

8. LANTAU NORTH WEST ISLAND LANDFILL

8.1 Basic Information

Project Title

8.1.1 Lantau North West Island Landfill (LNWIL) – marine site M.3.

Nature of Project

8.1.2 The Project would form a new marine based waste disposal site in waters located within the North West Lantau (*Figure 8.1*).

8.1.3 The LNWIL would require the construction of an artificial island of approximately 230ha in size. The site would be designated as a public filling area for the receipt of inert C&D material; once the reclamation is completed, the site would be developed as a landfill for subsequent operation for the disposal of waste. Construction works would be as described in Part A; Section 3.2.

Location and Scale of Project

8.1.4 The LNWIL is located at the north west of Lantau Island, in proximity to Tai O to the east. The Hong Kong International Airport is located approximately 7km to the northeast of LNWIL.

8.1.5 Seabed levels in the vicinity of LNWIL are 7-10m below Chart Datum. There would be no need for dredging works to develop the site. Approximately 65Mcum of fill material will be required to construct the site, with a final site formation level to around +6mPD. The capacity of the landfill site would be approximately 40Mcum.

History of Site

8.1.6 The site is located within open marine waters and would be entirely formed as part of this project. Prior to the “handover” in 1997 the site area was located in Mainland PRC waters. However, post-handover the boundary of the HKSAR was extended 2-4km westward and it is in this zone that LNWIL is located.

8.1.7 There has been no previous development activity within the site area. However, geotechnical site investigations were undertaken nearby to the northeast for the Airport development works, and there is a 240m long sewage outfall from Tai O located to the east of the site.

8.1.8 A Consultancy Study to undertake an EIA for a sheltered boat anchorage at Tai O was completed in the year 2000. The project will involve construction of a 4ha boat anchorage. Associated with the anchorage there will be a breakwater and a promenade with landing on 0.3-0.4ha. reclaimed land. The project will be implemented in December 2002 through March 2005.

8.1.9 The coastal waters are of some conservation significance, although the San Chau SSSI is the only designated conservation site in the vicinity. This SSSI was designated in May 1999 due to coastal vegetation. The protection of the waters off southwest Lantau within a Marine Park / Reserve has been endorsed by the Country and Marine Parks Board.¹ Subject to further study, the boundary of the proposed Marine Park / Reserve would be in proximity to Yi O.²

Number and Types of Designated Projects Covered

8.1.10 LNWIL would qualify as a Designated Project under the five categories listed in Part A, Section 2.1.

¹ AFCD (1998). Study on the Suitability of Southwest Lantau to be established as Marine Park or Marine Reserve' Commissioned by AFCD, March 1998.

² PlanD (2001). South West New Territories Development Strategy Review: Recommended Development Strategy - Final Report. July 2001.

8.2 Outline Of Planning and Implementation Programme

- 8.2.1 An outline for the planning and implementation of this site is summarised in Part A; Section 3.3 and an outline programme is shown in *Figure 8.2*. Assuming landfill operations start in 2017, LNWIL would be full during the period 2020 to 2025, depending upon the rate of waste arisings and the number of other landfills operating concurrently.
- 8.2.2 The site is currently not covered by any statutory town plans. As described in Section 3.3, Town Planning Ordinance procedures to cover the site would be required and the reclamation would need to be gazetted under the Foreshore & Sea-bed (Reclamations) Ordinance.
- 8.2.3 The LNWIL coincides with one of the sites proposed for development under the C&D Materials Study. It is also immediately to the south of an area proposed under the *Port Development Strategy Review* as one of four sites for a long-term container terminal. This scheme will be reviewed under the *Study for the Hong Kong Port - Master Plan 2020* that commenced in July 2002.
- 8.2.4 The Recommended Development Strategy formulated under the South West New Territories Development Strategy Review identified the potential for developing this area into a religious and recreation node, but with due regard to the conservation and protection of the natural and cultural heritage of the area. A Recommended Outline Development Plan has been developed under the *Tai O Revitalisation Study*. A boat anchorage has been proposed at Tai O to revitalise the fishing industry of the area.
- 8.2.5 AFCD has initiated a proposal to designate the waters immediately to the south of this site as a potential Marine Park. In late 1999, a Provincial Nature Reserve was designated by the Guangdong authorities outside SAR waters, to the immediate west of the site. The Reserve was designated for the protection of Chinese White Dolphin. It is proposed to upgrade this nature reserve from provincial to national status.

8.3 Possible Impacts on the Environment

- 8.3.1 Possible impacts on the environment during the construction, operation and aftercare phases of the LNWIL are outlined below. *Figure 8.1* provides details of identified sensitive receivers. The individual assessments are summarised in *Tables 8.1 and 8.2*.

Air Quality

- 8.3.2 The reclamation and landfill development has the potential to cause the following air quality impacts:
- Dust (TSP / RSP) and exhaust emissions from on-site plant during construction and operation.
 - Gaseous emissions during landfill operation and aftercare arising from non-point source emissions and gas flaring / utilisation (including emissions of methane, carbon dioxide, carbon monoxide, sulphur dioxide, nitrous oxides, etc.).
 - Odours arising during the operation of the landfill from waste decomposition and leachate treatment.
- 8.3.3 There are Air Sensitive Receivers (ASRs) found within a 500m radius from the boundary of this site. These are the Tai O Police Quarters in Tai O (Shek Tsai Po), Tai O Barracks, and village house in Nga Ying Kok, which are some 300m east of the site boundary. There are other ASRs located in Tai O and Yi O San Tsuen which are approximately 0.8km and 1.0km from the site boundary.
- 8.3.4 The LNWIL lies in an open marine area, with the existing village developments in Tai O located to the east of the site. A sheltered boat anchorage has been proposed to be constructed within Tai O Bay, and current available information indicates that the construction works will continue until end of 2003. This is unlikely to cause any cumulative air quality impacts as the boat anchorage construction will likely be completed well before any works to be commenced at this site, although a check should be carried out at the detailed study stage

to determine whether the Tai O Sheltered Boat Anchorage project construction programme has been delayed in which case there could be an overlapping of the works. Nonetheless, there are no other known developments (existing or planned) within 5km from the site that will cause any cumulative impacts. Since this site lies in an open marine area, the build up of air pollutants is not anticipated.

- 8.3.5 This is a marine site and marine vessels will be the mode of transportation for waste delivery to the site. The amount of air pollutants emission from the territory-wide waste delivery to the site will be less compared to a land based site that relies on road transport. However, the estimated cumulative distance to be travelled from the existing and planned (South East Kowloon RTS to be commissioned in 2012) marine RTSs to the site is approximately 490km. Based on the relatively large distance to be travelled, the regional air quality impacts are considered to be moderate.

