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## 1 INTRODUCTION

### 1.1 Project Background

- 1.1.1.1 The proposal of Road P1 covers a new primary distributor of approximately 12 km long running along the northern side of and in parallel with the North Lantau Highway (NLH), comprising mainly two sections – the Tung Chung to Tai Ho Section of about 2.5 km long and the Tai Ho to Sunny Bay Section of about 9.5 km long. The development of a new road (i.e. Road P1) in parallel with the NLH to connect Tung Chung to Sunny Bay and to accommodate the long-term traffic demand has long been studied and established in various comprehensive planning studies for development in Lantau, including the “Northshore Lantau Development Feasibility Study” in 2001, “Revised Concept Plan for Lantau” in 2007, the “Proposed Lantau Development Strategy” in 2016 and “Sustainable Lantau Blueprint” in 2017, the “Technical Study on Developments at Siu Ho Wan and the Associated Transport Infrastructures” in 2018 and the “Study on Traffic, Transport and Capacity to Receive Visitors for Lantau – Feasibility Study” in 2022. These studies concluded that with the completion of various economic and housing developments along Northshore Lantau [including the Three Runway System (3RS) of the Hong Kong International Airport (HKIA), expansion of AsiaWorld-Expo, North Commercial District (NCD) on the airport island, Tung Chung New Town Extension (TCNTE) and Siu Ho Wan Development], development of Road P1 to strengthen the connectivity of these major development would be necessary.
- 1.1.1.2 Leveraging the opportunities brought about by the development in North Lantau (including TCNTE and Road P1), construction of a continuous cycle track along the north shore of Lantau to connect Tung Chung with Sunny Bay alongside Road P1 has also been suggested as a key element of the North Lantau Recreation Corridor promulgated under the “Lantau Conservation and Recreation Masterplan” in 2020 (the “Masterplan”).
- 1.1.1.3 Road P1 (Tung Chung – Tai Ho Section) and coastal biking route from Tung Chung to Tai Ho are within the scope of 799CL entitled “Tung Chung New Town Extension – Detailed Design and Site Investigation” and are currently under the construction as part of the TCNTE.
- 1.1.1.4 AECOM Asia Company Limited (AECOM) was commissioned by Civil Engineering and Development Department (CEDD) to carry out the Agreement No. CE 75/2020(HY) for the investigation for Road P1 (Tai Ho – Sunny Bay Section), Lantau (hereinafter referred to as “the Project”), with an aim to extend the committed Tung Chung to Tai Ho Section of Road P1 being constructed under TCNTE from Tai Ho Interchange to Sunny Bay and to modify the westbound carriageway of NLH between Sunny Bay Interchange and the former Lantau Link Toll Plaza connecting with Road P1 to relieve the traffic pressure on the NLH and enhance the capacity and resilience of the traffic to and from between Lantau and urban areas. This Project also covers provision of cycle track and footpath alongside the proposed carriageway, which form part of the continuous coastal cycle track planned as part of the North Lantau Recreation Corridor under the Masterplan. Location of the Project is shown in [Figure 1.1](#).

### 1.2 Designated Projects under Environmental Impact Assessment Ordinance

- 1.2.1.1 A Project Profile (No. PP-615/2020) was submitted to Environmental Protection Department (EPD) on 18 December 2020 for application for an Environmental Impact Assessment (EIA) Study Brief under section 5(1)(a) of the Environmental Impact Assessment Ordinance (EIAO) and EIA Study Brief No. ESB-337/2020 for the Project was issued on 27 January 2021 under the EIAO.
- 1.2.1.2 Subsequent to issuance of the EIA Study Brief, further consideration of various development options for the Project has been conducted taking account of environmental aspects, engineering, and site constraints to come up with the Preferred Alignment Option. Based on the Preferred Alignment Option, the construction of a 2-lane tunnel of about 1 km long between Ta Pang Po and Yan O Wan, and the associated tunnel portal, administration building and ventilation facilities in the original design, have been eliminated. Therefore, no road tunnel and no marine carriageway bridge more than 100 m in length between abutments are proposed. In addition, as the existing barging point at the artificial seawall of Siu Ho Wan will be affected by the Project, it needs to be re-provisioned. [Figure 1.2](#) illustrates these changes due to the Preferred Alignment Option compared to the original design in the EIA Study Brief and Project Profile.

- 1.2.1.3 In accordance with Clause 6.2 of the EIA Study Brief, CEDD has sought confirmation from the Director of Environmental Protection (DEP) regarding the aforementioned changes. It was confirmed that the proposed changes would not fundamentally alter the key scope of the EIA Study Brief and the scope of issues covered by the EIA Study Brief can still cover the proposed changes. Therefore, the EIA Study Brief remains valid for the preparation of this EIA Report, and applying for a fresh EIA study brief is deemed not necessary.
- 1.2.1.4 Based on the latest design, the Project comprises the following designated projects (DPs) under Part I, Schedule 2 of the EIAO:
- (i) Items A.1 – “A carriageway for motor vehicles that is an expressway, trunk road, primary distributor road or district distributor road”;
  - (ii) Item C.1 – “Reclamation works (including associated dredging works) more than 5 ha in size”; and
  - (iii) Item C.2(1)(a) – “Reclamation works (including associated dredging works) that are of more than 1 ha in size and a boundary of which is less than 500 m from the nearest boundary of an existing or planned marine park that is wholly or partly situated on or over any foreshore and sea-bed”.

### **1.3 Purpose of this Executive Summary**

- 1.3.1.1 This Executive Summary (ES) summarizes the key findings, recommendations and conclusions of the EIA Report for the Project. The ES contains the following information:
- Section 2 presents purpose and nature of the Project, consideration of alternative options and construction methods for the Project;
  - Section 3 presents the key findings of the environmental impact assessment;
  - Section 4 describes the proposed environmental monitoring and audit for the Project; and
  - Section 5 presents the conclusions.

## 2 PROJECT DESCRIPTION

### 2.1 Purpose and Scope of the Project

2.1.1.1 Road P1 is an integral part of the holistic transportation network proposed to connect Tung Chung to Sunny Bay, accommodating the long-term traffic demand and strengthen the connectivity of the major developments along the northern shore of Lantau. It runs essentially along the northern side of Lantau Island and in parallel to the NLH, comprising two main sections: (i) Tung Chung to Tai Ho Section, which is within the scope of 799CL entitled “Tung Chung New Town Extension – Detailed Design and Site Investigation” and is being constructed under TCNTE, and (ii) Tai Ho to Sunny Bay Section, which the Project specifically covers.

2.1.1.2 This Project covers the construction and operation of the remaining section of Road P1 (i.e. Tai Ho to Sunny Bay Section) and associated modification works of NLH between Sunny Bay Interchange and the former Lantau Link Toll Plaza, aiming to extend the committed Tung Chung to Tai Ho Section of Road P1, for connection with NLH near Penny’s Bay Highway (PBH), the existing road network at Sunny Bay and / or the planned Route 11 and / or Tsing Yi – Lantau Link (TYLL) and other future planned road network. It also takes this opportunity to provide cycle track and footpath from Tai Ho Interchange to Sunny Bay alongside the proposed carriageway with a view to strengthen recreational appeal and enhance public enjoyment.

2.1.1.3 The project location plan of the Project is shown in [Figure 1.1](#). The Project site essentially runs parallel to the NLH from Tai Ho Interchange to Sunny Bay and constitutes the following three core areas.

- Tai Ho Interchange to Sham Shui Kok area, covering nearshore reclamation north of the existing SHW Depot, the proposed coastal road, cycle track and footpath on existing and proposed reclaimed land, road connection works to existing and committed road networks around Tai Ho Interchange and re-provision of the barging point at Sham Shui Kok to the west of the existing North Lantau Refuse Transfer Station;
- Sham Shui Kok to Tung Yip Hang area, covering the proposed coastal road, cycle track and footpath on existing reclaimed land and in nearshore waters at Sham Shui Kok, and viaduct spanning across the existing NLH at Tung Yip Hang for connection of the coastal and hillside alignments; and
- Tung Yip Hang to Sunny Bay area, covering the proposed hillside road, cycle track and footpath by the foothill south to NLH along Cheung Tung Road, road connection works to existing and planned road networks around Sunny Bay Interchange (including NLH, PBH, the planned Route 11) and associated slope works and retaining structures.

2.1.1.4 The scope of the Project comprises mainly the followings:

- (a) construction of a dual 2-lane carriageway of approximately 9.5 km long from Tai Ho Interchange to Sunny Bay with slip roads for connection with SHW Depot, NLH, PBH and the existing road network at Sunny Bay, as well as for future connection with the planned Route 11 and / or TYLL and other future planned road network;
- (b) reclamation works of about 14.7 hectares between Tai Ho Interchange and Sham Shui Kok for the proposed road works;
- (c) widening the westbound carriageway of NLH from 3-lane to 4-lane between Sunny Bay Interchange and the former Lantau Link Toll Plaza;
- (d) construction of cycle track and footpath along the proposed carriageway from Tai Ho Interchange to Sunny Bay;
- (e) re-provision of the existing barging point at Siu Ho Wan to Sham Shui Kok; and
- (f) the associated civil, structural, geotechnical, landscaping, streetscaping works, ancillary works and provision of environmental protection and mitigation works associated with the Project.

