

APPENDIX 4A LITERATURE REVIEW – MARINE ECOLOGY

4A.1 LITERATURE REVIEW – MARINE ECOLOGY

4A.1.1 Introduction

A literature review was conducted to review the marine baseline ecological characters of the Assessment Area, identify habitat resources and species of potential conservation importance, and identify information gaps to determine whether field surveys are required to provide sufficient information for the marine ecological impact assessment. This Appendix presents the findings of this literature review.

4A.1.2 Legislative Requirements and Evaluation Criteria

4A.1.2.1 *Marine Parks Ordinance (Cap. 476) and its Subsidiary Legislation*

The *Marine Parks Ordinance (Cap. 476)* provides for the designation, control and management of marine parks and marine reserves. It also stipulates the Director of Agriculture, Fisheries and Conservation as the Country and Marine Parks Authority which is advised by the Country and Marine Parks Board. The *Marine Parks and Marine Reserves Regulation* was enacted in July 1996 to provide for the prohibition and control of certain activities in marine parks or marine reserves.

4A.1.2.2 *Wild Animal Protection Ordinance (Cap. 170)*

Under the *Wild Animals Protection Ordinance (Cap. 170)*, designated wild animals are protected from being hunted, whilst their nests and eggs are protected from destruction and removal. All birds and most mammals including all cetaceans are protected under this Ordinance, as well as certain reptiles (including all sea turtles), amphibians and invertebrates. The Second Schedule of the Ordinance that lists all the animals protected was last revised in June 1997.

4A.1.2.3 *Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)*

The *Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)* was enacted to align Hong Kong's control regime with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). With effect from 1 July 2006, it replaces the *Animals and Plants (Protection of Endangered Species) Ordinance (Cap. 187)*. The purpose of the *Protection of Endangered Species of Animals and Plants Ordinance* is to restrict the import and export of species listed in CITES Appendices so as to protect wildlife from overexploitation or extinction. The Ordinance is primarily related to controlling trade in threatened and endangered species and restricting the local possession of them. Certain types of corals are CITES listed, including Blue coral (*Heliopora coerulea*), Organ pipe corals (family Tubiporidae), Black corals (order Antipatharia), Stony coral (order Scleractinia), Fire corals (family Milleporidae) and Lace corals (family Stylasteridae). The import, export and possession of listed species, no matter dead or living, is restricted.

4A.1.2.4 *Country Parks Ordinance (Cap. 208) and its Subsidiary Legislation*

The *Country Parks Ordinance (Cap. 208)* provides for the designation and management of Country Parks and Special Areas. Country Parks are designated for the purpose of nature conservation, countryside recreation and outdoor education. Special Areas are reserved generally for the purpose of nature conservation.

4A.1.2.5 *Town Planning Ordinance (Cap. 131)*

The *Town Planning Ordinance (Cap. 131)* provides for the designation of areas such as "Coastal Protection Areas", "Sites of Special Scientific Interest (SSSIs)", "Green Belt" and "Conservation Area" to promote conservation or protection or protect significant habitat.

4A.1.2.6 Environmental Impact Assessment Ordinance (Cap. 499) and the Technical Memorandum on Environmental Impact Assessment Process under the Environmental Impact Assessment Ordinance (EIAO-TM)

The *Environmental Impact Assessment Ordinance (Cap. 499)* specifies designated projects under Schedule 2 of the Ordinance, unless exempted, must follow the statutory environmental impact assessment (EIA) process and require environmental permits for their construction and operation. Annex 16 of the EIAO-TM sets out the general approach and methodology for assessment of ecological impacts arising from a project or proposal, to allow a complete and objective identification, prediction and evaluation of the potential ecological impacts. Annex 8 recommends the criteria that can be used for evaluating ecological impacts.

4A.1.2.7 Environmental Impact Assessment Ordinance (EIAO) Guidance Notes No. 6/2010, 7/2010 and 11/2010

The guidance notes provide respectively the observations on ecological assessment from the EIAO perspective, the general guidelines for conducting an ecological baseline survey for ecological assessment and methodologies for marine ecological baseline surveys in order to fulfil the requirements stipulated in the EIAO-TM in respect of marine ecological assessment for the proposed development.

4A.1.2.8 Hong Kong Planning Standards and Guidelines Chapter 10 (HKPSG)

Chapter 10 of the HKPSG covers planning considerations relevant to conservation. This chapter details the principles of conservation, the conservation of natural landscape and habitats, historic buildings, archaeological sites and other antiquities. It also addresses the issue of enforcement. The appendices list the legislation and administrative controls for conservation, other conservation related measures in Hong Kong and Government departments involved in conservation.

4A.1.2.9 Other Relevant Legislation

The Peoples' Republic of China (PRC) is a Contracting Party to the *United Nations Convention on Biological Diversity (CBD) of 1992* and it was extended to Hong Kong on 9 May 2011. The Convention requires signatories to make active efforts to protect and manage their biodiversity resources. The HKSAR Government has stated that it will be "committed to meeting the environmental objectives" of the Convention ⁽¹⁾. In the tenth meeting of the conference in 2010, the Parties adopted a revised and updated Strategic Plan for Biodiversity, including the Aichi Biodiversity Targets, for 2011-2020. This plan aims to "take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication". The Strategic Plan consisted with five strategic goals, which included 20 headline Aichi Biodiversity targets. The goals and targets comprised a flexible framework for the establishment of national and regional targets for biodiversity conservation.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora of Wild Fauna and Flora (CITES) was drafted and agreed at a meeting of members of International Union for Conservation of Nature (IUCN) with representative of 80 countries in 1972 and entered in force in 1975. This international agreement adheres voluntarily between government and aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

The IUCN is the world's oldest and largest authority on the conservation status of species. The IUCN Red List of Threatened Species™ is widely recognised as the most comprehensive, objective global

(1) Planning Environment and Lands Bureaux (1996) Environmental Policy Commitments.

approach for evaluating the conservation status of plant and animal species. The goal of the IUCN Red List is to provide information and analyses on the status, trends and threats to species in order to inform and catalyse action for biodiversity conservation. In 1994, a scientifically rigorous approach was adopted to determine risks of extinction that is applicable to all species and it has become a world standard.

The Convention on *Wetlands of International Importance Especially as Waterfowl Habitat* (the Ramsar Convention) applies in the HKSAR. The Convention requires parties to conserve and make wise use of wetland areas, particularly those supporting waterfowl populations. Article 1 of the Convention defines wetlands as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters." The Mai Po/Inner Deep Bay wetland was been declared a Wetland of International Importance ("Ramsar Site") under the Convention in 1995.