Noise

- 8.3.6 The reclamation and landfill development has the potential to cause the following noise impacts:

- Construction – from dredging, tipping, piling works and general construction activities;
- Operation – from the use of fixed plant, marine vessels, waste reception area, pumping plant, possible helicopter noise etc.

- 8.3.7 There are Noise Sensitive Receivers (NSRs) found near this site. These are the Tai O Police Quarters in Tai O (Shek Tsai Po), Tai O Barracks, and village house in Nga Ying Kok, which are marginally within 300m radius east of the site boundary. There may be potential noise impacts associated with the reclamation, construction and operation of the landfill facility. Given this distance separation, noise impacts can be significantly reduced by distance attenuation. Mitigation measures requirements will need to be investigated at the later detailed design stage.

- 8.3.8 Although not anticipated at this stage, it is possible that activities could continue beyond normal working hours during the construction and operation phases. This would depend upon working arrangements for fill delivery, day-to-day landfill operations and the overall construction programme. The Area Sensitivity Rating for the NSRs in Tai O area is 'A' and so the permissible night time noise limit is 45dBA (for non-designated area under NCO). As such there may be some potential for noise impact should night time works take place. However, night time works will be governed by the Construction Noise Permit system.

- 8.3.9 Potential operational phase noise impacts would need to be considered in subsequent studies in the event that the island reclamation is used for other land uses (in addition to landfill) or a separate afteruse is developed on top of the landfill following completion of the landfilling operations. In addition, cumulative noise may result from the operation of the Tai O Sheltered Boat Anchorage development.

- 8.3.10 The site can only be accessed by marine traffic during both operation and construction phase. Noise from land based waste delivery vehicles is not a concern for this site.

Water Quality

Baseline Conditions at the Site

- 8.3.11 The site is located some 500m off the northwest coast of Lantau Island, and falls within the North Western Supplementary Water Control Zone (WCZ). The water quality in the area is influenced by the flow from the Pearl River Estuary.
- 8.3.12 Background marine water quality in the area was established using EPD routine monitoring data. Monitoring data for the year 2000 from the nearest marine station ('NM8'), some 2km northeast of the site, shows full compliance with key WQOs such as dissolved oxygen, TIN,

un-ionised ammonia and *E. Coli*.³ From recent monitoring within Tai O Bay the water quality is good, with relatively low levels of nutrients, organic pollutants and heavy metals, and high dissolved oxygen levels.⁴ The results also show the importance of tidal flushing in maintaining good water quality by diluting potential water quality pollutants.

8.3.13 The LNWIL is sheltered to the south and east by Lantau Island. During the ebb tide, the current is from the direction of the Pearl River, and flows in a southeast direction. The current changes its direction to southwest and gains in strength as it approaches the western coast of Lantau Island. During flood tide, the current originates from the southern waters of Hong Kong and flows in a reverse direction. It flows from south to north in a north-easterly direction around the site. The tidal currents at the site are strong; up to 1.5m/sec. The flood tide current is generally weaker in magnitude than the current during ebb tide.

8.3.14 No site-specific marine sediment survey has been conducted previously. EPD sediment monitoring data from station 'NS6', some 5km to the north-east, indicates that the level of all pollutants in the sediment are less than the Lower Chemical Exposure Limit (LCEL), suggesting that the sediment is uncontaminated. The sediment was deemed suitable for open sea disposal. Since no dredging has been proposed for this site, the potential for impacts associated with mud dredging is not considered significant.

Key Issues and Sensitive Receivers

8.3.15 The project has the potential to cause the following water quality impacts:

- Sediment loss to the water column during dredging / reclamation;
- Runoff with elevated levels of suspended solids from the site during landfill construction (post-reclamation); and
- Change in the hydrodynamic regime (i.e., change in flushing capacity and sediment deposition / erosion patterns).

8.3.16 A number of Water Sensitive Receivers (WSRs) are present in the vicinity of the site. These include:

- Secondary contact recreation subzone at the western shoreline of Lantau Island, from Sai Tso Wan to Sham Shek Tsuen; and
- Cooling water intake at the east of the Hong Kong International Airport apron.

8.3.17 In addition, there are a range of aquatic and inter-tidal ecological receivers within the vicinity of the site that may be sensitive to any decline or change in the water quality or sediment deposition / erosion patterns. Impacts upon these are discussed under the ecology and fisheries subsections. The sensitive receivers include:

- Mangrove stands along Tai O Creek (including mangrove habitat creation / enhancement proposals);
- Horseshoe Crab habitat near Tai O South and North;
- The proposed Marine Parks at South-west Lantau and at Soko Island;
- The Sha Chau and Lung Kwu Chau Marine Park; and
- Fishing activities

8.3.18 The site also coincides with habitat of the Indo-Pacific Humpbacked (Chinese White) Dolphin, *Sousa chinensis*. Dolphin activity is concentrated in marine waters around the Lung Kwu Chau and Sha Chau Marine Park. The locations and uses of these sensitive receivers are shown in *Figure 8.1*.

³ EPD, Marine Water Quality in Hong Kong for 2000, (EPD 2000)

⁴ Scott Wilson (Hong Kong) Ltd (2000). Tai O Sheltered Boat Anchorage Environmental Impact Assessment - Final Report. For CED, HKSAR Government.

Reclamation and Site Formation

- 8.3.19 Based on the preliminary engineering design, no dredging of sediment is proposed for NWLIL. This significantly reduces the extent of any sediment plume likely to be generated and eliminates any pollutant releases to the water column as a result of dredging work. The placement of fill for island construction may still lead to increases in suspended solid levels and reduced dissolved oxygen.
- 8.3.20 Given the strength and current direction at the site, the WSR's most exposed to potential impacts from suspended sediment is the secondary contact recreation subzone between Sai Tso Wan and to Sham Shek Tsuen. During Phase 1 construction, marginal compliance with the WQO level increase (30%) was predicted at HC2 (29.23%) to the west of Hung Fai Shek in the dry season. HC3, the Horseshoe Crab area to the North of Tai O, also was predicted to suffer high SS Level (21.23%), although it complied with WQO. During Phase 2 construction, WQO exceedance is predicted during the dry season (40.24%) at HC2 whilst the wet season would remain marginally compliance (24.15%). Predictions for HC3 indicate that the SS levels in this location would remain marginally compliance during the dry season (24.93%). During Phase 3 construction, WQO exceedance is predicted at HC2 during the dry season (53.25%) and wet season (31.29%) and at HC3 (31.18%) during the dry season.