## 2.2 Need and Benefits of the Project

2.2.1.1 Upon the progressive development of various planned developments in North Lantau, traffic flow is expected to increase continuously, placing substantial pressure on transportation system in North Lantau. Furthermore, the NLH, currently one of the major roads connecting Lantau (including Tung Chung, the HKIA and Hong Kong–Zhuhai–Macao Bridge Hong Kong Port) to urban areas, is prone to serious disruptions whenever a traffic incident occurs.

2.2.1.2 Road P1 is strategically designed to provide a direct traffic connection between Tung Chung and Sunny Bay, bypassing the existing NLH to alleviate the traffic pressure on the NLH and enhancing the capacity and resilience of the traffic between Lantau and urban areas. As a main section of Road P1, the Project is essential for extending the Tung Chung to Tai Ho Section, running from Tai Ho Interchange to Sunny Bay. It serves all existing and planned developments alongside NLH, including the committed TCNTE, the committed Siu Ho Wan (SHW) Station and replanned SHW Depot, the planned Comprehensive Residential and Commercial Development atop the replanned SHW Depot, Public Housing Developments at Siu Ho Wan and the existing facilities at Sunny Bay, the potential Sunny Bay Development Area, facilitating the housing and economic development in North Lantau. Furthermore, it forms a major component of the planned strategic transport networks, thereby strengthening and supporting the connectivity and development of Lantau in the near future.

2.2.1.3 In addition to the aforementioned benefits, the implementation of the Project will deliver the following environmental benefits:

- ***Relief of Traffic Pressure on Existing Road Network:*** With the relief of the traffic pressure on NLH and the accommodation of future traffic demand from housing and economic development in North Lantau by the proposed Road P1, potential air quality and noise impacts associated with traffic congestion during peak hours on the receivers along the existing road network would be minimised. While the proposed road alignment would be located near some local sensitive receivers at the planned residential developments in Siu Ho Wan, traffic noise mitigation measures such as noise barriers and semi-enclosure would be implemented to protect these sensitive receivers under the Project.
- ***Minimisation of Interfacing Works with Other Developments:*** A detailed evaluation of various alignment options was conducted to arrive at the optimal alignment. Connection works to the adjoining planned interfacing developments, including SHW Depot development and Route 11 and/or TYLL under the Preferred Alignment Option have been closely coordinated with the corresponding project officers to avoid overlapping construction/road works and the need for additional modification works and hence minimise waste generation and potential disturbances to the environment and local public (e.g. dust, noise). Furthermore, by maximising the synergy effects from shared use of space and/or common provisions, project interfaces are streamlined, reducing prolonged and repeated environmental impacts from the interfacing works.
- ***Incorporation of Eco-shoreline Design and Artificial Reef:*** Eco-shoreline features would be incorporated into the proposed seawall (e.g. enhanced seawall panel and eco-tile) to enhance the existing intertidal/subtidal habitats which support limited marine life. Artificial reefs would also be installed at the reinstated subtidal habitats at the toe of the newly built seawall to re-create habitat for subtidal species such as juveniles of marine fish.
- ***Enhancement of Cycling and Pedestrian Connectivity:*** By incorporating cycle tracks and footpaths along the proposed carriageway from Tai Ho Interchange to Sunny Bay, this initiative not only enhances cycling and pedestrian connectivity in North Lantau but also reduces reliance on motorized vehicles, thereby promoting sustainable transportation options. Furthermore, the strengthened recreational appeal and enriched public enjoyment of the area encourage a connection with nature and eco-friendly lifestyles.

## 2.3 Consideration of Alternative Options

### 2.3.1 General

2.3.1.1 Various design options for road alignments, forms of structure, reclamation extent, and natural terrain hazard mitigation measures have been considered and evaluated in detail in the EIA Report to achieve an optimal design that is both engineering feasible and environmental preferable with due consideration of avoiding, minimising and mitigating

potential adverse environmental impacts to the greatest extent practicable. Furthermore, due considerations have been given to minimising the reclamation extent for the Project and enhancing public enjoyment of the waterfront, taking into account the latest development of interfacing projects in the vicinity of the Project area and feedback received from the public. Highlights of the considerations given to alternatives and options are presented in the following sections.

### **2.3.2 Alignment Alternative**

2.3.2.1 Various alternative alignment options for Road P1 (Tai Ho to Sunny Bay Section) were explored for road sections from Tai Ho Interchange to Sham Shui Kok and from Sham Shui Kok to Sunny Bay.

#### Road Section from Tai Ho Interchange to Sham Shui Kok

2.3.2.2 Four alignment options were considered for the road section from Tai Ho Interchange to Sham Shui Kok, including three coastal road options (Option 1a (at-grade road on reclaimed land), Option 1b (elevated marine viaduct) and Option 1c (marine viaduct)), and a hillside viaduct option (Option 2). The coastal road options run along the coast north to the existing Siu Ho Wan Depot and NLH, with connections to the existing / committed roads and SHW Depot topside developments. The hillside viaduct option follows Shun Long Road and Cheung Tung Road to the south of NLH, spanning across NLH near Tai Ho Interchange and Sham Shui Kok for road connections.

2.3.2.3 Development of road tunnel between Tai Ho and Sham Shui Kok was reviewed to be not engineeringly feasible for considerations due to various physical site constraints, including constraints on tunnel launching / retrieval shafts and tunnelling works by the existing road networks (e.g. Tai Ho Interchange and NLH along the area), live railway tracks and public utilities at Sham Shui Kok (e.g. North Lantau Transfer Station, Siu Ho Wan Water Treatment Works, Siu Ho Wan Sewage Treatment Works, and Sham Shui Kok Substation etc.), as well as Tai Ho Priority Site for Enhanced Conservation. The area is classified as the Designated Area of Northshore Lantau which is underlain by complex geological conditions, which pose significant construction and operation risk for tunnel operations. The marine viaduct (Option 1c) was considered engineeringly infeasible due to safety / emergency operations concerns as the existing seawall would be obstructed by the viaduct structures and the prevailing regular maintenance and emergency operation requirements could not be satisfiable. The elevated marine viaduct (Option 1b), while providing sufficient headroom for seawall maintenance and emergency operations, would require substantial marine works, larger viaduct structures and noise barriers, rendering it less preferable.

2.3.2.4 The hillside viaduct option (Option 2) was also considered less preferable due to its encroachment on ecological sensitive areas including the Tai Ho Priority Site for Enhanced Conservation, natural watercourses and woodland in Tai Ho area, as well as road safety concerns arising from the steep gradient and limited connectivity.

2.3.2.5 Among the four alternative options, Option 1a (At-grade road on reclaimed land) has been considered as the preferred alignment for this road section. While this option involves reclamation, the proposed reclamation area would cover a similar footprint of works area required for the marine viaducts in Options 1b and 1c. The reclamation would be confined to nearshore and shallow water areas along the existing artificial seawall, which are not the key habitats / foraging grounds for Chinese White Dolphin, having similar ecological and fisheries impacts to the marine viaduct options. Furthermore, with the adoption of non-dredged reclamation method under Option 1a along with appropriate control measures, the potential water quality impacts and disturbance to The Brothers Marine Park (The BMP) would be similar to those from the marine works required in the marine viaduct options. Considering that the road design in Option 1a could best fulfil the objectives of enhancing the transportation and pedestrian connectivity in North Lantau while meeting road safety, maintenance and emergency services requirements, and resulting in comparatively lesser extent of air quality, noise and visual impacts compared to the elevated marine viaduct (Option 1b), it has been chosen as the preferable alignment for the road section from Tai Ho Interchange to Sham Shui Kok.

#### Road Section from Sham Shui Kok to Sunny Bay

2.3.2.6 Three alignment options were considered to connect Sham Shui Kok with NLH and existing

/ planned road networks in the vicinity of Sunny Bay, including:

- Tunnel cum Yan O Viaduct (Option 1), comprising mainly a tunnel between Ta Pang Po and Yan O Wan, and coastal viaduct for the remaining parts from Sham Shui Kok to Ta Pang Po and from Ta Pang Po to NLH and existing / planned road networks;
- Hillside at-grade road and viaduct (Option 2), comprising at-grade road and viaduct by the foothill along Cheung Tung Road and south to NLH from Ta Pang Po to Sunny Bay, with viaduct spanning across NLH at Tung Yip Hang for connection with the proposed coastal viaduct at Sham Shui Kok and near Sunny Bay Interchange for connection with NLH and existing / planned road networks in the vicinity of Sunny Bay; and
- Sea viaduct (Option 3), in the form of a sea viaduct stretching across the sea around Yam Tsai Wan.

