

Appendix 7A Literature Review

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1 Introduction

- 1.1.1.1 A literature review was conducted to review the 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 ecological impact assessment. This **Appendix** presents the findings of this literature review.

2 Legislative Requirements and Evaluation Criteria

Marine Parks Ordinance (Cap. 476) and its Subsidiary Legislation

- 2.1.1.1 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.

Forests and Countryside Ordinance (Cap. 96) and its subsidiary legislation, the Forestry Regulations

- 2.1.1.2 The *Forests and Countryside Ordinance (Cap. 96)*, prohibits felling, cutting, burning or destroying of trees and growing plants in forests and plantations on Government land while it's subsidiary legislation the *Forestry Regulations* prohibit the selling or illegal possession of listed rare and protected plant species.

Wild Animal Protection Ordinance (Cap. 170)

- 2.1.1.3 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.

Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)

- 2.1.1.4 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.

Country Parks Ordinance (Cap. 208) and its Subsidiary Legislation

- 2.1.1.5 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.

Town Planning Ordinance (Cap. 131)

- 2.1.1.6 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.

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

- 2.1.1.7 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.

Environmental Impact Assessment Ordinance (EIAO) Guidance Notes No. 6/2010, 7/2010, 10/2010 and 11/2010

- 2.1.1.8 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, methodologies for terrestrial baseline surveys and methodologies for marine ecological baseline surveys in order to fulfil the requirements stipulated in the EIAO-TM in respect of ecological assessment for the proposed development.

Hong Kong Planning Standards and Guidelines Chapter 10 (HKPSG)

- 2.1.1.9 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.

Other Relevant Legislation

- 2.1.1.10 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.
- 2.1.1.11 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.
- 2.1.1.12 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 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 treats 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.
- 2.1.1.13 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

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

of marine water the depth of which at low tide does not exceed six meters". The Mai Po/Inner Deep Bay wetland has been declared a Wetland of International Importance ("Ramsar Site") under the Convention in 1995.

2.1.1.14 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.

3 Baseline Conditions of Terrestrial Ecological Resources of the Assessment Area

Information Reviewed

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

- EIA Report for Tung Chung Line Extension (Register No.: EIA-277/2021)⁽²⁾
- EIA Report for Tung Chung New Town Extension (Register No.: EIA-233/2015)⁽³⁾
- EIA Report for Expansion of Hong Kong International Airport into a Three-Runway System (Register No.: EIA-223/2014)⁽⁴⁾
- EIA Report for Tuen Mun - Chek Lap Kok Link (Register No.: EIA-174/2009)⁽⁵⁾
- EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facilities (Register No.: EIA-173/2009)⁽⁶⁾
- EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road (Register No.: EIA-172/2009)⁽⁷⁾
- Hong Kong - Zhuhai - Macao Bridge: Hong Kong Section and the North Lantau Highway Connection Ecological Baseline Survey (Agreement No. MW 01/2003)
- Field guides and published studies/literature for terrestrial habitats and fauna of Hong Kong

(2) ARUP (2021). Tung Chung Line Extension.

(3) ARUP (2015). Tung Chung New Town Extension.

(4) Mott MacDonald (2014). Expansion of Hong Kong Airport into a Three-Runway System.

(5) Highways Department (2009). Tuen Mun - Chek Lap Kok Link.

(6) Highways Department (2009). Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facilities.

(7) Highways Department (2009). Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road.

- Hong Kong Biodiversity Information Hub maintained by AFCD ⁽⁸⁾
- Available Published Scientific Literatures.

3.1.1.2 Findings of the review of these key sources are summarised in the following sections; a map showing their study areas, whenever defined, is provided in **Figure 7A.1**. Special attention was paid to ecologically sensitive areas, and species of conservation importance (i.e. species protected by local legislation, endemic to Hong Kong or South China, listed in international conventions for conservation of habitat/wildlife, listed in IUCN Red Data Book or those of the South China region and considered as rare in the territory or having special conservation importance by scientific studies etc.). The information gathered from the literature review was evaluated and the information gaps concerning assessment of the potential ecological impacts arising from the Project on the terrestrial environment were identified. The species of conservation importance with known locations are shown on **Figure 7A.2**.

Recognised Sites of Conservation Importance

3.1.1.3 There are no recognised sites of conservation importance within the 500m Assessment Area.

(8) Information reviewed from AFCD, Available at <https://bih.gov.hk/en/home/index.html>

Previously Recorded Species (Terrestrial)

Table 7A3.1 Key Previous Studies Relevant to the Study Area

Study	Survey Period	Flora and Fauna Groups Surveyed
EIA Report for Tung Chung Line Extension (Register No.: EIA-277/2021)	August 2020 – July 2021	Habitat & Vegetation, Terrestrial Mammal, Avifauna, Herpetofauna, Butterfly, Odonates, Aquatic Fauna
EIA Report for Tung Chung New Town Extension (Register No.: EIA-233/2015)	May 2012 – March 2013, June 2013 – August 2013, August 2014 – February 2015	Habitat & Vegetation, Terrestrial Mammal, Avifauna, Herpetofauna, Butterfly, Odonates, Aquatic Fauna
EIA Report for Expansion of Hong Kong International Airport into a Three-Runway System (Register No.: EIA-223/2014)	September 2012 – 2013	Habitat & Vegetation, Avifauna, Herpetofauna, Butterfly, Odonates, Aquatic Fauna
EIA Report for Tuen Mun - Chek Lap Kok Link (Register No.: EIA-174/2009)	July 2008 – April 2009	Habitat & Vegetation, Terrestrial Mammal, Avifauna, Herpetofauna, Butterfly, Odonates, Aquatic Fauna
EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facilities (Register No.: EIA-173/2009)	September 2003 – May 2004, August 2008 – January 2009	Habitat & Vegetation, Terrestrial Mammal, Avifauna, Herpetofauna, Butterfly, Odonates, Aquatic Fauna
EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road (Register No.: EIA-172/2009)	September 2003 – May 2004, August 2008 – January 2009	Habitat & Vegetation, Terrestrial Mammal, Avifauna, Herpetofauna, Butterfly, Odonates, Aquatic Fauna
Ecological Baseline Survey for Hong Kong - Zhuhai - Macao Bridge: Hong Kong Section and the North Lantau Highway Connection Ecological Baseline Survey (Agreement No. MW 01/2003)	September 2003 – May 2004	Habitat & Vegetation, Terrestrial Mammal, Avifauna, Herpetofauna, Butterfly, Odonates, Aquatic Fauna

Habitat and Vegetation

- 3.1.1.4 Based on a review of recent aerial photos and habitat maps prepared for several approved EIA studies, most habitats present within the Assessment Area ranged from natural such as woodland, shrubland, coastal area to developed area. The other minor habitats include some watercourses of both natural and channelized ones of various extents.
- 3.1.1.5 Based on the reviewed literature, five (5) flora species of conservation importance were recorded within the Assessment Area and its vicinity from previous surveys/ approved EIA studies as listed in **Table 7A3.2** below and their known locations are shown in **Figure 7A.2**.
- 3.1.1.6 Individuals of *Aquilaria sinensis* were recorded in woodland around Scenic Hill and shrubland edge around Tung Chung in the literature. This species is common in lowland woodland and fung shui woods in Hong Kong, however it is threatened by illegal logging and over exploitation due to its use as agarwood⁽⁹⁾. As such it is protected under the *Protection of Endangered Species of Animals and Plants Ordinance in Hong Kong (Cap. 586)* in Hong Kong. It is also listed in the book *Rare and Precious Plants of Hong Kong*, regarded as "Near Threatened" in China, listed as "Vulnerable" in the *China Plant Red Data Book* and under State protection (Category II) in China (AFCD 2003)⁽¹⁰⁾. It is also classified as "Vulnerable" on the IUCN Red List with over exploitation and harvesting as recognized threats within its distribution⁽¹¹⁾.
- 3.1.1.7 *Brainea insignis* was recorded in shrubland around Tung Chung in the literature. It is listed in the book *Rare and Precious Plants of Hong Kong* (AFCD 2003). It is also regarded as "Vulnerable" in China, and under State protection (Category II) (AFCD 2003)⁽¹²⁾. It is a common species with no known conservation threats in Hong Kong, however, outside Hong Kong it is impacted by threats such as habitat destruction and over exploitation for ornamental purposes (AFCD 2003)⁽¹³⁾.
- 3.1.1.8 Individuals of *Canthium dicoccum* were recorded in shrublands around Tung Chung in the literature. It is common in lowland forests (Xing *et al.* 2000)⁽¹⁴⁾ and is not known to be facing conservation threats within Hong Kong. However, it is classified as "Vulnerable" on IUCN Red List based on the assessment of its declined range in Sri Lanka⁽¹⁵⁾.

(9) AFCD (2018) Incense Tree (*Aquilaria sinensis*) Species Action Plan

(10) AFCD (2003) Rare and Precious Plants of Hong Kong. Agriculture, Fisheries and Conservation Department, HKSAR, Hong Kong.

(11) IUCN. (2022). The IUCN Red List of Threatened Species (Version 2022-1). Accessed from <<http://www.iucnredlist.org>>

(12) AFCD (2003) *Op. cit.*

(13) AFCD (2003) *Op. cit.*

(14) Xing, F.W., Ng, S.C., Chau, L.K.C. 2000. Gymnosperms and angiosperms of Hong Kong. *Memoirs of the Hong Kong Natural History Society* 23: 21-136.

(15) IUCN. (2022). The IUCN Red List of Threatened Species (Version 2022-1). Accessed from <<http://www.iucnredlist.org>>

- 3.1.1.9 The orchid species *Eulophia graminea* was recorded in shrubland around Scenic Hill in the literature. It has a restricted distribution in Hong Kong (Xing *et al.* 2000)⁽¹⁶⁾. It is also protected under *Forestry Regulations (Cap. 96A)* and *Protection of Endangered Species of Animals and Plants Ordinance in Hong Kong (Cap. 586)* in Hong Kong.
- 3.1.1.10 *Rhododendron spp.* was recorded along a vehicular road around Tung Chung in the literature. While protected under the *Forestry Regulations (Cap. 96A)*, the recorded individual is a cultivated individual and this species is also known to be commonly cultivated in Hong Kong for ornamental purposes.

(16) Xing *et al.* 2000. *Op. cit.*

Table 7A3.2 Flora of Conservation Importance Recorded from Previous Studies

Common Name	Scientific Name	Chinese Name	Conservation Status	Recorded Habitat	Previous Studies
Incense Tree	<i>Aquilaria sinensis</i>	土沉香	Protected under Cap. 586, Status in China as "Near Threatened" (AFCD 2003), listed as "Vulnerable" in China Plant Red Data Book, under State protection (Category II) in China (AFCD 2003), IUCN: VU	Woodland, Developed Area	EIA-277/2021, EIA-233/2015,
Cycad-fern	<i>Brainea insignis</i>	蘇鐵蕨	Regarded as "Vulnerable" in China, and under State protection (Category II) (AFCD 2003)	Shrubland	EIA-277/2021
Butulang Canthium	<i>Canthium dicoccum</i>	魚骨木	IUCN: VU	Shrubland, Developed Area	EIA-277/2021
Pale Purple Eulophia	<i>Eulophia graminea</i>	美冠蘭	Protected under Cap. 96, Cap. 586	Shrubland	EIA-233/2014
-	<i>Rhododendron spp.</i>	杜鵑花	Protected under Cap. 96	Developed Area	EIA-233/2014

Note:

Conservation Status:

- AFCD (2003) Rare and Precious Plants of Hong Kong. Agriculture, Fisheries and Conservation Department, HKSAR, Hong Kong.
- Cap. 96: Forestry Regulations, the subsidiary legislation of Forests and Countryside Ordinance (Cap. 96)
- Cap. 586: Protection of Endangered Species of Animals and Plants Ordinance
- IUCN – International Union for Conservation of Nature Red List of Threatened Species (2017). VU = Vulnerable
- Xing, F.W., Ng, S.C., Chau, L.K.C. 2000. Gymnosperms and angiosperms of Hong Kong. Memoirs of the Hong Kong Natural History Society 23: 21-136

Terrestrial Mammal

3.1.1.11 Based on the reviewed literature, no mammal species of conservation importance was recorded within the Assessment Area and its vicinity from previous surveys/ approved EIA studies.