Hydrodynamic and Water Quality Impacts Following Island Formation

- 8.3.21 The presence of an artificial island could locally affect the flow regime in the area. The hydrodynamic and water quality modelling did not predict any obvious difference in the momentary flow between the baseline and operational scenarios for either the wet or dry season. There is also no significant change predicted in the accumulated flow for the East or West Lamma Channels. For the Tathong Channel, however, an increase in accumulated flow of 16.69% is predicted for the wet season. In addition, the modelling predicts that a significant increase in velocity (94% on average) may occur between Tai O Bay and the island. However, the velocity is predicted to decrease further to the north (14% on average).
- 8.3.22 From the previous studies, it is known that Tai O Bay receives pollutants from various sources including the treated wastewater discharges from the Kau San Tei sewage treatment facility, sewage discharges from Tai O village and from vessels that operate in the area. A reduction in water circulation and flushing in the bay area may increase the residence time for potential water quality parameters such as BOD and *E.coli*.
- 8.3.23 In the water quality and hydrodynamic modelling, 5 sensitive receivers that are close to the site were selected for presentation. Of the 5 chosen indicator points, 2 are located in Mainland waters (WD2 and WD3) and 3 in the North Western Supplementary WCZ (HC2, HC3 and MP13).
- 8.3.24 According to the dry season water quality modelling results, the predicted 90%ile DO for depth average and bottom layer ranged from 6.62 to 7.18mg/L and 6.59 to 6.94mg/L respectively which complied with the WQOs of ≥ 4 mg/L for depth averaged DO and ≥ 2 mg/L for bottom layer DO as well as the Mainland sea water quality standard of >6 mg/L. Compared to the baseline water quality results, the percentage differences in DO caused by the presence of the island were minimal (less than 1%).
- 8.3.25 The predicted average dry season salinity ranged from 30.12 to 33.10ppt. The differences in salinity levels caused by the presence of the island were minimal (less than 1%) at all the selected indicator points as compared to the WQO requirements that change due to any waste discharge should not exceed 10% of natural ambient level.
- 8.3.26 The predicted dry season SS levels at the indicator points were in the range of 5.19 to 8.85mg/L. The island would increase the SS levels at MP13, HC3, HC2 and WD2 by 1.37%, 1.11%, 0.72% and 0.36% respectively. Compared to the WQO requirement that any waste discharge should not raise the natural ambient level by 30% as well as the Mainland standard that man-made increment should not exceed 10mg/L, these differences are considered very small.

- 8.3.27 The average in the dry season *E.coli* levels ranged from 1 to 4count/100mL which are well within the WQO of 610cfu/100mL as well as the Mainland standard of 200count/100mL.
- 8.3.28 The predicted average dry season UIA (0.00263 – 0.00275mg/L) at all indicator points was very small as compared to the WQO of 0.021mg/L for annual mean. The Mainland standard of 0.02mg/L and was comparable to the wet season data.
- 8.3.29 The dry season TIN levels ranged from 0.097 to 0.173mg/L which are below the annual mean WQO for TIN of 0.3mg/L for North Western WCZ. Since the WQO for TIN is an annual mean value, the predicted mean TIN levels for both the dry and wet seasons were averaged to represent the annual mean values. The annual averaged values ranged from 0.303 to 0.420mg/L which breached the annual mean WQO of 0.3mg/L as well as the Mainland standard of 0.2mg/L. However, the averaged baseline values also exceeded the WQO.
- 8.3.30 The predicted 90%ile DO for depth average and bottom layer ranged from 4.91 to 5.07mg/L and 4.54 to 4.83mg/L respectively which complied with the WQO of ≥ 4 mg/L for depth averaged DO and ≥ 2 mg/L for bottom layer DO. The DO levels predicted at WD2 and WD3 however did not comply with the Mainland standard of > 6 mg/L. However, the baseline values for these 2 stations also exceeded the Mainland standard. Comparing to the baseline water quality results, the percentage differences in DO caused by the presence of Site M3 were insignificant (less than 2%).
- 8.3.31 According to the wet season water quality modelling results, the predicted average salinity ranged from 6.17 to 12.09ppt. The differences in salinity levels caused by the presence of the site are small (less than 3%) as compared to the WQO requirements that change due to any waste discharge should not exceed 10% of natural ambient level.
- 8.3.32 The predicted wet season SS levels at the indicator points were in the range of 9.57 to 13.57mg/L. The percentage changes were within 4% which complied with the WQO of 30% as well as the Mainland standard that man-made increment should not exceed 10mg/L.
- 8.3.33 The average wet season *E.coli* levels ranged from 1 to 6count/100mL which were well below the WQO of 610cfu/100mL as well as the Mainland standard of 200count/100mL.
- 8.3.34 The predicted average wet season UIA (0.00476 – 0.00578mg/L) at all indicator points were low and well below the WQOs of 0.021mg/L as well as the Mainland standard of 0.02mg/L. The largest derivation with the baseline scenario was at HC2 with value of 1.1%.
- 8.3.35 For the predicted wet season TIN levels, the values were relatively higher as compared to the dry season data and ranged from 0.5095 to 0.667mg/L. Compliance of the predicted values with the annual mean WQO for TIN is discussed in Section 8.3.29 above.

Cumulative Impacts

- 8.3.36 Construction of the proposed Tai O Sheltered Boat Anchorage Area is planned between December 2002 and March 2005. Even if there is a slip in the construction programme the works for the boat anchorage would be completed many years before any works are due to commence for the LNWIL. As such, construction phase cumulative impacts are not anticipated. However, the long-term cumulative impacts on the hydrodynamics and water quality within Tai O Bay could still be significant. The extent and magnitude of cumulative impacts should be considered further at the detailed EIA stage of the project.
- 8.3.37 There are also further development works proposed at Tung Chung. The ongoing Comprehensive Feasibility Study for the Tung Chung New Town Development indicates that Phase 4 would be completed around 2011, and so there is some potential for works to overlap with reclamation at the proposed island site. Whilst the water current in Tung Chung Bay / south of Chek Lap Kok area is generally weak there would be potential for any sediment arising to be flushed through the confined water "channel" between San Tau and the south airport apron towards the site.

Waste Management / Disposal Impacts

- 8.3.38 For construction of the “island” on which the landfill would be located, inert C&D material would be brought in exclusively by marine vessel, from a network of barging points in the SAR. The location of barging points would vary during the filling process, according to the source of materials at any given time.
- 8.3.39 Various options for construction have been explored for this site and it is anticipated that muds would not need to be excavated to facilitate construction of the outer seawall, prior to public filling. Upon completion of construction, the “island” would act as a major recipient of municipal solid waste and other landfilled waste streams.
- 8.3.40 Anticipated volume of materials are as follows:
- Volume of public fill that could be accepted for island construction: 65Mcum.
- 8.3.41 Various potentially polluting materials may be stored, handled and transported to / from the site. Examples include chemicals for wastewater / leachate treatment, waste oils, fuel for plant working on the site, etc. These would be managed as described in Section 5.5.
- 8.3.42 Regarding the GHG emissions, waste delivery to the LNWL will be by marine vessel which will have a lower GHG emission per kg waste handled compared to road transport given the capacity is almost 100 times larger for a marine vessel than a truck. The cumulative distance between marine RTSs and the site is around 490km as estimated in the Preliminary Marine Review (March 2002). As such, the potential impacts associated with GHG emissions (from waste transportation) are considered to be moderate.

