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

Method Statement for Marine Ecological Survey

20 January 2021

Project No.: 0567994

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1. INTRODUCTION

1.1 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 the 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. According to the latest estimate, the total remaining capacity of the existing disposal facilities at ESC can only cope with the demand up to 2027 for the public and private projects. 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 to assess the potential sites suitable for development into future CMPs. The study has identified that a portion of the seabed in the West Lamma Channel, between Cheung Chau and Lamma Island, will have good potential for development into a new contaminated sediment disposal facility. It was recommended to develop a new disposal facility consisting of three CMPs with a total capacity of approximate 6 million m^3 to the west of Lamma Island ("the Project").

The Project covers a new marine contaminated sediment disposal facility involving marine dumping and dredging operation (with quantity more than 500,000 m^3). In accordance with Items C.10 and C.12, Part I of Schedule 2 under the Environmental Impact Assessment Ordinance (EIAO), the Project is classified as a designated project and therefore a statutory environmental impact assessment (EIA) is required. 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. The Study Area is indicatively shown in *Figure 1.1*.

1.2 Objectives and Scopes of this Method Statement

With reference to Clause 3.4.4.2 of the EIA Study Brief of the Project (ESB-328/2019), the Assessment Area for the purpose of the marine ecological impact assessment shall be the same as the Assessment Area for water quality impact assessment, covering the Southern Water Control Zone (WCZ) and Western Buffer WCZ as designated under the Water Pollution Control Ordinance (Cap. 358) (*Figure 1.2*). Baseline information within the Assessment Area is available from the following key sources:

- AFCD Marine Mammal Monitoring Reports. Available at: https://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html
- Consultancy Study on Marine Benthic Communities in Hong Kong (Agreement No. CE 69/2000)
- EIA Report for Development of a 100MW Offshore Wind Farm in Hong Kong (Register No.: AEIAR-152/2010)
- EIA Report for Development of the Integrated Waste Management Facilities Phase 1 (Register No.: AEIAR-163/2012)
- EIA Report for Hong Kong Offshore LNG Terminal (Register No.: AEIAR-218/2018)
- EIA Report for Improvement Dredging for Lamma Power Station Navigation Channel (Register No.: AEIAR-212/2017)

- Marine Ecology Baseline Review Report for Lamma Power Station Navigation Channel (Environmental Permit No. EP-535/2017)
- EIA Report for Outlying Islands Sewerage Stage 2 - South Lantau Sewerage Works (Register No.: AEIAR-210/2017)
- Provision of Compensatory Marine Park for Integrated Waste Management Facilities at an Artificial Island near Shek Kwu Chau – Investigation (Agreement No. CE 14/2012 (EP))

It is understood that the baseline information for marine ecology of the Assessment Area is available from other EIA studies conducted between 2008 and 2017 as described above, and the latest information on marine mammals was collected up to March 2020 (1). The above data sources provide up-to-date baseline information on important ecological habitats or habitats with conservation interest such as proposed Marine Park, mangroves, habitats for Finless Porpoise, etc. of the Assessment Area. Baseline survey of these habitats is not considered necessary.

There are identified data gaps with regards to the status of the subtidal habitat within the proposed Study Area of the WL Facility where no recent baseline information is available. Therefore, baseline surveys at selected habitats within the Assessment Area where potential impact could occur and up-to-date baseline information is not present are proposed to be conducted to update the latest ecological conditions in these areas. Furthermore, to better understand the occurrence, distribution and abundance of marine mammals especially Finless Porpoises (*Neophocaena phocaenoides*) in the Study Area, focussed marine mammal surveys within the Study Area is also proposed to be conducted.

In accordance with the requirements in *Appendix C* of the EIA Study Brief, marine ecological surveys shall be conducted for at least 6 months to fill in the identified data gaps as well as verify and update the desktop information on existing conditions of the Assessment Area. Subsequently, the information collected from desktop review and ecological surveys will be used to establish the general ecological profile and characterise the identified habitats within the Assessment Area. The proposed ecological surveys comprise:

- Coral survey;
- Subtidal benthos survey; and
- Marine mammal survey.

This *Method Statement* presents the methodology of the aforementioned marine ecological surveys. Reference has been made to the guidelines of for evaluating and assessing marine ecological impact as outlined in Annexes 8 and 16 of the EIAO-TM, the relevant Guidance Notes (GN 7/2010, GN 10/2010 and GN 11/2010), and approved EIA reports on the EIA Register.

It should be noted that the presence of species of conservation importance such as Green Turtles in the Assessment Area, if any, is likely to be opportunistic and hence is difficult to be studied by systematic dedicated field surveys. The existing uses of the Assessment Area by these species will be studied by a desktop review.

1.3 Structure of this Method Statement

Following this introductory section, the remainder of this *Method Statement* is arranged as follows:

- *Section 2* presents the methodologies for the marine ecological surveys, including coral survey and subtidal benthos survey.