The PRC in 1988 ratified the Wild Animal Protection Law of the PRC, which lays down basic principles for protecting wild animals. The Law prohibits killing of protected animals, controls hunting, and protects the habitats of wild animals, both protected and non-protected. The Law also provides for the creation of lists of animals protected at the state level, under Class I and Class II. There are 96 animal species in Class I and over 230 species in Class II. Class I provides a higher level of protection for animals considered to be more threatened.

4A.2 BASELINE CONDITIONS OF MARINE ECOLOGICAL RESOURCES OF THE ASSESSMENT AREA

4A.2.1 INFORMATION REVIEWED

Baseline information on the marine ecological resources of the Assessment Area for marine ecology is available from the following key sources:

- Consultancy Services for Identification of New Fish Culture Zones in Hong Kong – Feasibility Study (AFCD/FIS/01/14);
- Provision of Services on Desktop Review for Potential New Fish Culture Zones (AFCD/SQ/243/18/C);
- EIA Report for the Development of a 100MW Offshore Wind Farm in Hong Kong (AEIAR-152/2010);
- Consultancy Study on Marine Benthic Communities in Hong Kong (Agreement No. CE 69/2000);
- A Study of Soft Shore Habitats in Hong Kong for Conservation and Education Purposes;
- AFCD Final Report on Monitoring of Marine Mammals in Hong Kong Waters;
- Hong Kong Reef Check;
- Field guides and published studies / literature for marine habitats and fauna of Hong Kong; and
- Available Published Scientific Literature.

Findings of the review of these key sources is summarised in the following sections.

4A.2.2 Recognised Sites of Conservation Importance

Recognised sites of conservation importance within the Assessment Area include Marine Reserve, and Site of Special Scientific Interest (SSSI) (**Figure 4A.2.1**). No designated Country Park or Special Area is located within the Assessment Area. Some of these that are relevant to marine ecology and are located in the vicinity of the Project site are discussed below.

4A.2.2.1 Marine Reserve

The Cape D’Aguilar Marine Reserve (CDMR) is located about 4 km from the Project site. There are no existing or proposed marine reserves or marine parks in the vicinity of the Project site. Details of the marine reserve are summarised in **Table 4A.2.1** and its location is provided in **Figure 4A.2.1**⁽²⁾.

4A.2.2.2 Sites of Special Scientific Interest

Sites of special scientific interest in the Assessment Area include Hok Tsui (Cape D’Aguilar) Site of Special Scientific Interest (SSSI). Details of Hok Tsui (Cape D’Aguilar) SSSI are summarised in **Table 4A.2.1** and the location of the SSSIs are provided in **Figure 4A.2.1**.

(2) AFCD (2021) Designated Marine Parks and Marine Reserve.

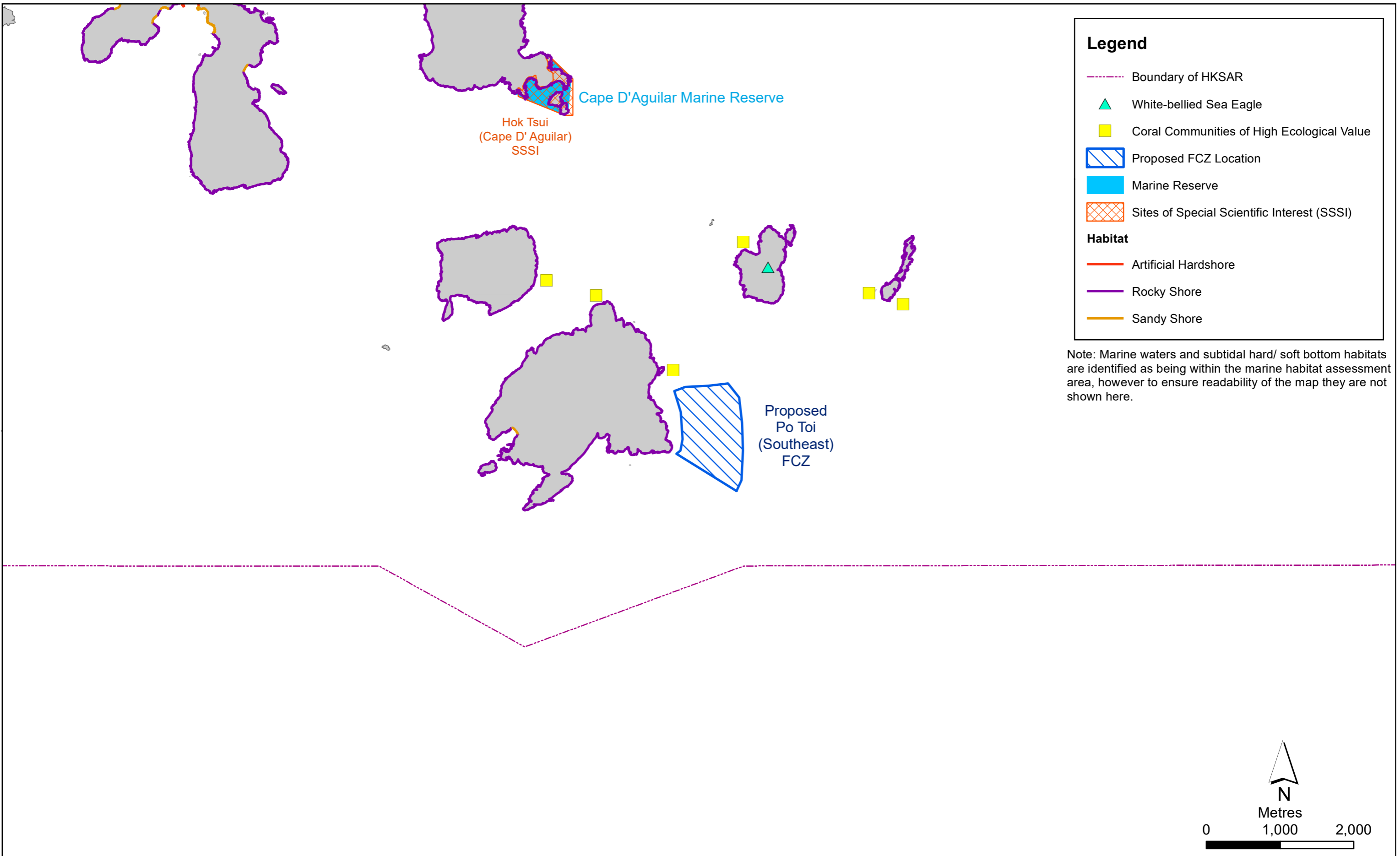


Figure 4A.2.1

Recognised Site of Conservation Importance and Marine Habitat Identified for the Proposed Po Toi (Southeast) FCZ

Table 4A.2.1 Existing Marine Reserve & Sites of Special Scientific Interest in the Assessment Area

