



The Government of the Hong Kong Special Administrative Region

Civil Engineering and Development Department

Sunny Bay Development

Project Profile

(prepared in accordance with
the Environmental Impact Assessment Ordinance (Cap. 499))

April 2014

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Drawing No.

Figure 1 Sunny Bay Development – Location of Project

1. BASIC INFORMATION

1.1 Project Title

1.1.1 Sunny Bay Development (hereinafter named as the Project)

1.2 Purpose and Nature of the Project

Northshore Lantau Development Feasibility Study

1.2.1 North-east Lantau, covering Sunny Bay, was previously planned primarily for port facilities based on the 1989 Port and Airport Development Strategy Study. The Northshore Lantau Development Feasibility Study (NLDFS) commissioned in 1998 comprehensively reviewed the land use potential of north-east Lantau. NLDFS recommended that north-east Lantau should be developed as a major tourism area, with an international theme park at Penny's Bay as a focus and compatible tourism and recreational uses in the vicinity. The North-east Lantau Outline Zoning Plan (hereinafter referred as NEL OZP) has been revised to take into account NLDFS's recommendations where appropriate. Part of the Sunny Bay development is zoned "Undetermined" on NEL OZP with the indication in the Explanatory Statement to the NEL OZP has explained that the area is intended for tourism and recreation related developments complementary to the international theme park in Penny's Bay.

The Revised Concept Plan for Lantau 2007

1.2.2 The Revised Concept Plan for Lantau, published in 2007, affirms the proposed leisure and entertainment node at Sunny Bay. The proposed leisure and entertainment node is regarded as a long-term proposal to make use of the synergy effect with Hong Kong Disneyland and other tourism developments in North Lantau in the Revised Concept Plan. The planning intention is to provide in the area a cluster of entertainment, leisure and tourist facilities.

Increasing Land Supply through Reclamation outside Victoria Harbour

1.2.3 A study for identifying suitable locations for reclamation outside Victoria Harbour in Hong Kong as one of the possible means to increase the Land Supply in Hong Kong was conducted as part of the Agreement No. CE 9/2011 (CE) - "Increasing Land Supply by Reclamation and Rock Cavern Development cum Public Engagement – Feasibility Study", undertaken by Civil Engineering and Development Department (CEDD) which commenced in 2011. After a territory-wide site search, site longlisting and shortlisting exercises with consideration of the site selection criteria established after public engagement and the results of broad technical assessments and environmental assessments under

the study, Sunny Bay was shortlisted as one of the five potential near shore reclamation sites.

Reprovisioning of Government Flying Service (GFS) Helicopter Base

1.2.4 With a view to eliminating the development constraints imposed by the existing GFS's helicopter flight path alongside the shoreline of northern Lantau hence unleashing the development potential of the region including Tung Chung New Town Extension, a study for relocation of the GFS helicopter base at Hong Kong International Airport (HKIA) was conducted as part of Agreement No. CE 32/2011 (CE) - "Planning and Engineering Study on the Remaining Development in Tung Chung - Feasibility Study", undertaken jointly by CEDD and Planning Department. In this study, Sunny Bay was identified as a potential relocation site for further engineering and environmental studies.

1.2.5 Against the above background, the Project, including the necessary engineering and environmental assessments, and associated site investigation works, would be conducted to examine the future land uses and the potential of developing Sunny Bay for tourism, entertainment and leisure uses. The Project will also explore the technical and engineering feasibility of relocation of the GFS helicopter base away from the HKIA.

1.3 Name of Project Proponent

1.3.1 The Project Proponent is Port Works Division (PWD), Civil Engineering Office, Civil Engineering and Development Department (CEDD) of the Government of the Hong Kong Special Administrative Region.

1.4 Location and Scale of Project and History of Site

1.4.1 The tentative potential development area (PDA) of the Project including the approximate extent of the reclamation (about 80 hectares) and the adjoining land-based areas (about 20 hectares) are shown in **Figure No. 1**. It should be emphasised that the extent of the reclamation and the adjoining land-based areas under Sunny Bay Development are tentative and indicative only, subject to the outcome of the EIA study.

1.4.2 Part of the PDA falls within the boundaries of the NEL OZP No. S/I-NEL/12 and is zoned "Undetermined". According to the Explanatory Statement of the NEL OZP, the "Undetermined" zone covering areas adjacent to the Sunny Bay MTR Station, Tsing Chau Wan and To Kau Wan can be considered for compatible tourism and recreational uses, subject to further study.

1.5 Number and Types of Designated Projects to be Covered by the Project Profile

1.5.1 In terms of the indicative reclamation scale as stated in paragraph 1.4.1 above, the Project falls within the definition of the Item 1 of Schedule 3 under Environmental Impact Assessment Ordinance (EIAO), i.e. "engineering feasibility study of urban development projects with a study area covering more than 20 hectares or involving a total population of more than 100 000", The Project is a Designated Project requiring an EIA report.