2.3.2.7 Apart from the above options, development of road tunnel between Sham Shui Kok and Sunny Bay was reviewed and considered not engineeringly feasible due to various physical site constraints. Construction of tunnel launching / retrieval shafts and tunnelling works along Northshore Lantau are largely constrained by the existing sub-sea utilities (including high voltage power cables, high pressure gas mains and watermains), the live railway tracks and NLH along the area, as well as the public utilities at Sham Shui Kok (e.g. North Lantau Transfer Station, Siu Ho Wan Water Treatment Works, Siu Ho Wan Sewage Treatment Works, and Sham Shui Kok Substation etc.). The area is classified as the Designated Area of Northshore Lantau which is underlain by complex geological conditions, which pose significant construction and operation risk for tunnel operations. Likewise, given that large portions of the existing slopes along Cheung Tung Road from Sham Shui Kok to Sunny Bay are relatively shallow, hillside tunnelling works through these areas would be segmented into numerous short sections, requiring excessive tunnel portals and potential encroachment onto the Lantau North (Extension) Country Park.

2.3.2.8 Option 1 (Tunnel cum Yan O Viaduct) was not considered environmentally preferable due to its encroachment on Ta Pang Po and Yan O Wan, areas rich in sensitive ecological, cultural heritage and landscape resources. Direct disturbance on these resources would result in significant and irreversible adverse environmental impacts. Additionally, the area is classified as the Designated Area of Northshore Lantau, with complex geological conditions that increase construction and operational risks for tunnels. By relocating the Road P1 alignment to the hillside, construction near live railway lines can be minimized, reducing risks to railway operations. While Option 3 (sea viaduct) could avoid the encroachment on Yan O Wan, the offshore marine works required around Yam Tsai Wan and Sunny Bay would significantly impact on coral communities, Chinese White Dolphin and fisheries resources, making it unfavourable.

2.3.2.9 Option 2 (hillside at-grade road and viaduct), while impacting hillside vegetation near Cheung Tung Road, would affect habitats that are either man-made or already subject to disturbances from nearby existing carriageways, and thus of comparatively low ecological value. This option would avoid direct and long-term indirect impacts on sensitive ecological (e.g. habitats and associated species of higher ecological values, including woodland, mudflat, coral communities, pipefish, horseshoe crabs, mangrove and seagrass bed), cultural heritage (Yam O SAI and log dock of Yam O) and landscape resources (i.e. the original landscape of the area, including the natural sea view and the lush woodland, which is a key scenic feature) at Yan O Wan. While a continuous waterfront for recreational purposes cannot be maintained, the cycling and pedestrian connectivity and public enjoyment can still be enhanced through provision of coastal boardwalk at Sham Shui Kok and incorporation of cycle track and footpath along the proposed carriageway from Sham Shui Kok to Sunny Bay area. Additionally, the excavated materials from site formation works would be reused as filling materials for reclamation where practicable, minimising waste management implications. Therefore, Option 2 has been selected as the preferred alignment for road section from Sham Shui Kok to Sunny Bay.

#### Preferred Alignment Option

2.3.2.10 The Preferred Alignment Option for the Project is illustrated in [Figure 2.1](#).

2.3.2.11 The connection works to the adjoining committed road works and / or interfacing developments have been closely coordinated with the corresponding project officers to avoid overlapping construction / road works and only stub ends are reserved at the proposed slip

roads near existing Sunny Bay area for the planned Potential Sunny Bay Development, hence avoiding any potential wastage of construction materials and reducing the unnecessary environmental impacts from extra remodification works required for uncoordinated design.

- 2.3.2.12 The design level and route of the proposed coastal and hillside cycle track / footpath under the Preferred Alignment Option have also been closely coordinated with the corresponding project officers on the development of TCNTE and North Lantau Recreation Corridor to ensure continuity with the promenade at TCNTE and overall planning of biking infrastructure in North Lantau (e.g. the planned Tai Ho Cycle Park and future cycle tracks in Sunny Bay and Penny's Bay), thereby enhancing public enjoyment of the waterfront through the synergy created.

### **2.3.3 Reclamation Extent**

- 2.3.3.1 As discussed in [Section 2.3.2](#), Option 1a (At-grade road on reclaimed land) has been selected as the preferred alignment for the road section from Tai Ho Interchange to Sham Shui Kok. The proposed alignment would be constructed on the existing reclaimed land from Tai Ho Interchange to Sham Shui Kok, and newly reclaimed land under the Project. The proposed reclamation has been optimised to minimise its extent as much as practicable, taking into account road safety and operation requirements of existing seafront facilities, navigation corridor requirements related to The BMP, and land requirements necessary to accommodate the proposed dual 2-lane carriageway, waterfront cycle track and footpath (extensions to the committed 4m-wide cycle track and 6m-wide footpath being constructed under TCNTE), as well as the reprovisioning of the existing barging point at Siu Ho Wan that would be affected by the Project. To further minimise the land requirements, various reclamation options have been explored, aiming to reduce the reclamation extent, thereby reducing potential environmental impacts. The options include reclamation with rocky eco-shoreline and vertical seawall (Option 1), reclamation with sloping seawall and vertical seawall (Option 2) and reclamation with vertical seawall only (Option 3).

- 2.3.3.2 Considering that only the existing seawall of low ecological value would be affected from the proposed reclamation and the reclamation with vertical seawall only (Option 3) would require the least extent of reclamation to suit the Project's need, it has been considered more preferable compared to the other two options, which would require more land for the provision of rocky eco-shoreline features or sloping seawall. This option has therefore been selected as the preferred option, minimising the reclamation extent while maintaining the transportation / pedestrian connectivity at the waterfront and enhancing the intertidal / subtidal habitats through the adoption of eco-shoreline features (e.g. enhanced seawall panel and eco-tile) for vertical seawall and deployment of artificial reefs.

### **2.3.4 Natural Terrain Hazard Mitigation Measures**

- 2.3.4.1 Due considerations have been given to minimising the environmental impacts as far as practicable in deriving the necessary effective landslip prevention and mitigation works to protect the at-risk populations and road section. While the hillside catchments identified with natural terrain hazards fall mostly within Lantau North (Extension) Country Park uphill of Cheung Tung Road, all proposed natural terrain hazard mitigation measures are situated outside of the Country Park in order to avoid direct impacts on the recognised site of conservation importance.
- 2.3.4.2 Deflector wall, deposition pond, flexible barrier and soil nailing of smaller scale located close to the proposed alignment, i.e. at the toe of the catchment, have been recommended ([Figure 2.1](#) refers), with a view to minimising disturbances to the Country Park, impacts on its surrounding natural habitats (including natural watercourse and woodland) and the overall visual impacts from at-source measures at uphill of the catchment (e.g. extensive soil nailing) or larger scale measures (e.g. reinforced concrete barrier).

## **2.4 Construction Methods and Sequence of Works**

### **2.4.1 Reclamation and Seawall Construction Method**

- 2.4.1.1 The proposed reclamation will be located nearshore and in shallow water (approximately 3m to 5m), and in the form of strip (approximately 40m to 66m wide inclusive of the proposed seawall) aligning with the existing artificial seawall.

- 2.4.1.2 The non-dredged reclamation method or reclamation method with the least dredging activities required is considered more environmentally friendly in general and hence would be preferred for the Project given the proposed reclamation area situated less than 500 m from the nearest boundary of The BMP.
- 2.4.1.3 The majority of the proposed reclamation and vertical seawall would be located above a dredging slope formed during the previous fully dredged reclamation at Siu Ho Wan and Sham Shui Kok. For the proposed reclamation areas within the dredging slope extent, subsoil conditions that contain substantial thickness of gravel or cobbles would obstruct the typical ground treatment techniques based on site experiences of other recent reclamation projects, e.g. deep cement mixing (DCM) plants or band drains used for prefabricated vertical drains (PVD) could not penetrate through the rocks in the fill stratum above the degrading slope. Due to engineering constraints, alternative ground treatment method, i.e. jet grouting through cutting soil by high pressure jet and filling the space created by cutting with grout, would be adopted for these areas.
- 2.4.1.4 Due considerations have been given to ground treatment and reclamation methods which could achieve relevant stability requirements of the proposed seawall and residual settlement of the reclamation whilst avoiding / minimising the release of the soft marine sediment during the ground treatment process. The overall reclamation scheme formulated is based on the principle that dredging and the extent of reclamation would be kept to minimum in order to minimise environmental impact. For the proposed reclamation areas within the dredging slope extent, jet grouting through the formation of a temporary land platform would be adopted while DCM would be adopted for reclamation outside of the dredging slope.
- 2.4.1.5 In order to control and mitigate for the water quality impacts from the reclamation works beyond the works area, the following working procedure would be applied before the ground treatment and subsequent filling activities.
- Installation of silt curtains to confine the whole reclamation area;
  - Installation of geotextile to prevent the occurrence of mud wave;
  - Installation of sand blanket (2m thick) before commencement of ground treatment works / filling to eliminate the induced mud wave or leakage of silts;
  - Deployment of a primary and secondary silt curtain around the DCM rigs and barges respectively to seal off the entire barge and its working area to further prevent any escape of silt.
- 2.4.1.6 Any temporary land platform constructed outside of the cope line of the proposed seawall construction would be removed after completion of jet grouting ground treatments and the existing hard substrates would be reinstated at the toe of the proposed vertical seawall.
- 2.4.1.7 The construction programme has been carefully phased so that the reclamation works along the shoreline would not be conducted all at once to minimise the disturbance impacts to The BMP. The fill generated from site formation works for construction of this Project would be reused in the reclamation works where practicable.