Marine Reserve / Sites of Special Scientific Interest	Location	Distance to the Project site (km)	Date of Designation	Area (ha)	Conservation Purpose
<i>Existing Marine Reserve</i>					
Cape D' Aguilar Marine Reserve ⁽¹⁾	Southeastern coast of Hong Kong Island	4	July 1996	20	<ul style="list-style-type: none"> ■ It was established for the conservation of marine resources, scientific studies and education for the appreciation of precious marine resources. ■ The biodiversity within the marine reserve is high including fish, corals and invertebrates. ■ Geologically, four major rock types are found adjacent to the marine reserve. ■ Geomorphologically, the marine reserve has typical exposed rocky shore of south-easterly-directed capes and headlands in Hong Kong.
<i>Sites of Special Scientific Interest</i>					
Hok Tsui (Cape D' Aguilar) ⁽²⁾	Southeastern coast of Hong Kong Island	4	19 July 1990	31.5	<ul style="list-style-type: none"> ■ The site is designated due to both of its ecological and geological interest. ■ Provide different examples of rocky shore formation in Hong Kong, such as blowholes, sea arch, and wave-cut platform. ■ Zonate flora and fauna along the coast are important resources for scientific and educational purposes.

Note:

(1) AFCD (2021) Cape D' Aguilar Marine Reserve.

(2) Planning Department (2005) Hoi Tsui (Cape D'Aguilar).

4A.2.3 Intertidal Hard Bottom Assemblages

Intertidal hard shores of Hong Kong display characteristic zonation patterns consisting of different algal and invertebrate species along the vertical gradient from terrestrial to marine environments.

With reference to the site visits conducted between September 2020 to February 2021, the intertidal hard bottom habitat of the closest vicinity of the Project site and the Assessment Area consists primarily of natural rocky or boulder shore (**Figure 4A.2.1**). Artificial hard bottom shores within the Assessment Area such as piers and seawalls have also been identified. In the vicinity of the Project site, common species such as sea snail, *Diodora cruciata* and red algae, *Hildenbrandia rubra* were recorded at the rocky shores of Po Toi ⁽³⁾.

Within the Assessment Area, literatures have reported that Cape D' Aguilar consists of zoning organisms, such as maritime vegetation (*Scaevola*) at the higher intertidal zone above the sea level; lichen on bare rocks; snails (*Nodilittorina* spp.) on the splashed intertidal areas, algae (*Bangia fusco-purpurea*, *Corallina* spp. and *Sargassum* spp.) along the zones, and barnacles (*Tetraclita squamosa* and *Megabalanus volcano*) ⁽⁴⁾. It is reported that intertidal hard bottom assemblages in the Assessment Area consist of mobile fauna such as herbivorous crab (*Grapsus albolineatus*) and snails (*Nodilittorina* sp), and sessile species such as mussels (*Septifer virgatus*) and barnacle (*Tetraclita squamosa*) ⁽⁵⁾. They are considered to be common and widespread organisms in the intertidal habitats of Hong Kong.

4A.2.4 Intertidal Soft Bottom Assemblages

4A.2.4.1 Mangrove and mudflat

Mangrove stands and associate mudflats are absent at the coastline in the Assessment Area. The closest mangrove stand identified is located in Tai Tam, which is far away with more than 9 km from the Project site. Therefore, impact of the Project on the identified mangrove stands, mudflats and associated species such as horseshoe crabs and seagrasses within the Assessment Area is not anticipated.

4A.2.5 Subtidal Hard Bottom Assemblages

Coral communities are commonly regarded as the most ecologically important and valuable subtidal hard bottom assemblages. AFCD reported that there are over 80 species of stony corals recorded in Hong Kong waters. The general trend for coral communities in Hong Kong is the increasing abundance and diversity from west to east with the greatest diversity and abundance generally found in the eastern waters of Hong Kong. The southern waters are more likely to be influenced by the Pearl River outflow, with lower salinity and higher turbidity. It has been suggested that the distribution of corals is primarily controlled by hydrodynamic conditions, in particular salinity level, turbidity and light penetration ⁽⁶⁾.

In the southeastern waters of Hong Kong, stony coral colonies are smaller and more isolated compared with those found in other areas. Their coverage and species diversity are low. Unlike the hermatypic hard corals, ahermatypic octocorals (including gorgonians, soft corals and black corals) which many of them do not require light for zooxanthellae photosynthesis, are more widely distributed

(3) Ng TPT, Cheng MCF, Ho KKY, Lui GCS, Leung KMY, Williams GA (2017) Hong Kong's rich marine biodiversity: the unseen wealth of South China's megalopolis. *Biodiversity and Conservation*, 26(1), 23-36.

(4) Morton B, Morton J (1983) *The sea shore ecology of Hong Kong* (Vol. 1). Hong Kong University Press.

(5) Kennish R, Williams GA, Lee SY (1996) Algal seasonality on an exposed rocky shore in Hong Kong and the dietary implications for the herbivorous crab *Grapsus albolineatus*. *Marine Biology* 125, 55-64.

(6) AFCD (2005) *Field Guide to Hard Corals of Hong Kong*.

in southern waters and often occur at greater depths ⁽⁷⁾ ⁽⁸⁾. A recent study suggested that the southern Hong Kong waters, including Waglan Island and Cape D'Aguilar, featured low coral cover and low generic richness of small encrusting colonies when comparing to northeastern, southeastern and eastern coastal waters ⁽⁹⁾.

Recent information on the subtidal hard bottom assemblages of the Assessment Area is available in various reports, literature and approved EIA reports. The findings are summarised in **Table 4A.2.2**. Previous survey locations of subtidal hard bottom assemblages in the vicinity of the Project site are shown in **Figure 4A.2.2**.

Table 4A.2.2 Baseline Information on Subtidal Hard Bottom Assemblages in the vicinity of the Project site

Source	Location	Summary of findings
ERM (2018) ⁽¹⁰⁾	Po Toi (Southeast), Lo Chau Mun (Southeast of Beaufort Island)	<p>In Po Toi (Southeast), a total of 25 species of hard corals, 10 species of octocorals and 2 species of black corals were found. The coral colonies in this region were composed of sparse (<5% coverage) and low diversity of hard corals and octocorals. The species recorded are generally common and widespread, including ahermatypic hard coral <i>Tubastrea / Dendrophyllia</i> sp., hermatypic hard coral <i>Plesiastrea versipora</i> and <i>Porites</i> sp. and octocoral <i>Dendronephthya</i> sp. and <i>Echinomuricea</i> sp.. Coral communities of high ecological concern were not identified within and in the vicinity of the Study site.</p> <p>In Lo Chau Mun, a total of 9 species of hard coral, 10 species of octocoral and 4 species of black coral were identified. Two deep water transects were identified as high ecological concern due to the high diversity and abundance (51-75% coverage) of octocorals and black corals. Scattered and low abundance (< 5% coverage) of common hard coral and octocoral species, such as ahermatypic hard coral <i>Tubastrea / Dendrophyllia</i> sp., hermatypic hard coral <i>Cyphastrea serailia</i>, <i>Plesiastrea versipora</i> and <i>Porites</i> sp. and octocoral <i>Dendronephthya</i> sp. and <i>Echinomuricea</i> sp. occurred in the other areas of Lo Chau Mun.</p>

(7) AFCD (2005) *Op. cit.*

(8) Ang PO Jr., Lee MW, Fung HL (2010) Provision of Services on Reference Collection and Study on Octocorals and Black Corals in Hong Kong Waters. Report submitted to Agriculture, Fisheries and Conservation Department.