1.5.2 The Project may also consist of various Schedule 2 Designated Projects under the EIAO that may be identified in the course of the EIA study. The following elements of the Project, which are not exhaustive and are identified as Schedule 2 Designated Projects, are also included in this Project Profile:-

- (i) Construction of primary distributor roads and district distributor roads [under Schedule 2, Part I, A.1];
- (ii) Reclamation works (including associated dredging works) more than 5 ha in size [under Schedule 2, Part I, C.1];
- (iii) Possible dredging operation exceeding 500,000m³ [under Schedule 2, Part I, C.12];
- (iv) Construction of a sewage pumping station with an installed capacity of more than 2,000 m³ per day [under Schedule 2, Part I, F.3];
- (v) Construction of a sewage treatment works with an installed capacity of more than 5,000 m³ per day [under Schedule 2, Part I, F.2(b)]; and
- (vi) Construction of a submarine sewage outfall [under Schedule 2, Part I, F.6].

1.6 Name and Telephone Number of Contact Person

1.6.1 All enquiries regarding the Project can be addressed to:

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2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Project Implementation

2.1.1 It is proposed to implement the Project by employing consultants to undertake the planning and engineering (P&E) feasibility study, preliminary design, detailed design, tender and supervision of construction phase of the Project.

2.1.2 The construction works of the proposed reclamation/land formation and infrastructure works to serve the Project will be carried out in phases by contractors to be appointed under various works contracts.

2.2 Project Timetable

2.2.1 The P&E feasibility study is scheduled to commence in the third quarter of 2014 for completion within a study period of about 24 months. The reclamation development will be implemented in phases tentatively, and the outline implementation programme of the possible developments and infrastructure including the potential re-provisioning of GFS helicopter base at Sunny Bay will be determined in the P&E study. Detailed design of the works under the Project will follow.

2.3 Interactions with Other Projects

Potential projects that would have interface with the Project have been identified and are listed below. Some of these projects are under planning or implementation has yet to be approved. This list should be revisited during the subject EIA study to ensure all the latest projects available from the respective stakeholders are incorporated. Any cumulative impacts from these concurrent projects during both construction and operational phases of the Project, including but not limited to the following, would need to be identified and addressed as appropriate.

1. Tung Chung New Town Extension – The Remaining Development in Tung Chung
2. Increasing Land Supply through Reclamation outside Victoria Harbour, in particular the identified potential near shore reclamation sites
3. Cumulative Environmental Impact Assessment Study for the Three Potential Nearshore Reclamation Sites in the Western Waters of Hong Kong
4. Dredging, Management and Capping of Contaminated Sediment Disposal Facility to the South of The Brothers
5. Construction of additional sewage rising mains and rehabilitation of the existing sewage rising main between Tung Chung and Siu Ho Wan

6. Salt water supply for Tung Chung, Lantau
7. Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facilities (HZMB HKBCF, being constructed)
8. Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road (HZMB HKLR, being constructed)
9. Tuen Mun - Chek Lap Kok Link (TM-CLKL)
10. Marine Park in the Brothers Islands
11. Proposed New Contaminated Mud Marine Disposal Facility at Airport East / East Sha Chau Area
12. Siu Ho Wan Water Treatment Works Extension
13. Upgrading works for North Lantau Refuse Transfer Station
14. Organic Waste Treatment Facilities Phase 1
15. Possible Lantau Logistics Park
16. Integration of Siu Ho Wan and Silver Mine Bay Water Treatment Works
17. Expansion of Hong Kong International Airport into a Three-Runway System under planning
18. Further Landscape Enhancement to North Lantau Highway
19. All the planned and committed public housing developments in Tung Chung Area
20. Preliminary feasibility study for Container Terminal 10 at Southwest Tsing Yi
21. Greening Master Plans for New Territories South West – Investigation, Design and Construction
22. Route 10 – North Lantau to Yuen Long Highway, North Lantau to Tsing Lung Tau Section
23. Possible development of Integrated Waste Management Facilities in Pa Tau Kwu, Northeast Lantau

3. POSSIBLE IMPACTS ON THE ENVIRONMENT

3.1 Air Quality

Construction Impacts

- 3.1.1 Dust generation from the construction activities including reclamation, excavation works, backfilling, wind erosion of exposed area, temporary storage of spoil on site, transportation and handling of spoil, etc., as well as gaseous emissions from constructional plants are expected to be the major sources of impact during construction phase.