## **2.4.2 Viaduct Construction Methods**

- 2.4.2.1 Having considered the scale and site conditions, the precast method would be adopted as it would be more efficient and environmentally friendly. The bridge deck section will be designed to allow for the use of precast concrete construction method. Precast concrete segments manufactured from off-site fabrication yard would be adopted for construction of viaduct along the coast north of NLH. Owing to limited mobilisation space for transportation of large precast concrete structures across NLH to Cheung Tung Road, two on-site fabrication yards would be set up along Cheung Tung Road for the concreting and steel fixing of the precast concrete segments for the viaduct section along hillside from Tung Yip Hang to Sunny Bay Interchange. The proposed on-site fabrication yards for precasting works and stockpiling would be located within the footprint of the proposed alignment and part of the existing site office / construction material storage along Cheung Tung Road and at over 500m from any air / noise sensitive receivers to minimise the environmental impacts.
- 2.4.2.2 The permanent foundation and substructure of the viaducts will generally involve the use of in-situ bored piles foundations founded on bedrock (for land viaduct) or seabed (for marine viaduct). For the foundation of marine viaduct, all piling equipment would be set up on a barge after the installation of silt curtain. No open sea dredging of seabed will be involved

for the marine viaduct construction. The marine viaduct pile cap above high-tide level will be installed through construction of a cofferdam, which consists of using permanent precast panel. The seawater trapped inside the cofferdam will be pumped out to generate a dry working environment throughout the construction process to minimise the release of contaminant into the water column and thus reduce the risk of disturbance to the seabed and the adjacent marine environment.

## 2.5 Construction Programme

2.5.1.1 The construction works of the Project are anticipated to tentatively commence in 2027 and be completed by 2031.

## 2.6 Key Public Concerns

2.6.1.1 During the public inspection of the Project Profile submitted for the Application of EIA Study Brief (No. PP-615/2020) from December 2020 to January 2021, public views and concerns on the Project were received.

2.6.1.2 A Project website was also launched in May 2024 to facilitate effective dissemination of information and collation of public views.

2.6.1.3 The Project design has taken into consideration the public views and concerns, and appropriate mitigation / precautionary / enhancement measures have been recommended as appropriate to minimise potential environmental impacts. The key public views / concerns and the corresponding design considerations / follow up actions taken are summarised in [Table 2.1](#).

**Table 2.1 Summary of Key Public Concerns and Follow Up Actions**

Public Concerns	Corresponding Design Considerations / Follow Up Actions
Avoidance and minimisation of impacts to Yan O Wan and the associated environmental sensitive receivers, in particular the ecological, cultural and landscape resources	Alternative alignment options between Sham Shui Kok and Sunny Bay were duly explored. Under the preferred alignment ( <a href="#">Figure 2.1</a> refers), encroachment on Yan O Wan has been avoided, ensuring that no construction works would be carried out at Yan O Wan to minimise any potential adverse environmental impacts and to preserve its natural habitat and associated wildlife, such as woodland, mudflat, coral communities, pipefish, horseshoe crabs, mangrove and seagrass bed), Yam O site of archaeological interest (SAI) and log dock of Yam O ( <a href="#">Section 2.3.2</a> refers). These features reflect the area's ecological richness and the historical significance of the original landscape of Yan O Wan — including the natural sea view, heritage log dock, and lush woodland, which is a key scenic feature of Yan O Wan.
Avoidance and minimisation of impacts to Tai Ho area and its encompassing recognised sites of conservation importance	Alternative alignment options between Tai Ho Interchange and Sham Shui Kok were duly explored. The preferred alignment has avoided encroaching on Tai Ho area, ensuring that no construction works would be carried out at Tai Ho area south of NLH to avoid or minimise any potential impacts on the recognised sites of conservation importance (e.g. Tai Ho Priority Site for Enhanced Conservation, Tai Ho Stream Site of Special Scientific Interest, Coastal Protection Area and Conservation Area) and natural habitats in Tai Ho area (e.g. natural watercourse and woodland) ( <a href="#">Section 2.3.2</a> and <a href="#">Figure 2.1</a> refer).
Minimisation of reclamation extent through exploration of alternative alignment	Alternative alignment options between Tai Ho Interchange and Sham Shui Kok and reclamation options were duly explored ( <a href="#">Section 2.3.2</a> refers) to minimise the reclamation extent. Upon careful consideration of various factors, the option of at-grade road on reclaimed land has been chosen as the preferred

Public Concerns	Corresponding Design Considerations / Follow Up Actions
options	<p>alignment for this section. The proposed reclamation required for this option has been optimised to minimise its extent as much as practicable, taking into account road safety and operation requirements of existing seafront facilities, navigation corridor requirements related to The BMP, and land requirements for the proposed road alignment, waterfront cycle track and footpath (extensions to the committed 4m-wide cycle track and 6m-wide footpath being constructed under TCNTE), as well as the reprovisioning of the existing barging point at Siu Ho Wan that would be affected by the Project.</p> <p>Additionally, the reclamation option with vertical seawall only would be adopted to keep the reclamation extent at its minimum while maintaining the transportation / pedestrian connectivity at the waterfront. The shoreline affected by the proposed reclamation would only be existing artificial seawall of low ecological values (<a href="#">Section 2.3.3</a> refers). Nonetheless, eco-shoreline features for vertical seawall and artificial reefs would also be adopted to enhance the intertidal / subtidal habitats (<a href="#">Section 3.6.1.9</a> refers).</p>
<p>Avoidance of key Chinese White Dolphin Habitat and Minimisation of Impacts to Chinese White Dolphins and The BMP</p>	<p>In order to avoid the key Chinese White Dolphin habitats and minimise the potential environmental impacts to Chinese White Dolphins and The BMP, the 24/7 activity pattern of Chinese White Dolphin and their usage within the assessment area were studied and established via Passive Acoustic Monitoring (PAM) surveys within and in the vicinity of the reclamation and marine works area (Section 8.3.3 of the EIA report refers). A comprehensive review of historic and on-going marine mammal studies [e.g. AFCD’s Marine Mammal Monitoring Report and marine mammal monitoring data from EIA studies in north Lantau (including Expansion of HKIA into a 3RS, HKZMB BCF and Tuen Mun – Chek Lap Kok Link)] was conducted to facilitate the formulation of the proposed reclamation scheme and methodology (Section 8 of the EIA report refers).</p> <p>The proposed reclamation would be confined to nearshore and shallow water areas along the existing artificial seawall, avoiding key habitat / foraging ground of Chinese White Dolphins, i.e. The BMP or the associated key Chinese White Dolphin habitats in offshore and deep waters around Tsz Kan Chau (Section 8 of the EIA Report refers). As the proposed reclamation area would be in the form of narrow strip aligning with the existing seawall, it is not expected to cause significant impacts on hydrodynamic that might affect The BMP or the associated key Chinese White Dolphin habitats.</p> <p>Additionally, non-dredged method with in-situ ground treatment methods (which could eliminate dredging and minimise the release of the soft marine sediment) would be adopted to minimise potential environmental impacts from the proposed reclamation works. Although the geology of seabed within the proposed reclamation extent poses engineering constraints to typical ground treatment methods (e.g. DCM), alternative ground treatment method (i.e. jet grouting) has been adopted to avoid dredging activities in vicinity of The BMP (<a href="#">Section 2.4.1</a> refers). Mitigation measures to control the water quality impacts from the ground treatment and subsequent filling activities have also been proposed (e.g. installation of silt curtains, geotextile, sand blanket).</p>