(9) Yeung YH, Xie JY, Kwok CK, Kei K, Ang P, Chan LL, Dellisanti W, Cheang CC, Chow WK, Qiu JW (2021). Hong Kong's subtropical scleractinian coral communities: Baseline, environmental drivers and management implications. *Marine Pollution Bulletin* 167: 112289

(10) ERM (2018) Consultancy Services for Identification of New Fish Culture Zones in Hong Kong – Feasibility Study (AFCD/FIS/01/14).

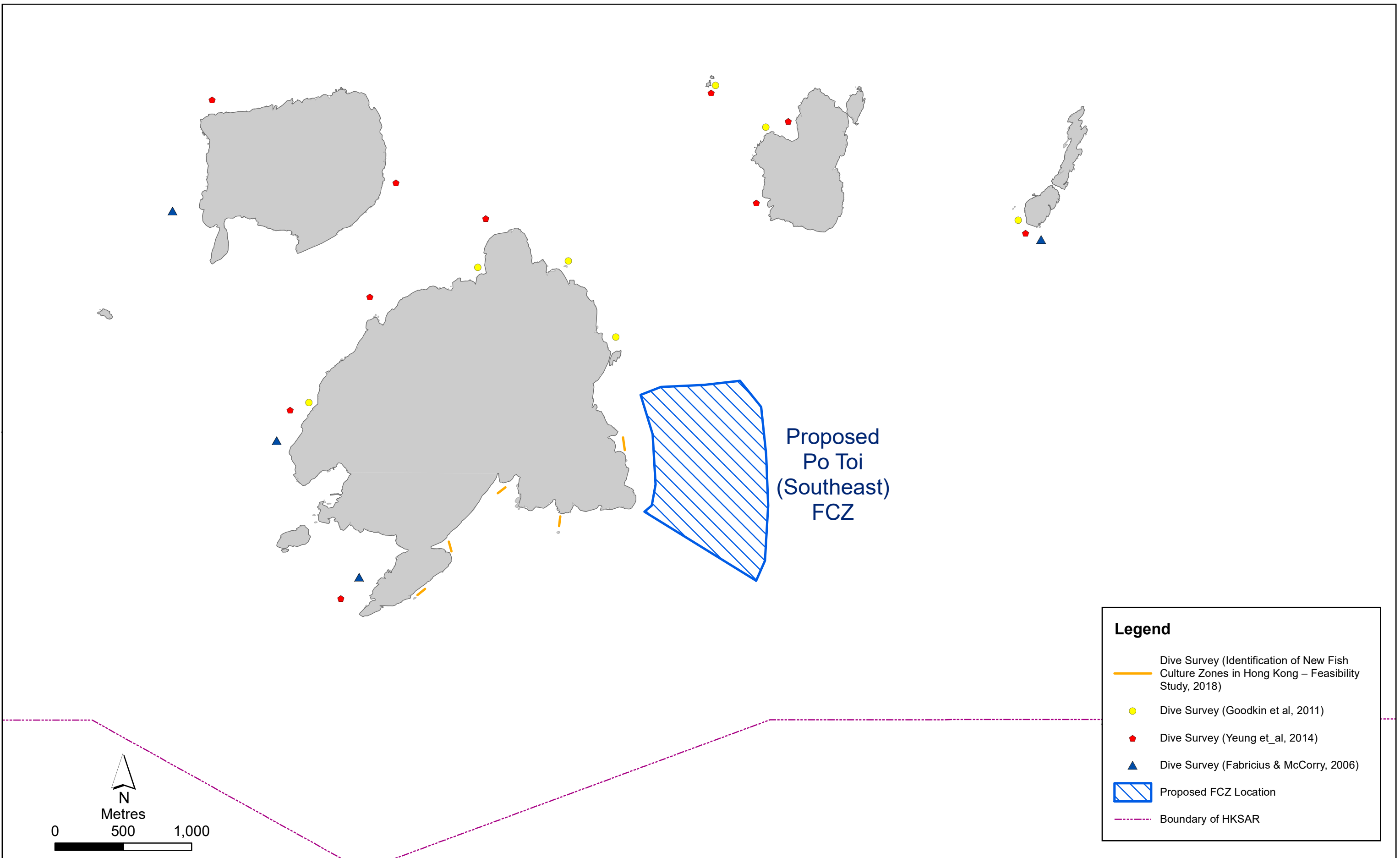


Figure 4A.2.2

Location of Survey Sites of Previous Intertidal and Subtidal Hard Bottom Assemblages Studies in the Vicinity of the Proposed Po Toi (Southeast) FCZ

Source	Location	Summary of findings
Yeung et al. (2014) ⁽¹¹⁾	Po Toi, Beaufort Island	Beaufort Island East was recorded as one of the site to have the highest number of octocoral and black coral species. >30 % of living coral coverage was recorded.
Goodkin et al. (2011) ⁽¹²⁾	Po Toi, Sung Kong and Waglan Island	<10% and <10% - 50% coral coverage were recorded at sampling sites around Po Toi and Sung Kong respectively. Higher coral coverage of 10-50% was recorded at Waglan Island.
Fabricius & McCorry (2006) ⁽¹³⁾	Po Toi, Beaufort Island and Waglan Island	Sampling sites were located at the west of Po Toi, west of Beaufort Island and around Waglan Island. The results showed that very low octocoral cover and near-absence of hard corals were recorded. The study suggested that low salinity is conceivably the major factor that causes the low coverage among the sites in the southern waters.

Based on the literature review, coral colonies in the vicinity of the Project site were composed of sparse (<5% coverage) and low diversity of hard corals and octocorals. The species recorded are generally common and widespread, such as ahermatypic hard coral *Tubastrea / Dendrophyllia* sp. In general, coral communities of high ecological concern were not identified within and in the vicinity of the Project site. Coral communities with higher ecological value were recorded at Po Toi (northeast), Beaufort Island (east to southeast), Sung Kong (northwest) and Waglan Island (southwest and southeast) which are located at >0.3km, 3 km, 2.4 km and 1.1 km from the Project site respectively. Two deep water transects at Lo Chau Mun (southeast of Beaufort Island) were identified as high ecological concern due to the high diversity and abundance (51-75% coverage) of octocorals and black corals. Coverage of hard corals was however considered low (<5%). No Reef Check surveys were conducted near the Project site during 2016-2020.