Operational Impacts

- 3.1.2 North Lantau Highway (a trunk road) and the potential Road P1¹ might be the major roads in the vicinity of the PDA. With the site developed, the traffic flow, and thus vehicular emission, may increase. Existing, planned and future air sensitive receivers (ASRs) within or near the PDA may be affected by the vehicular emission of these roads and other nearby and future distributor roads.
- 3.1.3 The chimney emission from the gas turbine plant at Penny's Bay Power Station may cause impact on future ASRs and existing/planned ASRs within or near PDA. While the power station is approximately 1800m away from the PDA, significant air quality impact is not anticipated. On the other hand, emissions generated from the operation of the potential GFS helicopter base, air pollutants emitted from passing-by marine vessels and other marine activities, odour from sewage pumping stations and sewage treatment works would need to be considered.

3.2 Noise

Construction Impacts

- 3.2.1 During construction, various construction activities such as earth filling, material lifting, concreting, piling, etc. will generate intermittent and transient noise nuisance to the nearby noise sensitive receivers (NSRs). As the reclamation and development may be carried out in phases, the potential construction noise impact on earlier completed noise sensitive land uses at Project site may have to be assessed and effective mitigation measures should be proposed.

Operational Impacts

- 3.2.2 Cumulative noise impacts including traffic noise from neighbouring roads such as North Lantau Highway, other fixed noise sources (such as rail station, sewage

¹ North-East Lantau Outline Zoning Plan No. S/I-NEL/12 and Approved EIA Study Report for Road P1 Advance Works at Yam O on Lantau Island (Register No. AEIAR-090/2005) refer.

pumping station, sewage treatment works, ventilation systems, shipyard) for day-time and night-time periods as appropriate on both nearby existing/planned NSRs and noise sensitive uses within the Project site (if any) would need to be considered where appropriate.

3.2.3 If noise sensitive land uses are proposed within the Project site, aircraft noise due to existing flight paths and the new flight paths for the planned third runway of HKIA would need to be considered.

3.2.4 The potential helicopter base located within the PDA is intended for operations of GFS. Operations are practically round the clock, whenever there is service demand. During operation, fixed noise source from maintenance activities and helicopter operation will generate noise. Helicopter noise nuisance is anticipated when helicopters are flying across and taking-off/landing. The potential helicopter noise impact will be assessed carefully with consideration on various information including helicopter flight path, helicopter type and flight frequency during the P&E study and EIA study.

3.3 Water Quality

Construction Impacts

3.3.1 Release and suspension of sediments and backfilling materials may occur during the reclamation works. When there are dredging operations, locked-up contaminants and nutrients bound inside the sediments may be released into the nearby water bodies. With the adoption of non-dredged reclamation methods and provision of adequate mitigation measures and environmental monitoring programme, the water quality impact caused to the nearby sensitive receivers such as Ma Wan fish culture zone, Yan O seagrass bed and mangrove site, gazetted and non-gazetted beaches in Tsuen Wan and Ma Wan district and the Brothers Island (Committed Marine Park) should be controllable and acceptable. For land-based works, the construction site runoff may cause blockage of drainage channels and increase the suspended solid levels, has to be studied and addressed. Sewage arising from on-site construction workforce may also cause water pollution if directly discharged into adjacent water bodies is not controlled. All the above impacts and mitigation measures will be assessed and studied in the EIA study.

3.3.2 Historically, Chinese White Dolphins (CWDs) were recorded in low densities around northeast Lantau. According to the findings of previous surveys on Chinese White Dolphins, Sunny Bay is unlikely to be a CWD hotspot and has only low and probably occasional dolphin use. However, construction phase

activities have the potential to generate water quality impacts that could affect CWD distribution and behavior in the habitat outside the reclamation area.

Operational Impacts

3.3.3 Sewage will be generated from the proposed Sunny Bay Development. The sewage arising shall be collected by a network of trunk sewer to a sewage treatment works to receive treatment before discharging it through submarine outfall into the open water tentatively off the Siu Ho Wan. If the Siu Ho Wan Sewage Treatment Works does not have capacity to cater for the sewage arising from the Project, the development shall make own provision for the collection, treatment and disposal of the sewage arising from the Project. The sewage collection, treatment and disposal infrastructure will be developed as an integral part of the essential infrastructures for supporting the Project.

3.3.4 Surface runoff from the roads, open spaces, roofs of the future developments during rainfall events is anticipated. Release of pollutants (e.g. fuel oil on the potential helicopter base if not properly controlled) carried by surface runoff into the marine water might affect the water quality if in abundant amount. Proper drainage system, designed with pollution management measures, e.g. oil interceptors, needs to be provided to avoid pollution to marine waters and water sensitive receivers (WSRs).