Public Concerns	Corresponding Design Considerations / Follow Up Actions
	<p>The construction programme has also been carefully phased so that the reclamation works along the shoreline would not be conducted all at once to minimise the disturbance impacts on The BMP. Based on the reviewed Chinese White Dolphin activity patterns, to minimise disturbance on Chinese White Dolphin nocturnal foraging behaviour, marine works during dry season (i.e. Nov to Mar) would be restricted to be outside the hours of 11pm to 7am as precautionary measure. Further precautionary measures, including marine vessel traffic and speed control, establishment of dolphin exclusion zone, dolphin watching plan and accidental spill response plan, would be implemented to further minimise potential disturbance to any potential occurrence of Chinese White Dolphins (<a href="#">Section 3.6.1.10</a> refers).</p> <p>Furthermore, eco-shoreline features would be incorporated in the newly constructed seawall and artificial reefs would be deployed to extend and enrich the intertidal and subtidal communities of North Lantau, which could in turn potentially enhance the prey resources of Chinese White Dolphins (<a href="#">Section 3.6.1.9</a> refers).</p>
<p>Protection of natural shoreline and habitats</p>	<p>Based on the Preferred Alignment Option, direct impacts to natural / undeveloped shoreline have been avoided with only the existing artificial seawall of low ecological values at Siu Ho Wan being directly affected by the proposed reclamation and marine works. Likewise, the proposed on-site fabrication yards would be located within the footprint of the proposed alignment and part of the existing site office / construction material storage area along Cheung Tung Road, thereby minimising the loss of natural habitats (<a href="#">Section 2.4.2.1</a> refers).</p> <p>The works area of the Project would be clearly defined and fenced to restrict vehicular and pedestrian access, particularly to the natural / undeveloped shoreline of north Lantau outside of works area, ensuring disturbances are avoided.</p>
<p>Careful coordination of connection works and design with other planned developments</p>	<p>In order to avoid unnecessary environmental impacts from overlapping construction works or extra remediation works due to unsynchronised designs, the connection works with the adjoining planned interfacing development of SHW Depot development and Route 11 / Tsing Yi – Lantau Link under the Preferred Alignment Option have been closely coordinated with the responding project officers. Stub ends have been reserved for future connections with the planned Potential Sunny Bay Development, as its design was unavailable during the time of the preparation of this EIA (<a href="#">Section 2.3.2.11</a> refers).</p> <p>The design elevation and route of the proposed coastal and hillside cycle track / footpath under the Preferred Alignment Option have also been closely coordinated with the corresponding project officers on the development of TCNTE and North Lantau Recreation Corridor to ensure continuity with the promenade at TCNTE and the overall planning of biking infrastructure in North Lantau (e.g. the planned Tai Ho Cycle Park and future cycle tracks in Sunny Bay and Penny's Bay), thereby enhancing public enjoyment of the waterfront through synergy created (<a href="#">Section 2.3.2.12</a> refers).</p>

### 3 KEY FINDINGS OF ENVIRONMENTAL IMPACT ASSESSMENT

#### 3.1 Air Quality Impact

- 3.1.1.1 Potential air quality impacts associated with the construction and operational phases of the Project have been assessed in accordance with the requirements stated in Section 3.4.4 and Appendix B of the EIA Study Brief, as well as the criteria and guidelines in Annexes 4 and 12 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The assessment area for air quality impact assessment is defined by a distance of 500m from the Project boundary.
- 3.1.1.2 The potential air quality impacts may arise from the construction works of the Project including site clearance, demolition of the existing structure and minor excavation with limited backfilling for column installation, wind erosion of limited exposed area, exhaust emission from PMEs and marine-based construction works. With the implementation of good site practices and mitigation measures specified in the Air Pollution Control (Construction Dust) Regulation and the Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation, no adverse air quality impact on air sensitive receivers (ASRs) would be anticipated during the construction phase of the Project. Monitoring for potential dust impacts should be conducted during the construction phase so as to check compliance with the legislative requirements. Regular site audits for potential air quality impact are recommended to be conducted during the entire construction phase of the Project so as to ensure the control measures and good site practices are implemented in order.
- 3.1.1.3 Cumulative air quality impact arising from vehicular emission from open road, vehicular emission associated with public transport interchanges (PTI), bus depots, heavy goods vehicle and coach parking sites, industrial, portal and marine emissions within assessment area has been assessed for the operation phase of the Project. The results conclude that the predicted cumulative NO<sub>2</sub>, RSP and FSP concentration at all identified ASRs would comply with the respective Air Quality Objectives (AQOs). Furthermore, no existing or planned air sensitive use was identified within the exceedance zones identified in the contour plots. As such, no adverse air quality impact would be anticipated arising from the Project operation.

#### 3.2 Noise Impact

- 3.2.1.1 Potential noise impacts associated with the construction and operational phases of the Project have been assessed in accordance with the requirements given in Section 3.4.5 and Appendix C of the EIA Study Brief, as well as the criteria and guidelines in Annexes 5 and 13 of the EIAO-TM. The assessment area for noise impact assessment is defined by a distance of 300m from the Project boundary. As detailed in [Section 2.3](#), consideration of various development options for the Project has been conducted, taking account of environmental aspects, engineering, and site constraints, to come up with the Preferred Alignment Option. Under this option, the road tunnel initially presented in the Project Profile submitted for application for the EIA Study Brief (No. PP-615/2020) has not been adopted in the current design. Therefore, assessment for ground-borne construction noise impact is considered not necessary. In addition, as no fixed noise source is proposed under the Project, no fixed plant noise impact assessment is considered necessary.
- 3.2.1.2 The assessment for the potential construction noise impact of the Project has been conducted. The assessment results indicate that the mitigated noise levels at all representative noise sensitive receivers (NSRs) would comply with the noise criteria set out in the EIAO-TM with the implementation of the proposed noise mitigation measures, including good site practices and use of Quality Powered Mechanical Equipment (QPME). Thus, no adverse construction noise impact arising from the Project would be anticipated. Construction noise monitoring is recommended to be conducted, if the concerned representative planned NSR has been occupied by the time of the construction works. A Construction Noise Management Plan (CNMP), aiming to verify the inventory of noise sources, and to assess the effectiveness and practicality of all identified measures for mitigating the construction noise impact of the project, would be prepared to submit during the pre-tender stage, and before the commencement construction of the project to demonstrate that the quiet construction methods and equipment can be duly specified and implemented for the corresponding noisy construction activities. Regular site environmental audits during the construction phase are recommended to ensure proper implementation of mitigation measures and good site practices.

3.2.1.3 The assessment for the potential road traffic noise impact from operation of the Project has been conducted. The assessment results indicated that the predicted road traffic noise levels at most of the representative NSRs would exceed the noise criteria under the unmitigated scenario. With the implementation of noise mitigation measures including vertical noise barriers/cantilevered noise barriers, semi-enclosure on certain Project Road sections, the overall traffic noise levels at all representative NSRs, except for some NSRs of Planned Residential Development atop Siu Ho Wan Depot Phase 1, would comply with the noise criteria. Although the overall noise levels at these NSRs were still predicted to exceed the noise criteria under the mitigated scenario, these exceedances were primarily attributable to other existing roads. The predicted mitigated noise levels from the Project roads at all these NSRs would comply with the noise criteria, contributing less than 1.0dB(A) to the overall noise levels. As such, adverse road traffic noise impact arising from the Project would not be anticipated during the operational phase. A Road Traffic Noise Mitigation Plan, taking into account the latest design of the planned NSRs at Siu Ho Wan, should be submitted to review the necessary noise mitigation measures before the commencement of construction of the Project.

### 3.3 Water Quality Impact

3.3.1.1 The water quality impact assessment was conducted in accordance with the requirements in Annexes 6 and 14 of the EIAO-TM and the requirements in Section 3.4.6 and Appendix D of the EIA Study Brief. The assessment area for the water quality impact assessment includes areas within 500 m from the boundary of the Project and covers North Western Water Control Zone (WCZ) and Western Buffer WCZ as designated under the Water Pollution Control Ordinance (WPCO) and the water sensitive receivers (WSRs) in the vicinity of the Project.

3.3.1.2 The construction activities for the Project will primarily involve reclamation between Siu Ho Wan and Sham Shui Kok, as well as the construction of marine viaduct and cycle track / footpath along the coast north to NLH, from Sham Shui Kok to Tung Yip Hang. No open sea dredging of the seabed will be involved under this Project. Cumulative construction phase marine water quality impacts from the proposed reclamation have been assessed. The assessment results show that the resulting dissolved oxygen (DO) concentrations at all water sensitive receivers (WSRs) were predicted to comply with the water quality objectives even without any mitigation measures. However, temporary exceedances of the criteria for suspended solids (SS) and sediment flux were predicted at one of the observation points of The BMP (P3) without mitigation. The predicted maximum SS elevations and sedimentation rates under mitigated scenario with single silt curtain indicate a significant reduction in SS elevations compared to the unmitigated scenarios, with all WSRs except P3 complying with the relevant Water Quality Objectives (WQOs) criteria. The close proximity of P3 to the reclamation zone may result in a temporary exceedance of the criteria for SS and sedimentation rate even with the implementation of single silt curtain. With the implementation of further mitigation measure in the form of double silt curtains at the reclamation area near P3, the predicted maximum SS elevation and sedimentation rate at P3 would be in full compliance with water quality standards during both the dry and wet seasons. Similarly, the installation of marine bridge steel pile casing was predicted to cause only minor displacement of sediment, which would settle quickly without a significant increase in suspended solids. A Silt Curtain Deployment Plan should be submitted to EPD prior to the commencement of the reclamation works. Detailed silt curtain deployment arrangement should be proposed under the Silt Curtain Deployment Plan. As such, no adverse water quality impact would be anticipated during the construction phase.

