due to marine emissions during the construction and operation phase is not anticipated</li> </ul>	No	Project site located in remote locations avoiding impacts to ASRs	<ul style="list-style-type: none"> <li>■ Implement dust control measures stipulated in the <i>Air Pollution Control (Construction Dust) Regulation (Cap. 311R)</i> during the construction phase where appropriate.</li> <li>■ Requirements stipulated in the Air Pollution Control (Fuel Restriction) Regulations, Air Pollution Control (Marine Light Diesel) Regulation, Air Pollution Control (Fuel for Vessels) Regulation and Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation will be followed.</li> <li>■ Ultra-low sulphur diesel (ULSD) will be used for all PMEs, as defined as diesel fuel containing not more than 0.005% sulphur by weight) as stipulated in Environment, Transport and Works Bureau Technical Circular (ETWB-TC(W)) No 19/2005 on Environmental Management on Construction Sites</li> <li>■ The engine of the PMEs during idling shall be switched off</li> <li>■ Regular maintenance of PMEs shall be conducted to prevent black smoke emission</li> <li>■ All PMEs shall comply with the prescribed emission standards and approved with a proper label by EPD</li> <li>■ Number of trips would be monitored and vessel travelling routes would be kept away from the ASRs as far as possible</li> <li>■ Loading of the dredged sediment to the TSHD and hopper barges should be controlled to avoid splashing and overflowing of the sediment slurry to the surrounding water</li> <li>■ Dredged sediment on board the TSHD and hopper barges should be properly covered</li> </ul>	No adverse residual impacts are expected

Sensitive Receivers/ Assessment Points	Relevant Standards and Criteria	Results of Impact Predictions	Extents of Exceedances Predicted	Impact Avoidance Measures Considered	Mitigation Measures Proposed	Residual Impacts (After Mitigation)
					as far as practicable to minimise the exposed area and potential fugitive dust and odour emissions during its transportation. If the dredged sediment is found to be malodorous, it shall be removed from site as soon as possible <ul style="list-style-type: none"> <li>■ Dredged sediment on board the TSHD and hopper barges should be transferred to disposal sites at the SDFs/ CMPs as capping materials as soon as possible to minimise potential fugitive dust and odour emissions</li> </ul>	
<b>Noise</b>						
Noise Sensitive Receivers (NSRs) within 300m from the Key Area	<ul style="list-style-type: none"> <li>■ Annexes 5 and 13 of EIAO-TM</li> <li>■ Noise Control Ordinance (NCO)</li> <li>■ Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM)</li> <li>■ Technical Memorandum on Noise From Places Other than Domestic Premises, Public Places or Construction Sites (IND-TM)</li> </ul>	Adverse noise impacts are not expected during both construction and operation phases of the Project	No	Project site located in remote locations avoiding impacts to NSRs	<ul style="list-style-type: none"> <li>■ Noise mitigation measures are not required for the construction and operation phases</li> </ul>	No adverse residual impacts are expected

## 6. CONCLUSION

This EIA Study has critically assessed the overall acceptability of the environmental impacts likely to arise from the construction and operation activities of the Project. It has demonstrated the acceptability of any residual impacts from this Project and the protection of the population and the environmentally sensitive resources. The EIA Study concluded that, with the implementation of the recommended mitigation measures, the Project would be environmentally acceptable and in compliance with the relevant assessment standards/criteria of the *EIAO-TM*. Where appropriate, EM&A mechanisms have been recommended to verify the accuracy of the EIA predictions to ensure the effectiveness of the recommended mitigation measures.

While non-dredged methods are encouraged for construction of infrastructure projects in Hong Kong, dredging is necessary for essential maintenance works for harbours, fairways, anchorage or drainage channels. The existing CMPs at ESC are anticipated to be exhausted by 2027 and they cannot be expanded further due to the limited usable seabed in the vicinity. The implementation of this Project can allow an uninterrupted disposal service to be maintained and flood protection works, harbour maintenance dredging works and the implementation of the on-going and planned building/ infrastructure projects will be able to proceed.

---

**ERM has over 160 offices across the following countries and territories worldwide**

Argentina	The Netherlands
Australia	New Zealand
Belgium	Norway
Brazil	Panama
Canada	Peru
Chile	Poland
China	Portugal
Colombia	Puerto Rico
France	Romania
Germany	Russia
Guyana	Singapore
Hong Kong	South Africa
India	South Korea
Indonesia	Spain
Ireland	Sweden
Italy	Switzerland
Japan	Taiwan
Kazakhstan	Tanzania
Kenya	Thailand
Malaysia	UK
Mexico	US
Mozambique	Vietnam
Myanmar	

**ERM's Hong Kong Office**

2509, 25/F One Harbourfront  
Hunghom, Kowloon  
Hong Kong

T: (852) 2271 3000

F: (852) 3015 8052

[www.erm.com](http://www.erm.com)