3.3.5 With the reclaimed land, the potential impact on hydraulic and change of hydrodynamics regime would be addressed. Tidal condition as well as the mangrove site and seagrass bed within Yan O Wan may be affected. The reclaimed land will also narrow the channels which may induce water quality impact on nearby Ma Wan Fish Culture Zone and Tsuen Wan beaches. Hydrodynamic and water quality condition would be reviewed in the EIA study.

3.4 Ecology

3.4.1 The potential terrestrial and marine ecological impacts in the vicinity of the proposed Sunny Bay development arising from the Project will be associated with:

Construction Impacts

- (i) Direct habitat loss and habitat fragmentation;
- (ii) Disturbance to wildlife and vegetation due to possible air pollution, water pollution, noise and glare, reclamation activities/related vessel traffic;
- (iii) Disturbance to ecological sensitive receivers (e.g. committed Marine Park at the Brothers, mudflat, mangroves, seagrass bed, coral communities,

- pipefish and horseshoe crabs);
- (iv) Increased sediment load;
- (v) Toxic pollutants from construction and operation;
- (vi) Temporary loss of Chinese White Dolphin (CWD) habitat due to the works areas though there is only low and probably occasional occurrence of CWD recorded in Sunny Bay in the past;
- (vii) Temporary habitat loss and habitat degradation;
- (viii) Disturbance impact on CWD due to working vessels (collisions and noise) and construction works (underwater noises);
- (ix) Soil compaction; and
- (x) Loss of artificial seawall habitat for colonization of marine fauna due to the reclamation work.

Operational Impacts

- (i) Ecological barrier;
- (ii) Potential impacts arising from change of water flow due to reclamation;
- (iii) Permanent loss of CWD habitat arising from the reclamation footprint, though there is only low and probably occasional occurrence of CWD recorded in Sunny Bay in the past;
- (iv) Change of hydrodynamic regime, erosion and sedimentation patterns;
- (v) Disturbance to wildlife due to increased human activities; and
- (vi) Disturbance to wildlife and vegetation due to possible air pollution, water pollution, noise and glare.

3.4.2 The impact on terrestrial fauna (e.g. noise, human disturbance) during the operational phase is anticipated to be low, as the vicinity of the reclamation land has already been disturbed. The associated impact will be studied in the EIA study with consideration on the planned land uses.

3.5 Fisheries

Construction Impacts

3.5.1 Reclamation works may lead to potential temporary and permanent loss of fishing ground, spawning ground, nursery ground, aquaculture site for commercial species and nearby fish culture zone. The reclamation works and associated dredging works may also cause impacts to water quality and hence fisheries due to potential increase in suspended solids concentration and deterioration of water quality. In the vicinity of the Project site, the increase in marine traffic of working vessels during construction around the original migratory route of the fishes may cause a change in their route and behaviour. There may also be

potential risk of accidental chemical spillage to the surrounding water during offshore and coastal construction, which may affect fisheries resources nearby the Project site. Potential impact due to the Project and the related changes in water quality or hydrodynamics regime on fisheries resources nearby the proposed Project site will be assessed in the EIA study.

Operational Impacts

3.5.2 During operational phase, the proposed reclamation would lead to a direct loss of fishing grounds which may affect fisheries' resources and fishing operation within and adjacent to the proposed reclamation areas. Also, disturbance to fisheries resources arising from increased human activities and possible water pollution.

3.5.3 The proposed reclamation may change the local hydrodynamic regime and affect spawning or nursery ground and aquaculture site. The fisheries resources as well as spawning or nursery grounds and aquaculture sites nearby the Project site may also be affected and the associated impact will be assessed in the EIA study.

3.6 Sediment and Waste Management

Construction Impacts

3.6.1 With the adoption of non-dredged reclamation method, very limited quantity of sediments may be dredged and disposed of.

3.6.2 Construction and demolition (C&D) materials will be generated from the site formation activities and construction of the proposed developments at the proposed sites.

3.6.3 Chemical waste generated during construction without careful and proper handling may pose environmental, health and safety hazards.

3.6.4 The construction workforce will generate general refuse comprising food scraps, waste paper, empty containers etc. The general refuse may give rise to adverse environmental impacts e.g. odour generation, windblown litter, vermin, if the waste storage areas are not properly maintained and regularly cleared.

Operational Impacts

3.6.5 Municipal, commercial and industrial waste will be generated from the future visitors and working population. The quantity of municipal, commercial and industrial waste to be generated during the operational phase of the site will depend on the future population intake and land uses in the PDA. The

management and disposal of this waste as well as the screening and sludge arising from the sewage treatment works will be assessed in the EIA study.