Ecology

Baseline Conditions

- 8.3.43 The Sha Chau and Lung Kwu Chau Marine Park is approximately 7km north of the site at its closest point. The Marine Park was designated in November 1996 with the primary objective of protecting the Chinese White Dolphin *Sousa chinensis* and its habitat. The dolphin is protected under the Wild Animal Protection Ordinance, under Mainland PRC conservations law (Class I protected species) and is listed on Appendix I of CITES. Other sites of conservation importance in the area are the proposed Marine Parks / Reserves at southwest Lantau and at the Soko Islands.
- 8.3.44 The benthic community in the vicinity of the site has been investigated through field survey and was reportedly dominated by polychaete worms, with molluscs and crustaceans also abundant.⁵ Study of the benthic community in Tai O Bay compared to the offshore seabed some 6km north revealed that the density and diversity of the Tai O community was markedly lower. The benthic community in the abandoned salt pans in Tai O was dominated by the polychaetes *Mediomastus californiensis*, *Melinna* sp. and *Neanthes glandicincta*.⁶
- 8.3.45 The most significant epibenthic invertebrate to utilize the waters in the vicinity of the site is the Horseshoe Crab *Carcinoscorpius rotundicauda*. The crab can be found in the shallow sub-tidal waters of northwest Lantau, including Tai O and Yi O, and has been observed to a limited extent on muddy intertidal areas in inner Tai O Bay (*ibid.*). Other species observed at the Tai O salt pans that are representative of sheltered muddy inter-tidal zones in the HKSAR include the fiddler crabs *Uca lactea*, *U. borealis*, and *U. arcuata*; whilst the Mudskipper *Periophthalmus cantonensis* and the gastropod *Cerithidea rhizophorarum* were also abundant. A key component of the shallow water habitats in Tai O Bay is the mangrove habitat, with a variety of mangroves and associates recorded. These include *Acanthus*

⁵ Greiner Maunsell (1991). New Airport Master Plan: Environmental Impact Assessment – Final Report. For Provisional Airport Authority – Hong Kong.

⁶ Scott Wilson (Hong Kong) Ltd (2000). Tai O Sheltered Boat Anchorage Environmental Impact Assessment - Final Report. For CED, HKSAR Government.

ilicifolius, Acrostichum aureum, Aegiceras corniculatum, Avicennia marina, Bruguiera gymnorhiza, Clerodendrum inerme, Excoecaria agallocha, Hibiscus tiliaceus and Kandelia candel.

- 8.3.46 According to an AFCD Study, the LNWIL is located in the vicinity of an ecologically important spawning habitat for a number of fish species, including a number of commercially valuable species⁷. The ecological linkage with the Marine Park is such that the same range of species is expected in waters around the site. [See also 'Fisheries' sub-section below].
- 8.3.47 Other ecologically significant areas in the vicinity of the site include the Tai O Egretty that provides breeding sites for the Chinese Pond Heron, Night Heron and Little Egret. There are important wetland sites at Leung Uk marsh (habitat to the rare Rough-skinned Floating Frog) and Tai O reed-bed (one of the largest areas in the HKSAR).

Direct Habitat Loss

- 8.3.48 The site footprint covers a surface area of 230ha and is entirely sub-tidal. The benthic community in the area is comprised of a range of common species, although in more shallow coastal waters near Tai O the seabed is habitat to the Horseshoe Crab, *Carcinoscorpius rotundicauda*, which is of limited distribution in the HKSAR. It is quite possible that the range of this species in the NW Lantau area overlaps in part with that of the site footprint. Any impact on the breeding ground of this species may be reflected in ecosystem dynamics in other areas such as Tai O and Yi O.
- 8.3.49 The waters around LNWIL form part of the continuous open water habitat that is heavily used by the Chinese White Dolphin. The coastal waters around the site are also of importance to fisheries in the area.

Water Quality / Hydrodynamics

- 8.3.50 The Chinese White Dolphin that inhabits the area is native to the Pearl River Delta that is characterised by high levels of suspended sediment. Given that sediment levels are naturally high, and that the dolphins feed by echolocation, any increase in suspended solids from reclamation activities is not anticipated to lead to any significant impacts on this species. This initial assumption is supported by the output of the hydrodynamic and water quality modelling exercise, with only a marginal increase in suspended solids levels (by < 1mg/L) in the dolphin habitat to the north (WD3). Impacts on adult pelagic and particularly demersal fish would be more locally significant due to greater sensitivity to increased suspended sediment levels. As the waters are also an important spawning ground for a number of species, there is potential for a greater impact on less mobile and more physiologically sensitive juvenile fish.
- 8.3.51 Of greater potential for adverse impact is the effect of smothering and hydrodynamic change on inter-tidal habitats and the benthic community. Soft inter-tidal habitats that are most prone to sedimentation exist at Tai O and Yi O (e.g., mudflat / mangrove). The LNWIL would also be across the mouths of Tai O and Yi O bays; and in waters used by the Horseshoe Crab. The numerical model predicts a potentially significant increase in suspended solids levels in coastal waters north and south of Tai O. Suspended solids levels at the Horseshoe Crab habitat to the north (HC3) are predicted to increase by up to 2.5mg/L over baseline to around 10mg/L, whilst levels to the south (HC2) may increase by 3.5mg/L to around 11mg/L. Whilst these absolute concentrations are not great, the effects on visibility / Horseshoe Crab feeding habit are unknown.
- 8.3.52 The results of modelling do not indicate that there would be any adverse ecological effects on the potential Marine Park / Marine Reserve at Southwest Lantau from the site, or on any of the ecological receivers once the island has been constructed.

⁷ Government Environmental Resources Management (1998). Fisheries Resources and Fishing Operations in Hong Kong Waters. Report to the Agriculture and Fisheries Department, Hong Kong.

Marine Vessel Disturbance

- 8.3.53 Marine transportation of fill and construction material, and operational marine traffic all give rise for potential collision and noise disturbance with these mammals. There is potential for an increase in incidences of vessel collision with dolphins due to the inevitable increase in marine traffic required for site formation / reclamation activities. Dolphins may feasibly be attracted to the area because of temporary feeding opportunities provided by the works (i.e. disturbance of benthic fishes by the works), thus increasing the chances of collision.