(1) Hung KYS (2020). Monitoring of Marine Mammals in Hong Kong Waters (2019-20). Submitted to AFCD under AFCD/SQ/232/18

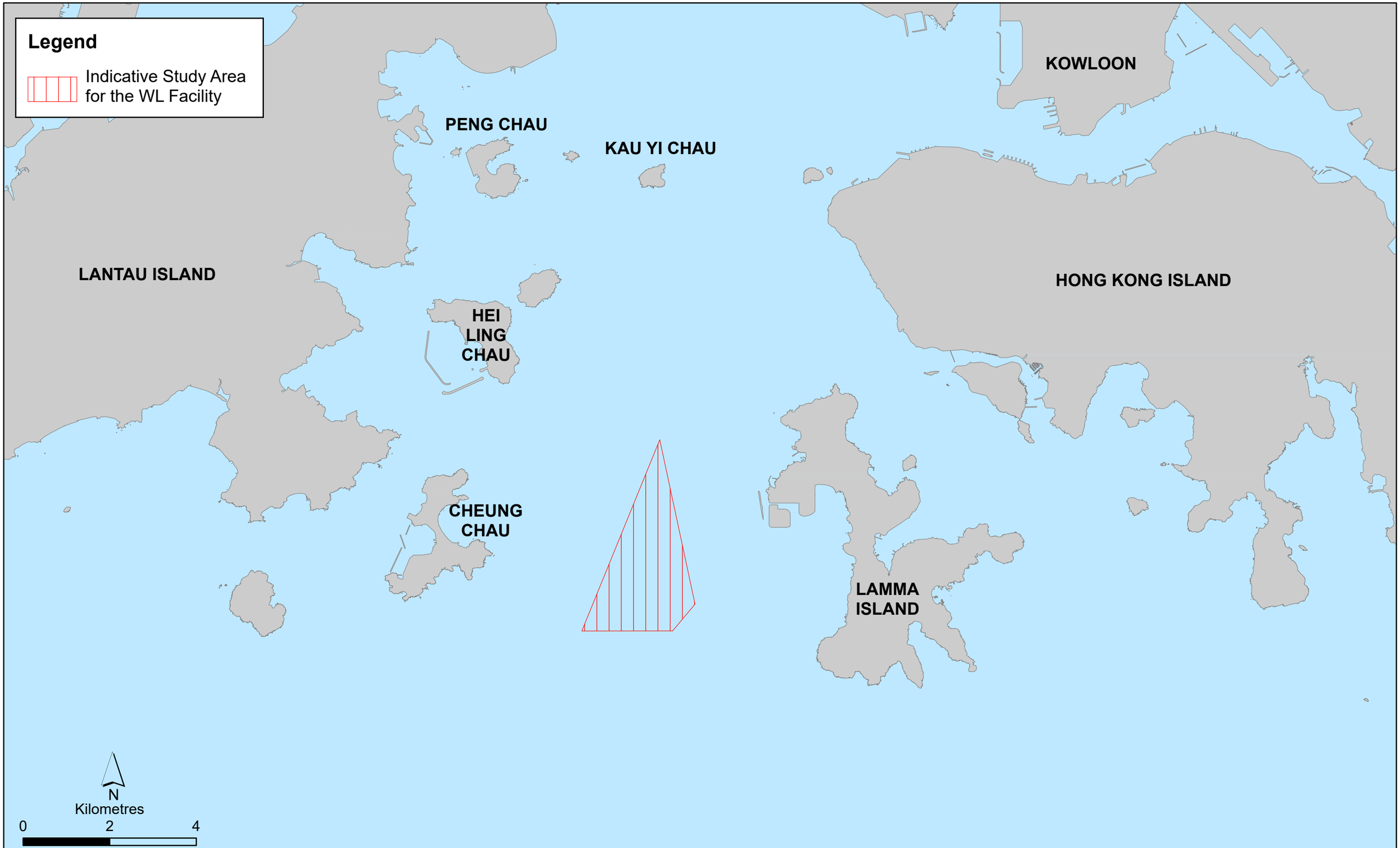

Figure 1.1

Indicative Study Area for the Contaminated Sediment Disposal Facility at West of Lamma Island (WL Facility)