Avifauna

3.1.1.12 Eight avifauna species of conservation importance were recorded within the Assessment Area and its vicinity from previous surveys/ approved EIA studies as listed in **Table 7A3.3** below and their known locations are shown in **Figure 7A.2**.

3.1.1.13 Ardeids such as Grey Heron *Ardea cinerea*, Great Egret *Ardea alba*, Little Egret *Egretta garzetta* and Pacific Reef Heron *Egretta sacra* were recorded along the shoreline of Airport Island, no active egrettries/roosting sites were recorded within the assessment area according to literature. They are considered to be common residents and/or migrants in Hong Kong⁽¹⁷⁾.

3.1.1.14 Black Kite *Milvus migrans* was recorded along the shoreline of Airport Island in the literature. It is protected under the *Protection of Endangered Species of Animals and Plants Ordinance in Hong Kong (Cap. 586)* in Hong Kong. It is also listed under Appendix II of China State Major Protection Status and CITES with breeding/roosting sites listed as “Regional Concern” in Fellowes *et al.* (2002)⁽¹⁸⁾. However, it is a common resident and winter visitor that is widely distributed in Hong Kong⁽¹⁹⁾.

3.1.1.15 Common Kestrel *Falco tinnunculus* was recorded in shrubland around Scenic Hill in the literature. It is protected under the *Protection of Endangered Species of Animals and Plants Ordinance in Hong Kong (Cap. 586)* in Hong Kong. It is also listed under Appendix II of China State Major Protection Status and CITES. However, it is a common autumn migrant and winter visitor that is widely distributed in Hong Kong⁽²⁰⁾.

3.1.1.16 Pacific Swift *Apus pacificus* was recorded in shrubland around Scenic Hill in the literature. Its breeding/roosting sites are listed as “Local Concern” in Fellowes *et al.* (2002)⁽²¹⁾. It is an uncommon spring migrant and summer visitor in Hong Kong⁽²²⁾.

3.1.1.17 White-throated Kingfisher *Halcyon smyrnensis* was recorded along the shoreline of Chek Lap Kok in the literature. Its breeding/roosting sites are listed as “Local Concern”

(17) Distribution as per AFCD database. Available at <https://bih.gov.hk/en/home/index.html>

(18) Fellowes, J. R., Lau, M. W. N., Dudgeon, D., Reels, G. T., Ades, G. W. J., Carey, G. J., Chan, B. P. L., Kendrick, R. C., Lee, K. S., Leven, M. R., Wilson, K. D. P. and Yu, Y. T. 2002. Wild animals to watch: Terrestrial and freshwater fauna of conservation concern in Hong Kong. *Memoirs of the Hong Kong Natural History Society* 25:123-159.

(19) Distribution as per AFCD database. Available at <https://bih.gov.hk/en/home/index.html>

(20) Distribution as per AFCD database. Available at <https://bih.gov.hk/en/home/index.html>

(21) Fellowes *et al.* 2002 *Op. cit.*

(22) Distribution as per AFCD database. Available at <https://bih.gov.hk/en/home/index.html>

in Fellowes *et al.* (2002)⁽²³⁾. However, it is a common resident that is widely distributed along coastal areas throughout Hong Kong⁽²⁴⁾.

Table 7A3.3 Avifauna Species of Conservation Importance Recorded from Previous Studies

Common Name	Scientific Name	Chinese Name	Conservation Status	Recorded Habitat	Previous Studies
Grey Heron	<i>Ardea cinerea</i>	蒼鷺	Fellowes: PRC	Sea	EIA-233/2014
Great Egret	<i>Ardea alba</i>	大白鷺	Fellowes: PRC (RC)	Sea	Agreement No. MW 01/2003
Little Egret	<i>Egretta garzetta</i>	小白鷺	Fellowes: PRC (RC)	Sea	Agreement No. MW 01/2003
Pacific Reef Heron	<i>Egretta sacra</i>	岩鷺	Fellowes: (LC), CSMPS (II)	Sea	Agreement No. MW 01/2003
Black Kite	<i>Milvus migrans</i>	黑鳶	Cap. 586, Fellowes: (RC), CSMPS (II), CITES (II)	Sea	EIA-233/2014
Common Kestrel	<i>Falco tinnunculus</i>	紅隼	Cap. 586, CSMPS (II), CITES (II)	Shrubland	EIA-233/2014
Pacific Swift	<i>Apus pacificus</i>	白腰雨燕	Fellowes: (LC)	Shrubland	Agreement No. MW 01/2003
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	白胸翡翠	Fellowes: (LC)	Sea	Agreement No. MW 01/2003

Note:

Conservation Status:

- Cap. 586: Protection of Endangered Species of Animals and Plants Ordinance
- Fellowes – Fellowes *et al.* (2002): LC = Local Concern, PRC = Potential Regional Concern, RC = Regional Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
- CSMPS– China State Major Protection Status: Appendix (I) or Appendix (II)
- CITES– Under Appendix (I) or Appendix (II) of Convention on International Trade in Endangered Species of Wild Fauna

(23) Fellowes *et al.* 2002 *Op. cit.*

(24) Distribution as per AFCD database. Available at <https://bih.gov.hk/en/home/index.html>

Herpetofauna

3.1.1.18 Two herpetofauna species of conservation importance, Romer's Tree Frog and Chinese Bullfrog, were recorded within the Assessment Area and its vicinity from previous surveys/ approved EIA studies as listed in **Table 7A3.4** and their known locations are shown in **Figure 7A.3**.

3.1.1.19 Romer's Tree Frog *Liuixalus romeri* is a species endemic to Hong Kong first discovered in 1952 on Lamma Island (Karsen *et al.* 1986). Individuals were recorded in woodland around Scenic Hill in the literature, which are believed to be remnants of the original population in Chek Lap Kok⁽²⁵⁾. The latest available report regarding the Romer's Tree Frog on Scenic Hill (survey conducted between May 2014 – Apr 2015) suggested that there were fewer adult frogs, tadpoles and eggs on Scenic Hill in comparison with the 1992 survey before the construction of the Airport⁽²⁶⁾, with a total of six breeding sites recorded within the vicinity of Scenic Hill as shown in **Figure 7A.3**. While originally known to have a limited distribution in Chek Lap Kok, Lantau, Lamma and Po Toi Island, it has been bred in captivity and subsequently released in select locations in New Territories and Hong Kong Island due to potential impacts related to Airport Development at Chek Lap Kok during the 1990s with stable populations successfully established at the released sites since then. This species lives on the forest floor and has a high preference for slow-flowing or stagnant waters shaded by surrounding canopy⁽²⁷⁾. Man-made structures and containers that hold water among their habitat range can also act as viable breeding sites as observed in prior field investigations (Fung 2015)⁽²⁸⁾. The diet of Romer's Tree Frog consists of small forest litter invertebrates (Lau 1998)⁽²⁹⁾. The species is protected under the *Wild Animals Protection Ordinance in Hong Kong (Cap. 170)* in Hong Kong. It is also listed as "Potential Global Concern" in Fellowes *et al.* (2002)⁽³⁰⁾, "Vulnerable" in the Red List of China's Vertebrate (2016) and "Endangered" in the IUCN Red List with habitat degradation as recognized threats within its distribution⁽³¹⁾.

3.1.1.20 Chinese Bullfrog *Hoplobatrachus rugulosus* was recorded near developed area around Scenic Hill in past literature. It is widely distributed in Hong Kong⁽³²⁾ and its main habitats include cultivated fields, ponds, streams and marshes⁽³³⁾. The species is protected under the *Wild Animals Protection Ordinance in Hong Kong (Cap. 170)*

(25) Fung (2015) Romer's Tree Frog on Scenic Hill, Chek Lap Kok – A Dissertation Submitted for the Master of Science in Environmental Management – The University of Hong Kong

(26) Fung (2015) *Op. cit.*

(27) Lau, W.N.M. 1998. Habitat use by Hong Kong amphibians, with special reference to the ecology and conservation of *Philautus romeri*. Unpublished thesis. The University of Hong Kong. 333pp.

(28) Chan, S.K.-F., Cheung, K.-S., Ho, C.-Y., Lam, F.-N., Tang, W.-S., Lau, M.W.- N. & Bogadek, A. (2005) A Field Guide to the Amphibians of Hong Kong. Friends of Country Parks and Cosmos Books, Hong Kong.

(29) Fung (2015) *Op. cit.*

(30) Fellowes *et al.* 2002 *Op. cit.*

(31) IUCN. (2022). The IUCN Red List of Threatened Species (Version 2022-1). Accessed from <<http://www.iucnredlist.org>>

(32) Distribution as per AFCD database. Available at <https://bih.gov.hk/en/home/index.html>

(33) Chan *et al.* (2005) *Op. cit.*

in Hong Kong. It is also listed as “Potential Regional Concern” in Fellowes *et al.* (2002)⁽³⁴⁾, “Endangered” in the Red List of China’s Vertebrate (2016)⁽³⁵⁾. The main threats that the species is facing include the genetic pollution of local populations by individuals from wet markets that are introduced to the wild through mercy release.

Table 7A3.4 Herpetofauna Species of Conservation Importance Recorded from Previous Studies

Common Name	Scientific Name	Chinese Name	Conservation Status	Recorded Habitat	Previous Studies
Romer's Tree Frog	<i>Liuixalus romeri</i>	盧氏小樹蛙	Cap.170, Fellowes: PGC, IUCN: EN, RLCV(VU)	Woodland, Waterco	EIA-173/2009, EIA-172/2009
Chinese Bullfrog	<i>Hoplobatrachus rugulosus</i>	虎紋蛙	Cap.170, Fellowes: PRC, RLCV(EN)	Woodland	EIA-173/2009, EIA-172/2009

Note:

Conservation Status:

- a. Cap. 170: Protected under Wild Animals Protection Ordinance
- b. Fellowes – Fellowes et al. (2002): PGC = Potential Global Concern, PRC = Potential Regional Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
- c. RLCV – Red List of China’s Vertebrate (2016): VU = Vulnerable, EN = Endangered
- d. IUCN – International Union for Conservation of Nature Red List of Threatened Species (2017). EN = Endangered

Butterfly and Odonate

3.1.1.21 Two butterfly species of conservation importance, Plain Palm Dart and Danaid Egg-fly, were recorded within the Assessment Area and its vicinity from previous surveys/ approved EIA studies as listed in **Table 7A3.5** and their known locations are shown in **Figure 7A.2**.

3.1.1.22 Plain Palm Dart was recorded in shrubland around Tung Chung in the literature. It is considered to be very rare according to previous assessment by AFCD⁽³⁶⁾ with a restricted distribution confined to Ngong Ping⁽³⁷⁾.

(34) Fellowes, J. R., Lau, M. W. N., Dudgeon, D., Reels, G. T., Ades, G. W. J., Carey, G. J., Chan, B. P. L., Kendrick, R. C., Lee, K. S., Leven, M. R., Wilson, K. D. P. and Yu, Y. T. 2002. Wild animals to watch: Terrestrial and freshwater fauna of conservation concern in Hong Kong. *Memoirs of the Hong Kong Natural History Society* 25:123-159.

(35) IUCN. (2022). The IUCN Red List of Threatened Species (Version 2022-1). Accessed from <<http://www.iucnredlist.org>>

(36) Chan, A., Cheung, J., Sze, P., Wong, A., Wong, E. and Yau, E. 2011. A Review of the Local Restrictedness of Hong Kong Butterflies. *Hong Kong Biodiversity* 21: 1-12

(37) Distribution as per AFCD database. Available at <https://bih.gov.hk/en/home/index.html>

3.1.1.23 Danaid Egg-fly was recorded in shrubland around Scenic Hill in the literature. It is considered to be uncommon according to previous assessment by AFCD⁽³⁸⁾ and its breeding/roosting sites are listed as “Local Concern” in Fellowes *et al.* (2002)⁽³⁹⁾. Male individuals are well known for its hill-topping behavior and has a wide distribution present in multiple localities in New Territories and Hong Kong Island⁽⁴⁰⁾.