Fisheries

- 8.3.54 The closest designated fishing areas to the LNWIL are Shum Wat (0017) and Sha Lo Wan (0018). "Shum Wat" is the nearest of the two areas to the LNWIL, but there is no overlap with the site. Data from the Port Survey 96/97 undertaken by AFCD shows these fishing areas to be ranked 34th and 75th for adult fish productivity (per hectare) respectively.⁸ The "catch value" ranking is almost identical (34th and 77th, respectively). As such, compared to the deduced HKSAR-wide average as shown in Table 7.1, these fishing areas – particularly Shum Wat – are "productive". Amongst the most important adult fish species caught in the Shum Wan fishing area (by weight) are: *Caranx kalla* (shrimp cad); *Argysomus spp.* (croaker); *Sardinella jussieu* (sardine); and *Trichiurus haumela* (hairtail).
- 8.3.55 With defined areas of spawning importance to the northeast and the south of Lantau, the LNWIL is located in proximity to waters beyond the immediate LNWIL footprint that are important spawning grounds for a range of commercially valuable fish and crustaceans. The species of commercial value that spawn in these waters include the fish *Leiognathus brevisrostrus*, *Lateolabrax japonicus*, *Clupanodon punctatus*, *Johnius belengeri* and the shrimp *Metapenaeus joyneri*. Commercially valuable shrimp species such as *Penaeus penicillatus* and *Metapenaeus ensis* are also found toward the Sha Chau and Lung Kwu Chau Marine Park.⁹
- 8.3.56 Given that these spawning areas fall on either side of the site, it is likely that the waters immediately around the site are also of comparable economic importance. This is supported by the fact that Tai O has a seafood industry that supports its fishing community. Some local fishermen sell their catches directly in the Tai O market while some deliver their catches to food processing companies for the production of salted fish and shrimp paste that are famous products of Tai O. Modelling results predict that there may be localised increases in suspended solids around the coastline north and south of Tai O. There is thus some potential for adverse impacts on coastal fisheries resources.
- 8.3.57 There are no fish culture zones in the vicinity of the site: the nearest being at Ma Wan off northeast Lantau.

Cultural Heritage

- 8.3.58 There is no immediate evidence of archaeological remains in this area. However the site lies adjacent to Tai O, which has recognised historical significance.
- 8.3.59 Tai O Bay is strategically located at the heart of the Hong Kong-Macau-Guangzhou triangle. As this area provides an excellent natural harbour, it has been the focus for a range of maritime activities over the years.
- 8.3.60 Archaeological discoveries indicate that the western shore of Lantau was occupied by early human settlement. A number of archaeological sites have been identified, such as the Tai O and Yi O Archaeological Sites. This also suggests that the earliest inhabitants were seafarers, making frequent landings ashore.

⁸ AFCD (1998). Port Survey 96/97. Fisheries Management Division, AFCD

⁹ AFCD (2001). Marine Parks Database: Sha Chau & Lung Kwu Chau [http://parks.afcd.gov.hk/marine/mpark/scmp.htm]

- 8.3.61 Archaeological discoveries made on Lantau show that the island has had settlements since Neolithic times. Fishing, salt making and lime burning were the three main industries of the island for many centuries. Salt production in intertidal salt lagoons at Tai O is one of the earliest industrial activities recorded in Hong Kong and there is evidence of these activities dating from the 18th Century.¹⁰
- 8.3.62 Tai O was one of the six guard stations established for land based coastal defence of Hong Kong during the Ming Dynasty. It was also a guard station during the late Ching Dynasty.
- 8.3.63 A marine archaeological investigation was carried out in 2000, in the inner harbour of Tai O under the recommendations of the Sheltered Boat Anchorage EIA, (*Ibid*) no artefacts or relics were found.
- 8.3.64 Recognising the rich history of this area and the likelihood of archaeological remains in this area, a detailed marine archaeological investigation should be carried out in any future studies.

Landscape and Visual

- 8.3.65 *Landscape Planning Designations* - this area of landscape is not covered by any planning designations reflecting landscape/landscape values and so there will be no impact on these values.
- 8.3.66 *Landscape Resources* - the site lies in a marine area, so that the only landscape resource affected will be an area of offshore water. Given the low sensitivity of this resource, there will be no significant impacts on landscape resources.
- 8.3.67 *Landscape Character* - the site is located in the Pearl River Estuary LCA on the northwestern coast of Lantau Island, adjacent to the harbour entrance of Tai O (*Figures 8.3 and 8.4*). The Pearl River Estuary LCA has a remote and exposed character, broken by frequent ferries and occasional shipping. The coastline of Lantau in this area is dramatic and natural. Scattered along the coastline are small, steep rising granitic islands.
- 8.3.68 There exists potential for substantial impacts on landscape resulting from construction/operation works that will introduce new elements that are incompatible with the existing natural landscape. The location of the island landfill will impact upon the relationship of Tai O to the Pearl River Estuary as well as substantially contrasting with the natural quality of the adjacent Lantau uplands and coastline. Upon completion of the LNWIL landfill and the commencement of the afteruse phase, these impacts are likely to be reduced somewhat, as the completed island is restored. The somewhat artificial character of the island however will still be inconsistent with the natural character of the surrounding landscape. As a consequence of this, the long-term impact on landscape character will be substantial to moderate.
- 8.3.69 *VSRs* - VSRs affected by the site are identified in *Tables 8.3 and 8.4* the extent of the project visual envelopes is shown in *Figure 8.5*.
- 8.3.70 Although not located close to any densely populated VSRs, the site will impact substantially upon the residential VSRs of Tai O, Ching Ting and Shek Tsai Po Peninsula. Recreational VSRs include users of trails on Lantau while travelling VSRs will include passengers on the Tai O and Macau ferries and passengers on aircraft using Hong Kong International Airport.
- 8.3.71 VSRs will experience works on the landfill (shipping, marine vessels, and partially constructed island) as relatively close artificial elements contrasting with the natural, coherent qualities of the existing landscape. Open views from Tai O and Shek Tsai Po will be the most notably effected with a loss of open views connecting the area to the Pearl River Delta. Resulting aggregate visual impacts will be substantial to moderate. After the restoration of the landfill, its

¹⁰ Scott Wilson (Hong Kong) Ltd (2000) Tai O Sheltered Boat Anchorage Environmental and Drainage Impact Assessment, EIA-Final Assessment Report. Civil Engineering Department, Hong Kong Government.

visual impact will be reduced to moderate to slight for more distant VSRs, while impacts will remain substantial for those such as VSRs in Tai O who are close to the site (*Figure 8.6*).