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Date: 7/12/2020

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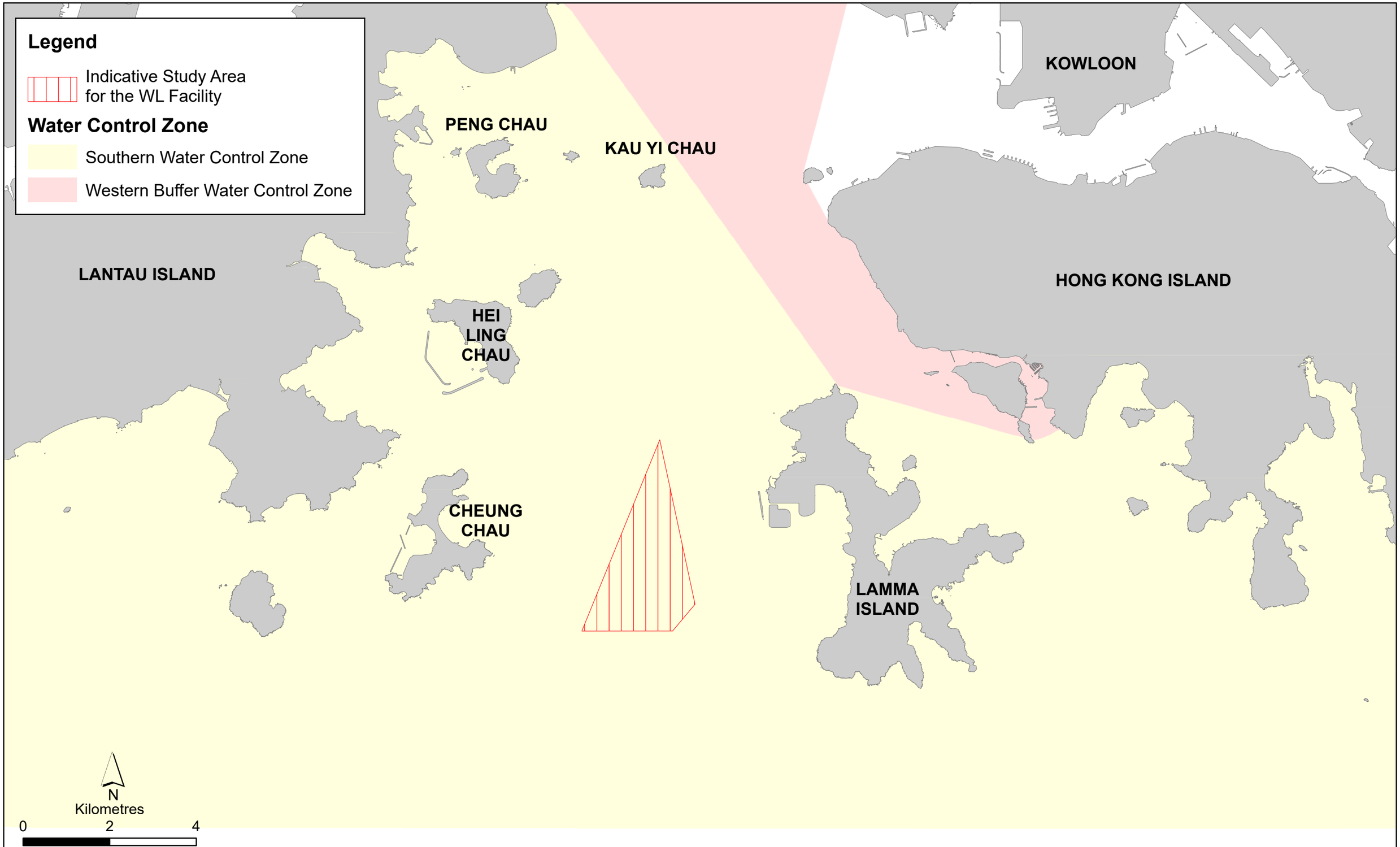

Figure 1.2

Relevant Water Control Zones for the Project

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2. MARINE ECOLOGICAL SURVEYS

2.1 Coral Surveys

Coral surveys will be conducted to identify and characterize the existing ecological conditions of the seabed and shoreline within and in the vicinity of the Study Area. Coral survey locations are proposed in areas which have not been surveyed previously or in areas within the Study Area having potential as habitats for corals in order to fill information gaps. The coral surveys, which will be conducted once, will comprise of the following three components:

- Qualitative spot dive reconnaissance check;
- Semi-quantitative Rapid Ecological Assessment (REA) survey; and
- Drop Camera Survey.

2.1.1 Qualitative Spot-dive Reconnaissance Check

The qualitative spot dive reconnaissance check will investigate if coral communities e.g. (hard corals, soft corals, sea pen and black corals) are present at the areas along the natural shores in the vicinity of the Study Area. The proposed survey locations are presented in *Figure 2.1*. As the Study Area is located near principal fairways, in view of safety considerations, drop camera survey will be conducted within the Study Area instead of coral surveys on Self Contained Underwater Breathing Apparatus (SCUBA) and the details are discussed in *Section 2.1.3*.

At each survey location, a spot dive reconnaissance check will be conducted along a 100 m transect by coral specialists using SCUBA to identify the substrate type and associated sessile benthos, particularly the presence of hard and soft coral communities. The dive surveys will generally follow the bathymetry of the survey transect and will be separated into shallow water (< -5 mCD) and deep water (> -5 mCD) (to be adjusted based on the site condition and substrates). The characteristics of seabed and associated fauna along the survey transect will be recorded by photographs and videos to characterise the biological nature of the subtidal area along the survey transect. All organisms and coral colonies encountered will be identified to the lowest possible taxonomic level. This technique is regarded as standard practice for EIA marine baseline surveys in Hong Kong, with many previously approved EIA's utilising the same or similar methodology [(2) (3) (4) (5) (6) (7)].

2.1.2 Semi-quantitative Rapid Ecological Assessment (REA) Survey

When corals are recorded during the qualitative spot-dive reconnaissance check, semi-quantitative survey, Rapid Ecological Assessment (REA), will then be undertaken with reference to the EIAO Guidance Notes (*GN 11/2010*) to provide information on the relative coverage of coral and other benthic groups, in addition to creating an inventory of sessile benthic taxa used to define the community types. This technique is regarded as standard practice for EIA marine baseline surveys in

(2) ERM (2016) Hong Kong Offshore LNG Terminal. EIA Study (AEIAR-218/2018). Prepared for CLP Power Hong Kong Limited.