Table 7A3.5 Butterfly Species of Conservation Importance Recorded from Previous Studies

Common Name	Scientific Name	Chinese Name	Conservation Status	Distribution in Hong Kong (a)	Recorded Habitat	Previous Studies
Plain Palm Dart	<i>Cephrenes acalle</i>	金斑弄蝶	-	Very Rare	Shrubland	EIA-277/2021
Danaid Egg-fly	<i>Hypolimnas misippus</i>	金斑蛺蝶	Fellowes: LC	Uncommon	Shrubland	Agreement No. MW 01/2003

Note:

- Distribution in Hong Kong refers to AFCD assessment: Available at Chan, A., Cheung, J., Sze, P., Wong, A., Wong, E. and Yau, E. 2011. A Review of the Local Restrictedness of Hong Kong Butterflies. Hong Kong Biodiversity 21: 1-12

Conservation Status:

- Cap. 170: Protected under Wild Animals Protection Ordinance
- Fellowes – Fellowes *et al.* (2002): LC = Local Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.

Aquatic Fauna

3.1.1.24 Based on the reviewed literature, no aquatic fauna species of conservation importance was recorded within the Assessment Area and its vicinity from previous surveys/ approved EIA studies.

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- (38) Chan, A., Cheung, J., Sze, P., Wong, A., Wong, E. and Yau, E. 2011. A Review of the Local Restrictedness of Hong Kong Butterflies. Hong Kong Biodiversity 21: 1-12
 - (39) Fellowes, J. R., Lau, M. W. N., Dudgeon, D., Reels, G. T., Ades, G. W. J., Carey, G. J., Chan, B. P. L., Kendrick, R. C., Lee, K. S., Leven, M. R., Wilson, K. D. P. and Yu, Y. T. 2002. Wild animals to watch: Terrestrial and freshwater fauna of conservation concern in Hong Kong. *Memoirs of the Hong Kong Natural History Society* 25:123-159.
 - (40) Distribution as per AFCD database. Available at <https://bih.gov.hk/en/home/index.html>

4 Baseline Conditions of Marine Ecological Resources of the Assessment Area

Information Reviewed

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

- EIA Report for Intermodal Transfer Terminal - Bonded Vehicular Bridge and Associated Roads (Register No.: AEIAR-216/2018);
- EIA Report for Tung Chung New Town Extension (Register No.: AEIAR-196/2016);
- EIA Report for Expansion of Hong Kong International Airport into a Three-Runway System (Register No.: AEIAR-185/2014);
- EIA Report for Tuen Mun - Chek Lap Kok Link (Register No.: AEIAR-146/2009);
- EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facilities (Register No.: AEIAR-145/2009);
- EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road (Register No.: AEIAR-144/2009);
- Consultancy Study on Marine Benthic Communities in Hong Kong (Agreement No. CE 69/2000);
- Field guides and published studies/literature for marine habitats and fauna of Hong Kong;
- AFCD Marine Mammal Monitoring Reports; and
- Available Published Scientific Literatures.

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

Recognised Sites of Conservation Importance

4.1.1.3 Recognised sites of conservation importance within the Assessment Area include Marine Parks and Sites of Special Scientific Interest (SSSI) (**Figure 7A.4**).

Existing and Proposed Marine Parks

4.1.1.4 The existing and proposed marine parks in the vicinity of the Project include the Brothers Marine Park (BMP), and the proposed North Lantau Marine Park (NLMP). Details of these marine parks are summarised in **Table 7A4.1** and locations of these marine parks are provided in **Figure 7A.4**.

Sites of Special Scientific Interest (SSSIs)

4.1.1.5 SSSIs are terrestrial or marine sites recognised with special biological and/or geological importance by Hong Kong Government. SSSIs within the Assessment Area

with marine ecological interest include Tai Ho Stream SSSI and San Tau Beach SSSI. The sites are considered far away from the Project site (>1km) and are therefore not further discussed below. Locations of the SSSIs are provided in **Figure 7A.4**.

Table 7A4.1 Existing and Proposed Marine Parks in the Assessment Area

Marine Park	Location	Shortest sea distance to the Project site (km)		Date of Designation	Area (ha)	Conservation Purpose
		Marine Facilities	Marine Viaduct			
Existing Marine Park						
The Brothers Marine Park ⁽¹⁾	North Lantau waters	2.5	3.9	30 th December 2016	~970	<ul style="list-style-type: none"> BMP is considered as an important habitat of Chinese white dolphin (<i>Sousa chinensis</i>). The waters around BMP are identified as the feeding grounds of Chinese White Dolphin and the potential spawning grounds of some commercially important fish species.
Proposed Marine Park						
North Lantau Marine Park ⁽²⁾	North Lantau waters	0.9	4.6	2024 anticipated	~2,400	<ul style="list-style-type: none"> NLMP aims to connect the two existing marine parks (Sha Chau and Lung Kwu Chau Marine Park (SCLKCMP) and BMP), the existing and proposed Hong Kong International Airport Approach Areas (HKIAAAs), to form an interlinked water body in north Lantau waters that will help conserving the marine ecological and fisheries resources. The proposed NLMP also connects the Pearl River Estuary Chinese White Dolphin National Nature Reserve which is at the immediately west of Hong Kong waters to facilitate movement of Chinese White Dolphins among key habitats.

Note:

[1] AFCD (2022) The Brothers Marine Park

[2] AFCD (2020) Working Paper: WP/CMPB/9/2020 Country and Marine Parks Board – Proposed Marine Park for the Expansion of Hong Kong International Airport into a Three-Runway System

Intertidal Hard Bottom Habitats

4.1.1.6 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 April to August 2022, the intertidal hard bottom habitats within and in the vicinity of the Project site consist primarily of artificial hard bottom shores (**Figure 7A.4**), including piers, vertical and sloping seawalls. Literatures have reported that these artificial hard bottom shores consist of common and widespread organisms that are present in other artificial intertidal habitats of Hong Kong, such as algae (*Hildenbrandia rubra* and *Ulva* spp), mobile organisms (*Echinolittorina radiata* and *Monodonta labio*) and sessile organisms (*Amphibalanus amphitrite*, *Cellana grata* and *Saccostrea cucullata*) that are commonly recorded in the vicinity of the Project site⁽⁴¹⁾⁽⁴²⁾⁽⁴³⁾. Other intertidal hard bottom habitats within the Assessment Area mainly consist of natural rocky shores or sloping seawalls, which are also dominated by common and widespread organisms found in the North Western WCZ (NWWCZ), such as shore crabs (*Hemigrapsus sanguineus*, *Metopograpsus* sp.), gastropods (*Littoraria articulata*, *Nerite* spp. and *Reishia clavigera*) and sessile organisms (*Saccostrea cucullata* and *Mytilisepta virgata*)⁽⁴⁴⁾⁽⁴⁵⁾⁽⁴⁶⁾⁽⁴⁷⁾⁽⁴⁸⁾⁽⁴⁹⁾. Location of intertidal surveys conducted from previous studies can be referred to **Figure 7A.5**

Intertidal Soft Bottom Habitats

4.1.1.7 Intertidal soft shores of Hong Kong are represented by mudflats and the associated habitats, including habitats of horseshoe crabs and seagrasses. Location of these habitats are shown in **Figure 7A.4**.

Mangrove and Mudflat

4.1.1.8 Mangroves are a group of trees and shrubs which can be found in estuarine soft shore. They can be found in different areas in Hong Kong, including Sai Kung, Northeast New Territories, Tolo Harbour, Deep Bay, Lantau Island and Hong Kong Island⁽⁵⁰⁾. Mangroves are important habitats, breeding sites, nursery area and

(41) Ecosystems Limited (2009) Report for Ecological Survey Results. Hong Kong-Zhuhai-Macao Bridge, Hong Kong Boundary Crossing Facilities – Investigation (Agreement N. CE 14/2008(CE))

(42) Mott MacDonald (2014) EIA Report for Expansion of Hong Kong International Airport into a Three-Runway System (Register No.: AEIAR-185/2014)

(43) AECOM (2018) EIA Report for Intermodal Transfer Terminal - Bonded Vehicular Bridge and Associated Roads (Register No.: AEIAR-216/2018)

(44) Asia Ecological Consultants Ltd (2009) Hong Kong - Zhuhai-Macao Bridge Hong Kong Link Road - Verification Survey for Ecological Baseline Final Report

(45) AECOM (2009a) Hong Kong – Zhuhai – Macao Bridge Hong Kong Link Road EIA - Final Supplementary Ecological Survey Report (Quotation Reference: Hy(S)Q/0445/2008)

(46) AECOM (2009b) EIA Report for Tuen Mun Chek Lap Kok Link (Register No.: AEIAR-146/2009)

(47) Ecosystems Limited (2009) *Op. cit.*

(48) Mott MacDonald (2014) *Op. cit.*

(49) ARUP (2015) EIA Report for Tung Chung New Town Extension (Register No.: AEIAR-196/2016)

(50) AFCD (2020) Mangroves in Hong Kong.

feeding grounds to various organisms. Mangroves that are located in the vicinity of the Project site include those found in Tung Chung Bay, San Tau and Tai Ho Wan. From previous EIA studies, some true mangrove species that are commonly found in San Tau include *Aegiceras corniculatum*, *Bruguiera gymnorhiza* and *Kandelia obovata*. Tai Ho Wan was found to consist of most true mangrove species in Hong Kong, except for *Lumnitzera racemosa* and the extremely restricted *Heritiera littoralis* (*ibid.*)⁽⁵¹⁾. Examples of typical soft shore fauna that can be found at these mangrove habitats include gastropods, such as *Pirenella cingulata*, *Pirenella alata*, *Batillaria multiformis* and *Batillaria zonalis*⁽⁵²⁾⁽⁵³⁾⁽⁵⁴⁾⁽⁵⁵⁾⁽⁵⁶⁾. Locations of intertidal surveys conducted from previous studies can be referred to **Figure 7A.5**.

- 4.1.1.9 The nearest mangrove stand to the marine viaduct area of the Project site is located at Tung Chung Bay and San Tau of about 1.4km away, while other mangrove stands are located >3km away.

Horseshoe Crab

- 4.1.1.10 Two horseshoe crab species, *Tachypleus tridentatus* and *Carcinoscorpius rotundicauda*, been recorded in AFCD surveys around Hong Kong waters⁽⁵⁷⁾. Confirmed nursery grounds of horseshoe crabs around the Lantau area include San Tau, Tung Chung Bay, Tai Ho Wan, Hau Hok Wan, Tai O, Yi O, Sham Wat Wan, Sha Lo Wan, and northern and western waters of Chek Lap Kok⁽⁵⁸⁾⁽⁵⁹⁾⁽⁶⁰⁾⁽⁶¹⁾⁽⁶²⁾⁽⁶³⁾. Both *Tachypleus tridentatus* and *Carcinoscorpius rotundicauda* are recorded on key intertidal sandy shores or mudflats in the vicinity of the Project site, including Tung Chung Bay, San Tau and Tai Ho Wan. The nearest horseshoe crab population at Tung Chung Bay is about 1.4km from the marine viaduct area of the Project site. Locations of horseshoe crab records and intertidal survey locations from previous studies can be referred to **Figures 7A.4** and **Figure 7A.5** respectively.

(51) ARUP (2015) *Op. cit.*

(52) Asia Ecological Consultants Ltd (2009) *Op. cit.*

(53) Mott MacDonald (2014) *Op. cit.*

(54) ARUP (2015) *Op. cit.*

(55) ARUP (2021) EIA Report for Tung Chung Line Extension (Register No.: AEIAR-235/2022)

(56) AECOM (2009b) *Op. cit.*

(57) A third species of horseshoe crab *Tachypleus gigas* was not recorded in Hong Kong since March 1995 and its local status is uncertain, likely to be locally extinct.

(58) Shin PKS, Li HY, Cheung SG (2009) Horseshoe Crabs in Hong Kong: Current Population Status and Human Exploitation. *Biology and Conservation of Horseshoe Crabs*. Springer US. 347-360.

(59) Morton B, Lee CN (2011) Spatial and temporal distribution of juvenile horseshoe crabs (Arthropoda: Chelicerata) approaching extinction along northwestern shoreline of the New Territories of Hong Kong SAR, China. *Journal of Natural History* 45:227-251.