3.7 Cultural Heritage

3.7.1 The sites of archaeological interest, area of archaeological potential and potential offshore marine archaeological remains, which have not been investigated and/or adequately studied previously, may be affected. Construction works may result in damage to or loss of buried archaeological sites by:

- (i) Disturbance through excavation at or near a site of archaeological interest, topsoil stripping and the passage of heavy machinery on exposed and buried deposits;
- (ii) Burial of areas resulting in limitation on accessibility for future archaeological investigations (including surface survey and remote sensing technique) and obscuring visible surface evidence;
- (iii) Ground compaction due to construction activities may cause damage or distortion to buried archaeological remains;
- (iv) Impacts caused by reclamation on any remains of cultural significance buried in the seabed; and
- (v) Indirect impacts such as visual and vibration intrusion on the setting and amenity of archaeological resources.

3.7.2 The Luk Keng site of archaeological interest is located at more than 300m from the Project site. Excessive impact caused by the Project is not anticipated due to the separation by waters in between.

3.8 Landscape and Visual

3.8.1 The expected sources of landscape and visual impacts arising from the Project would include, but not limited to, the following:

Construction Phase

- (i) Loss of landscape elements, e.g. woodland, marshland/wetland, trees, small ponds and natural topography, e.g. coastal water and natural coastline;
- (ii) Loss of visual amenity through removal of landscape elements e.g. trees;
- (iii) Visual appearance of any temporary use prior to the new development;
- (iv) Construction activities on the existing available land;
- (v) Obstruction of or intrusion into views by the new development; and
- (vi) Land reclamation works and associated activities at sea.

Operational Phase

- (i) Visual intrusion and obstruction created by the new development;

- (ii) Visual quality of the new development;
- (iii) Landscape impact arising from road works and related infrastructure facilities;
- (iv) Permanent loss of landscape and visual amenity of the sea and natural environment due to the new development; and
- (v) Narrowing the sea between Tsuen Wan Tsing Lung Tau and North Lantau due to reclamation.

3.9 Land Contamination

3.9.1 Since the majority of Project site would be formed by reclamation, it is unlikely to have land contamination impact for the pre-construction phase. The possibility of land contamination for the adjoining land-based area, in particular the existing shipyard, would be further examined.

3.10 Potential Hazard

3.10.1 It is not intended to have any Potential Hazardous Installations (PHI) within the PDA at Sunny Bay. For the possible maintenance and various operations of helicopters due to the potential helicopter base, it is estimated that underground fuel tanks for A-1 jet fuel with a total storage capacity of about 170 tonnes would be provided and small amount of dangerous goods (DG) storage would be required at the helicopter base. Bulk storage of jet fuel and DG is not anticipated, and the DG will be handled and stored in compliance with the requirements of Fire Services Department. The construction and operation of the Project is unlikely to pose significant safety issues of concern.

4. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

4.1 Existing Environment

4.1.1 The major existing and planned sensitive receivers and sensitive parts of the natural environment that may be affected by the proposed project include, but not limited to, the following:

- (i) Existing Toll Plaza of Lantau Link to the south of the site;
- (ii) Sunny Bay MTR Station;
- (iii) Sunny Bay public transport interchange and temporary car park;
- (iv) Existing shipyard operated by Yiu Lian Dockyards Ltd.;
- (v) A private mooring located to the west of the Yiu Lian Dockyards;
- (vi) A public pier and log ponds in Yan O Wan;
- (vii) Existing village type/residential developments at Luk Keng Bay, Ma Wan, Tuen Mun, So Kwun Wat, Tsing Lung Tau and Sham Tsang;

- (viii) Ma Wan Fish Culture Zone;
- (ix) Ma Wan Channel;
- (x) Site of archaeological interest such as Luk Keng Tsuen;
- (xi) Gazetted and non-gazetted beaches in Tsuen Wan, Ma Wan and Tuen Mun district;
- (xii) CWD habitat though there is only low and probably occasional occurrence of CWD recorded in Sunny Bay in the past;
- (xiii) Intertidal mudflat area at Yan O Wan supporting mangroves, seagrass, pipefish and horseshoe crab;
- (xiv) Coral community along coastline in the vicinity of the proposed reclamation site;
- (xv) Fisheries spawning ground and nursery ground at North Lantau Waters;
- (xvi) Sunny Bay (Ta Pang Po) seawater intake (pumping station);
- (xvii) Proposed Lok On Pai Salt Water Pumping Station;
- (xviii) Lantau North (Extension) Country Park, Tai Lam Country Park and sensitive areas in Tai Ho;
- (xix) Committed Marine Park at The Brothers Island;
- (xx) Hong Kong Disneyland Theme Park to the south of the site.

5. ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATIONS

5.1 General

5.1.1 The EIA study will investigate those environmental impacts (both cumulative impacts and those arising from the Project) and propose the appropriate mitigation measures with the intention that all development and infrastructure proposals recommended by the Project would be environmentally acceptable and cost effective. The residual impacts, if any, would be confined within the allowable limits. Environmental monitoring and auditing of potential impacts that may arise from implementation of the works proposed by the Project will be provided for the construction and operational phases. Subject to the findings of the EIA study, the following mitigation measures would be incorporated in the design and construction of the Project.