(3) ERM (2015) Additional Gas-fired Generation Units Project. EIA Study (AEIAR-197/2016). Prepared for Castle Peak Power Company Limited (CAPCO).

(4) ERM (2010) Development of a 100MW Offshore Wind Farm in Hong Kong. EIA Study (AEIAR-152/2010). Prepared for Hong Kong Electric

(5) ERM (2003) The Proposed Submarine Gas Pipeline From Cheng Tou Jiao Liquefied Natural Gas Receiving Terminal, Shenzhen to Tai Po Gas Production Plant, Hong Kong. EIA Study (EIA-089/2003). Prepared for The Hong Kong and China Gas Company Limited.

(6) AECOM (2016) Sha Tin Cavern Sewerage Treatment Works. EIA Study (AEIAR-202/2016). Prepared for the Drainage Services Department.

(7) Black & Veatch Hong Kong Limited (2016) Outlying Islands Sewerage Stage 2 – South Lantau Sewerage Works. EIA Study (AEIAR-210/2017). Prepared for Drainage Services Department.

Legend

- Indicative Study Area for the WL Facility
- Proposed Location for Coral Surveys
- Proposed Location for Drop Camera Survey
- Proposed Location for Benthic Grab Survey

C1
C2
C3
D1
D2
D3
D4
D5
B1
B2
B3
B4
B5
B6
B7

CHEUNG CHAU

LAMMA ISLAND

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Kilometres

0 0.5 1

Figure 2.1

Proposed Locations for the Marine Ecological Surveys

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Date: 10/12/2020

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Hong Kong, with many previously approved EIA's utilising the same or similar methodology [8] [9] [10] [11] [12] [13]. The methodology outlined has been modified from the standardised REA survey technique established for the assessment of coral communities on the Great Barrier Reef [14] for the marine environment of Hong Kong [15].

Based upon the information gathered in the qualitative spot-dive reconnaissance check, such areas where coral appear to be the most abundant, the REA survey will then be performed along a 100 m transect. REA surveys are proposed to be conducted at shallow and deep water (< -5 mCD and > -5 mCD zones dependent on the bathymetry of the site; to be adjusted based on the site condition and substrates) along the shoreline to search for hard coral, octocoral and black coral. After the transect line has been laid, video footage will be taken for the benthos along the transect and the assessment of the benthic cover (Tier I) and taxon abundance (Tier II) will be conducted in a swathe ~ 2 m wide, 1 m either side of each transect. The belt transect width is dependent on underwater visibility experienced, with regards to the marine environment in Hong Kong this generally consists of a swathe ~2 m wide, 1 m either side of the each transect. An explanation of the two assessment categories (Tiers) used in the survey is presented below.

Tier I - Categorisation of Benthic Cover

Upon the completion of each survey transect, ecological and substratum attributes (*Table 2.1*) will be assigned to standard ranked (ordinal) categories (*Table 2.2*).

Table 2.1 Tier I Benthic Attribute Categories

Ecological Attributes	Substratum Attributes
Hard coral	Bedrock
Dead coral	Continuous pavement
Octocoral (Soft corals and Gorgonians)	Rocks (<26 cm)
Black coral	Large boulders (>50 cm)
Dead standing coral	Small boulders (<50 cm)
Macroalgae	Rubble
Other Benthos (including sponges, zoanthids, ascidians and bryozoans)	Sand
	Mud/ Silt
	Other

(8) ERM (2016) (AEIAR-218/2018). *Op. Cit.*

(9) ERM (2015) (AEIAR-197/2016). *Op. Cit.*

(10) ERM (2010) (AEIAR-152/2010). *Op. Cit.*

(11) ERM (2003) (EIA-089/2003). *Op. Cit*

(12) AECOM (2016) (AEIAR-202/2016). *Op. Cit.*

(13) Black & Veatch Hong Kong Limited (2016) (AEIAR-210/2017). *Op. Cit.*

(14) DeVantier LM, De'Ath G, Done TJ, Turak E (1998) Ecological assessment of a complex natural system: A case study from the Great Barrier Reef. *Ecological Applications* 8: 480-496.

(15) Fabricius KE, McCorry D (2006) Changes in octcoral communities and benthic cover along a water quality gradient in reefs of Hong Kong. *Marine Pollution Bulletin* 52: 22-33.

Table 2.2 Tier I Ordinal Ranks of Percentage Cover of Benthic Attributes

Rank	Percentage Cover (%)
0	None recorded
1	1-5
2	6-10
3	11-30
4	31-50
5	51-75
6	76-100

Tier II - Taxonomic Inventories to Define Types of Benthic Communities

An inventory of benthic taxa will be compiled for each transect. Taxa will be identified *in situ* to the following levels:

- Scleractinian (hard) corals to species, where possible;
- Soft corals, anemones and conspicuous macroalgae to genus level where possible;
- Other benthos (including sponges, zoanthids, ascidians and bryozoans) recorded to genus level, where possible, or phylum plus growth form.

