

Contents

	Page	
14	Summary of Environmental Outcomes	1
14.1	General	1
14.2	Environmentally Friendly Options Considered and Incorporated to Avoid Environmental Impacts	1
14.3	Environmental Designs Recommended to Minimise and Mitigate Environmental Impacts	3
14.4	Summary of Key Environmental Problems Avoided and Sensitive Areas Protected	7
14.5	Estimated Population Protected from Various Environmental Impacts	9
14.6	Environmental Benefits of Environmental Protection Measures Recommended	9
14.7	Environmental Enhancements Included	11
14.8	Summary	12

14 Summary of Environmental Outcomes

14.1 General

14.1.1.1 This section summarises the overall environmental outcomes due to the proposed development atop Siu Ho Wan Depot (SHD). It can be seen in **Section 1** and **Section 2** that environmental considerations have been the key considerations throughout the development of the Project. Alternative options for designs and construction methodologies have been duly considered. Besides, all the options considered have ensured that environmental impacts could be avoided or minimised where practicable and mitigated by implementation of suitable mitigation measures to fulfil all the statutory requirements. The technical assessments conducted (see **Section 3** to **Section 12**) have demonstrated that all the statutory requirements in the EIA Study Brief (ESB-294/2016) and Technical Memorandum of the Environmental Impact Assessment Ordinance (EIAO-TM) have been complied with.

14.1.1.2 This chapter summarises the following: A) environmentally friendly options considered and incorporated to avoid environmental impacts (**Section 14.2**); B) environmental designs recommended to minimise and mitigate environmental impacts (**Section 14.3**); C) estimated population protected from various environmental impacts (**Section 14.5**) and; D) environmental enhancements included (**Section 14.7**). Summary tables are included in **Section 14.4** and **Section 14.6** to summarise the key environmental problems avoided and sensitive areas protected, and environmental benefits of environmental protection measures recommended respectively.

14.2 Environmentally Friendly Options Considered and Incorporated to Avoid Environmental Impacts

14.2.1.1 Avoidance of environmental impacts has been one of the key considerations throughout the entire project development and design. For those impacts that could not be avoided, due considerations have been given to minimise those impacts as much as practicable so that all the residual impacts would comply with the statutory requirements. The environmental impacts that have been avoided are listed and discussed below:

- Avoidance of reclamation and marine works;
- Avoidance of habitat loss and encroachment onto recognised sites of conservation importance;
- Avoidance of encroachment onto the Consultation Zone of Siu Ho Wan Water Treatment Works;

- Avoidance of use of concrete batching plant; and
- Avoidance of impacts from aircraft noise.

14.2.2 Avoidance of Reclamation and Marine Works

14.2.2.1 As discussed in **Section 5**, the proposed development and its associated infrastructure are all land-based and would neither involve reclamation nor require any marine works. The proposed development would also avoid marine traffic. Hence, the proposed development would have avoided any adverse direct impacts on marine ecology and fisheries resources in the vicinity.

14.2.3 Avoidance of Habitat Loss and Encroachment onto Recognised Sites of Conservation Importance

14.2.3.1 As discussed in **Section 9**, ecological studies have identified the following recognised sites of conservation importance in the vicinity of the proposed development. They include:

- Lantau North (Extension) Country Park – It covers the mostly vegetated hill slopes to the south of North Lantau Highway between Sunny Bay and Sham Wat;
- Tai Ho Stream Site of Special Scientific Interest (SSSI), Conservation Area (CA) and Tai Ho Ecologically Important Stream (EIS) – Tai Ho Stream is one of the most ecologically valuable fresh water streams in Hong Kong and is classified as an Ecologically Important Stream (EIS). The stream and riparian habitat is excellent, and the stream and its extensive tributaries run from upland to the lowland estuary without fragmentation. Buffer areas of the SSSI are zoned as CA in order to provide sufficient separation from the developed area;
- Tai Ho Priority Site – It is one of 12 sites for enhanced conservation under New Nature Conservation Policy. The site comprises four major habitat types, namely natural stream, mangrove stand / mudflat, agricultural land and woodland;
- Coastal Protection Area (CPA) in Tai Ho Wan – It is a natural coastline with geological, ecological and conservational values; and
- The Brothers Marine Park – One of its primary aims to set up this marine park is to mitigate the habitat loss of Chinese White Dolphin caused by the Hong Kong Boundary Crossing Facilities.