3.3.1.3 Other potential water quality issues arising from the construction of the Project include construction works within and in close proximity to inland water, wastewater generated from general construction activities, construction site runoff, sewage from construction workforce, accidental spillage of chemicals/filling materials. The potential water quality impacts could be mitigated and controlled by implementing the recommended mitigation measures. Regular site inspections and water quality monitoring should be undertaken routinely to inspect the construction activities and works area to ensure the recommended mitigation measures are properly implemented.

3.3.1.4 Potential hydrodynamic impacts due to the proposed reclamation and marine bridge piles during the operational phase were assessed with the use of computational modelling approach. The hydrodynamic modelling results showed that the proposed Project would not

significantly affect the local hydrodynamic regime. The differences in flow velocities, flow rates, and flow fields between with and without the Project scenarios were found to be negligible. The potential changes in hydrodynamic regime due to the project can be considered insignificant.

- 3.3.1.5 Other key sources of potential water quality impact associated with the operation of Project would include non-point source surface runoff from proposed new roads and cycle track / footpath and sewage from visitors. With the incorporation of the proper drainage system into the proposed works to receive surface runoff to the drainage system and implementation of appropriate mitigation measures outlined in ProPECC PN 1/23, no adverse water quality impact from the non-point source surface run-off would be anticipated. Additionally, considering that sufficient number of public toilet facilities (operated and maintained by Food and Environmental Hygiene Department and connected to public sewerage system, as per existing practices) have already been provided in areas with connection to the proposed cycle track / footpath between Tai Ho Interchange and Sunny Bay, adverse water quality impact associated with the sewage from visitors would not be anticipated.

### **3.4 Waste Management Implications**

- 3.4.1.1 The waste management implication was assessed in accordance with the requirements stated in in Section 3.4.7 and Appendix E of the EIA Study Brief, as well as Annexes 7 and 15 of the EIAO-TM.
- 3.4.1.2 During construction phase, waste types generated from the Project are likely to include construction and demolition (C&D) materials from construction activities, chemical wastes from maintenance and servicing of construction plants and vehicles, general refuse from workforce, floating refuse and excavated sediment. Reuse of the inert C&D materials should be prioritised on-site wherever possible to minimise the net amount of inert C&D materials generated from the Project; in particular, the fill generated would be reused in the reclamation works where practicable. Improper handling, collection, transportation and re-use / disposal of the wastes would likely give rise to hygiene problems and adverse environmental impacts, e.g. odour nuisance, and contamination of the nearby water bodies. Provided that these wastes are handled, transported and disposed of according to the recommended good site practices and measures, no adverse environmental impacts (including potential hazard, air and odour emissions, noise and wastewater discharges) would be anticipated during the construction phase.
- 3.4.1.3 The main waste types generated from the operation of the Project would be general refuse from visitors of the proposed cycle track and footpath. Provided that sufficient number of trash bins and recycling bins are provided for the collection of general refuse generated by visitors, no adverse environmental impact would be anticipated. The proposed new artificial seawall has been properly designed to achieve a shoreline that does not have any sharp turns or abrupt indentation in order to avoid or minimise any trapped or accumulated floating refuse. Same as existing practices, floating refuse will be collected by regular operation of the contractor of the Marine Department. With the proper seawall design and implementation of management control practices, no adverse environmental impact associated with floating refuse would be anticipated.

### **3.5 Land Contamination**

- 3.5.1.1 The land contamination assessment has been conducted in accordance with the requirements given in Section 3.4.8 and Appendix F of the EIA Study Brief, as well as Sections 3.1 and 3.2 of Annex 19 of the EIAO-TM.
- 3.5.1.2 A site appraisal, in the form of desktop review and site walkover, was conducted from October 2021 to July 2023 to identify any current/historical potentially contaminating land uses within the assessment area of the Contamination Assessment Plan (CAP), which covered the Project Area. Based on the site appraisal, a total of 2 facilities / areas [Former Highways Department (HyD) Site Office (Site CS-7) and Leisure and Cultural Services Department (LCSD) Depot (Site CS-8)] were identified with potential land contamination concerns to the Project within the Project Area.
- 3.5.1.3 A sampling and testing programme, targeting the concerned facility had been proposed. A total of 5 sampling locations were proposed for soil and groundwater sample collection. The collected samples will be tested for the identified chemicals of concern (COCs) (i.e. volatile

organic compounds (VOCs), semi-volatile compounds (SVOCs), petroleum carbon ranges (PCRs) and metals).

- 3.5.1.4 The proposed SI works are considered not appropriate / feasible to be carried out under the EIA Study for the concerned facilities / areas. Based on the tentative construction programme, construction works for the Project would not commence until 2027, there could be changes in the operation or changes in land use within the 2 concerned facilities / areas and Project Area which may cause further contamination issues. In addition, there are two existing antennas (Site TF-4 and TF-5) which were inaccessible at the time of the site walkover. While no vehicle / equipment maintenance / refueling activities or signs of chemicals or chemical stains / spillage or stressed vegetation were observed based on peripheral observation, further site walkover would need to be carried out within these sites at the later stage of the Project when the sites are accessible to confirm whether there are any land contamination issues. Site re-appraisal should be carried out for the whole Project Area at a later stage of the Project in order to address any new contamination issues caused by the (i) changes in operation within the 2 concerned facilities / areas and (ii) changes in land use within the Project Area. The submission of supplementary CAP(s), associated SI works and any necessary remediation should be carried out prior to the commencement of construction at the concerned facilities / areas and any new contaminated area identified in the site re-appraisal. The recommended further assessment and remediation works, including the submission of supplementary CAP(s), Contamination Assessment Report(s) (CAR(s)/ Remediation Action Plan(s) (RAP(s)) and Remediation Report(s)(RR(s)) would follow relevant Guidance Manual, Guidance Note and Practice Guide.
- 3.5.1.5 With the implementation of the recommended follow up works for the Project, including site re-appraisal and submission of supplementary CAP(s), any soil/groundwater contamination would be identified and properly treated prior to the construction works. No insurmountable land contamination impacts to the Project would therefore be anticipated.

### **3.6 Ecological Impact (Terrestrial and Marine)**

- 3.6.1.1 The ecological impact assessment has been conducted in accordance with the relevant requirements as specified in Section 3.4.9 and Appendix G of the EIA Study Brief, as well as Annexes 8 and 16 of the EIAO-TM. The assessment area for terrestrial ecological impact assessment includes areas within 500m of the Project boundary and any other areas likely to be impacted by the Project while for marine ecology, the assessment area is same as the water quality impact assessment area, i.e. including areas within 500m from the boundary of the Project and should cover the North Western WCZ and Western Buffer WCZ.
- 3.6.1.2 A literature review and ecological field surveys covering both dry and wet seasons between November 2021 and February 2023 have been conducted. A total of nine terrestrial habitats (woodland, shrubland/grassland mosaic, plantation, modified watercourse, natural watercourse, marsh, village area, dry agricultural land and developed area) and six marine habitats (sea, seawall, sandy shore, rocky shore, mangrove, and mudflat) were recorded within the assessment area. Direct impacts on shrubland/ grassland mosaic, developed area, woodland, plantation, modified watercourse, natural watercourse, sea (marine waters and subtidal habitat) and artificial seawall would be anticipated from this Project.
- 3.6.1.3 Recognised sites of conservation importance identified within the 500 m assessment area include Lantau North (Extension) Country Park (the Country Park), The BMP, and Tai Ho Priority Site for Enhanced Conservation. The terrestrial recognised site of conservation importance Tai Ho Stream SSSI is situated outside the assessment area. Sha Chau and Lung Kwu Chau Marine Park (SCLKCMP), North Lantau Marine Park (NLMP), and San Tau Beach SSSI were identified to be situated within the marine ecology assessment area but are separated by a significant distance of over 2.5 km from the Project site. Due considerations have been given to avoiding encroachment of any proposed works on these recognised sites of conservation importance in the preferred alignment. Based on the current design, all these recognised sites of conservation importance are located outside the Project boundary and no direct impacts from the construction works of the Project would therefore be anticipated.