Landfill Gas

- 8.3.72 There are no sensitive receivers (targets) or pathways within 500m of the site and therefore no potential off-site landfill gas hazard. Landfill gas would have safety implications for those working on the site. In the event that the reclamation on which the landfill would be constructed is also developed for other afteruses, the potential operational phase landfill gas hazards would need to be considered for those developments.
- 8.3.73 Given the lack of any sizeable population nearby, the direct off-site use of LFG as an energy source in surrounding communities, is not considered practical. However, it will be used as an on-site energy source.

8.4 Environmental Protection Measures to be Incorporated into Design and Further Environmental Implications

- 8.4.1 Environmental design measures have been identified in Part A (Section 3.8) and generic approaches to mitigating impacts on different environmental parameters are outlined in Part A (Section 5). Whilst the specific requirement for environmental mitigation would be dependent upon the findings of an EIA, the following environmental protection measures are site-specific to LNWIL.

Air Quality

- 8.4.2 No specific air quality mitigation measures are recommended at this stage, other than good site practice as described in Part A (Section 5).

Noise

- 8.4.3 No specific noise mitigation measures are recommended at this stage, other than good site practice as described in Part A (Section 5). Night time construction works, if any, will be controlled by a Construction Noise Permit procedure.

Water Quality

- 8.4.4 Mitigation is likely to be required to prevent impacts during filling for the reclamation for the island. Construction procedures, defining the rates and method of filling taking in to account the hydrodynamics of the surrounding waters and tidal effects (ebb and flood) should be defined in the EIA. If significant impacts are predicted, a silt curtain may be installed around the immediate works area to prevent dispersion of sediments.
- 8.4.5 Where long term cumulative hydrodynamic and water quality impacts are proved to exist within the Tai O Bay, the setting and shape of the island may need to be modified in the detailed design stage.

Waste Management

- 8.4.6 No specific waste management mitigation measures are recommended at this stage, other than good site practice as described in Part A (Section 5).

Ecology

- 8.4.7 Vessel movements in the area should be reviewed to minimize disturbance of and the potential for collision with the Chinese White Dolphin population.

Fisheries

- 8.4.8 There are no special measures recommended for fisheries mitigation.

Cultural Heritage

- 8.4.9 No specific measures are recommended at this stage for the protection of cultural heritage resources.

Landscape & Visual

- 8.4.10 *Mitigation Measures* - Landscape and visual mitigation measures are outlined in Section A of the Report and are illustrated in *Figure 8.8*. Given the proximity of the site to the Hong Kong International Airport flight paths, the orientation of landscape mitigation and choice of appropriate vegetation species should be made with reference to aviation authorities at the full EIA stage.

8.5 Summary

8.5.1 A summary of the SEA for the LNWIL is provided in *Tables 8.1 and 8.2*:

Table 8.1: Lantau North West SEA

| | Impacts | Score | Commentary |
|--------------------------------------|---|-------|---|
| <i>Air Quality Assessment</i> | | | |
| 1 | Distance to areas of air sensitive land use | - | Tai O Police Quarters, Tai O Barracks, and a small number of village houses in Nga Ying Kok are within 500m of LNWIL site. |
| 2 | Presence of topographic features which could decrease or exacerbate impacts | ○ | The site does not lie within any airshed and generally experiences wind. It is unlikely that dust or odours would accumulate around the site. |
| 3 | Occurrence of meteorological conditions which could exacerbate impacts | ○ | Wind blows both towards and away from ASRs. No prevailing wind direction has been identified. |
| 4 | Cumulative Impacts of relevant emissions (TSP (construction), NO _x , CO, SO ₂ – LFG Flare) taking into account ambient conditions | ○ | The site is located in open marine waters to the south west of Hong Kong International Airport. The proposed Tai O Sheltered Boat Anchorage will be constructed in Tai O Bay and completed in Year 2003. Therefore, it is unlikely that there will be overlapping of construction works with the LNWIL. No other known developments that have relevant emissions in the site vicinity. Hence no cumulative impacts are anticipated. |
| 5 | Total Emissions of Air Pollutants from the territory-wide waste transportation between the RTSS and the site | - | Waste will be delivered to the site by marine vessel and the cumulative distance to be travelled is estimated to be 490km. |
| 6 | Overall Impact | ○ / - | Given the presence of ASRs within 500m and the potential for regional air quality impacts (due to the long distance to be travelled for waste delivery), the overall impacts are considered to be 'Neutral / Negative – Low' . |
| <i>Noise Assessment</i> | | | |
| 1 | Distance to areas of noise sensitive land use | ○ | Tai O Police Quarters, Tai O Barracks, and a small number of village houses in Nga Ying Kok are some 300m of LNWIL. At night time the BNL for these NSRs is reduced to 45dBA and there is a potential for noise impacts. |
| 2 | Topographic Features (Only applicable if there are NSRs within 300m) | ○ / - | The site is located within open marine waters. No particular features are found between NSRs and the site. However, NSRs are located marginally within 300m from site boundary. |
| 3 | Cumulative Impacts of developments within 300m | ○ / - | The proposed Tai O Sheltered Boat Anchorage will be constructed in Tai O Bay and completed in Year 2003. Therefore, it is unlikely that there will be overlapping of construction works with the LNWIL. However, there may be cumulative noise during the operational phase. |
| 4 | Overall Impact | ○ / - | 'Neutral / Negative – Low' |

| | Impacts | Score | Commentary |
|---------------------------------|--|---------|---|
| Water Quality Assessment | | | |
| 1 | Water Course Diversion | ○ | As a marine site, no watercourse diversions are required. |
| 2 | Potential for sediment contaminant release | ○ | No dredging (neither for reclamation nor seawall construction) has been proposed for this site. As such, the release of sediment bound contaminants from the dredging work is not anticipated. |
| 3 | Potential impacts on WSRs | -- | <p>Filling may result in a localised increase in suspended solids level in the water column. No dredging has been proposed and this together with placing the fill materials within a confined cell unit will reduce the extent of sediment plume.</p> <p>It is predicted that both DO and TIN standards in the operational phase would be breached, however, these were both breached in the baseline scenario and the elevations due to the presence of island were not significant, therefore, the island would not be the cause of the exceedances.</p> |
| 4 | Potential Impacts on Groundwater | ○ | As a marine site, so there are no groundwater issues. |
| 5 | Potential Cumulative Impacts (Potential for concurrent projects to exacerbate preceding impacts) | - / - - | <p>The Tai O sheltered boat anchorage development will be completed prior to the construction of LNWIL and so there is no potential for cumulative construction phase effects. However, given the close proximity of the island to Tai O Bay, there may be cumulative effects on hydrodynamics in the Bay area with associated potential for decreased flushing capacity and water quality decline.</p> <p>Further development works at Tung Chung may also contribute to water quality impacts in the area transmitted through the semi-enclosed channel between the San Tau and the south of the airport apron.</p> |
| 6 | Overall Impact | - | 'Negative – Low' . There are potential impacts on the secondary contact zone from sediment plume formation / transport along the nearby coastline. Water quality modelling predicts WQO exceedance for SS to the north and south of Tai O Village during construction. No other WQO exceedance is anticipated. |