It is reasonable to expect that coral communities with high ecological value would not occur in the vicinity of the Project site based on the literature review whilst it is possible that solitary hard coral may be present in the Assessment Area. Presence of large or important communities of hard corals are not expected due to the unfavourable environmental conditions. Presence of higher coverage of octocorals and black corals are expected to be found mainly at locations further away from the Project site, such as Lo Chau Mun.

4A.2.6 Subtidal Soft Bottom Assemblages

4A.2.6.1 Epifaunal Assemblages

Subtidal epifauna are organisms (> 1 mm in size) living either on or within the surface sediments of the seabed. Due to the nature of the Hong Kong's fishery and the typical subtidal substratum in Hong

(11) Yeung CW, Cheang CC, Lee MW, Fung HL, Chow WK, Ang P, (2014). Environmental variabilities and the distribution of octocorals and black corals in Hong Kong. *Marine Pollution Bulletin*, 85(2), 774–782.

(12) Goodkin NF, Switzer AD, McCorry D, DeVantier L, True JD, Hughen KA, Angeline N, Yang TT (2011) Coral communities of Hong Kong: long-lived corals in a marginal reef environment. *Marine Ecology Progress Series*. 426:185-196

(13) Fabricius KE, McCorry D (2006). Changes in octocoral communities and benthic cover along a water quality gradient in the reefs of Hong Kong. *Marine Pollution Bulletin*, 52(1), 22–33.

Kong being soft bottom (sandy or silty) habitat, data on subtidal epifaunal assemblages in Hong Kong are primarily available from studies on fisheries resources, collected by trawling surveys.

Historically, results of trawl surveys undertaken as part of AFCD's study ⁽¹⁴⁾ indicated that the highest biomasses of epifaunal assemblages recorded in the Southern and Second Southern Supplementary WCZs were contributed by mantis shrimp (e.g. *Oratosquilla oratoria*) which are common and widespread species. A more recent study was conducted to examine the effects of trawling ban on demersal crustacean resources through demersal trawling surveys ⁽¹⁵⁾. The nearest sampling sites were located at the eastern waters of Waglan Island within the Assessment Area. The results showed that two commercially important and dominant crustacean species (in terms of biomass), namely *Portunus pelagicus / trituberculatus* (swimming crab) were recorded. Other species with high relative abundance in the sampling sites were *Metapenaeopsis* sp. (shrimp) and *Charybdis feriatus* (swimming crab). Overall, findings from the previous surveys suggested that the epifaunal assemblages of the Assessment Area are dominated by common and widespread species.

Previous survey locations of subtidal soft bottom epifaunal assemblages in the vicinity of the Project site are shown in **Figure 4A.2.3**.

4A.2.6.2 Infaunal Assemblages

Subtidal infauna are organisms (> 0.5 mm in size) living either on or within the surface sediments of the seabed. In order to provide an indication of the potential ecological value of the infaunal assemblages of the Assessment Area in the context of seabed of Hong Kong waters, it is considered useful to review studies that have investigated infaunal assemblages in Hong Kong on a wide scale.

An AFCD commissioned study was published in 2002 on marine benthic communities in Hong Kong ⁽¹⁶⁾. The study has examined the benthic community at 120 stations within Hong Kong waters, including areas in the vicinity of the Project site. The results are considered to provide representative information of the assemblages within the Assessment Area which reported that eastern and southern waters were found to have a more homogenous benthic composition and diversity, reflecting relatively higher ecological importance than other regions, including northeastern waters, western waters and Victoria Harbour.

Among infaunal assemblages, amphioxus are considered to be of scientific interest as they are recognised to be the closest living invertebrate to vertebrates. Amphioxus have a wide geographic distribution but are considered as rare animals as they are present at scattered locations throughout their range and in high densities occasionally ⁽¹⁷⁾. Suitable habitats for amphioxus are shallow, subtidal sand flats in tropical, subtropical and temperate waters, with coarse sand and shelly sediments ⁽¹⁸⁾. In Hong Kong waters, there are a total of five amphioxus species identified ⁽¹⁹⁾ and among them *B. belcheri* and *B. malayanum* are the two dominant species contributing to nearly 90% of the total number of specimens collected in the field.

Distribution studies consistently reported that amphioxus are present within Hong Kong's oceanic, eastern waters. Three *Branchiostoma* species have been recorded in Hong Kong in densities ranging from 10 to 400 ind / m² predominantly at sites in Tai Long Wan, Nam She Wan, Long Ke Wan and

(14) ERM (1998) Study of Fisheries Resources and Fishing Operations in Hong Kong Waters, AFD.