Following the completion of the survey of each transect, each taxon in the inventory will be ranked in terms of abundance in the community (*Table 2.3*). These broad categories rank taxa in terms of relative abundance of individuals, rather than the contribution to benthic cover along each transect. The ranks are visual assessments of abundance, rather than quantitative counts of each taxon. Representative photos of organisms will be taken.

Table 2.3 Ordinal Ranks of Taxon Abundance

Rank	Abundance
0	Absent
1	Sparse
2	Uncommon
3	Common
4	Abundant
5	Dominant

The photographs and videos recorded for each REA transect will be reviewed in order to compile the REA data. Species lists, species richness and the relative coverage for ecological and substratum attributes will be presented.

2.1.3 Drop Camera Survey

Marine geophysical surveys were conducted for the Project to study the seabed features and shallow geology within and in the vicinity of the Study Area. Review of the survey findings identified 17 sonar contacts (SC01 to SC17) within and in the vicinity of the Study Area as shown in *Figure 2.2*. Amongst these sonar contacts, a number of small patches of hard substrate (e.g. buoy clump weight, possible tire, rope/chain, high relief object) were identified..

In order to characterise the substrate and benthic communities of the seabed within the Study Area, in particular the small patches of hard substrate, taking safety into consideration, the use of handheld drop camera / underwater drone system will be utilised and deployed on vessel, mitigating the need of any person working underwater. This technique has been used for marine baseline surveys in Hong

Legend

- Sonar Contacts
- Indicative Study Area for the WL Facility
- Geophysical Survey Area

Sonar Contact	Description
SC01	Buoy clump weight
SC02	Debris
SC03	Buoy clump weight
SC04	Possible tire
SC05	Possible tire
SC06	Debris
SC07	Debris
SC08	High relief object
SC09	Possible tire
SC10	Possible tire
SC11	Debris
SC12	Debris
SC13	Debris
SC14	Debris
SC15	Possible rope/ chain
SC16	Possible tire
SC17	Debris