#### Terrestrial Ecology

- 3.6.1.4 Potential terrestrial ecological impacts associated with the Project would include direct habitat loss, direct injury/ mortality to wildlife, and indirect construction/ operational disturbances (i.e. glare, noise, air/dust, deterioration of water quality and increased human disturbance). As

- summarised in [Section 2.3](#), various alignment options were considered to achieve the optimal alignment to avoid and minimise the potential ecological impacts on areas with significant ecological resources, such as Yan O Wan and Tai Ho area. Based on the Project design, it is expected that approximately 18.6 ha of man-made habitats (i.e. developed area, plantation and modified watercourse), along with approximately 2.2 ha of woodland, 0.9ha of shrubland/grassland mosaic, and 137 m of natural watercourse, would be directly affected by the land-based construction works.
- 3.6.1.5 The majority of the proposed works areas (around 58%) are situated within developed areas along or near existing busy roads and public facilities, which are of low ecological value due to disturbances like dust, noise, and glare. Most recorded vegetation in these areas consisted of ornamental species used for roadside planting. Given that the affected man-made habitats are of low ecological value and are already subjected to continuous disturbance from existing roads and human activities, the impact due to direct loss of these habitats is considered minor. Small areas of modified watercourses (around 0.003 ha) would be directly affected by viaduct column installation works. These watercourses might serve as potential breeding grounds for the lesser spiny frog, a species of conservation importance, as tadpoles were recorded during the survey. Considering the viaduct columns constitute less than 1% of the area of the concerned modified watercourse, the water flow and habitat quality of the already highly disturbed channel would unlikely be affected. Nonetheless, to minimise potential impacts on the two herpetofauna species of conservation importance, translocation of any individuals of lesser spiny frog and Romer's tree frog within the concerned modified watercourse is recommended prior to any construction works within the channel. A pre-construction herpetofauna survey will be conducted for the modified watercourse by a qualified ecologist with at least 5 years of relevant experience and a Protection and Translocation Proposal (PTP) will be prepared and submitted to relevant government authorities (e.g. EPD and AFCD) for approval.
- 3.6.1.6 One butterfly species of conservation importance, namely small cabbage white, and three avifauna, namely black-crowned night heron, Pacific reef heron and grey heron, were recorded within the Project site. The butterfly species of conservation importance was recorded in plantation habitat on an engineered slope adjacent to Cheung Tung Road near Penny's Bay Road, while the three avifauna species of conservation importance were recorded either perching on/near the seawall or in flight across the sea near Siu Ho Wan Depot. The black-crowned Night Heron was also recorded from a modified watercourse adjacent to the existing site office along Cheung Tung Road near Sunny Bay. No breeding nor roosting grounds of these species were recorded within the Project site during the surveys. Furthermore, as the Project footprint largely aligns with the existing seawall, roads and other disturbed areas, and adjoins with the fringe of wider areas of natural habitat that could serve as alternative habitats for wildlife outside of the Project site, these comparatively highly mobile butterfly and avifauna species of conservation are expected to utilise these alternative habitats outside the Project site. Hence, potential impacts on these species of conservation importance are anticipated to be insignificant even without mitigation.
- 3.6.1.7 The areas of woodland habitats (approx. 2.2 ha) and shrubland/grassland habitats (around 0.9 ha) subject to direct loss, are located at the fringe of hillslopes and adjacent to busy roads and have already been subjected to human disturbances such as traffic noise and regular vegetation trimming for road safety. Given these affected habitats were relatively small in size, fragmented and highly disturbed, the direct loss is anticipated to be minor. One flora species of conservation importance, Luofushan Joint-fir, was recorded at woodland habitat within the Project boundary, direct impact from the proposed works would not be anticipated. The floral species of conservation importance will be preserved in-situ with a plant protection zone with a radius of minimum 1.5 m to avoid any potential direct injury and to minimise the construction disturbances to this species. Approximately 137 m of hillside natural watercourses would be affected by proposed natural terrain hazard mitigation measures along Cheung Tung Road and bridge column to the east of Yan O Tuk. Given the affected sections are relatively small in size and already subject some degree of modification, direct impact to natural watercourse habitat is considered as minor.
- 3.6.1.8 Given the low ecological values of the affected terrestrial habitats, the direct loss of habitats and indirect disturbances to habitats in vicinity of the Project site is considered as minor.

### Marine Ecology

- 3.6.1.9 Potential marine ecological impacts included direct habitat loss from marine works, direct injury and/or mortality to Chinese White Dolphin (CWD), indirect disturbance impacts from potential deterioration of marine water quality and indirect disturbances to CWD. The directly affected artificial seawalls and subtidal hard-bottom habitats supported limited marine life with low coverage (<5%) of only common and widespread stress-tolerant hard coral *Oulastrea crispata* and gorgonian *Guaiaogorgia* sp. Considering that these habitats are of low ecological value and can easily be recreated and recolonised by benthic organisms and common coral species, as well as the small area affected, direct impacts to these habitats are considered minor. While no specific measures would be required to mitigate for the loss of seawalls and subtidal hard-bottom habitats (or the loss of common corals), eco-shoreline features will be incorporated in the proposed seawall (e.g. enhanced seawall panel and eco-tile) to enhance the existing intertidal/subtidal habitats which support limited marine life. Artificial reefs would also be installed at the reinstated subtidal habitats at the toe of the newly built seawall. A plan outlining the design and implementation of the proposed seawall with incorporation of eco-shoreline features and artificial reefs will be prepared in consultation with relevant government authorities (e.g., EPD and AFCD) prior to the commencement of the reclamation works.
- 3.6.1.10 The proposed reclamation area and marine bridge pile would be restricted to nearshore and very shallow (<5 m) waters with limited marine life recorded. The directly affected marine waters and its vicinity is not a key habitat (e.g. activity or foraging ground) or of ecological significance (e.g. prey resources) for CWD based on PAM surveys conducted for this Project as well as review of relevant literature such as regular AFCD monitoring at The BMP and Siu Ho Wan. As such, no significant direct or indirect impacts to CWD would be anticipated. Nonetheless, precautionary measures to further minimise the potential disturbance to the limited night-time usage of the marine waters in vicinity of the Project site by CWD have been recommended, including restriction of night-time (11pm to 7am) marine works during dry season (i.e. Nov to Mar), marine vessel traffic and speed limit control, and establishment of dolphin exclusion zone, dolphin watching plan and accidental spill response plan.
- 3.6.1.11 No open sea dredging of seabed would be involved for the construction of marine bridge piles and it is anticipated that the installation of marine bridge column would only cause minor displacement of marine sediment, which would quickly settle without significant increase in SS. Release and elevations of SS would mainly arise from filling activities for reclamation, which would be localised and constrained to areas within the proposed reclamation works with the provision of single and dual-layer silt curtains.
- 3.6.1.12 With the implementation of the recommended mitigation measures and precautionary/enhancement measures, no unacceptable residual impacts on both terrestrial and marine ecology would be expected during construction or operation phase.

### **3.7 Fisheries Impact**

- 3.7.1.1 A fisheries impact assessment (FIA) based on existing information on fisheries resources and activities within the assessment area has been undertaken, following criteria and guidelines for evaluating and assessing fisheries impact as stated in the Section 3.4.10 and Appendix H of EIA Study Brief and Annexes 9 and 17 of the EIAO-TM. The Assessment Area of the FIA covers areas within 500 meters from the boundary of the Project, and the North Western Water Control Zone WCZ and Western Buffer WCZ.
- 3.7.1.2 A review of baseline information on commercial fisheries resources, habitats and fishing operations surrounding the waters of the proposed Project from available literature and field surveys has been undertaken. Results from the review indicate that the level of fisheries operation within the shoreline of the Project site supported very low to high level of fisheries operation mainly conducted by sampans, but only supports a small proportion of fisheries production in Hong Kong with species largely of low commercial value or not commercially targeted. Sites of fisheries importance include spawning grounds of commercial fisheries resources in North Lantau, Ma Wan Fish Culture Zone (FCZ), SCLKCMP, The BMP, NLMP and the artificial reefs (ARs) within these marine parks and other ARs deployed or to be deployed within the assessment area.
- 3.7.1.3 There will be an approximately 15.5 ha permanent loss and an approximately 4.65 ha temporary loss of fishing grounds and fisheries habitats from the proposed reclamation works

and construction of marine bridge piles. Given that the lost areas only supported a small portion of fisheries production and that no spawning grounds and nursery areas are located within the Project site, the impacts due to the loss of fishing grounds and fisheries habitats are considered minor. Indirect disturbance impact to fisheries resource from potential deterioration of marine water quality, underwater noise disturbances from marine works and indirect disturbance on fishing activities from marine traffic of works vessels would be temporary and localised, with significance being insignificant to minor. With the adoption of non-dredged reclamation method for the proposed reclamation and no open sea dredging required for the proposed marine bridge piles construction to minimise the release of soft marine sediment and contaminants, together with the good site practices and mitigation measures for controlling water quality impact, unacceptable indirect impact due to water quality deterioration would not be anticipated.