14.2.3.2 The proposed development is located on the existing SHD and its associated infrastructure would run along existing roads / formed areas. Hence, the proposed development has avoided encroachment onto the above recognised sites of conservation importance. Therefore, all the

aforementioned important ecological resources would not be directly affected.

14.2.4 Avoidance of Encroachment onto the Consultation Zone of Siu Ho Wan Water Treatment Works

14.2.4.1 A small portion of 8,600 m² of the proposed development would be within the Consultation Zone (CZ) of the Siu Ho Wan Water Treatment Works (SHWWTW) (see **Section 12**). In order to avoid having residential and commercial population within the CZ, all the residential buildings and the landscaped deck have been strategically located and planned to be beyond the CZ. Furthermore, facilities without the need of stationed staff including SPS and depot tracks will be located within the CZ. This would help to minimise the additional hazard to life as well.

14.2.5 Avoidance of Use of Concrete Batching Plant

14.2.5.1 The need of adopting a concrete batching plant for the proposed development during various phases has been studied in details as discussed in **Section 2**. While having concrete batching plant on site would provide certain benefits to facilitate the construction process, the associated dust and noise emissions from their operations on neighbouring residential developments during phased implementation have been duly considered. Although there are engineering measures to ensure that the impacts could be properly managed, it is considered more prudent to avoid having any concrete batching plant so that its associated dust and noise are minimised throughout the construction period.

14.2.6 Avoidance of Impacts from Aircraft Noise

14.2.6.1 As discussed in **Section 2**, the proposed development is located outside the existing Noise Exposure Forecast (NEF) 25 contour and the future NEF25 forecasted in the approved EIA for the Three-Runway System of the Hong Kong International Airport (AEIAR-185/2014). Hence, this avoidance of the NEF25 contours has ensured that the aircraft noise impacts on the proposed development would be acceptable.

14.3 Environmental Designs Recommended to Minimise and Mitigate Environmental Impacts

14.3.1.1 Other than initiatives to avoid environmental impacts as summarised in **Section 14.2**, efforts have been exercised to minimise those inevitable impacts. The need for any environmental designs required to mitigate the associated impacts have also been identified and will be

implemented as appropriate. A summary of these approaches is given in this section. These approaches include:

- Minimise emergency discharge for sewage pumping stations in Siu Ho Wan;
- Integrating wind and visual corridors;
- Adopting a terraced podium;
- Adopting self-protecting building design;
- Adopting curvilinear layout;
- Enhancing facade treatment at the Southern facade;
- Reducing traffic on podium level;
- Provision of a comfortable walking environment for pedestrians;
- Adopting Sustainable Building Design; and
- Minimisation of in-situ concreting.

14.3.2 Minimise Emergency Discharge for Sewage Pumping Stations in Siu Ho Wan

14.3.2.1 As discussed in **Section 6**, in order to address the unlikely event of operational failure of the sewage pumping stations (SPSs), direct emergency discharge would be prevented by adopting adequate emergency measures so as to avoid direct discharge of sewage into the marine waters on ecological sensitive receivers and their habitats, and also fisheries resources. Considering the following measures would be implemented, chances of emergency discharge from the proposed SPSs are minimised. The measures would be implemented for SPS include:

- 100% standby pumping capacity within each SPS, with spare pump up to 50% pumping capacity stockpiled in each SPS for any emergency use;
- dual-feed power supply for each SPS;
- emergency storage tank providing up to 3-hours ADWF capacity at the ultimate SPS. This emergency storage will be provided adjacent to the wet well chamber. The inlet of the emergency storage will be at the same level as the invert level of incoming pipe of wet well chamber. It is noted that this emergency storage will be provided at the ultimate SPS located at ground level of the eastern end of the proposed development and will consider all sewage flow from the development;
- Monitoring and Control System (MACS) providing real-time notification of alert signal in emergency situation;
- Project Proponent's term contractor to provide 24-7 emergency repair service in the case of emergency situation; and

- Qualified personnel appointed by the Project Proponent carrying out regular inspection, routine maintenance and repairing of the facilities and equipment.

