

## 19. NENT LANDFILL EXTENSION SITE

### 19.1 Basic Information

#### *Project Title*

19.1.1 NENT Landfill Extension Site (NLES).

#### *Nature of Project*

19.1.1 The Project would form an extension to the existing NENT landfill, designated as the NLES, which would occupy the valley in which the existing NENT Landfill Stockpile and Borrow Area is located (*Figure 19.1*). The NLES would be designed to accept waste from the time at which the disposal capacity of the existing NENT Landfill has been reached.

19.1.2 The landfill extension would require two rockfill bunds, constructed from material excavated on-site, to raise the perimeter low points located to the north and south to required levels. The maximum depth of fill in the eastern corner is envisaged at about 90m. In this location, the final restoration level would be +230mPD. The maximum elevation of the final restoration profile would be +245mPD along the south easternmost boundary.

19.1.3 If it is assumed that the NLES would be constructed as a “stand alone” facility, procured through competitive tendering, construction works would be as described in Section 3.4 (Part A). In addition specific issues for the NLES would include:

- Delivery of waste by road-vehicle.

19.1.4 However, if the project was constructed as an “addition” to the existing NENT Landfill, procured through a negotiated extension with the existing landfill contractor, then the following facilities could be shared, thus reducing the scope and cost of the works:

- Weighbridges, wheel washing and vehicle cleaning facilities.
- Facilities for recording and processing waste inputs and other site activities.
- Accommodation for Government supervisory staff and Independent Consultants.
- Accommodation for landfill contractor’s staff.
- Plant garaging, workshop and maintenance facilities.
- Container handling areas.
- Mess and welfare facilities.
- Fire fighting facilities.
- Site security and fencing.

#### *Location and Scale of Project*

19.1.5 The NLES is located partially on the site of the NENT Landfill Stockpile and Borrow Area that was formed to the east of the existing landfill as part of the original site development of the NENT Landfill.

19.1.6 The extension site covers an area of 70ha and would accommodate a landfill with a capacity of 19Mcum.

19.1.7 For the most part of the NLES would fall within the existing NENT Landfill Stockpile and Borrow Area zoned “Other Specified Uses (Landfill)” on the approved Wo Keng Shan OZP No. S/NE-WKS/3. However, part of the site would be outside the Stockpile and Borrow Area and extend into the surrounding “Green Belt” zone.

19.1.8 Approval from the relevant policy bureau(x) and the Town Planning Board would need to be sought on this scheme. In particular, approval from the Town Planning Board on the rezoning of the affected “Green Belt” zone for the NLES would be required. The current OZP would therefore need to be amended accordingly.

### ***History of Site***

- 19.1.9 The existing NENT Landfill was commissioned in 1995 and receives waste mainly by road from the North East New Territories, and the Kowloon Bay and Shatin Refuse Transfer Stations. This inland landfill occupies approximately 67ha and is located in a remote valley 2km west of Robin's Nest (Hung Fa Leng), 6km north-east of Fanling in the very northern part of the New Territories, and is adjacent to the Closed Boundary Area to the north.
- 19.1.10 The site was first developed under a CED Contract CV/91/05, which formed an initial area of the site ready for waste deposition, and also created a Stockpile and Borrow Area, where spoil from the initial excavation was stored for later reuse. CED's contractor also constructed the waste reception area and a 2km access road and water main from Sha Tau Kok Road to serve the landfill (Contract CV/90/07). These works are referred to in the NENT Landfill Contract as "Advance Works", and also included advance construction of a leachate treatment plant.
- 19.1.11 The NENT Landfill Contract EP/SP/12/92 was awarded by EPD to Far East Landfill Technologies Ltd (FELT) (referred to subsequently as "the landfill contractor") in 1994; and was the last in the series of three Strategic Landfill Contracts to be awarded on a Design-Build-and-Operate basis.

### ***Number and Types of Designated Projects Covered***

- 19.1.12 The NLES would be a Designated Project under the following Schedules of the EIAO:
- G1 - A landfill for waste as defined in the Waste Disposal Ordinance (Cap 354)
  - G4 - A waste disposal facility for refuse.

## **19.2 Outline of Planning and Implementation Programme**

- 19.2.1 A generic outline for the planning and implementation is summarised in Section 3.5 (Part A), and a specific outline programme for the NLES is shown in *Figure 19.2*.

## **19.3 Possible Impacts on the Environment**

- 19.3.1 Possible impacts on the environment during the construction, operation and aftercare phases of the NLES are outlined below. *Figure 19.1* provides details of identified sensitive receivers. The individual assessments are summarised in *Tables 19.1 and 19.2*.