(60) ARUP (2009a) EIA Report of the Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road. (Register No.: AEIAR-144/2009)

(61) ARUP (2009b) EIA Report of the Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facilities. (Register No.: AEIAR-145/2009)

(62) AECOM (2009b) *Op. cit.*

(63) Mott McDonald (2014) *Op. cit.*

Seagrass

4.1.1.11 Seagrasses are marine flowering plant which can live underwater. Seagrass beds are generally associated with mangroves, which are considered as important habitats provides food, shelters and nursery grounds for marine lives. In Hong Kong, seagrass beds can be found in estuarine soft shores and areas in the vicinity of the Project site, including Tung Chung Bay, San Tau and Tai Ho Wan⁽⁶⁴⁾. Among the five species of seagrass recorded in Hong Kong, *Halophila ovalis*, *Halophila minor* and *Zostera japonica* are recorded in these three areas⁽⁶⁵⁾ ⁽⁶⁶⁾. The nearest seagrass bed at Tung Chung Bay is about 1.4km from the marine viaduct area of the Project site. Locations of the seagrass beds and intertidal survey conducted from previous studies can be referred to **Figures 7A.4** and **Figure 7A.5** respectively.

Subtidal Hard Bottom Assemblages

4.1.1.12 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 corals recorded in Hong Kong waters⁽⁶⁷⁾. The abundance and diversity of corals in Hong Kong generally increase from west to east. It has been suggested that the distribution of corals is primarily controlled by hydrodynamic conditions, in particular salinity level, turbidity and light penetration.

4.1.1.13 The western waters of Hong Kong, including the Deep Bay WCZ, North Western WCZ, North Western Supplementary WCZ, Second Southern Supplementary WCZ and western part of the Southern WCZ (i.e. southern waters of Lantau Island), are greatly influenced by the Pearl River Estuary which reduces salinities, increases turbidity and therefore reduces light penetration. Due to the requirements for coral growth, the cumulative effect of these conditions results in sub-optimal conditions for recruitment and survival of most coral. Corals are therefore much less abundant and less diverse in Hong Kong's western waters than eastern waters. Unlike most hard corals which highly relies on sunlight to survive, gorgonians, soft corals and black corals which do not require light for zooxanthellae photosynthesis, are more widely distributed in western waters.

4.1.1.14 Recent information on the subtidal hard bottom assemblages in the vicinity of the Project site is available in various reports, literature and approved EIA reports. The

(64) AFCD (2020) Seagrasses in Hong Kong website. Available at https://www.afcd.gov.hk/english/conservation/con_wet/con_wet_sea/con_wet_sea.html (Retrieved on 9th August 2022)

(65) Kwok WP, Yang JK, Tong PY, & Lam CP (2005) Distribution of seagrasses in Hong Kong. Hong Kong biodiversity AFCD Newsletter Issue No. 8, 12-14.

(66) Kwok-Leung YIP, & LAI Chuen-Chi P (2006) *Halophila minor* (Hydrocharitaceae), a new record with taxonomic notes of the *Halophila* from the Hong Kong Special Administrative Region, China. Journal of Systematics and Evolution, 44(4), 457.

(67) Chan A, Choi C, McCorry D, Chan K, Lee MW, Put A Jr (2005) Field Guide to Hard Coral of Hong Kong. Friends of the Country Parks

findings are summarised in **Table 7A4.2**. The indicative locations of coral communities are presented in **Figure 7A.6**.

Table 7A4.2 Key Baseline Information on Subtidal Hard Bottom Assemblages in the vicinity of the Project Site

Source	Location	Summary of findings
Asia Ecological Consultants Ltd (2009) ⁽⁶⁸⁾	Natural shores and artificial shores at East of Airport Island	Low abundance and coverage of ahermatypic cup coral <i>Balanophyllia</i> spp. and soft coral <i>Echinomuricea</i> spp. recorded.
AECOM (2009a) ⁽⁶⁹⁾	Natural shores and artificial shores at the east coast of Airport Island	At the east coast of Airport Island, one species of gorgonian <i>Echinomuricea</i> sp. was found on boulder surfaces with low abundance and sparse distribution.
Ecosystem Limited (2009) ⁽⁷⁰⁾	Artificial seawalls at east Airport Island	A small number of sites were recorded with low coverage of ahermatypic cup coral <i>Balanophyllia</i> spp. and soft coral <i>Echinomuricea</i> spp. (<5%).
The Oceanway Corporation Ltd ⁽⁷¹⁾	Tai Mo To and West of Tai Ho Wan	At Tai Mo To, low to moderate abundance of gorgonian (cf. <i>Guaiaigorgia</i> sp.) was recorded but in lower populations levels (<10-30%). Ahermatypic cup coral <i>Paracyathus rotundatus</i> was recorded in low abundance (<5%). On the rocky walls at the west of Tai Ho Wan, gorgonian (cf. <i>Guaiaigorgia</i> sp.) and ahermatypic cup coral <i>Paracyathus rotundatus</i> were recorded with low coverage (<10% and <5% respectively).

(68) Asia Ecological Consultants Ltd (2009) *Op. cit.*

(69) AECOM (2009a) *Op. cit.*

(70) Ecosystems Limited (2009) *Op. cit.*

(71) The Oceanway Corporation Ltd (2009) Marine Ecological Survey Report – The Tuen Mun to Airport Island Link Road

Source	Location	Summary of findings
Mott MacDonald (2014) ⁽⁷²⁾	Tai Mo To, Airport Channel and artificial seawalls of Airport Island and Tung Chung	<p>Low coverage (<1%) of gorgonian <i>Guaiaegorgia</i> sp. and ahermatypic cup coral <i>Balanophyllia</i> sp. were recorded at Tai Mo To.</p> <p>Only sparsely distributed small sized gorgonian <i>Guaiaegorgia</i> sp., were found at seawall of Airport Island. Many of the colonies were observed to have partial mortality.</p> <p>On the seawalls in Tung Chung, gorgonian <i>Guaiaegorgia</i> sp. and ahermatypic cup coral <i>Balanophyllia</i> sp. were recorded with low coverage (< 1%). The gorgonians were all of small sizes and scatterly distributed on boulders. Partial mortality was observed in many colonies. No coral was recorded at the shore at airport channel.</p>
ARUP (2015) ⁽⁷³⁾	Along the natural coastline and artificial seawalls from Tung Chung Bay to the seawall outside Tai Ho Wan	On artificial seawalls, gorgonian <i>Guaiaegorgia</i> sp. and ahermatypic cup coral <i>Balanophyllia</i> sp. were recorded with low coverage (< 1%).
AECOM (2018) ⁽⁷⁴⁾	Artificial seawalls at the east coast of Airport Island	Substrate was mainly artificial seawall and artificial boulders. Low coverage (1-5%) of hard hermatypic coral <i>Oulastrea crispata</i> and soft coral <i>Guaiaegorgia</i> sp. were recorded. The hard coral colonies were in fair to unhealthy conditions, while the soft coral colonies were in unhealthy conditions which exhibited relatively high partial mortality rate ranging from 20% to 70%.

4.1.1.15 In summary, only a few species of gorgonians (*Echinomuricea* spp. and *Guaiaegorgia* sp.) and hard corals (*Balanophyllia* sp. and *Oulastrea crispata*) were recorded in the vicinity of the Project site which were in low abundance and low coverage. All the recorded coral species are common and widespread in the northwestern waters in Hong Kong.

(72) Mott MacDonald (2014) *Op. cit.*

(73) ARUP (2015) *Op. cit.*

(74) AECOM (2018) *Op. cit.*

Subtidal Soft Bottom Assemblages

Epifaunal Assemblages

- 4.1.1.16 Subtidal epifauna are organisms (>1mm 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 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.
- 4.1.1.17 Information on the epifaunal assemblages of the Assessment Area is available from a review of data on fisheries resources collected from demersal trawls conducted as part of the ongoing Environmental Monitoring & Audit (EM&A) of contaminated mud disposal at the East of Sha Chau and South of Brothers Contaminated Mud Pits during 2012 to 2017⁽⁷⁵⁾. This review provides long-term data on epifaunal assemblages around North Lantau waters. These data indicate that epifaunal assemblages at North Lantau waters are dominated by gastropods (e.g. *Turritella terebra*), sea urchins (e.g. *Temnopleurus toreumaticus*) and bivalves (e.g. *Timoclea scabra* and other unidentified juvenile bivalve species). Species recorded were generally common species recorded in Hong Kong waters.
- 4.1.1.18 An EIA study in 2014 for the Expansion of Hong Kong International Airport into a Three-Runway System (3RS EIA) has conducted baseline studies of benthic assemblages in North Lantau waters and reported a diverse assemblage of fish, crustaceans and molluscs in the area. Most fauna recorded were found to be common and widespread in Hong Kong. Fishes with conservation importance, including seahorse (*Hippocampus kuda*), and other fish species (Goatee croaker (*Dendrophysa russelii*), longtooth grouper (*Epinephelus bruneus*) and banded tuna (*Scomberomorus commerson*)) were recorded in the BMP and northern Chek Lap Kok waters. Similarly, seahorse (*Hippocampus kuda*), horseshoe crab (*Carcinoscorpius rotundicauda*) and several marine fishes (including *Aetobatus flagellum*, *Telatrygon zugei*, *Dendrophysa russelii*, *Epinephelus bruneus*, *Ephinephelus coioides*, *Larimichthys crocea*, *Otolithes ruber* and *Scomberomorus commerson*) are recorded in the proposed NLMP area⁽⁷⁶⁾.
- 4.1.1.19 A more recent EIA study in 2021 for the Tung Chung Line Extension has conducted a coastal fish survey at Tung Chung Bay (**Figure 7A.6**), which reported that Shuttles Hoppfish (*Periophthalmus modestus*) was the dominant fish species found in the area and the Blue Mudhopper (*Scartelaos histophorus*) was the only species of conservation importance recorded.

(75) CEDD (2017) Dredging, Management and Capping of Contaminated Sediment Disposal Facility to the South of The Brothers and East of Sha Chau.

(76) Mott MacDonald (2014) *Op. cit.*

4.1.1.20 Previous survey locations of subtidal soft bottom epifaunal assemblages in the vicinity of the Project site are shown in **Figure 7A.7**.

Infaunal Assemblages

4.1.1.21 Subtidal infauna are organisms (>0.5mm in size) living either on or within the surface sediments of the seabed. To provide an indication of the ecological value of the infaunal assemblages within the Assessment Area, territory-wide surveys of Hong Kong subtidal infauna assemblages were conducted in 2001⁽⁷⁷⁾. Findings of the surveys indicated that the benthic assemblages within the Assessment Area mainly consisted of annelid worms, arthropods and molluscs which were typical of Hong Kong waters. There are also several studies covering the Assessment Area^{(78)(79)(80)(81) (82)} which showed similar results. A shrimp species, *Metapenaeus ensis* which is of conservation importance was recorded outside of Siu Ho Wan according to a study⁽⁸³⁾.

4.1.1.22 Previous survey locations of subtidal soft bottom infaunal assemblages in the vicinity of the Project site are shown in **Figure 7A.7**.

Marine Mammals

4.1.1.23 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 sighted 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 the Finless Porpoise (FP) *Neophocaena phocaenoides*⁽⁸⁴⁾. CWDs are mainly distributed in the western waters of Hong Kong while FPs are common in the southern and eastern Hong Kong waters. As the Assessment Area is located in western waters of Hong Kong which is within the habitats utilised by CWDs, the following context focusses on CWD.

4.1.1.24 CWD is a tropical cetacean widely distributed in Pacific Ocean and Indian Ocean. It can be found in coastal marine waters, especially in estuaries⁽⁸⁵⁾. It is protected locally by the *Wild Animals Protection Ordinance (Cap. 170)* and is listed as

(77) CityU Professional Services Limited (2002) Agreement No. CE 69/2000 Consultancy Study on Marine Benthic Communities in Hong Kong, for AFCD.

(78) Asia Ecological Consultant Ltd (2009) *Op. cit.*

(79) AECOM (2009a) *Op. cit.*

(80) AECOM (2009b) *Op. cit.*

(81) AECOM (2018) *Op. cit.*

(82) ARUP (2021) *Op. cit.*

(83) ARUP (2015) *Op. cit.*

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

(85) Hung SK (2008) Habitat Use of Indo-Pacific Humpback Dolphins (*Sousa chinensis*) in Hong Kong. PhD Thesis. The University of Hong Kong

"Vulnerable" in the IUCN Red List of Threatened Species⁽⁸⁶⁾. CWD is also listed in CITES Appendix I (i.e. highest protection), and is listed as "Grade I National Key Protected Species" in China. As such CWD is considered a species of conservation importance, both locally in Hong Kong and regionally in China and across the Asia Pacific.