14.3.2.2 The above measures are considered to be the most appropriate for the proposed sewerage system. Based on the respective risks of pump, rising mains and power failure and the adequacy of these mitigation measures, chances of emergency discharge are minimised.

14.3.3 Integrating Wind and Visual Corridors

14.3.3.1 As discussed in **Section 2.4**, breezeways/air paths and visual corridors have been planned at strategic locations based on air ventilation and visual assessments to enhance air circulation and visual permeability. Specifically, four 30m-wide main corridors running diagonally and six horizontal NW-SE running supplementary corridors of minimum 15m-wide have been introduced across the Project to facilitate penetration of annual and summer prevailing winds above the podium. The four 30m-wide main corridors are diagonally arranged which improve the effectiveness as visual corridors for the passengers riding along the NLH. No residential tower or school would be located within the prominent corridors.

14.3.4 Adopting a Terraced Podium

14.3.4.1 The current design has also incorporated a building podium with two terraced platforms at approximately +20.1 mPD and +26.5 mPD (see **Section 2.4**). These terraced platforms would have an effect of breaking down the physical bulk, enhancing visual interest from the waterfront.

14.3.5 Adopting Self-protecting Building Design

14.3.5.1 Noise from North Lantau Highway (NLH) and Lantau Airport Railway (LAR) have been identified as the key noise sources that would affect the proposed development (see **Section 4.2**). It is proposed that self-protecting building design would be adopted for the residential blocks with their facades along the south frontage directly facing NLH and LAR. In addition, there would also be other noise control measures such as provision of canopy along the podium edge and acoustic window at certain façade locations. While these noise mitigation measures would control the noise impacts to an acceptable level for these self-protecting buildings themselves, these self-protecting buildings would also act as a noise barrier especially for those residential blocks further away from the highways and railways.

14.3.6 Adopting Curvilinear Layout

14.3.6.1 Typical 4-unit-per-floor layout of about 20m-wide has been adopted for towers along the southern site boundary facing the LAR and NLH. This would allow the opportunity for curvilinear disposition of the towers

with shorter façade length to enhance air flows and visual interest, as well as landscape treatment along the southern podium edge. The option of using other building layout, such as 6-unit-per-floor, is found to be less adaptable to the curvilinear layout and building separation.

14.3.7 Enhancing Facade Treatment at the Southern Facade

14.3.7.1 During the study on landscape and visual impact assessment, the southern facade of the self-protecting residential buildings fronting Lantau North (Extension) Country Park presents an interesting opportunity for facade treatment. The flexibility to use a combination of solid and void (glazing) articulation would open up an opportunity for interesting facade treatment. A range of façade treatments could also be considered during detailed design to alleviate the potential adverse visual impact to the visually sensitive receptors from the south.

14.3.8 Reducing Traffic on Podium Level

14.3.8.1 To create a pleasant environment for walking on podium deck with reduced roadside air and noise pollution, the topside development would be designed in a way that the traffic is mainly contained under the podium deck such that less traffic would take place on podium deck.

14.3.9 Provision of a Comfortable Walking Environment for Pedestrians

14.3.9.1 All-weather pedestrian links would be provided on podium and podium deck levels of the proposed development. Internal cycle track network would also be provided primarily at the podium deck level. These facilities would create a comfortable walking environment for pedestrians and would encourage walking and cycling within the proposed development.

14.3.10 Adopting Sustainable Building Design

14.3.10.1 The proposed development would follow the Building Department's Sustainable Building Design (SBD) Guidelines. The Project would also apply for registration of the Building Environmental Assessment Method (BEAM) Plus certification in the detailed design stage. The opportunities for provision of environmentally friendly measures such as food waste recycling and electrical charging facilities for electric vehicles would also be explored in the detailed design stage.