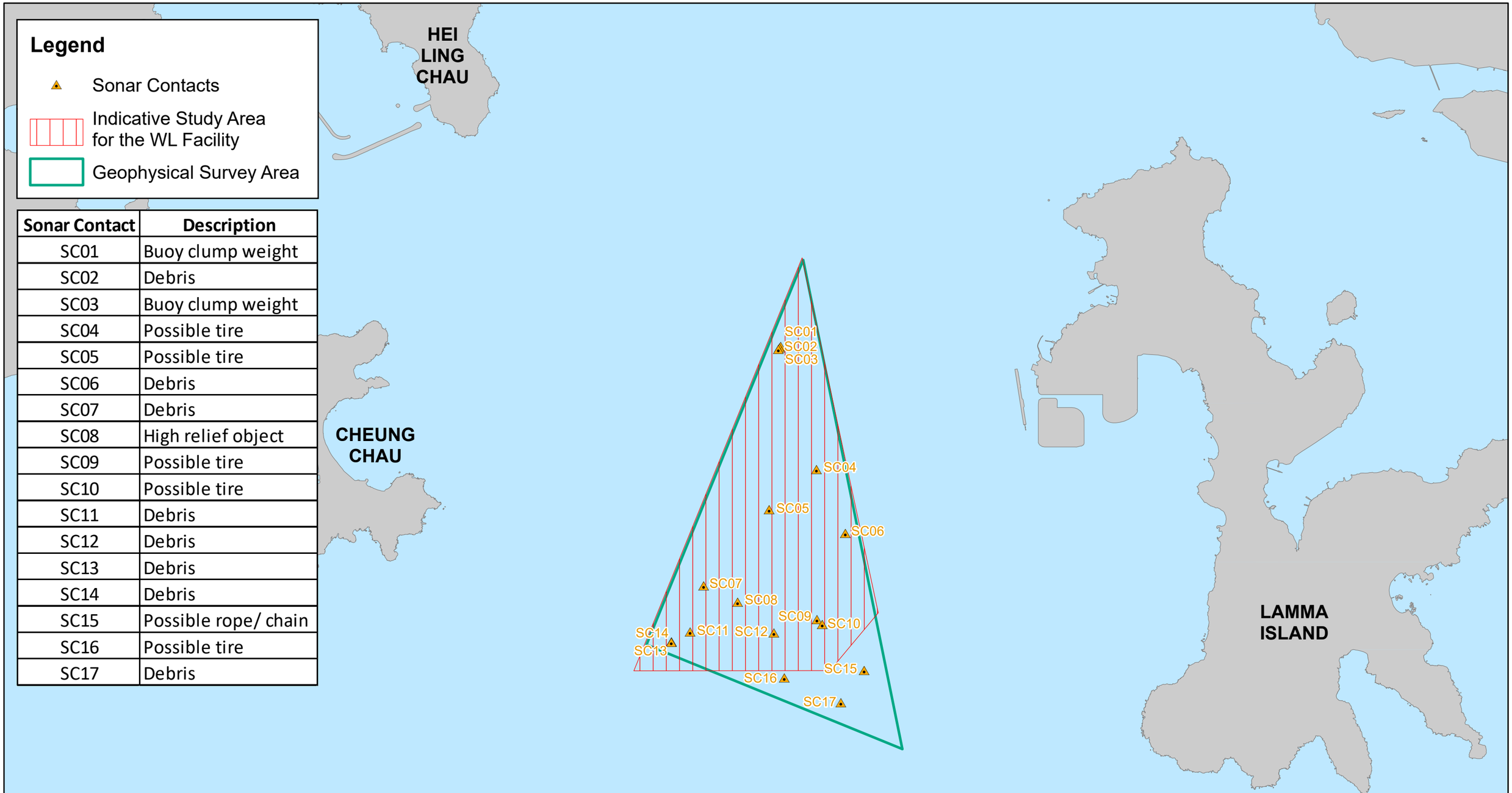

Figure 2.2

Geophysical Survey Area and Location of Sonar Contacts

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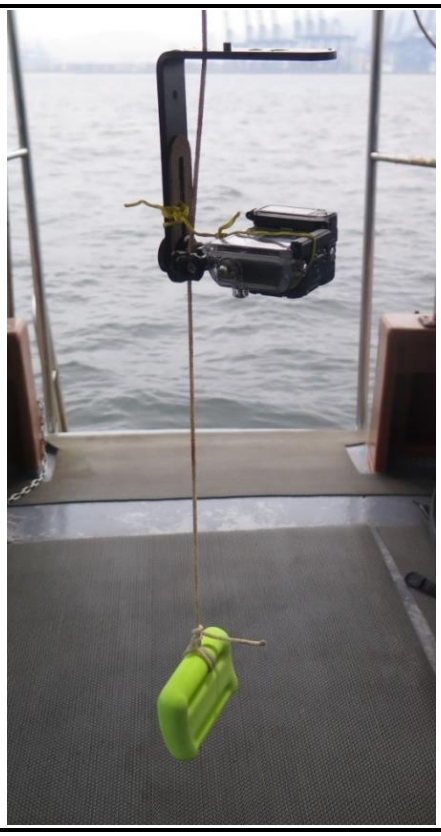
Kong and overseas, with previously approved EIA and projects utilising the same or similar methodology [16] [17] [18]. The drop camera system will consist of a high quality digital video camera (e.g. GoPro HERO3+ or equivalent) mounted to a weight that could be lowered onto the seabed and towed above it to collect video footages and photographs (*Figure 2.3)*. These techniques allow greater survey coverage in a relatively short period of time compared to the SCUBA surveys especially for areas which are exposed and offshore.

The survey locations for drop camera survey are presented in *Figure 2.1*. During the survey, the drop camera /underwater drone system will be deployed from a support vessel at the survey location. Once the drop camera system reaches the bottom, the operator will allow the system to drift with the current, or alternatively move the system slowly and steadily over the substrate. Video footage and imagery of the seabed will be taken continuously throughout this deployment for at least two (2) minutes, with ~4m^2 of seabed recorded per second under wide angle camera setting (i.e. ~480m^2 for 2 minutes) if the camera is placed ~1m above seabed, to characterise the seabed substrate and benthic communities. Following retrieval, the footage and photographs will be examined ex-situ and verify the presence / absence of corals or other habitats / organism of interest.

Figure 2.3 Representative Photo of the Drop Camera System Set Up



(16) ERM (2010) (AEIAR-152/2010). *Op. Cit*.

(17) ERM-HK and ERM-Malaysia (2009) Marine Survey for Coral Habitats: Photo Quadrat Assessment (PQA) of Mampak, For Confidential Client.

(18) ERM-Hong Kong and ERM-Malaysia (2008) Coral Habitat Verification and Assessment Study for Block A-1 and Block A-3 Gas Development, Myanmar. For Confidential Client.

2.2 Subtidal Benthos Survey

Subtidal soft bottom surveys will be conducted as described below to characterize the existing ecological conditions of the seabed within the Study Area. Sampling locations, equipment involved, sampling procedure, laboratory analytical procedures, and QA/QC requirements for the proposed surveys are detailed below, with the methods similar to that of previously approved EIAs in Hong Kong.

2.2.1 Benthic Grab Survey

Benthic sediment samples will be collected within the Study Area for biological analyses (i.e. taxonomic identification and abundance of subtidal benthos) with particular attention on the presence of amphioxus or any notable marine benthos. Seabed sediment samples will be collected from seven (7) sampling locations representative of the subtidal soft-bottom habitats (*Figure 2.1)*. Amphioxus habitat has not been identified at or in vicinity of the Study Area from the literature, and as reported in the literature, amphioxus are mostly found in shallow, subtidal sand flats [(19)]. Consequently the muddy soft bottom of the Study Area may not be suitable habitats for amphioxus and the sampling locations are proposed within the Study Area to confirm this. At each location, one grab sample will be collected from the seabed. The number of sampling locations is considered sufficient given the scale of the Project and the relatively homogenous nature of sediments at the Study Area. Sampling will be conducted twice, once in the wet season and once in the dry season.