4.1.1.25 Studies on the distribution, abundance, habitat use, life history and behaviour of CWD within Hong Kong have been undertaken since September 1995. It was estimated that there were around 1,300-1,500 CWDs⁽⁸⁷⁾ in the eastern part of the Pearl River Estuary and Hong Kong waters⁽⁸⁸⁾. Of these individual dolphins, about 368 individuals are thought to include waters within Hong Kong as part of their range⁽⁸⁹⁾.

4.1.1.26 The highest abundance of CWDs in Hong Kong waters are mainly found at West Lantau and Southwest Lantau waters⁽⁹⁰⁾ (**Figure 7A.8**). These areas are considered to be the major habitats for CWDs in Hong Kong, where individuals of dolphins have been consistently sighted throughout the year. Seasonal and spatial variation of abundance of CWD is usually observed. This is thought to be due to the increased input of freshwater from the discharge of the Pearl River Estuary and the subsequent movements of estuarine prey species into Hong Kong from PRC waters⁽⁹¹⁾.

4.1.1.27 According to the long-term marine mammal monitoring conducted by AFCD⁽⁹²⁾, the abundance of CWD in Hong Kong waters, estimated using sighting effort data collected in four survey areas (Northeast, Northwest, West and Southwest Lantau), in 2016 to 2020 were 47, 47, 32, 52 and 37 dolphins respectively, and in most recent report, 40 dolphins were recorded from the four survey areas in 2021. The data indicated that the abundance of dolphin decreased in recent years compared to previous estimates of 188 dolphins recorded in 2003⁽⁹³⁾. A population trend with annual decline rate of ~2.5% for the CWD population in the Pearl River Estuary including Hong Kong has been reported⁽⁹⁴⁾. Survey results from 2013-2021 showed that the abundance of CWD has been decreasing in North Lantau waters over the years, and lower dolphin densities were recorded at waters in Northeast Lantau

(86) Jefferson TA, Smith BD, Braulik GT & Perrin W (2017) *Sousa chinensis* (errata version published in 2018). The IUCN Red List of Threatened Species 2017: e.T82031425A123794774.

(87) The estimates do not include the dolphins found in the western estuary, near Macau and Zhuhai. Including the western estuary, there are at least 2500 dolphins inhabiting the Pearl River Estuary.

(88) AFCD (2020) Chinese White Dolphin. Abundance.

(89) Chan SCY, Karczmarski L (2017) Indo-Pacific humpback dolphins (*Sousa chinensis*) in Hong Kong: Modelling demographic parameters with mark-recapture techniques. PLoS ONE 12(3): e0174029.

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

(91) Barros NB, Jefferson TA, Parsons ECM (2004) Feeding habits of Indo-Pacific humpback dolphins (*Sousa chinensis*) stranded in Hong Kong. Aquatic Mammals (Special Issue) 30: 179-188

(92) AFCD (2021) Chinese White Dolphin – Marine Mammal Monitoring Reports.

(93) Combined abundance estimates from three survey areas (West, Northwest and Northeast Lantau)

(94) Huang SL, Karczmarski L, Chen J, Zhou R, Lin W, Zhang H, et al. (2012) Demography and population trends of the largest population of Indo-Pacific humpback dolphins. Biol. Conserv. 147, 234–242.

(NEL). A few dolphin sightings were recorded at around BMP during 2013-2015 and 2018, while no sightings were recorded during 2016-2017 and 2019-2021⁽⁹⁵⁾ (**Figure 7A.9**).

- 4.1.1.28 Apart from AFCD's study, long-term CWD monitoring has been conducted for major projects in North Lantau, including the construction of the Three-Runway System (3RS), Hong Kong-Zhuhai-Macao-Bridge (HKMB) (including Tuen Mun - Chek Lap Kok Link (TM-CLKL), the Hong Kong Boundary Crossing Facilities (HKBCF) and the Hong Kong Link Road (HKLR) projects). The 3RS project has been conducting CWD monitoring with boat-based and land-based surveys since the construction works commenced in 2016⁽⁹⁶⁾. Survey results showed that NEL (including the BMP) has very low dolphin usage, with only 2 vessel-based dolphin sightings of a total 2 dolphin individuals recorded in 2018 during the whole monitoring period, while most dolphin sightings were recorded at NWL around SCLKCMP and also West Lantau. Number of dolphin sightings have peaked at 2018 (i.e. 52 sightings) and decreased gradually with 27, 7 and 24 sightings recorded during 2019, 2020 and 2021 respectively in NWL. Over the years, dolphin abundance which is generally distributed across North Lantau waters has shifted towards NWL. Dolphin monitoring conducted for the construction of HZMB since 2012, including the also showed similar findings⁽⁹⁷⁾. Dolphins in North Lantau waters were mainly observed in NWL waters.
- 4.1.1.29 Passive acoustic monitoring (PAM) has also been conducted during the long-term AFCD study⁽⁹⁸⁾, which showed that detections have been recorded at Tai Mo To within BMP for at least 10 DPMs (a Detection Positive Minute is any one minute period where at least one click train was detected) were recorded per day for 10 days during 2017-2020, but none in the first half of 2021). More night-time detections were found compared to day-time detections within BMP. PAM data analysis was conducted for the deployment of 12 C-POD units placed around Lantau waters during 2018-2019⁽⁹⁹⁾. Two of the units were located within Tai Mo To of BMP and Sham Shui Kok and these two locations had the least detection amongst other locations in NWL and West Lantau. More detections were recorded at night-time.
- 4.1.1.30 Overall, CWD sightings recorded in North Lantau waters have been decreasing during 2013-2021, with higher densities recorded mainly around SCLKCMP in NWL waters, while very low/no dolphin sightings were found in NEL waters in recent years. Areas with higher CWD densities, such as SCLKCMP are considered to be far away from the Project site. In addition, the proposed marine facilities of the Project site are located within the channel east of Airport Island where the SkyPier is located.

(95) AFCD (2022) Monitoring of Marine Mammals in Hong Kong Waters (2021 -2022). *Op. cit.*

(96) Mott MacDonald (2016-2022) Expansion of Hong Kong International Airport into a Three-Runway System – EM&A Reports and EM&A Data.

(97) EM&A Reports of HZMB Hong Kong Link Road, Hong Kong Boundary Crossing Facilities and Tuen Mun-Chek Lap Kok Link.

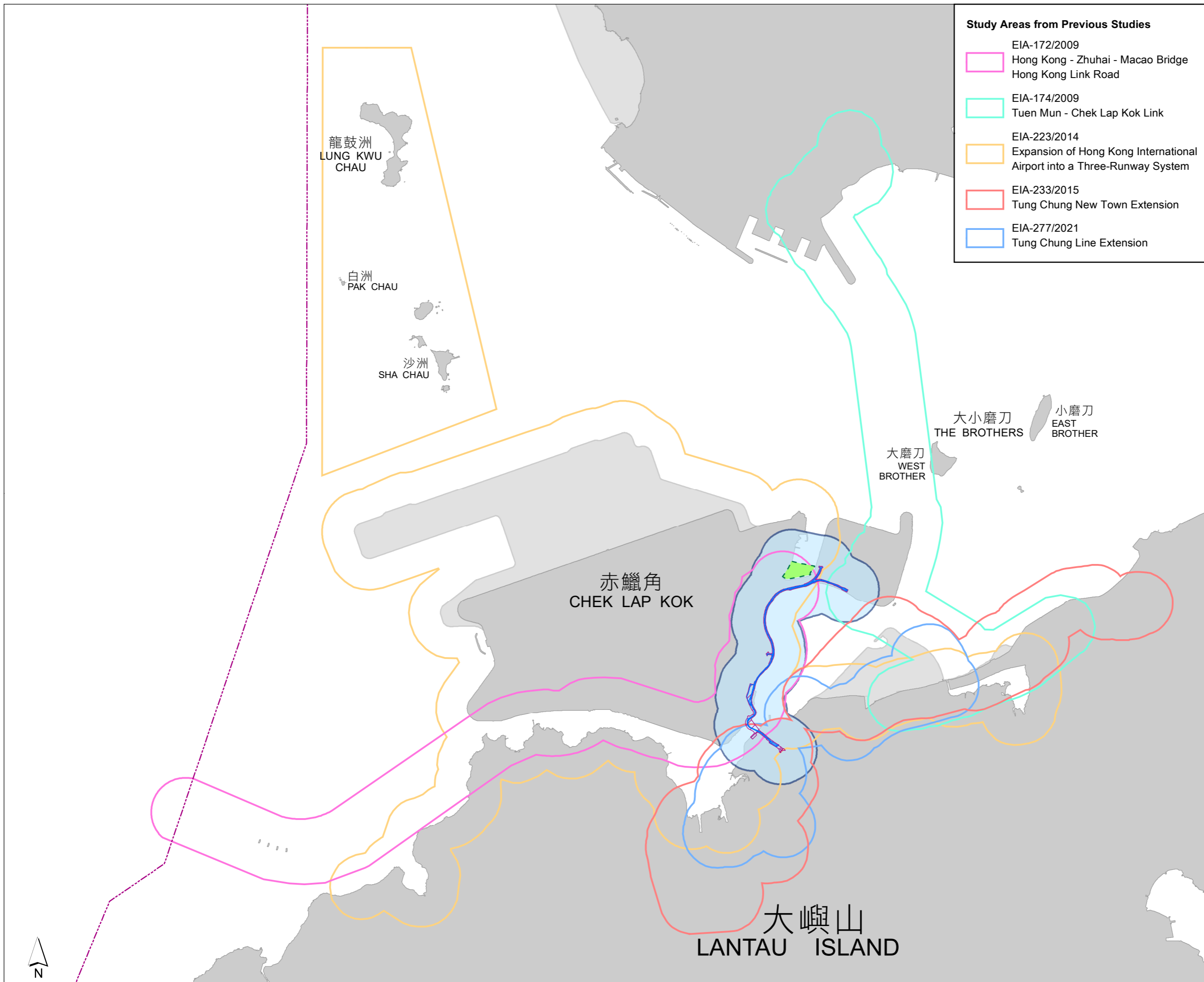
(98) AFCD (2022) Monitoring of Marine Mammals in Hong Kong Waters (2021 -2022). *Op. cit.*

(99) Schormans E.K. (2021) Temporal and spatial characterization of acoustic activity patterns of Indo-Pacific humpback dolphins (*Sousa chinensis*) in Hong Kong waters. Saint Mary's University.

With a fair amount of marine traffic present near the pier, the likelihood of the area near the proposed marine facilities as important habitat for CWDs is low. The location of proposed marine viaduct is also located near the Tung Chung pier with busy marine traffic and the location is at a far distance from the CWD habitats around BMP and SCLKCMP. With the above considerations, areas within and in the vicinity of the Project site are therefore not considered as unique and important habitats for CWDs.

- 4.1.1.31 The data from the long-term marine mammal monitoring conducted by AFCD are considered to be comprehensive and adequate for this Project. No further land-based or boat-based baseline survey for marine mammals is considered necessary. However, to supplement night-time activity of CWDs around the Project site, PAM survey was conducted around the proposed marine facilities to provide additional baseline information of the dolphin activity.