5.2 Air Quality

Construction Phase

5.2.1 In order to prevent adverse impacts on air quality, the control measures stipulated

in the Air Pollution Control (Construction Dust) Regulations should be implemented wherever applicable, to limit the dust emissions from the site. Subject to investigation, the following mitigation measures will be considered during construction period to minimize impacts on air quality on nearby ASRs.

- (i) Any vehicles/marine vessels with an open load compartment used for transferring dusty materials off-site will be properly fitted with side and tail boards and cover;
- (ii) Stockpiles of sand and aggregate will be enclosed on three sides and water sprays will be used to dampen stored materials and when receiving raw material;
- (iii) The site will be frequently cleaned and watered to minimise fugitive dust emissions;
- (iv) In the process of material handling, any material which has the potential to create dust will be treated with water or sprayed with a wetting agent where practicable;
- (v) Implementation of wheel washing facilities at access roads into and out of construction sites; and
- (vi) Speed control of vehicles on-site.

Operational Phase

5.2.2 Subject to investigation, the proposed mitigation measures to improve the air quality within the possible developments and infrastructure are to be considered as follows :

- (i) Well planning of building layout such as adequate buffer distance is recommended to separate the ASRs and roads;
- (ii) Building height restriction may be needed subject to detailed modeling; and
- (iii) Odour control measures such as covering the odour sources, installing odour scrubber and locating ASRs away from odour sources, is recommended if any new sewage pumping stations or sewage treatment works are proposed. If the Siu Ho Wan Sewage Treatment Works requires extension, additional deodourizers may be required.

5.3 Noise

Construction Phase

5.3.1 Subject to investigation, the following measures will be considered during construction period to minimize construction noise impacts on nearby NSRs.

- (i) Use of quieter powered mechanical equipment and plant, and/or fitted with muffler/silencers/sound reduction devices;
- (ii) Provision of temporary noise barrier and enclosure where practicable;
- (iii) Noise screening structures or purpose-built noise barriers will be provided along the site boundary to provide additional protection to NSRs nearby;
- (iv) Good site practices will be implemented as effective noise mitigation measures. These will include, but not limited to, locating noisy equipment and activities as far from NSRs as practical, scheduling noisy activities to minimise exposure of nearby NSRs to high levels of construction noise, limiting the use and number of equipment operating close to the NSRs, proper maintenance of construction plant and devising methods of working to minimise noise impacts on the surrounding environment; and
- (v) Travelling route of the construction vehicles on public roads should be planned as far as practicable in a way to minimize the noise impacts to NSRs.

Operational Phase

5.3.2 In order to minimize the impacts arising from the Project on the nearby existing / planned NSRs, the following mitigation measures are to be considered :

- (i) For road noise, the use of direct noise mitigation measures such as noise barriers along roads as appropriate.
- (ii) For fixed noise sources, careful siting of noisy machinery within the site; by enclosing the noisy machinery within building structures; by use of acoustic louver, silencer for ventilating fan, acoustic door and absorptive wall lining; and any opening of the building to be located facing away from any NSRs.
- (iii) Mitigation will include optimized location of the helicopter base and flight paths to minimize the noise impact of helicopter operation on sensitive uses.

5.3.3 In case noise sensitive uses within the Project site are proposed, the following mitigation measures and appropriate building design would be considered:

- (i) Proper arrangement of land uses and the use of direct noise mitigation

measures such as noise barriers along roads as appropriate, and the use of special building design including noise insulation as appropriate;

- (ii) In consideration that the proposed reclamation site is only about 50m from North Lantau Highway, sufficient buffer distance (300m without screening) between proposed NSRs and North Lantau Highway; and
- (iii) Avoid putting noise sensitive land uses in the portion of the PDA falling inside the NEF 25 contour.

5.4 Water Quality

Construction Phase

5.4.1 In order to prevent adverse impacts on water quality, the following general mitigation measures would be put in place where appropriate.

- (i) Non-dredged reclamation method is recommended. In case limited dredging is required, installation of silt curtain to control the dispersion of suspended solids;
- (ii) Reclamation boundary would be surrounded by cofferdam type seawall to minimise the sediment plume generated by the associated excavation and backfilling works disperse to nearby waters;
- (iii) Provision of adequate construction site drainage according to the established good practices;
- (iv) All runoffs arising from the construction site should be properly collected and treated to ensure the effluent comply with Water Pollution Control Ordinance. Silt trap and oil interceptor will be provided to remove the oil, lubricants, grease, silt, grit and debris from the wastewater before being pumped to the public stormwater drainage system. The silt traps and oil interceptors will be cleaned and maintained regularly;
- (v) Minimisation of the impacts of concrete washings, use of infiltration/sedimentation pits to settle out the washings before treatment/re-use/discharge, and adoption of treatment units with pH adjustment if necessary; and
- (vi) For bore piling operations, the resulting suspension will be settled in sedimentation/infiltration pit until supernatant is clear and the bentonite solids will be disposed appropriately.