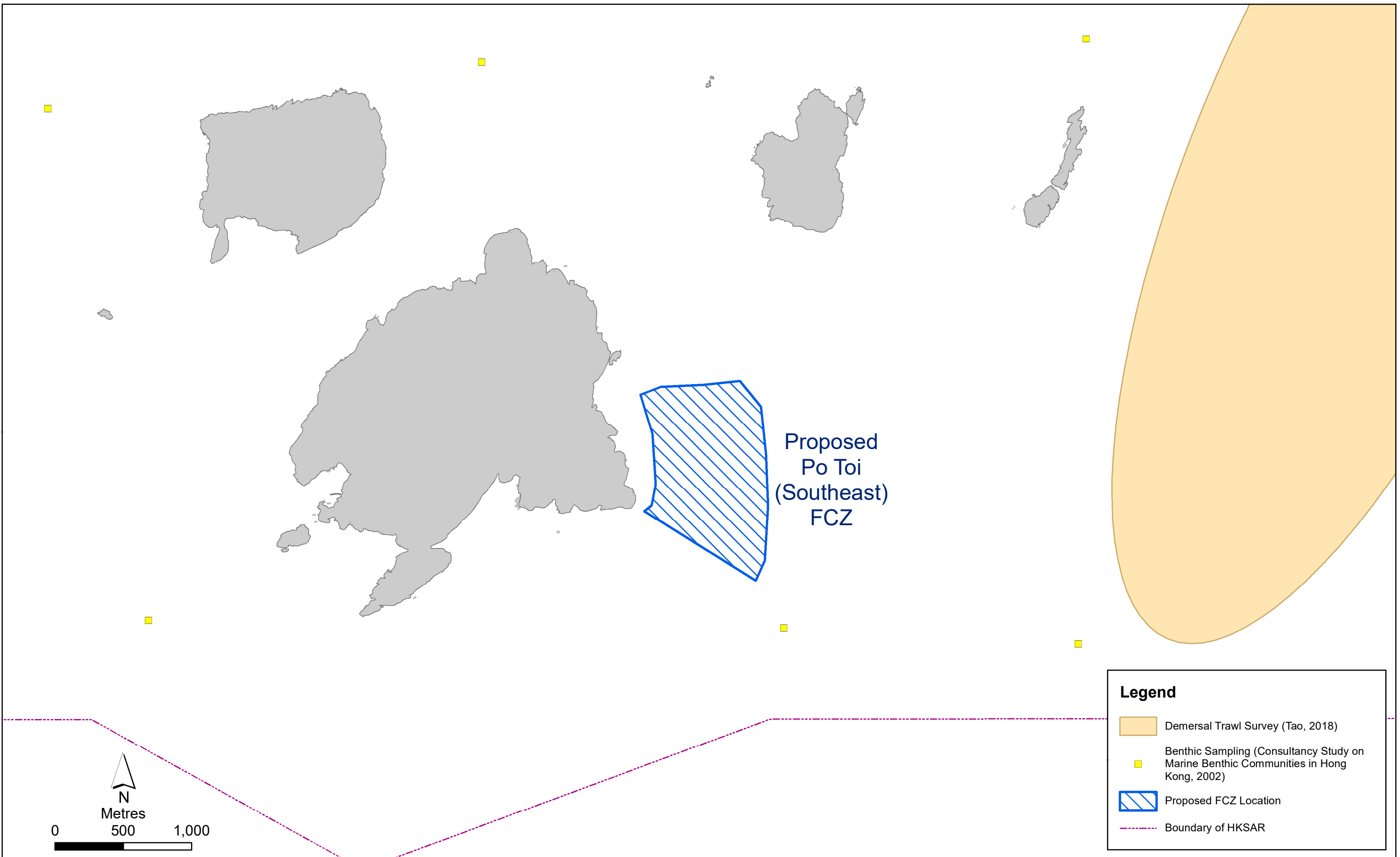
(15) Tao S (2018) Effects of the trawling ban on demersal crustacean resources (orders: decapoda and stomatopoda) in the marine environment of Hong Kong. (Thesis). University of Hong Kong, Pokfulam, Hong Kong SAR.

(16) CityU Professional Services Limited (2002) Consultancy Study on Marine Benthic Communities in Hong Kong (Agreement No. CE 69/2000). Final Report submitted to AFCD.

(17) Chen Y et al. (2013) *Op. cit.*

(18) 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.

(19) Chen Y (2007) The Ecology and Biology of Amphioxus in Hong Kong. PhD. Thesis. The City University of Hong Kong.



Legend





-  Demersal Trawl Survey (Tao, 2018)
-  Benthic Sampling (Consultancy Study on Marine Benthic Communities in Hong Kong, 2002)
-  Proposed FCZ Location
-  Boundary of HKSAR



Figure 4A.2.3

Location of Survey Sites of Previous Intertidal and Subtidal Soft Bottom Assemblages Studies in the Vicinity of the Proposed Po Toi (Southeast) FCZ

Pak Lap Wan off the Sai Kung Peninsula ⁽²⁰⁾. This scientific study in 2007 specifically examined amphioxus in Hong Kong's eastern waters, however, the sampling sites were located out of the Assessment Area. Therefore, the abundance of amphioxus were further examined through baseline benthic grab surveys conducted for this Project.

Previous survey locations of subtidal soft bottom infaunal assemblages in the vicinity of the Project site are shown in **Figure 4A.2.3**.

4A.2.7 Marine Mammals

A total of 20 species of marine mammals (all cetaceans) have been recorded in Hong Kong waters (including one humpback whale sighted in 2009, one stranding of Omura's whale in 2014, one short-finned pilot whale stranded in 2015 and occasional sightings of passing false killer whale pods). Among these two of which are considered residents, including the Chinese White Dolphin (CWD) *Sousa chinensis* and Finless Porpoise (FP) *Neophocaena phocaenoides* ⁽²¹⁾. CWD are mainly distributed in western and southwestern waters of Hong Kong. As the Assessment Area is located in southeastern waters of Hong Kong within the habitats utilised by FP, the following context focusses on FP.

FP is a tropical / sub-tropical cetacean widely distributed in coastal marine waters, as well as some river mouths and estuaries, from the Arabian / Persian Gulf eastwards around the rim of the Indian Ocean to the Taiwan Strait area in southern Japan. It is protected locally by the *Wild Animals Protection Ordinance (Cap. 170)*, and is listed as "Vulnerable" in the IUCN Red List of Threatened Species ⁽²²⁾. FP is also listed in CITES Appendix I (i.e. highest protection), and is listed as "Grade II National Key Protected Species" in China. As such FP is considered a species of conservation importance, both locally in Hong Kong and regionally in China and across the Asia Pacific.

Studies on the distribution, abundance, habitat use, life history and behaviour of FP in Hong Kong have been undertaken since 1998. It was estimated that there were at least 147 porpoises occurring in Chinese waters just south of Hong Kong, which makes the minimum population size estimate to be 217 animals ⁽²³⁾.

In Hong Kong, FPs occur year-round, and they can be found primarily in the southern (i.e. Po Toi, Lamma, Southeast and Southwest Lantau) and eastern (i.e. Sai Kung and Ninepins) waters of the territory ⁽²⁴⁾ ⁽²⁵⁾ ⁽²⁶⁾ (**Figure 4A.2.4**). The majority of porpoise sightings have been made to the south of Soko Islands and Cheung Chau, around Shek Kwu Chau, and between the waters of Soko Islands and Shek Kwu Chau. These areas are thus considered to be the main habitats for FP.

Seasonal variation in distribution is evident for FPs in Hong Kong. FPs move into the waters of south Lantau and Lamma in winter (from December to February), and peak abundance was recorded in spring (from March to May) when significant numbers occurred in southern waters. During summer (from June to August), FP generally vacated the waters of south Lantau and Lamma and moved to Po Toi, Ninepins and Sai Kung, and abundance appears to reach a low point in autumn (from September

(20) Chen (2007) *Op. cit.*

(21) Jefferson TA, Hung SK (2007) An updated, annotated checklist of the marine mammals of Hong Kong. *Mammalia* 2007: 105–114

(22) Wang, JY, Reeves, R (2017) *Neophocaena phocaenoides*. The IUCN Red List of Threatened Species 2017: e.T198920A50386795.

(23) AFCD (2021) Finless Porpoise. Distribution and Abundance.