| | Impacts | Score | Commentary |
|------------------------------------|--|--------|--|
| Waste Management Assessment | | | |
| 1 | Balance of Materials (surplus/deficit of public fill needed for landfill development) | + | The site could accommodate a major volume of public fill (65Mcum) negating the need to import filling material for site formation. This site will not require the dredging of any muds. |
| 2 | GHG emissions from mode of transport for delivery of waste to the site from RTSS | - | Waste will be delivered to the site via marine vessel. The distance travelled from marine RTS(s) to the site has been estimated to be 490km. |
| 3 | Overall Impact | ○ | 'Neutral' . Overall the site is considered to have neutral impact due to the balance out of the benefit for being able to accommodate C&D surplus materials and the relatively larger amount of GHG emissions for the longer distance travelled. |
| Ecological Assessment | | | |
| 1 | Affects a protected Area (Protected areas are 'Areas of Absolute Exclusion' – this assumes no land take) | ○ | The modelling results predict that there would be no construction or operational effects upon the water quality or hydrodynamics in the proposed South-West Lantau Marine Park / Reserve. |
| 2 | Affects an important habitat | -- | The shallow sub-tidal and inter-tidal habitat to the north and south of Tai O is important for the Horseshoe Crab. The coastal waters are also well utilised by the Chinese White Dolphin that would suffer habitat loss. |
| 3 | Affects a species of conservation importance | -- | Whilst the Chinese White Dolphin may be able to avoid the works area and frequent other undisturbed waters, the site is located within their core habitat and so there is potential for adverse impacts upon this protected species during site construction and operation. The coast is also a habitat of the Horseshoe Crab. |
| 4 | Potential for Cumulative Ecological impacts on sites of recognised value | - / -- | There is slight potential for cumulative impacts on dolphin use in the area from future works at Tung Chung, but greater potential for disturbance of shallow sub-tidal and inter-tidal habitat that is used by the Horseshoe Crab and a diverse benthic community. |
| 5 | Overall Impact | -- | 'Negative – High' . The site is located within an important habitat for Horseshoe Crabs, whilst the area is part of the range of the protected Chinese White Dolphin. |

| | Impacts | Score | Commentary |
|-------------------------------------|--|-------|--|
| Fisheries Assessment | | | |
| 1 | Potential for secondary environmental impacts on "Areas of Absolute Exclusion" | ○ | There are no "Areas of Absolute Exclusion" in the vicinity of the works area. |
| 2 | Affects an important mariculture / fisheries resources (including spawning / nursery ground) | - / - | The site is located in the vicinity of waters that are of economic importance for fish spawning, whilst Tai O Bay may be of limited importance as a nursery for certain fish species of commercial value. |
| 3 | Potential for Cumulative Fisheries Impacts on sites of recognised value | - / - | There is some potential for cumulative impacts on fisheries in outer Tai O and along the NW Lantau coast between Tai O and Tung Chung from future development of Tung Chung. |
| 4 | Overall Impact | - | The broader area is of importance as a spawning ground for several commercially valuable fish species, and there is some potential for cumulative effects. There are however no protected fisheries areas immediately around the site, and so overall impacts will be limited: 'Negative – Low' . |
| Cultural Heritage Assessment | | | |
| 1 | Important cultural (Declared, Deemed or Graded sites) / archaeological sites | ○ | There are no known sites of cultural heritage significance. |
| 2 | Potential for archaeological value | - | The site is located adjacent to Tai O, a natural harbour with a recognised maritime history and evidence of early salt production and fortifications. It is considered that the likelihood of archaeological remains in this area is high. A detailed marine archaeological investigation should be carried out in any future studies. |
| 3 | Potential for Cumulative Heritage Impacts on sites of recognised value | ○ / - | The adjacent land based saltpans are intertidal. Given their proximity to the site, a change in flow characteristics through Tai O Creek could result in sedimentation or erosion of these cultural relics. |
| 4 | Overall Impact | - | 'Negative – Low' . The nearest area of cultural heritage value is Tai O (<1km), which is recognised for its cultural heritage value through a long history of salt production, trade and fortification. The integrity of relic intertidal saltpans is at risk in the event of changes in hydrodynamic regime of Tai O Creek. |

| | Impacts | Score | Commentary |
|---|--|--------|--|
| Landscape and Visual Impact Assessment | | | |
| 1 | Implications for Landscape Planning and Designations | ○ | This area of seascape is not covered by any planning designations reflecting landscape/seascape values and so there will be no impact on these values. Overall impacts on landscape designations will therefore be Neutral. |
| 2 | Impacts on Landscape Resources | ○ | As the site lies in a marine area, there will be no significant impacts on landscape resources. Overall impacts on landscape resources will therefore be Neutral. |
| 3 | Impacts on Landscape Character | -- | The island landfill will have a substantial impact on the natural character of the Lantau Coastline. The island will impact on the relationship of Lantau to the Pearl River Estuary. Overall impacts on landscape character will therefore be Negative – High. |
| 4 | Overall Visual Impacts | - / -- | Although, the visual envelope is not heavily populated, the island will have substantial visual impacts on those residential receivers in close proximity to it. These substantial impacts will last throughout the afteruse phase and will include significant visual impacts on some VSRs, notably residents in Tai O. Overall visual impacts will therefore be Negative – Low/Moderate. |
| 5 | Overall Impact | - / -- | Overall the landscape impacts are considered to be 'Negative – Low / High' for the following reasons: <ul style="list-style-type: none"> • There are no landscape designations covering the disposal site. • As the site is a marine one, no significant landscape resources are affected. • There will be significant impacts on the natural character of the Lantau coast and on the relationship of Tai O to the Pearl River Estuary. • Small numbers of VSRs (at Tai O and Shek Tsai Po) will experience very substantial visual impacts. |
| Landfill Gas Assessment | | | |
| 1 | Distance between the new / extended landfill and SRs | ○ | The nearest sensitive receivers are >250m from the site. |
| 2 | Number of Receivers within 250m (i.e. Consultation Zone) | ○ | There are no sensitive receivers within 250m of the site. |
| 3 | Man made/Natural Pathways for LFG Migration | ○ | None. |
| 4 | Additional Utilisation of LFG to Reduce GHG Emissions | ○ | There are no potential users of LFG (other than on-site use) |
| 5 | Overall Impact | ○ | 'Neutral' |