Operational Phase

5.4.2 The following mitigation measures are to be considered:

- (i) Provision of sand/silt and oil/grease traps, porous pavements and detention ponds at suitable locations to prevent ingress of pollutants to the

stormwater system;

- (ii) Adopting proper sewerage system to treat sewage flows from the possible developments;
- (iii) Construction of drainage works to prevent increased risk of flooding; and
- (iv) Adopting streamlined coastline along the reclamation to reduce stagnant region and interference with the marine flow.

5.5 Ecology

Construction Phase

5.5.1 The mitigation measures that are to be implemented to minimize the impacts on air quality, noise and water quality will also help to minimize any impacts on ecological resources.

5.5.2 As regards ecological impact, the best mitigation is avoidance and will be used wherever possible. For impact which is considered unavoidable, mitigation measures will be adopted to minimize such impact, e.g. translocation of important species, confining works in specific area/season, minimizing reclamation size, avoiding percussive piling, alternative design/construction methods such as non-dredged reclamation, good site practices etc. Compensation will be provided for the loss of important species or habitats, if any.

5.5.3 For potential impact on CWD, additional measures can be implemented during construction phase to mitigate the possible noise disturbance and other impacts though there is only low and probably occasional occurrence of CWD recorded in Sunny Bay in the past. A range of mitigation measures in relatively standard use, such as dolphin exclusion zone and silt curtains described below will be considered where necessary for land formation and construction works. Also, operation speed of construction vessels will be controlled to avoid any accidental collision with CWDs.

- (i) **Dolphin Exclusion Zone:** A monitored exclusion zone with a diameter of up to several hundred meters can be set up around marine works area for reducing chances of any adverse impact on dolphins. The exclusion zone will be closely monitored in such a way that if dolphins are observed, marine works will be delayed until dolphins have left the exclusion zone.
- (ii) **Silt Curtains:** To avoid the spread of suspended solids which will be re-suspended back into the water column during marine works, silt curtains can be used around work areas or locally around the operating

equipment wherever necessary

Operational Phase

5.5.4 Implementation of water pollution control measures described in Section 5.4 will minimise the potential ecological impact on marine wildlife during the operational phase of the Project.

5.6 Fisheries

Construction Phase

5.6.1 Subject to investigation, the mitigation measures on water quality impact proposed in Section 5.4.1 will be considered to minimise the impact on fisheries.

Operational Phase

5.6.2 Mitigation measures to minimize the environmental impact on fisheries resources include the following:

- (i) The loss of intertidal habitats (artificial and rocky shores) and seabed could be compensated through the provision of ecologically-friendly designed seawalls. In the waters of Sunny Bay, hard bottom substrate is limiting as most substrates are large open expanses of soft mud or muddy sands. This limits hard substrate available for colonising sessile organisms. The provision of ecology-friendly designed seawalls would provide opportunities for sessile organisms colonise and increase the diversity and heterogeneity of the seawalls thereby increasing habitat quality for other species such as juvenile fish and shrimp; and
- (ii) Water quality and ecology impact mitigation measures proposed in Sections 5.4 and 5.5.

5.7 Sediment and Waste Management

Construction Phase

5.7.1 The following mitigation measures will be considered during the construction phase to minimize waste generation and provide good control on waste management.

- (i) Good site practice and implementation of Waste Management Plan will be adopted to minimize any potential waste impacts;
- (ii) Careful design, planning and good site management to encourage on-site sorting of C&D materials and minimize their generation during the course of construction;

- (iii) Chemical waste will be properly stored and transported off-site for treatment by a licensed collector;
- (iv) Refuse will need to be stored in enclosed bins and reputable waste collector should be employed to remove the generated refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts;
- (v) A recording system for the amount of wastes generated, recycled and disposed;
- (vi) A Waste Management Plan (WMP) shall be prepared and this WMP shall be submitted to the Engineer for approval;
- (vii) Use of reusable non-timber formwork to reduce the amount of C&D material; and
- (viii) Proper storage and site practices to minimise the potential for damage or contamination of construction materials.

Operational Phase

5.7.2 Proper collection, transfer and disposal system will be considered and provided to deal with the municipal wastes, including the sewerage screening and sludge generated during the operational phase of the Project.