The benthic grab surveys will be conducted utilizing a modified Van Veen grab sampler (960 cm^2 sampling area; 11,000 cm^3 capacity) with a supporting frame attached to a swiveling hydraulic winch cable. Sediments for biological analysis will be sieved on board the survey vessel. The sediments will be washed into a sieve stack (comprising 1 mm^2 and 500 μm^2 meshes) and gently rinsed with seawater to remove all fine material. Following rinsing, any material remaining on the two screens will be combined and carefully rinsed using a minimal volume of seawater into pre-labelled thick triple-bagged ziplock plastic bags. A 5% solution of borax-buffered formalin containing Rose Bengal in seawater will then be added to the bag to ensure tissue preservation. Samples will be sealed in plastic containers for transfer to the taxonomy laboratory for sorting and identification.

2.2.2 Parameters Measured

The parameters to be measured for subtidal benthos analysis are:

- Total number of species (diversity)
- Abundance of each species recorded (biomass)

In addition to the above parameters, other relevant data will also be measured and recorded, inclusive but not limited to; time, weather conditions, sea conditions, special phenomena (if any), and other activities undertaken around the sampling location that may influence the sampling results.

2.2.3 Laboratory Analyses

The benthic laboratory will perform sample re-screening after the samples have been held in formalin for a minimum 24 hours to ensure adequate fixation of the organisms. Individual samples from the 500 μm^2 and 1 mm^2 mesh sieves will be gently rinsed with fresh water into a 250 μm^2 sieve to remove the formalin from the sediments. Sieves will be partially filled while rinsing a specific sample to maximize washing efficiency and prevent loss of material. All material retained on the sieve will be placed in a labeled plastic jar, covered with 70% ethanol, and lightly agitated to ensure complete mixing of the alcohol with sediments. Original labels will be retained with the re-screened sample material.

(19) Chen Y, Cheung SG, Shin PKS (2013). A baseline study of benthic community associated with Amphioxus Sand in subtropical Hong Kong. Marine Pollution Bulletin. 72, 274–280.

Standard and accepted techniques will be used for sorting organisms from the sediments. Small fractions of a sample will be placed in a petri dish under a 10-power magnification dissecting microscope and scanned systematically with all animals and fragments removed using forceps. Each petri dish will be sorted at least twice to ensure removal of all animals. Organisms representing major taxonomic groups, such as Polychaeta, Arthropoda, Mollusca and miscellaneous taxa will be sorted into separate, labeled vials containing 70% ethanol.

Taxonomic identifications will be performed by qualified and experienced specialist using stereo dissecting and high-power compound microscopes. These are generally to the species level except for unidentified taxa, which will be identified to genera as far as practical. The careful sampling procedure employed minimizes fragmentation of organisms. If breakage of soft-bodied organisms occurred, only anterior portions of fragments will be counted, although all fragments will be retained and weighed for biomass determinations (wet weight).

2.2.4 Quality Assurance & Control (QA/QC) Procedures

The sediment samples will be evaluated for acceptance based upon the degree of disturbance, penetration depth, and amount of leakage from the grab. In the following cases, a sediment sample would be rejected and another sample collected:

- The sediment sampler doors open in recovery, causing possible surface washout.
- Half sample obtained where the sediment sampler had not struck a flat area of seabed, or improper deployment of benthic grab, or half sample of sediment.
- Disruption of the sample by heavy shaking or contamination (these can occur when a sample is badly handled or if the sediment sampler strikes the side of the vessel during operations).
- The sample represents less than 30% of the sediment sampler's total capacity (i.e. less than 15 cm penetration).
- Grab deployment location deviates from the designated position [20].

Before sieving each sample on site, the grab, frame and sample containers will be washed with seawater to avoid cross contamination of samples.

Sample integrity for subtidal benthos analyses should be maintained for the duration of the survey, demobilization through to delivery to the appropriate laboratory. All samples should be accompanied with a Chain of Custody form to document sample management and delivery.

2.3 Marine Mammal Survey

To better understand the occurrence, distribution and abundance of marine mammals especially Finless Porpoises (*Neophocaena phocaenoides*) in the Study Area, vessel-based marine mammal survey by means of systematic line-transect boat survey will be undertaken to examine the distribution, abundance, encounter rate and density of marine mammals within the Study Area. The methodology of the proposed survey is consistent and compatible with that adopted in the long-term marine mammal monitoring programme conducted by AFCD since 1995 to allow potential comparisons and pooling data for analysis. Line-transect boat survey technique for marine mammals has been standardised in Hong Kong waters so that data from all surveys are directly comparable.

The survey areas will focus on the Study Area and the proposed survey transects are presented in *Figure 2.4*. The transect boat survey will be conducted from a 15 m inboard vessels (with an open upper deck above the pilothouse, providing a mostly unobstructed 180° view of the area ahead of the vessel), weather permitting (Beaufort 0-5, no heavy rain, and visibility > 1,200 m). The marine mammal observer (MMO) team will conduct searches and observations from the flying bridge area, 4-

(20) Concerns about positional errors must be weighed against the aims of the survey. Horizontal accuracies to within a few metres are acceptable distance.