(24) Jefferson TA, Braulik G T (1999) Preliminary report on the ecology of the finless porpoise in Hong Kong waters. *IBI Reports* 9: 41-54

(25) Jefferson TA, Hung SK, Law L, Torey M, Tregenza N (2002) Distribution and abundance of finless porpoises in Hong Kong and adjacent waters of China. *Raffles Bulletin of Zoology* 10: 43-55.

(26) AFCD (2022) Monitoring of Marine Mammals in Hong Kong Waters (2021-2022).

to November). Their abundance in Hong Kong waters ranges from approximately 152 individuals in spring to approximately 55 in autumn ⁽²⁷⁾.

A data review of long-term marine mammal monitoring conducted by AFCD up to the year of 2022 has been conducted ⁽²⁸⁾. Survey results from 2017-2021 showed that FP were mainly sighted at the offshore waters between Soko Islands and Shek Kwu Chau. During the dry season, FPs were mostly sighted at waters between Soko Islands and Shek Kwu Chau, south part of Cheung Chau and southwestern waters of Lamma Island, while in the wet season, FPs were mostly sighted at waters between Po Toi and Lamma, at the juncture between Po Toi and Ninepins survey area, and at eastern waters.

The usage of FP around Po Toi was further investigated using the data from 2012 to 2021 (**Figure 4A.2.4**). Porpoise densities were reported to be low to moderate around the Po Toi Islands (i.e. Po Toi, Beaufort Island, Sung Kong and Waglan Island), in the offshore waters in Po Toi survey area, as well as at the juncture of the Po Toi and Ninepins survey areas in the wet seasons (June through November). The porpoise densities at the Project site were low compared to offshore waters. The encounter rate of FP varied over time between 2004-2021 and the FP encounter rate at Po Toi waters was slightly lowered in recent years (2017-2020) and showed increased usage in 2021 (**Figure 4A.2.5**). During 2021, high density (DPSE values) of FPs was recorded at some locations in the Assessment Area, including southern waters of Po Toi. However, due to the imbalanced survey effort between Lantau waters and southern waters (i.e. Lamma, Po Toi and Ninepins survey areas), it was reported that such high density in Po Toi could be heavily biased as the survey effort at Po Toi were considered to be relatively low. Regardless of the bias caused by survey effort on quantifying the density of FP, the results of marine mammal surveys from AFCD consistently indicate that FP is an inhabitant of the waters in the Assessment Area in the recent years but mainly in the summer and autumn months.

Overall, the encounter rate and seasonal distribution of FPs remain to be similar in recent years and it is considered that the data from the long-term marine mammal monitoring conducted by AFCD are comprehensive and adequate for this Project. No further baseline survey for marine mammals would be necessary.

4A.2.8 White-bellied Sea Eagles

White-bellied Sea Eagles (WBSE), *Haliaeetus leucogaster*, is one of the species of conservation importance in Hong Kong due to its protection status (PRC Class II protected and CITES Appendix II species). The species were restricted to nearshore coastal waters and belong to surface-feeding species ⁽²⁹⁾. Their foraging distance could reach as far as 2 km from nesting locations with the peak foraging period occurring between 5 pm and 7 pm ⁽³⁰⁾.

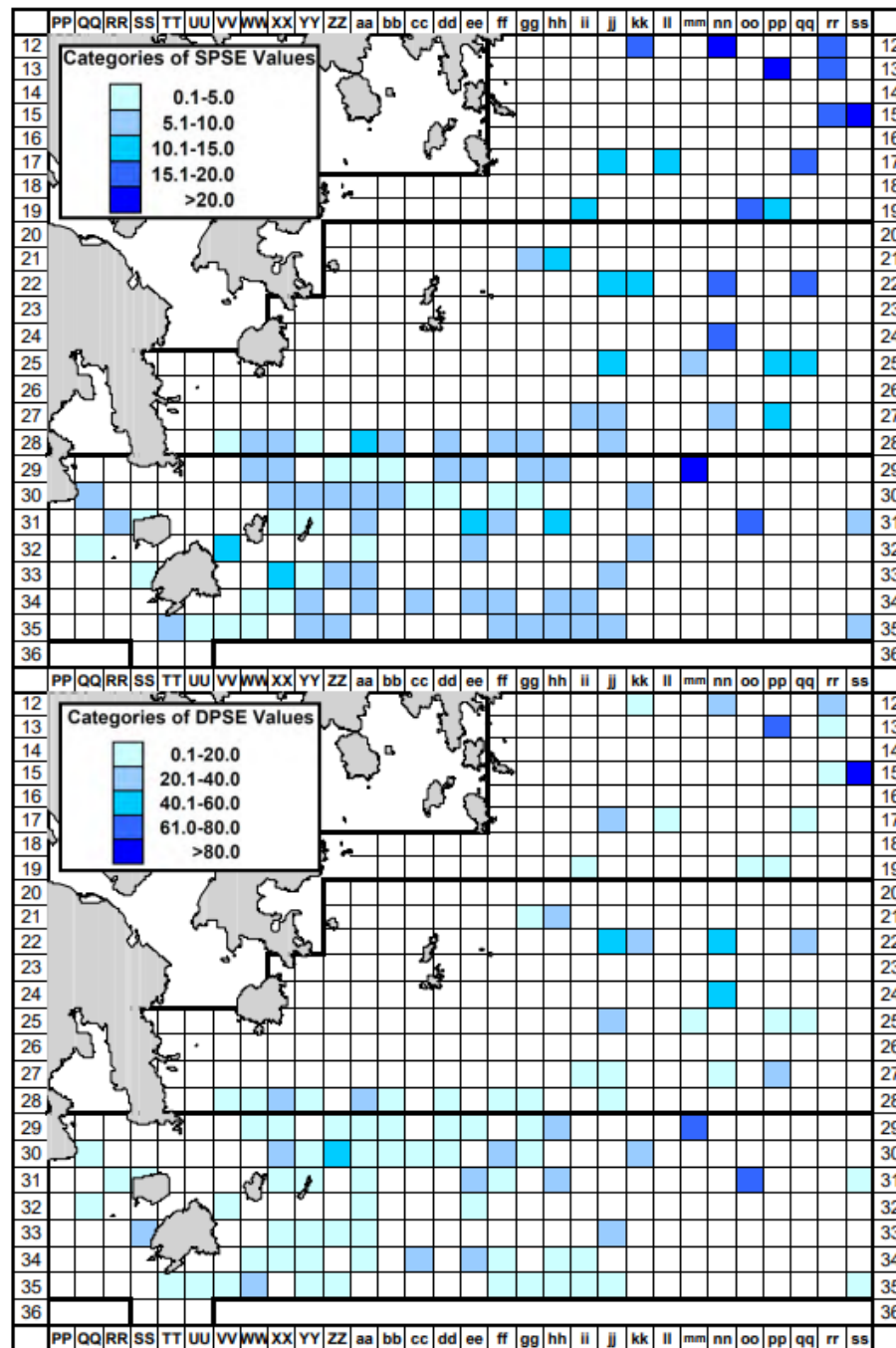
Since 2002, AFCD has been conducting surveys on the species. There are 25 recorded nesting sites around Hong Kong covering Lung Kwu Chau in the west to Tsim Chau and Tsang Pang Kok in the east. WBSE was recorded nesting within the Assessment Area. Nesting ground have been spotted 1.7 km away from the Project site on Sung Kong (**Figure 4A.2.1**). Breeding behaviour of WBSE was recorded in 4-6 years in the Sung Kong nesting ground from 2002 to 2020. Compared with the rest of the nesting sites found in Hong Kong by the AFCD survey, the usage of the nesting site as breeding