Table 8.2: Summary of Lantau North West Island Landfill SEA

| Overall Impacts | Score | Commentary |
|-----------------------------------|----------------|--------------------------|
| Overall Air Quality Impact | O / - | Neutral / Negative – Low |
| Overall Noise Impact | O / - | Neutral / Negative – Low |
| Overall Water Quality Impact | - | Negative – Low |
| Overall Waste Management Impact | O | Neutral |
| Overall Ecological Impact | - - | Negative – High |
| Overall Fisheries Impact | - | Negative – Low |
| Overall Cultural Heritage Impact | - | Negative – Low |
| Overall Landscape & Visual Impact | - / - - | Negative – Low / High |
| Overall Landfill Gas Impact | O | Neutral |

**Table 8.3 Assessment of Significance of Visual Impacts for Northwest Lantau Island Landfill During Construction / Operation Phase
(Note: All impacts adverse unless otherwise noted)**

| Identity No. of VSR | Key Visually Sensitive Receiver (VSR) | Approx. Minimum Distance Between VSR and Source(s) | No.s of VSRs (order of magnitude only) | Magnitude of Impact During Construction / Operation (Negligible, Small, Intermediate, Large) | VSR Sensitivity (Low, Medium, High) | Impact Significance before Mitigation Measures (Insubstantial, Slight, Moderate, Substantial) | Significance of Residual Impacts (Insubstantial, Slight, Moderate, Substantial) |
|--------------------------|---|--|--|--|-------------------------------------|---|---|
| <i>Residential VSRs</i> | | | | | | | |
| VR 33 | Residents at Tai O and Environs | 1.5km | Many | Large | High | Substantial | Substantial |
| VR 34 | Residents at Ching Ting | 3.5km | Few | Intermediate | High | Moderate to Substantial | Moderate |
| VR 35 | Residents at Shek Tsai Po Peninsula | 0.5km | Few | Large | High | Substantial | Substantial |
| <i>Occupational VSRs</i> | | | | | | | |
| VR 36 | Fishing Boats at Tai O | 0.5km | Few | Large | Low | Moderate | Moderate to Slight |
| <i>Recreational VSRs</i> | | | | | | | |
| VR 33a | Visitors at Tai O and Environs | 1.5km | Many | Large | Medium | Substantial to Moderate | Substantial to Moderate |
| VR 34a | Visitors at Ching Ting | 3.5km | Few | Intermediate | Medium | Moderate | Moderate to Slight |
| VR 35a | Visitors at Shek Tsai Po Peninsula | 0.5km | Few | Large | Medium | Substantial to Moderate | Substantial to Moderate |
| VR 20 | Hikers at Lantau Peak | 5km | Few | Intermediate | Medium | Moderate | Moderate to Slight |
| VR 37 | Hikers within Lantau North County Park | 3km | Very Few | Intermediate | Medium | Moderate | Moderate |
| VR 38 | Hikers at Coastal Footpath between Yi O and Tai O | 1km | Very Few | Large | Medium | Substantial to Moderate | Substantial to Moderate |
| VR 11 | Area for Boating, Fishing, Diving and other water sports activities | 0.5 - 10km | Very Few | Large | Medium | Substantial | Substantial |
| VR 39 | Hikers at Coastal Footpath between Kau San Tei and Sha Lo Wan | 1km | Very Few | Large | Medium | Substantial to Moderate | Moderate |
| <i>Travelling VSRs</i> | | | | | | | |
| VR 40 | Passengers aboard Hong Kong - Macau Ferries | 5.5km | Moderate | Intermediate | Medium | Moderate | Moderate to Slight |
| VR 25 | Passengers aboard Aircraft approaching / departing Chek Lap Kok Airport | N/A | Moderate | Intermediate | Medium | Moderate | Moderate |
| VR 41 | Tai O Ferry | 0.5km | Few | Intermediate | Medium | Moderate | Moderate |

Table 8.4 Assessment of Significance of Visual Impacts for Northwest Lantau Island Landfill During Afteruse Phase
(Note: All impacts adverse unless otherwise noted)

| Identity No. of VSR | Key Visually Sensitive Receiver (VSR) | Approx. Minimum Distance Between VSR and Source(s) | No.s of VSRs (order of magnitude only) | Magnitude of Impact During Afteruse (Negligible, Small, Intermediate, Large) | VSR Sensitivity (Low, Medium, High) | Impact Significance before Mitigation Measures (Insubstantial, Slight, Moderate, Substantial) | Significance of Residual Impacts (Insubstantial, Slight, Moderate, Substantial) |
|--------------------------|---|--|--|--|-------------------------------------|---|---|
| <i>Residential VSRs</i> | | | | | | | |
| VR 33 | Residents at Tai O and Environs | 1.5km | Many | Large | High | Substantial | Substantial |
| VR 34 | Residents at Ching Ting | 3.5km | Few | Intermediate | High | Moderate to Substantial | Moderate to Slight |
| VR 35 | Residents at Shek Tsai Po Peninsula | 0.5km | Few | Large | High | Substantial | Substantial |
| <i>Occupational VSRs</i> | | | | | | | |
| VR 36 | Fishing Boats at Tai O | 0.5km | Few | Large | Low | Moderate | Slight |
| <i>Recreational VSRs</i> | | | | | | | |
| VR 33a | Visitors at Tai O and Environs | 1.5km | Many | Large | Medium | Substantial to Moderate | Substantial to Moderate |
| VR 34a | Visitors at Ching Ting | 3.5km | Few | Intermediate | Medium | Moderate | Slight |
| VR 35a | Visitors at Shek Tsai Po Peninsula | 0.5km | Few | Large | Medium | Substantial to Moderate | Substantial to Moderate |
| VR 20 | Hikers at Lantau Peak | 5km | Few | Intermediate | Medium | Moderate | Slight |
| VR 37 | Hikers within Lantau North County Park | 3km | Very Few | Large | Medium | Substantial to Moderate | Slight |
| VR 38 | Hikers at Coastal Footpath between Yi O and Tai O | 1km | Very Few | Large | Medium | Substantial to Moderate | Slight |
| VR 11 | Area for Boating, Fishing, Diving and other water sports activities | 0.5 - 10km | Very Few | Large | Medium | Substantial to Moderate | Moderate to Slight |
| VR 39 | Hikers at Coastal Footpath at Fu Shan, Tai O | 1km | Very Few | Large | Medium | Substantial to Moderate | Moderate to Slight |
| <i>Travelling VSRs</i> | | | | | | | |
| VR 40 | Passengers aboard Hong Kong - Macau Ferries | 5.5km | Moderate | Intermediate | Medium | Moderate | Insubstantial |
| VR 25 | Passengers aboard Aircraft approaching / departing Chek Lap Kok Airport | N/A | Moderate | Intermediate | Medium | Moderate | Insubstantial |
| VR 41 | Tai O Ferry | 0.5km | Few | Intermediate | Medium | Moderate | Moderate |