FIGURES



Study Areas from Previous Studies

- EIA-172/2009
Hong Kong - Zhuhai - Macao Bridge
Hong Kong Link Road
- EIA-174/2009
Tuen Mun - Chek Lap Kok Link
- EIA-223/2014
Expansion of Hong Kong International
Airport into a Three-Runway System
- EIA-233/2015
Tung Chung New Town Extension
- EIA-277/2021
Tung Chung Line Extension

Legend

- Boundary of HKSAR
- Tentative Alignment of
Airport Tung Chung Link
- Construction Site Boundary
- Proposed Marine Facilities
- 500m Assessment Area
- Potential / Planned
Reclamation

Rev	Date	Descriptions	Check
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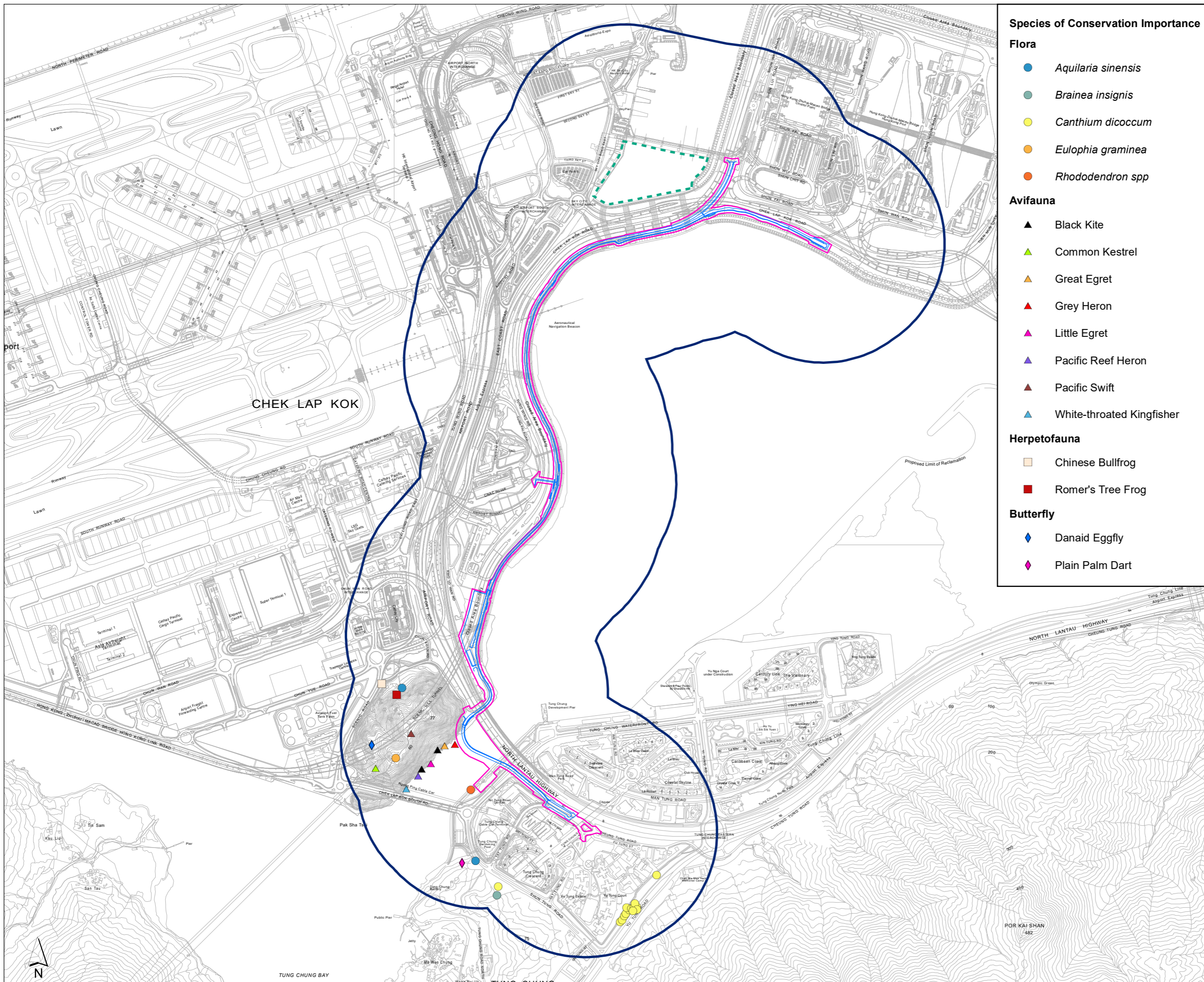
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Checkers		
Authorized Representative		

Title
Previous Study Areas of Relevant EIAs

Drawing No.
Figure 7A.1

Status	Scale 1:55,000	Date 10/5/2023	Rev @A3
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- Species of Conservation Importance**
- Flora**
- *Aquilaria sinensis*
 - *Brainea insignis*
 - *Canthium dicoccum*
 - *Eulophia graminea*
 - *Rhododendron spp*
- Avifauna**
- ▲ Black Kite
 - ▲ Common Kestrel
 - ▲ Great Egret
 - ▲ Grey Heron
 - ▲ Little Egret
 - ▲ Pacific Reef Heron
 - ▲ Pacific Swift
 - ▲ White-throated Kingfisher
- Herpetofauna**
- Chinese Bullfrog
 - Romer's Tree Frog
- Butterfly**
- ◆ Danaid Eggfly
 - ◆ Plain Palm Dart

- Legend**
- Tentative Alignment of Airport Tung Chung Link
 - Construction Site Boundary
 - Proposed Marine Facilities
 - 500m Assessment Area

Rev	Date	Descriptions	Check
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Title
Species of Conservation Importance from Literature Review within the Study Area

Drawing No.
Figure 7A.2

Status	Scale	Date: 10/5/2023	Rev
	1:15,000 @A3		



- Legend**
- Breeding Area of Romer's Tree Frog
 - Tentative Alignment of Airport Tung Chung Link
 - Construction Site Boundary
 - Proposed Marine Facilities
 - 500m Assessment

Rev	Date	Descriptions	Check



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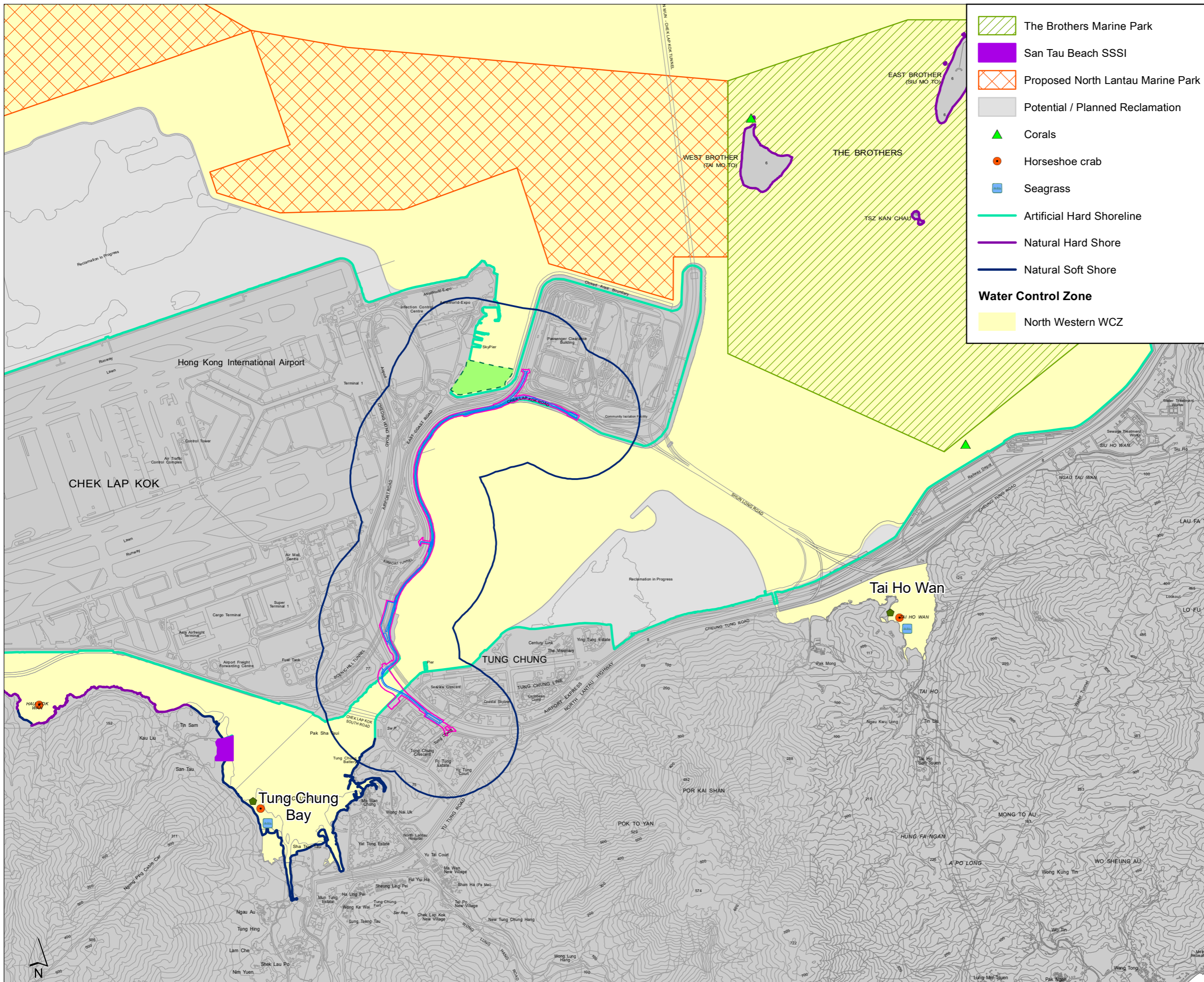
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







Authorized Representative





Title
Breeding Area of Romer's Tree Frog on Scenic Hill

Drawing No.
Figure 7A.3

Status	Scale	Date	Rev
	1:15,000 @A3	11/5/2023	



-  The Brothers Marine Park
-  San Tau Beach SSSI
-  Proposed North Lantau Marine Park
-  Potential / Planned Reclamation
-  Corals
-  Horseshoe crab
-  Seagrass
-  Artificial Hard Shoreline
-  Natural Hard Shore
-  Natural Soft Shore
- Water Control Zone**
-  North Western WCZ

- Legend**
-  Tentative Alignment of Airport Tung Chung Link
 -  Construction Site Boundary
 -  Proposed Marine Facilities
 -  500m Assessment Area

Rev	Date	Descriptions	Check



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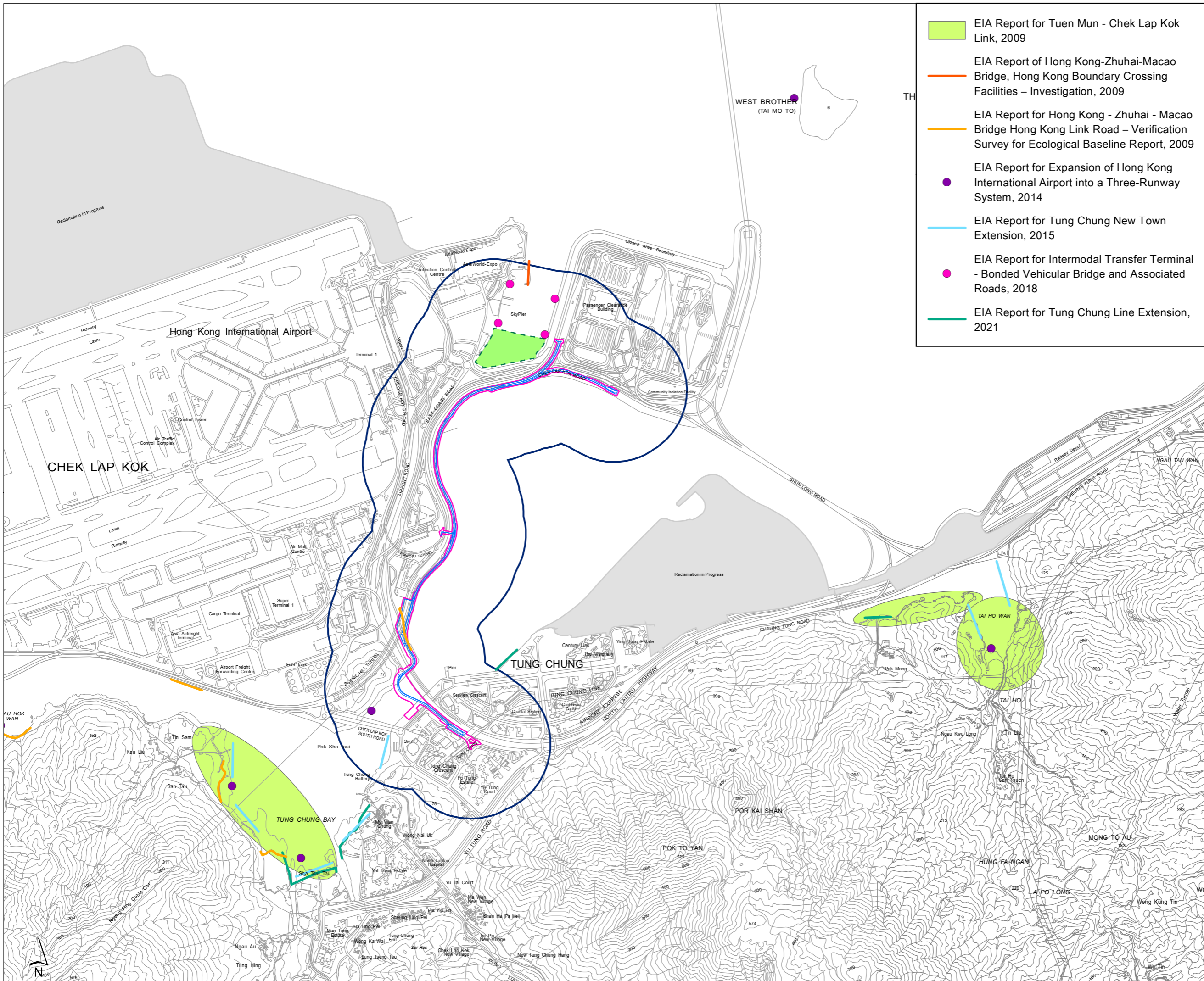
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Title
Marine Ecological Sensitive Receivers