- 3.7.1.4 During the operational phase, there will be an approximately 15.5 ha permanent loss of fishing ground and fisheries habitats. No additional direct impacts on fisheries resources are anticipated during the operational phase of the Project. Indirect impacts, including the change of hydrodynamic and marine water quality, and disturbance on fishing activities from the operation of reprovisioned barging point would be localised to the immediate vicinity of the newly reclaimed land or marine viaduct and would be insignificant. Thus, no unacceptable indirect impacts on fisheries would be anticipated during the operation of the Project.
- 3.7.1.5 No unacceptable residual impacts on fisheries would be anticipated from the construction and operation of the Project, and therefore fisheries-specific mitigation measures and monitoring programme would not be required. Nonetheless, eco-shoreline features and artificial reefs would be incorporated in the future seawall design to provide a range of habitats for different marine species, which would in turn benefit the local fisheries species.

### **3.8 Cultural Heritage Impact**

- 3.8.1.1 The cultural heritage impact assessment (CHIA) has been conducted in accordance with the relevant requirements as specified in Section 3.4.11 and Appendix I of the EIA Study Brief, as well as Annexes 10 and 19 of the EIAO-TM. The assessment area for the CHIA of this EIA Study covers the area within 300 m from the Project boundary.
- 3.8.1.2 No declared monument, proposed monument, graded historic building nor government historic site identified by Antiquities and Monuments Office (AMO) are located within the assessment area. No impact would therefore be anticipated on these items.
- 3.8.1.3 Two other identified items are located within the assessment area, namely the floating docks of Yam O and the former Yu Fung Public School. Both items are situated outside the works area and would not be directly impacted by the proposed works. However, as indirect impact is anticipated on the former Yu Fung Public School, mitigation measures including protective covering or sheltering, documentation, condition survey and monitoring would be necessary for the school building.
- 3.8.1.4 No site of archaeological interest (SAI) or area with archaeological potential would be encroached upon by the works areas. No terrestrial archaeological impact would therefore be anticipated. As a precautionary measure, the project proponent and his/her contractor are required to inform AMO immediately when any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance are discovered during the works.
- 3.8.1.5 The marine archaeological investigation established that no marine archaeological resources would be impacted by the Project. Nonetheless, as a precautionary measure, the project proponent and his/her contractor are required to inform AMO immediately when any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance are discovered during the marine works. Additionally, in case of any changes to the proposed extent of marine works, the archaeological potential of the area should be reviewed by a marine archaeologist and AMO should be consulted regarding the need and scope of any further investigation.

### **3.9 Hazard to Life**

- 3.9.1.1 The hazard to life assessment has been conducted in accordance with the relevant requirements as specified in Section 3.4.12 and Appendix J of the EIA Study Brief, as well as Annex 4 of the EIAO-TM. According to Section 3.4.12 and Appendix J of the EIA Study Brief, a hazard to life assessment shall be conducted to evaluate the risks associated with (i)

- storage, transport and use of explosives; (ii) on-site transport, generation, storage and use of chlorine at Siu Ho Wan Water Treatment Works (SHWWTW); (iii) on-site transport, generation, storage and use of biogas at Organic Resource Recovery Centre Phase I (ORRC1); and (iv) transshipment of dangerous goods at Sham Shui Kok Transshipment Dock (SSK Dock).
- 3.9.1.2 According to the latest design, explosives will not be used during both construction and operational phases of the Project, as such, no hazard related to explosives would be anticipated.
- 3.9.1.3 On-site chlorine generation (OSCG) plants have been installed in the SHWWTW to replace the conventional liquid chlorine storage, and the plant has recently been de-listed from the Potentially Hazardous Installation (PHI) register. The major chlorine gas related hazard associated with operation of the OSCG plants would be the failure associated with the chlorine gas lines, which worst downwind affected distance was estimated to be 260m in the approved EIA for Proposed Comprehensive Residential and Commercial Development atop Siu Ho Wan Depot (Register No.: AEIAR-213/2017). The Project site is located more than 400m from the OSCG plants in SHWWTW, no risk impact to the Project site would be anticipated due to accidental release of chlorine gas from SHWWTW.
- 3.9.1.4 Quantitative Risk Assessment (QRA) were conducted to assess the risks associated with the operation of the ORRC1 and SSK Dock during the construction and operational phases of the Project.
- 3.9.1.5 The results show that both the individual risks and societal risks of the ORRC1, taking into account the population induced by the Project, would be in compliance with the risk criteria stipulated in Annex 4 of the EIAO-TM. Therefore, risk mitigation measures are not required.
- 3.9.1.6 The risk associated with accidental detonation during the explosives off-loading operation at SSK Dock on the Project was assessed. The results showed that the individual risks, taking into account the population induced by the Project, would be in compliance with the risk criteria stipulated in Annex 4 of the EIAO-TM. Although part of the Frequency-Number (FN) curves were found to fall within the As Low as Reasonably Practicable (ALARP) region of the Hong Kong Risk Guideline (HKRG), the risk is found to be mainly contributed by the existing occupants in the North Lantau Refuse Transfer Station instead of the population induced from the Project. Cost-benefit analysis was conducted and no cost-effective measure is identified. Therefore, no mitigation measure is required.

### **3.10 Landscape and Visual Impacts**

- 3.10.1.1 Potential landscape and visual impacts arising from the Project have been assessed in accordance with Section 3.4.13 and Appendix K of the EIA Study Brief, Annexes 10 and 18 of the EIAO-TM, and EIAO Guidance Note No.8/2010. The assessment area for the landscape impact assessment includes areas within 100m from the boundary of the Project, while the assessment area for the visual impact assessment is defined by the visual envelope of the Project.
- 3.10.1.2 The key sources of impact during the construction phase are from activities associated with the construction of aboveground structures within the works sites and areas of the Project. The surface works would inevitably affect existing landscape and visual resources, such as trees and hillside vegetation. Alternative designs of the Project were considered to avoid direct impacts on significant landscape resources and to minimise works areas so as to minimise disturbance to the surrounding areas along NLH. Based on the current project design, neither Registered Old and Valuable Trees (OVTs) nor rare and endangered species would be affected by the Project, and the trees impacted are mainly common tree species. It was estimated that approximately 2,606 nos. of trees would be potentially affected by the proposed works. Opportunities for tree compensation have been fully explored and incorporated in the proposed mitigation measures as much as practicable during the EIA study. Compensatory tree planting of 950 heavy standard size and 318 standard size trees are proposed at roadside flat areas mainly near the waterfront promenade. Approximately 1,338 nos. of whip tree are proposed along the slope within the Project. The exact number of trees to be retained, transplanted and felled, along with the associated compensation proposal, would be further explored with the consideration of available areas for tree planting and operational constraints during the preparation of detailed Tree Preservation and Removal Proposals (TPRPs) in accordance with DEVB TC(W) No. 4/2020 to be submitted to relevant

government departments in the later stage of the Project with the aim of achieving a tree compensation ratio of 1:1 as far as possible.

- 3.10.1.3 With the implementation of proposed mitigation measures, it is anticipated that there would be moderate/substantial to insubstantial/slight residual landscape impacts during construction and moderate to insubstantial/slight impacts on day 1 of operation. The residual landscape impact would be further reduced to slight/moderate to insubstantial when the proposed compensatory planting, buffer planting and woodland mix planting become mature by year 10 of operation. While the residual visual impacts from the Project would be moderate to insubstantial during construction, they would be reduced to moderate to insubstantial on day 1 and further reduced to slight/moderate to insubstantial by year 10 of operation. Overall, the residual landscape and visual Impacts from the Project are considered acceptable with mitigation.

## **4 ENVIRONMENTAL MONITORING AND AUDIT**

- 4.1.1.1 Environmental Monitoring and Audit (EM&A) requirements for air quality, noise, water quality, waste management, land contamination, ecology (terrestrial and marine), fisheries, cultural heritage, hazard to life and landscape and visual impacts have been identified and recommended to ensure that the recommended mitigation measures are properly implemented. The EM&A requirements are specified and detailed in a separate EM&A Manual.

## **5 CONCLUSION**

- 5.1.1.1 The EIA study assessed the overall acceptability of the environmental impacts likely to arise during the construction and operational phases of the Project, in accordance with the EIA Study Brief (No. ESB-337/2020), EIAO-TM and other relevant guidelines and criteria.
- 5.1.1.2 The EIA study has demonstrated the protection of the population and environmental sensitive resources and the acceptability of any possible environmental impacts from the Project. The findings of the study indicated that, with the implementation of the recommended mitigation measures, the Project would be environmentally acceptable and in compliance with the relevant assessment standards / criteria of the EIAO-TM. No unacceptable residual impacts on nearby environmental sensitive receives arising from the construction and operation of the Project are anticipated. An EM&A programme has been recommended to verify the environmental acceptability of the Project and to check the effectiveness of the recommended mitigation measures.