14.3.11 Minimisation of In-situ Concreting

14.3.11.1 As discussed in **Section 2**, precast method would be adopted as far as practicable instead of in-situ concreting for construction of the Proposed Development to reduce construction duration and on-site

activities, thereby minimising the associated dust and noise impacts, as well as the generation of construction and demolition (C&D) materials.

14.4 Summary of Key Environmental Problems Avoided and Sensitive Areas Protected

14.4.1.1 Sections 14.2 and 14.3 have summarised the key approaches adopted in the current proposal to avoid current proposed scheme to avoid, minimise and mitigate environmental impacts. Some of these approaches have contributed to avoid a number of environmental issues and to protect a number of environmental sensitive areas. The following table presents the key environmental problems that have been avoided and any sensitive areas protected by these approaches.

Table 14.1 Key environmental problems avoided and sensitive areas protected

Design Approach	Key Environmental Problems Avoided, Sensitive Areas Protected & Environmental Outcomes Achieved
Avoidance of reclamation and marine works (Section 14.2.2)	<ul style="list-style-type: none"> Adverse direct impacts on marine ecology and fisheries would be avoided
Avoidance of habitat loss and encroachment onto recognised sites of conservation importance (Section 14.2.3)	<ul style="list-style-type: none"> Direct impacts onto recognised sites of conservation importance such as Lantau North (Extension) Country Park, Tai Ho EIS, Tai Ho SSSI, Tai Ho Priority Site, Coastal Protection Area and Conservation Area, The Brothers Marine Park and the proposed marine park under the Expansion of HKIA into 3RS project would be avoided
Avoidance of encroachment onto the SHWWTW's CZ (Section 14.2.4)	<ul style="list-style-type: none"> Increase in hazard to life would be avoided to the maximum practical extent
Avoidance of concrete batching plant (Section 14.2.5)	<ul style="list-style-type: none"> Dust and noise emissions due to concrete batching plant would be avoided
Avoidance of impacts from aircraft noise (Section 14.2.6)	<ul style="list-style-type: none"> Aircraft noise impacts on the proposed development would be acceptable
Minimisation of emergency discharge (Section 14.3.2)	<ul style="list-style-type: none"> Emergency discharge to neighbouring water bodies in the vicinity would be minimised
Integration of wind and visual corridors in the Conceptual Master Plan (Section 14.3.3)	<ul style="list-style-type: none"> Wind circulation would be enhanced and potential visual impacts would be ameliorated

Design Approach	Key Environmental Problems Avoided, Sensitive Areas Protected & Environmental Outcomes Achieved
Adopting a terraced podium (Section 14.3.4)	<ul style="list-style-type: none"> The physical bulk would be broken down by the terraced podium and the visual interest from the waterfront would be enhanced
Adopting self-protecting building designs (Section 14.3.5)	<ul style="list-style-type: none"> The noise from the highways and railways would be blocked by the self-protecting building design
Adopting curvilinear layout (Section 14.3.6)	<ul style="list-style-type: none"> Visual permeability would be enhanced in comparison with the linear layout
Facade treatment at the southern facade (Section 14.3.7)	<ul style="list-style-type: none"> Visual impacts would be enhanced by a combination of facade treatment methods
Reducing traffic on podium level (Section 14.3.8)	<ul style="list-style-type: none"> With reduced traffic, traffic noise and vehicular emissions on the podium level would be minimised to the maximum practical extent
Provision of a comfortable walking environment for pedestrians (Section 14.3.9)	<ul style="list-style-type: none"> Provision of all-weather pedestrian links at both podium deck and podium levels of the Project to provide a comfortable walking environment to minimize reliance on road transport
Adopting Sustainable Building design (Section 14.3.10)	<ul style="list-style-type: none"> SBD Guidelines would be made reference to. BEAM Plus certification would be applied. The elements of building sustainability in these schemes would be duly considered
Minimisation of in-situ concreting (Section 14.3.11)	<ul style="list-style-type: none"> Dust and noise impacts associated with in-situ concreting would be minimised by adopting precast method as far as practicable The generation of C&D materials would be minimized

14.5 Estimated Population Protected from Various Environmental Impacts

14.5.1.1 The proposed development has been carefully designed to protect the populations from various environmental impacts. The protected populations include the following:

- The proposed development is atop the existing Siu Ho Wan Depot (SHD). There is no existing residential population in the Subject Site.
- The Subject Site is carefully designed such that the area within the consultation zone (CZ) of SHWWTW is not planned for residential buildings and landscaped podium. Hence, there is no significant increase in hazard to life.
- With careful planning of self-protecting building design and adoption of other noise control measures such as provision of canopy and acoustic window, the noise level of all residents (approximately 37,800 population) would be controlled to an acceptable level.