Drawing No.
Figure 7A.4

Status	Scale	Date	Rev
	1:28,000 @A3	10/5/2023	



- EIA Report for Tuen Mun - Chek Lap Kok Link, 2009
- EIA Report of Hong Kong-Zhuhai-Macao Bridge, Hong Kong Boundary Crossing Facilities – Investigation, 2009
- EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road – Verification Survey for Ecological Baseline Report, 2009
- EIA Report for Expansion of Hong Kong International Airport into a Three-Runway System, 2014
- EIA Report for Tung Chung New Town Extension, 2015
- EIA Report for Intermodal Transfer Terminal - Bonded Vehicular Bridge and Associated Roads, 2018
- EIA Report for Tung Chung Line Extension, 2021

- ### Legend
- Tentative Alignment of Airport Tung Chung Link
 - Construction Site Boundary
 - Proposed Marine Facilities
 - 500m Assessment Area
 - Potential / Planned Reclamation

Rev	Date	Descriptions	Check



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in association with

Consultant's Signatures for Approval	Date
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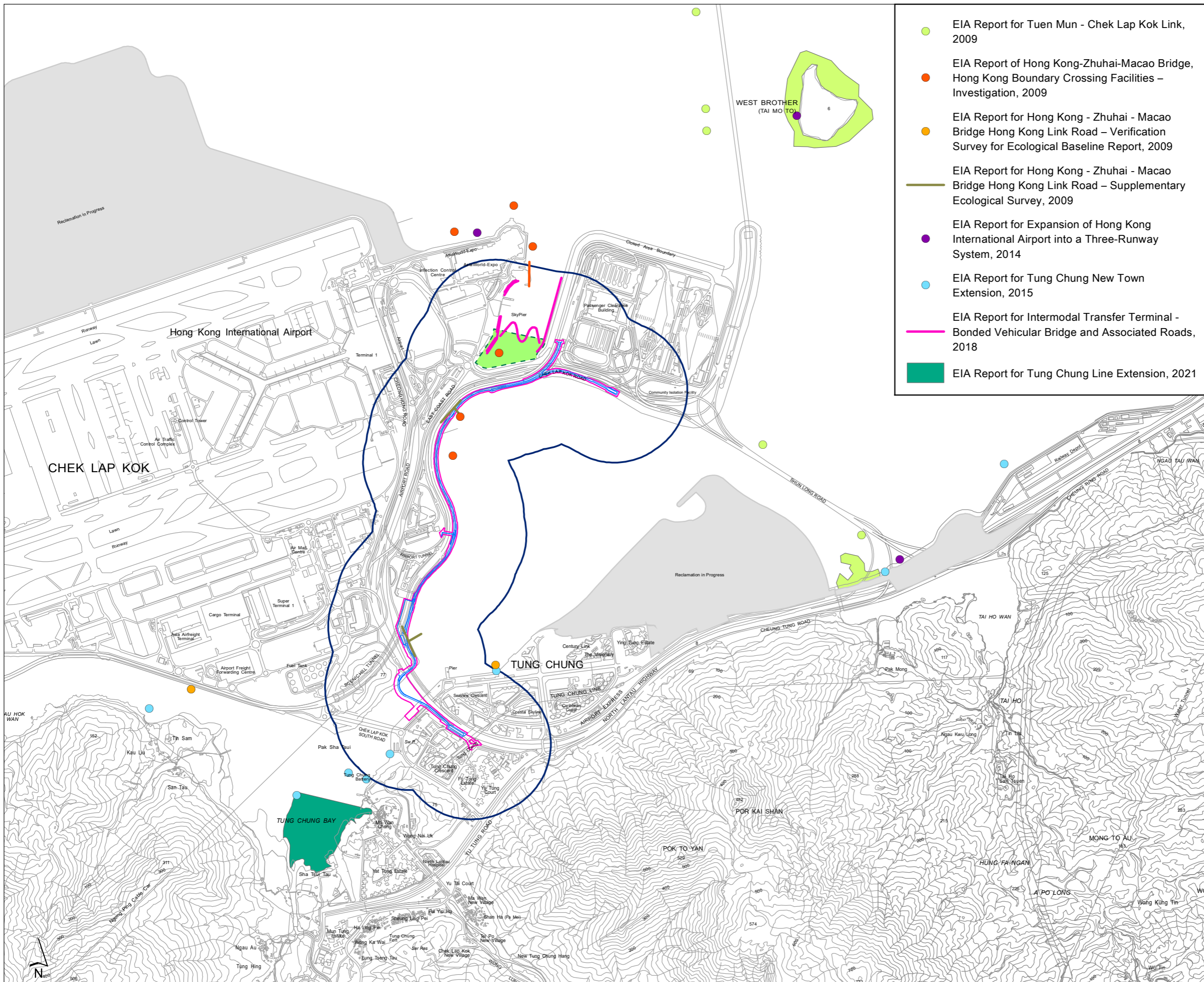
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Title
Location of Intertidal Surveys from Previous Studies in the Vicinity of the Project site

Drawing No.
Figure 7A.5

Status	Scale 1:25,000 @A3	Date: 10/5/2023	Rev
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- EIA Report for Tuen Mun - Chek Lap Kok Link, 2009
- EIA Report of Hong Kong-Zhuhai-Macao Bridge, Hong Kong Boundary Crossing Facilities – Investigation, 2009
- EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road – Verification Survey for Ecological Baseline Report, 2009
- EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road – Supplementary Ecological Survey, 2009
- EIA Report for Expansion of Hong Kong International Airport into a Three-Runway System, 2014
- EIA Report for Tung Chung New Town Extension, 2015
- EIA Report for Intermodal Transfer Terminal - Bonded Vehicular Bridge and Associated Roads, 2018
- EIA Report for Tung Chung Line Extension, 2021

- ### Legend
- Tentative Alignment of Airport Tung Chung Link
 - Construction Site Boundary
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 - Potential / Planned Reclamation

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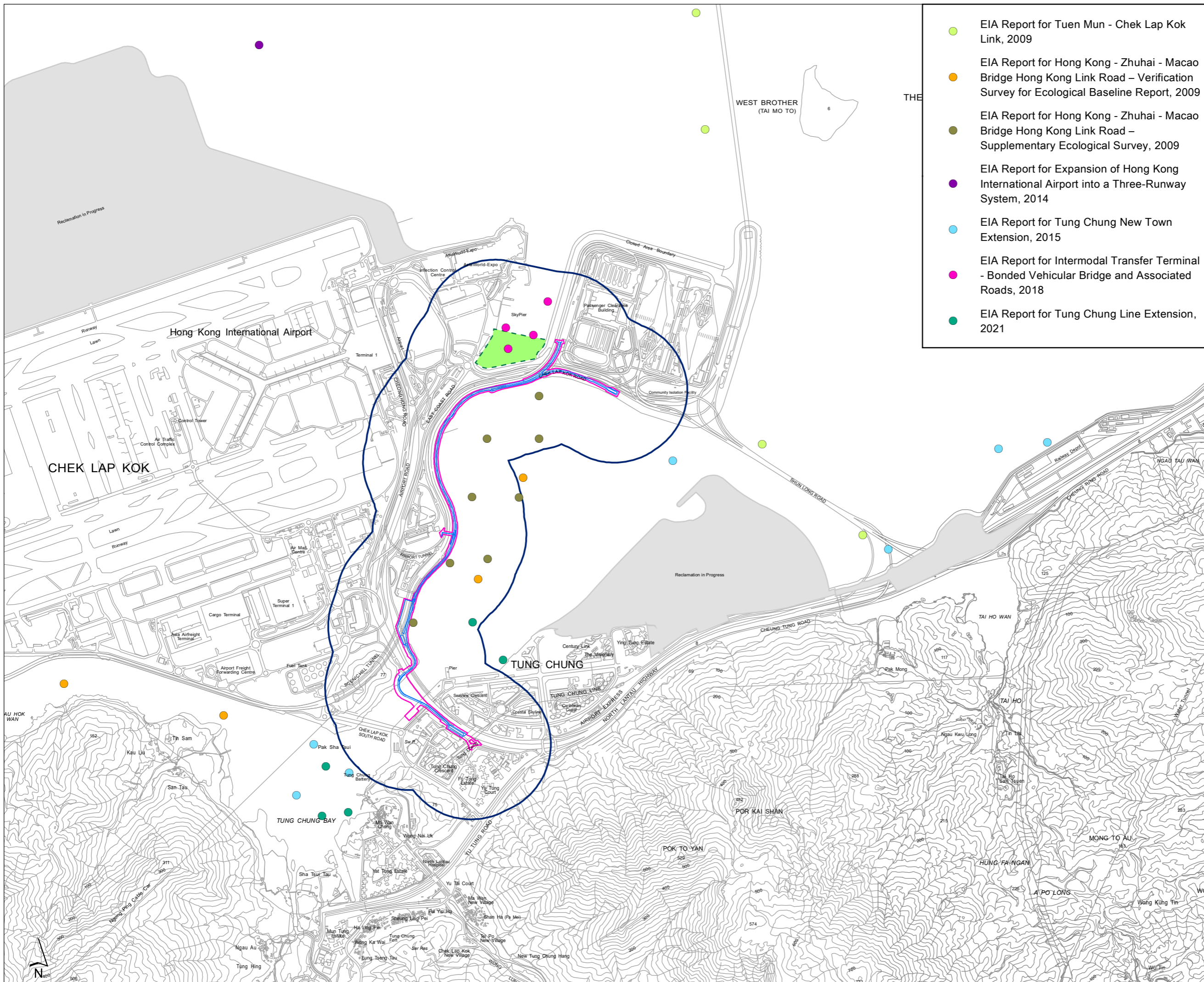
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Title
Location of Dive Surveys from Previous Studies in the Vicinity of the Project site

Drawing No.
Figure 7A.6

Status	Scale 1:25,000 @A3	Date: 10/5/2023	Rev
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- EIA Report for Tuen Mun - Chek Lap Kok Link, 2009
- EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road – Verification Survey for Ecological Baseline Report, 2009
- EIA Report for Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road – Supplementary Ecological Survey, 2009
- EIA Report for Expansion of Hong Kong International Airport into a Three-Runway System, 2014
- EIA Report for Tung Chung New Town Extension, 2015
- EIA Report for Intermodal Transfer Terminal - Bonded Vehicular Bridge and Associated Roads, 2018
- EIA Report for Tung Chung Line Extension, 2021

Legend	
—	Tentative Alignment of Airport Tung Chung Link
	Construction Site Boundary
	Proposed Marine Facilities
	500m Assessment Area
	Potential / Planned Reclamation