(27) AFCD (2022) Finless Porpoise. Distribution and Abundance. *Op. cit.*

(28) AFCD (2022) Monitoring of Marine Mammals in Hong Kong Waters (2021-2022).

(29) ERM (2010) EIA Report for the Development of a 100MW Offshore Wind Farm in Hong Kong (AEIAR-152/2010)

(30) Tsim ST, Lee WH, Cheung CS, Chow KL, Ma YN, Liu KY (2003) The Population and Breeding Ecology of White-bellied Sea-eagles in Hong Kong. Hong Kong Biodiversity, AFCD Newsletter: Issue 5.



(Ref: AFCD (2022) Monitoring of Marine Mammals in Hong Kong Waters (2021-2022). Prepared by Hong Kong Cetacean Research Project.)

FIGURE 4A.2.4

Density of Finless Porpoises with Corrected Survey Effort per km² in Eastern Waters of Hong Kong during Wet Season (June to November), using Data Collected during 2012-21 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort; DPSE = no. of porpoises per 100 units of survey effort)

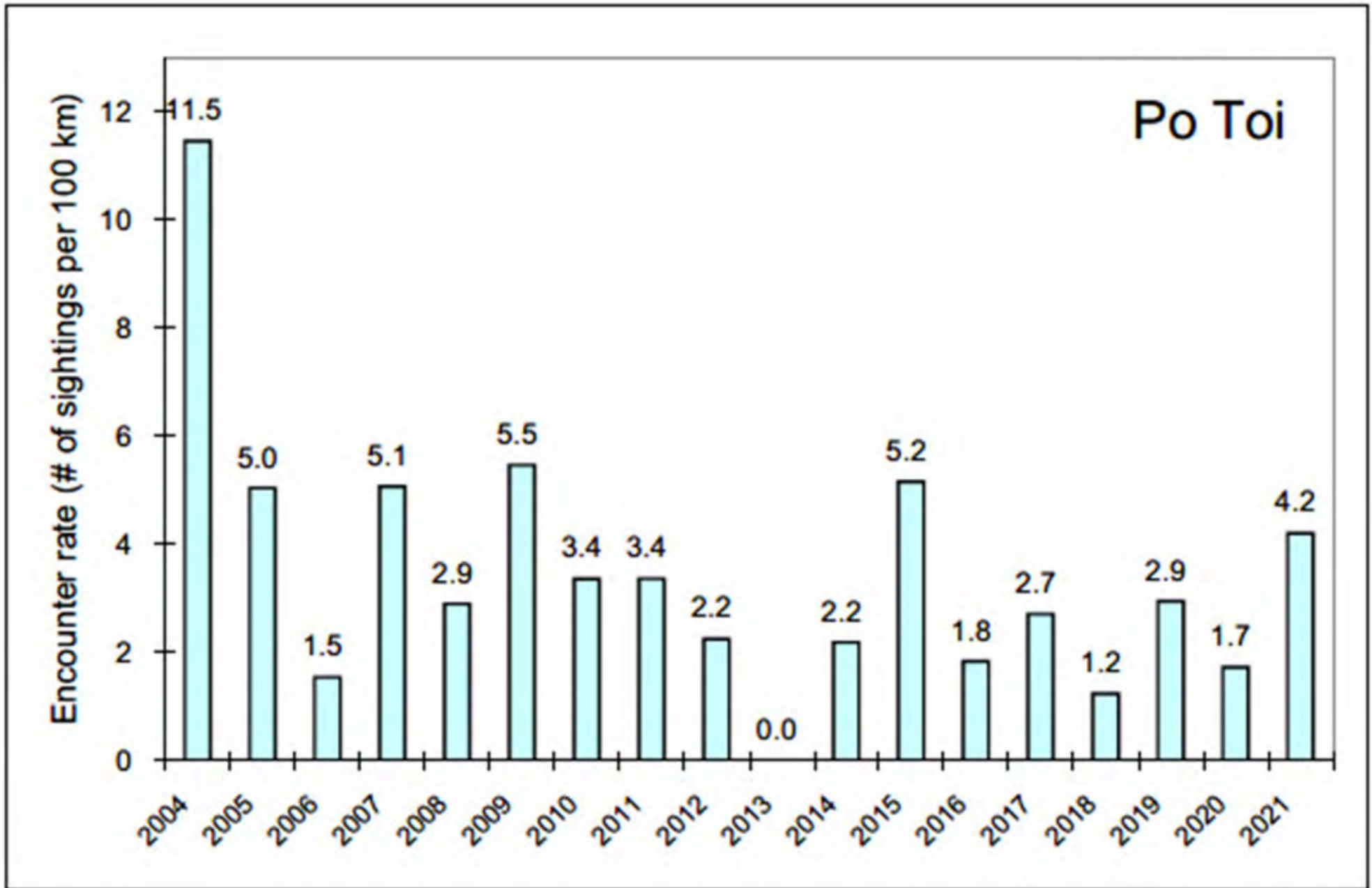


FIGURE 4A.2.5

Temporal Trends in Annual Encounter Rates of Finless Porpoise in Po Toi Survey Area

(Ref: AFCD (2022) Monitoring of Marine Mammals in Hong Kong Waters (2021-2022). Prepared by Hong Kong Cetacean Research Project.)

ground is relatively low, the majority of nesting sites with more than 10 years of recorded breeding behaviour are located at Sai Kung east like Tsim Chau and in Port Shelter ⁽³¹⁾.

Overall, it is considered that the data from the long-term survey conducted by AFCD are comprehensive and adequate for this Project. No further baseline survey for WBSE would be necessary. As the nesting ground on Sung Kong is of low usage as breeding ground, impact of Project works on WBSE is not anticipated.

(31) So WY, Yuen NF (2020) A Short Note on the Breeding of White-bellied Sea Eagle in Hong Kong. Hong Kong Biodiversity, AFCD Newsletter: Issue 26.