14.6 Environmental Benefits of Environmental Protection Measures Recommended

14.6.1.1 In addition, mitigation measures have been recommended to further reduce the environmental impacts due to construction and operation of the Project. Key recommended mitigation measures and their associated benefits are summarised in **Table 14.2** below.

Table 14.2 Key recommended mitigation measures and their associated benefits

EIA Aspect	Key recommended mitigation measures and their associated benefits
Air quality	<ul style="list-style-type: none"> • Implementing relevant control measures as required in the Air Pollution Control (Construction Dust) Regulation to minimise dust generation • Watering once per hour on exposed worksites and haul road • Potential odour sources associated with the proposed sewage pumping station should be enclosed • Negative pressure should be maintained within the proposed sewage pumping station • Installation of deodouriser with an odour removal efficiency of at least 95% to control odour emission from ventilation exhaust of the proposed sewage pumping station • Exhaust of the deodouriser at the proposed sewage pumping station should be oriented away from sensitive receivers and vertically upwards to avoid direct facing to any sensitive receivers • Maintenance of deodouriser at the proposed sewage pumping station should be regularly conducted to ensure good condition

EIA Aspect	Key recommended mitigation measures and their associated benefits
Noise	<ul style="list-style-type: none"> • Adoption of self-protecting building design on the first layer of residential blocks along NLH to act as noise barrier for the noise from NLH and rail noise • Employing a package of direct mitigation measures including provision of acoustic window and fixed windows in some buildings and sections of canopy along the podium edge, arrangement of noise tolerant use etc. to reduce impacts from traffic and railway noise • Adoption of good site practices including use of temporary noise barrier and enclosure and using quality powered mechanical equipment (QPME) to reduce construction noise emissions at the source • Mechanical plants should be enclosed inside a building structure to mitigate impacts from fixed noise sources • Installation of silencer/ acoustic enclosure/ acoustic louver for the exhaust of ventilation system to reduce impacts of fixed noise
Water Quality	<ul style="list-style-type: none"> • Adopting good site practices in accordance to Practice Note for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94) to avoid potential adverse water quality impacts from construction site runoff • Minimise emergency discharge to neighbouring water bodies to avoid impacts on water quality.
Sewerage and sewage treatment	<ul style="list-style-type: none"> • Minimise emergency discharge to neighbouring water bodies to avoid impacts on water quality.
Waste Management	<ul style="list-style-type: none"> • Good waste management and control practices to avoid generation of excessive amount of waste materials • Good site practices to alleviate impacts related to waste management such as dust, odour and noise • Implementation of a trip-ticket system promulgated under DEVB TC(W) No. 6/2010 to monitor off-site delivery of surplus inert C&D materials and to control fly tipping • Handling of chemical wastes in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, and disposal of chemical wastes at licensed chemical waste recycling / treatment facilities to avoid potential hazard and land/ water pollution due to malpractice or chemical leakage/ spillage. • Employ reputable licensed waste collectors for disposal of general refuse to prevent potential nuisance caused by mistreating general refuse, such as windblown, vermin, water pollution and visual impact.
Land contamination	<ul style="list-style-type: none"> • The land contamination issues within existing SHD would be assessed under the SHO and SHD Replanning Works. The land would be adequately remediated (if remediation is required) before construction of SHO and SHD Replanning Works and subsequent construction works of the Project.
Ecology	<ul style="list-style-type: none"> • Good site practices in accordance to Practice Note for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94) should be implemented to avoid potential adverse water quality impacts