5.8 Cultural Heritage

5.8.1 Since the reclamation will cause direct loss or disturbance to the seabed, marine archaeological investigation at EIA stage will be required to ascertain the archaeological value of the affected seabed. If any archaeological material is found, detailed evaluation will need to be conducted and practical mitigation measures, i.e. preservation in totality with sufficient buffer distance etc., agreed with Antiquities and Monuments Office (AMO), to be implemented to rescue the archaeological remains.

5.9 Landscape and Visual

5.9.1 Subject to investigation, the following measures will be considered to minimize landscape and visual impacts on nearby sensitive receivers.

- (i) Optimization of reclamation area, construction area and contractor's temporary works areas to be minimised to avoid impacts on adjacent landscape;
- (ii) Screening of works areas with hoardings with appropriate colours compatible with the surrounding area;
- (iii) Control of night-time lighting by hooding all lights and through

- minimisation of night working periods;
- (iv) Sensible control of development height;
- (v) Sensitive and innovative architectural design, chromatic and facade treatment of new buildings;
- (vi) Tree and shrub planting to provide adequate greening and mitigation, and minimise visual impact of the development;
- (vii) Sensitive landscape design of reclamation edge with attractive landscape treatments and incorporation of coastal vegetation into seawalls;
- (viii) Incorporation of green roofs and vertical greening where feasible to mitigate visual impacts of buildings and structures;
- (ix) Reduction of construction period to minimum and introduction of phasing of the construction stage; and
- (x) Construction traffic (land and sea) should be kept to a minimum.

5.10 Land Contamination

5.10.1 Subject to EIA findings, the following mitigation measures will be considered during the construction phase to minimise any potential exposure to contaminated soils or groundwater:

- (i) Site workers should wear gloves, masks and other protective clothing where exposure to vapour or contaminated soil may be encountered.
- (ii) Contaminated materials should be removed with bulk earth movers to prevent human contact.
- (iii) Adequate washing facilities should be provided and smoking/eating should be prohibited in the area.
- (iv) Any contaminated sediments that may need stockpiling or need to be transported should be covered with tarpaulin.
- (v) Leakage of pollutants or leaching from excavated soil should be prevented by storing on an impermeable surface.
- (vi) Only licensed waste hauliers should be used to collect and transport any contaminated material to an appropriate disposal site and procedures should be developed to ensure that illegal disposal of wastes does not occur.
- (vii) The necessary waste disposal permits should be obtained, as required, from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354), as required.
- (viii) Land use planning to avoid putting sensitive uses on contamination hotspots, on-site or off-site treatment of the contaminated soil shall also be considered.

5.11 Severity, Distribution and Duration of Environmental Effects and Further Implications

5.11.1 Based on the findings of assessments, effective control and mitigation measures will be deployed to ensure the impacts will be limited to the acceptable level. The possible severity, distribution and duration of environmental effects such as beneficial and adverse effects; short and long term effects; secondary and induced effects; cumulative effects and transboundary effects will be considered and addressed in the EIA, where applicable. The key results from community consultation etc should also be documented in the EIA report.

6. USE OF PREVIOUSLY APPROVED EIA REPORTS

6.1.1 There are no relevant EIA reports already approved under the EIA Ordinance. However, the following studies are relevant and will be referred to in the subsequent EIA study:

Item	Register No.	Title
(i)	-	Lantau Port and Western Harbour Development Studies (1991)
(ii)	-	North Lantau Development Feasibility Study (2001)
(iii)	-	Southwest New Territories Development Strategy Review (2001)
(iv)	AEIAR-030/2000	Route 10 North Lantau to Yuen Long Highway Investigation and Preliminary Design (Southern Section)
(v)	AEIAR-032/2000	Construction of an International Theme Park in Penny's Bay of North Lantau together with its Essential Associated Infrastructures
(vi)	AEIAR-082/2004	Siu Ho Wan Water Treatment Works Extension
(vii)	AEIAR-090/2005	Approved EIA Study for Road P1 Advance Works at Yan O on Lantau Island
(viii)	AEIAR-087/2005	Approved EIA Study for Peng Chau Helipad
(ix)	AEIAR-089/2005	Approved EIA Study for New Contaminated Mud Marine Disposal Facility at Airport East/East Sha Chau Area
(x)	AEIAR-094/2006	Approved EIA Study for Helipad at Yung Shue Wan, Lamma Island
(xi)	AEIAR-144/2009	Approved EIA Study for Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road
(xii)	AEIAR-145/2009	Approved EIA Study for Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facilities
(xiii)	AEIAR-146/2009	Approved EIA Study for Tuen Mun – Chek Lap Kok Link
(xiv)	AEIAR-158/2011	Integration of Siu Ho Wan and Silver Mine Bay Water Treatment Works

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