Legend

Vessel-Based Marine Mammal Survey Location

Indicative Study Area for the WL Facility

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Figure 2.4

Proposed Vessel-based Marine Mammal Survey Location

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5 m eye height above the water surface. In order to ensure the quality of the data and allow consistency with the long-term AFCD database, and take consideration of the sea conditions of the monitoring site, a team of three qualified and trained MMOs will make up the survey team. As the vessel transits the transect lines at a relatively constant speed of 13-15 km/hr, the primary MMO searches for marine mammals continuously through 7 X 50 marine binoculars. A second MMO searches with unaided eye and fills out data sheets. Both MMOs search ahead of the vessel, between 270° and 90° (in relation to the bow, which is defined as 0°). MMOs rotate positions approximately every 30 minutes. There will be an additional MMO on the boat, who rotate into position to give observers a rest after each hour of search effort, thereby minimizing fatigue. Effort data collected during on-effort monitoring periods includes time and position for the start and end of search effort, vessel speed, sea state (Beaufort scale), visibility, and distance travelled in each series (a continuous period of search effort). When marine mammals are sighted, the MMO fills out a sighting sheet (*Appendix A*), and generally the team is taken off-effort and the vessel is diverted from its course to approach the marine mammal group for group size estimation, behavioural observations, and collection of identification photos. The sighting sheet includes information on initial sighting angle and distance, position of initial sighting, sea state, group size and composition, and behaviour, such as response to the survey vessel and associations with vessels. Position, distance travelled, and vessel speed are obtained from a hand-held Global Positioning System (GPS) unit. All records of marine mammal sightings will be collated, compiled and integrated with Geographic Information System (GIS).

Positions of sightings together with group sizes, activities and calf occurrence will be plotted on figures for illustration of spatial and temporal patterns of dolphin and porpoise distribution, if any. The method for line transect analysis of marine mammal abundance and encounter rate will follow the established approach for AFCD long-term marine mammal monitoring. It should be noted that as Finless Porpoises are cryptic and difficult to identify as unique individuals with no useful natural markings, the potential of double counting cannot be eliminated and hence rendering any abundance estimation confounded with serious violation of assumption under the line-transect survey method; therefore such analysis is not proposed to be completed for Finless Porpoises, which is the same approach for the AFCD long-term marine mammal monitoring.

Vessel-based marine mammal surveys are proposed to be conducted for six months between March and August 2021, covering both the peak (March to May) and non-peak (June to August) season of occurrence for Finless Porpoises based on the data from long-term marine mammal monitoring programme conducted by AFCD [21]. Each transect line is proposed to be surveyed once per month (i.e. one (1) survey day per month will be conducted).

2.4 Proposed Survey Schedule

The proposed survey schedule for marine ecological surveys to be conducted for the Project, as outlined in *Sections 2.1* to *2.3*, is presented in ***Table 2.4***.

(21) Hung KYS (2020). *Op cit.*

Table 2.4 Tentative Survey Schedule for Marine Ecological Surveys

Survey	Method	Mar 21	Apr 21	May 21	Jun 21	Jul 21	Aug 21
Coral Survey	Qualitative Spot-dive Reconnaissance Check				✓		
	REA				✓		
	Drop Camera Survey					✓	
Subtidal Benthos Survey	Benthic Grab Survey	✓		✓			
Marine Mammal Survey	Systematic line-transect boat survey	✓	✓	✓	✓	✓	✓

APPENDIX A

SIGHTING SHEET FOR MARINE MAMMAL SURVEY

DOLPHIN / PORPOISE SIGHTING SHEET

HIGH PRIORITY DATA (Record at Initial Sighting)

Date _____ Time _____ Sighting No. _____

Sighting Distance (metres) _____ Sighting Angle (O) _____

Sighting Angle – Dolphins _____ Sighting Angle – Bow of Boat _____

Sighting Position (Initial) _____

Sighting Position (dolphin) _____ (Trip: _____ km)

LOW PRIORITY DATA (Record During or After Sighting)

Species □ Humpback Dolphin **Effort** □ On

□ Finless Porpoise □ Off

□ Other

Seen By _____

Group Size Best _____ High _____ Low _____

CWD* Group Composition† UC _____ UJ _____ SJ _____

SS _____ SA _____ UA _____

FP‡ Group Composition Calves _____ Adults _____

Beaufort □ 0 □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7+

Boat Assoc. □ None □ Pair □ Shrimp □ Hang

□ Other _____

Photos □ Yes □ No

Survey Area _____

Survey Type _____

BEHAVIOUR / COMMENTS

□ Feeding □ Socializing □ Travelling □ Milling/Resting

□ Breaching □ Spy-hopping □ Porpoising

Other Behaviour _____

Identified Individual(s) _____

Other Comments _____

_____

_____

* CWD = Chinese White Dolphin

† UC = Unspotted Calf, UJ = Unspotted Juvenile, SJ = Spotted Juvenile, SS = Spotted Sub-Adult, SA = Spotted Adult, UA = Unspotted Adult

‡ Finless Porpoise