EIA Aspect	Key recommended mitigation measures and their associated benefits
	<ul style="list-style-type: none"> Minimise emergency discharge to neighbouring water bodies to avoid impacts on marine ecology and fisheries resources
Fisheries	<ul style="list-style-type: none"> Good site practices in accordance to Practice Note for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94) should be implemented to avoid potential adverse water quality impacts Minimise emergency discharge to neighbouring water bodies to avoid impacts on marine ecology and fisheries resources
Landscape and Visual	<ul style="list-style-type: none"> Optimisation of construction areas to ensure that the landscape and visual impacts arising from the construction activities are minimised. Provide landscape treatments to the affected trees (such as tree transplantation and compensatory planting) to mitigate adverse landscape impacts Provision of visual corridors and adopting curvilinear layout to enhance visual permeability Apply suitable facade treatments to alleviate adverse visual impacts Compensatory planting for felled trees would be provided. Trees unavoidably affected by the construction of associated utilities would be transplanted where practical. Transplantation would be conducted in accordance with DEVB TCW No.7/2015.
Hazard to Life	<ul style="list-style-type: none"> Emergency planning, training and drill for construction workers will be provided during construction phase to reduce the risk associated with any potential chlorine release from SHWWTW ^[1].

Note: [1] Emergency planning, training and drill for chlorine release from SHWWTW are considered as precautionary measures.

14.7 Environmental Enhancements Included

14.7.1.1 Other than the approaches to avoid, minimise and mitigate environmental impacts as summarised in **Section 14.2** and **Section 14.3**, a series of environmental enhancement works has also been proactively considered by the Project Proponent, as explained in the following sections.

14.7.2 A Better Interface after Development of Podium Deck

14.7.2.1 The existing Siu Ho Wan Depot (SHD) supports necessary operation and maintenance needs for TCL, AEL and DRL such as stabling tracks, workshops, and there are running / heavy maintenance facilities as well as infrastructure maintenance facilities. Parts of these existing facilities are located outdoor.

14.7.2.2 This Project would construct a podium deck under which the operation of reprovisioned SHD would be covered. The current design of the topside development atop SHD would accommodate all the essential maintenance facilities within a covered space with necessary control of silencer / acoustic louver for intake and exhaust of ventilation system.

The noise emission can be controlled within certain limit in comparison with outdoor environment.

14.7.2.3 By isolating the existing industrial interface, the Project would allow the opportunity of environmentally sensitive land uses in the vicinity.

14.7.3 Sustainable Commuting for Siu Ho Wan

14.7.3.1 A new station, Siu Ho Wan Station (SHO), would be built along the proposed topside development. This would provide a sustainable means of commuting for the community of the Project. In addition, a Public Transport Interchange (PTI) would be built in the Project, providing more options of public transports to residents and users.

14.7.3.2 SHO and the PTI would be coupled with a pedestrian-friendly environment at the podium level. Vehicles at the podium level would be reduced and walkways would be connected with cover. Residents and users of the Project would be attracted to use the public transport.

14.7.4 Creation of a Sustainable Community in North Lantau

14.7.4.1 The Project would supply residential flats as an option for the working populations in North Lantau. By reducing the needs for commuting with other parts of Hong Kong, the Project would be able to reduce resources, energy and time consumed by the community. The proposed SHO and PTI would provide means of public transport for the new community.

14.7.4.2 One of the planning concepts of the Project is provision of a comfortable walking environment for pedestrians. At the podium level, pedestrian walkways would be well connected between the SHO and facilities of the Project via covered walkways. There would also be cycling tracks in the Project. These facilities promote walking and cycling. With better connection facilities, the residential and commercial populations would be motivated to use SHO and the PTI, reducing reliance on road transport.

14.8 Summary

14.8.1.1 This chapter summarises the following: A) environmentally friendly options considered and incorporated to avoid environmental impacts (**Section 14.2**); B) environmental designs recommended to minimise and mitigate environmental impacts (**Section 14.3**); C) estimated population protected from various environmental impacts (**Section 14.5**) and; D) environmental enhancements included (**Section 14.7**). Summary tables are included in **Section 14.4** and **Section 14.6** to summarise the key environmental problems avoided and sensitive areas protected, and environmental benefits of environmental protection measures recommended respectively.