Rev	Date	Descriptions	Check



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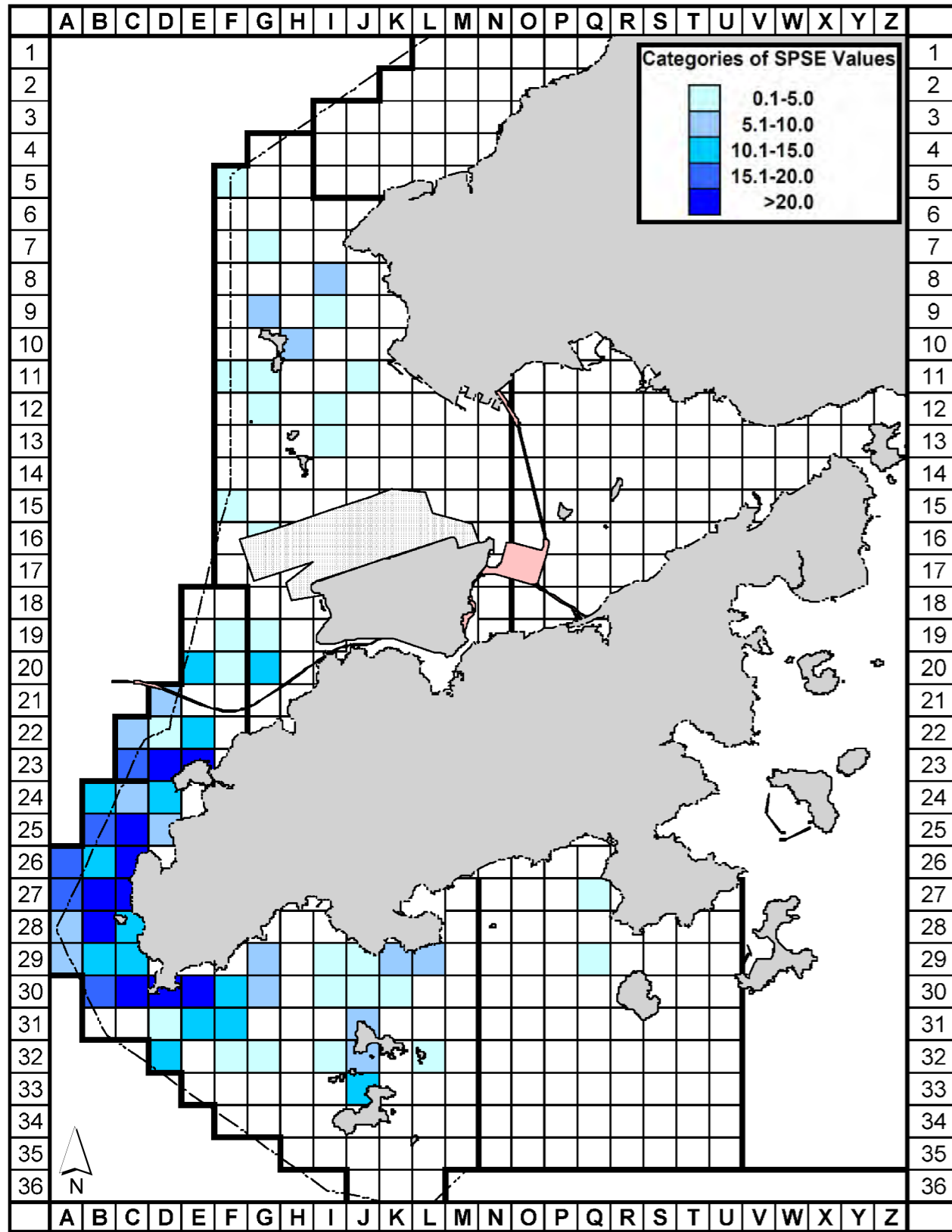
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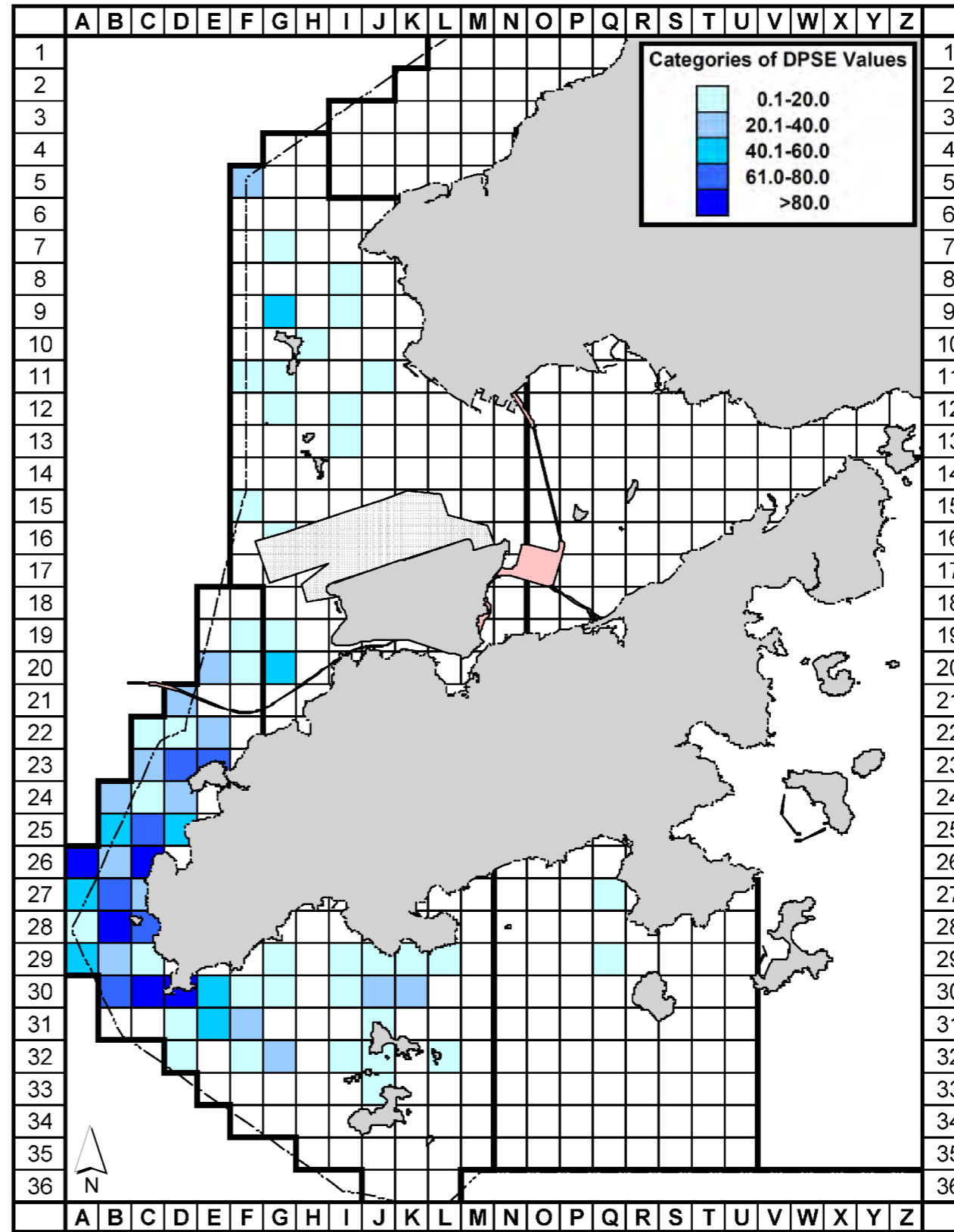
Title
Location of Benthic Sampling Surveys from Previous Studies in the Vicinity of the Project site

Drawing No.
Figure 7A.7

Status	Scale	Date: 10/5/2023	Rev
	1:25,000 @A3		



Sighting density of Chinese white dolphins with corrected survey effort per km² in waters around Lantau Island (number within grids represent "SPSE" = no. of on-effort dolphin sightings per 100 units of survey effort) (using data from January - December 2021)



Density of Chinese white dolphins with corrected survey effort per km² in waters around Lantau Island (number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort) (using data from January - December 2021)

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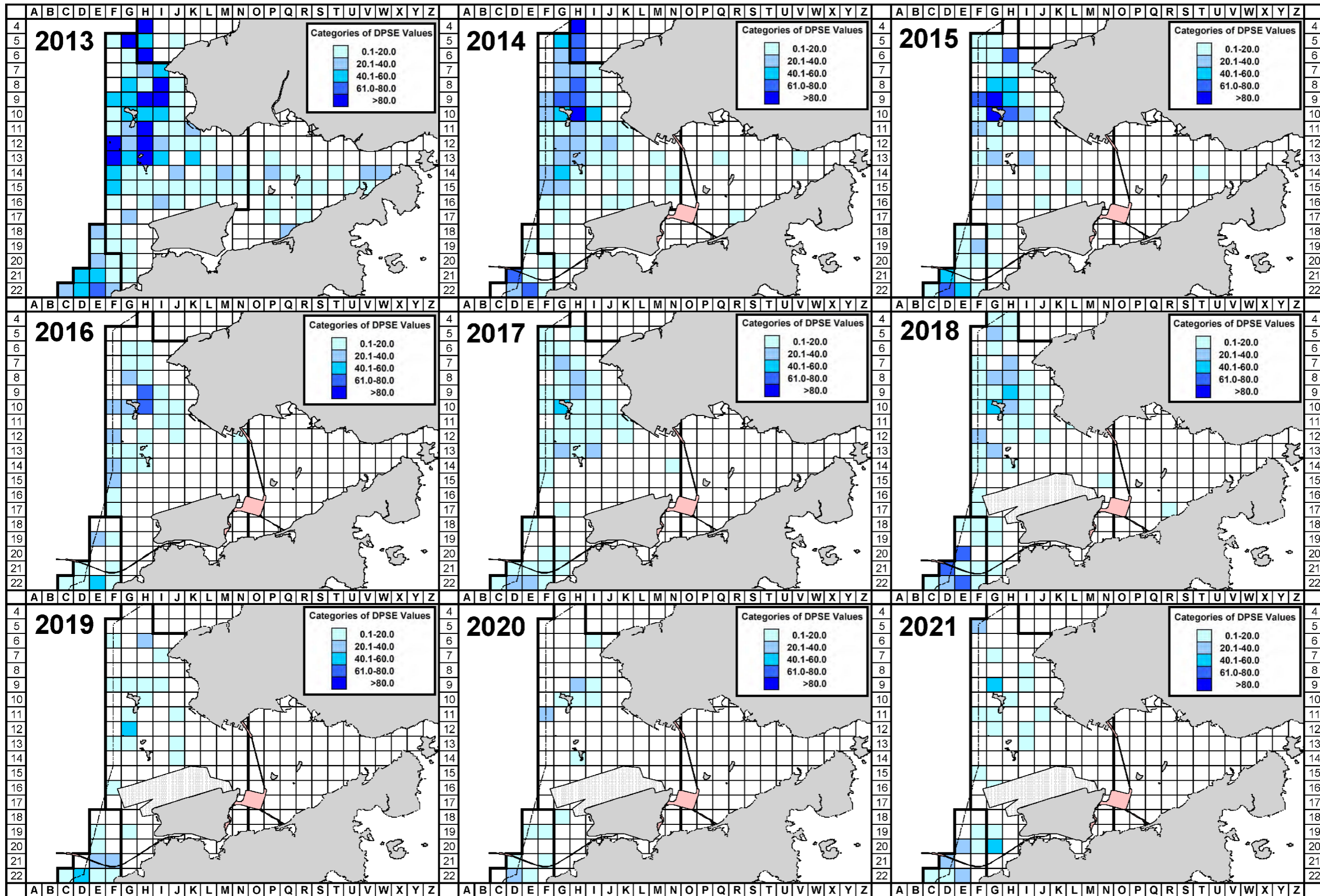


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Title
Sighting density of Chinese white dolphins
(Prepared by HKCRP, 2022)

Drawing No.
Figure 7A.8

Status	Scale 1:25,000	Date: 22/3/2023	Rev
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Comparison of dolphin densities with corrected survey effort per km² in North Lantau waters in 2013-21
(number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort)

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Title
Comparison of dolphin densities
(Prepared by HKCRP, 2022)

Drawing No. Figure 7A.9		Date: 22/3/2023
Status	Scale 1:25,000 @A3	Rev