### ***Air Quality***

- 19.3.2 The nearest ASRs within 500m of the landfill extension are a number of village houses in Tong To Shen Tsuen and Wo Keng Shan. Beyond this, lies Lin Ma Hang which is situated some 900m from the site and is unlikely to be affected by the extension.
- 19.3.3 The site lies within a hilly area, with turbulent air flow, however there are no significant topographic features between the site and the ASRs. Although the site is located within the Deep Bay Airshed, it is unlikely that air would stagnate within the vicinity of the site because of prevailing winds.
- 19.3.4 Notwithstanding the adjacent village of Tong To Shan, the site is located in a remote area, with few known developments (existing or planned) except the NENT Landfill. However, given the preliminary nature of this SEA, the status of this issue should be reviewed in subsequent, more detailed, studies.
- 19.3.5 It should also be noted that previous studies (NENT Landfill Final Report in 1988 and the Supplementary Environmental Impact Assessment in 1995) on the existing NENT Landfill reported that no significant air quality impacts were expected.

19.3.6 This is a land based site with road access only. The cumulative distance to be travelled from the existing network of inland RTSs (eg. NWNT RTS, Shatin RTS) to the site is estimated to be 96km. Given the fact that only road vehicles can be used for waste delivery, the total emissions of air pollutants to this site will likely be higher than an equivalent marine based site.

### **Noise**

19.3.7 The landfill development has the potential to cause the following noise impacts:

- Excavation, site formation and general construction activities.
- Heavy mobile plant used during operation.
- Waste collection vehicles, etc. entering and leaving the site during operation.
- Fixed plant noise.

19.3.8 Given the remote location of the site, there are few NSRs in the area, (see *Figure 19.1*).

19.3.9 An assessment of potential noise impacts arising from the construction and landfilling operations of the existing NENT landfill was carried out as part of a Supplementary Environmental Impact Assessment<sup>1</sup> (SEIA) by the landfill operator in 1995. Predictions of noise impacts from vehicular delivery of waste, landfilling activities as well as fixed plant, (i.e. LFG flare, leachate treatment plant) indicated that cumulative noise impacts from these sources would exceed recommended noise limits at NSRs surrounding the landfill, such as at Wo Keng Shan, Ping Yeung, Ha Heung Yeung and Tsung Yeung. The NLES, however, is located at some distance away from most of these NSRs. Of the previously assessed NSRs, only Wo Keng Shan remains within 300m of the NLES. However, Tong To Shan Tsuen now falls just within 300m of the northeast boundary of the site.

19.3.10 The noise impact assessment for the existing landfill was based on a number of assumptions in terms of phasing of works and included a worst case scenario that involved minimal down-time and continuous works activities. Notwithstanding this, impacts were predicted to be mitigable to within acceptable levels.

19.3.11 A combination of temporary and permanent noise mitigation measures was recommended in the SEIA for the existing landfill, including mobile noise barriers and temporary noise bunds for various landfill phases. Whilst outside the scope of SEIA study, it was also recommended that vehicular noise impacts to Wo Keng Shan could be mitigated by construction of permanent noise barriers along the public access road at the entrance to the site.

19.3.12 In the event, however, noise barriers along the site entrance have not been required and the experience to date has shown that noise levels at the existing landfill are within acceptable levels. Potential noise impacts associated with the NLES are likely to include those associated with vehicle movements on the residents at Wo Keng Shan, as well as noise from landfilling operations on residents at Tong To Shan Tsuen.

19.3.13 During construction and operation phases, it is possible that activities could continue into the night-time period, depending upon day-to-day landfill operations and the overall landfill development programme employed by the landfill contractor. However, it should be noted that under the currently proposed arrangements, landfill activities outside of normal working hours are not envisaged.

19.3.14 Given the isolated nature of villages in the area, the number of affected dwellings is likely to be small. Whilst experience at the existing landfill indicates no significant impacts, on the basis of the previous EIA for the landfill development further more detailed investigation is likely to indicate that predicted impacts require mitigation.

<sup>1</sup> ERM Hong Kong (1995) NENT Landfill: Supplementary Environmental Impact Assessment, Far East Landfills Technologies

### ***Water Quality***

- 19.3.15 The landfill development has the potential to cause the following water quality impacts:
- Sediment-laden runoff escaping from the site during landfill construction.
  - Effluent from the leachate treatment plant during operation and aftercare.
  - Accidental leachate breakout into surface water drainage during operation and aftercare.
- 19.3.16 The stream located in the valley of Lin Ma Hang is close to the NLES and is a WSR by virtue of its ecological sensitivity (see below). No other WSRs have been identified in the vicinity. Uncontaminated stormwater discharges are not considered to be a potential source of impact.
- 19.3.17 Although the NLES is located in a hilly area and while there is potential for sediment-laden and leachate-contaminated runoff, the majority of construction works would be undertaken within a “bowl” and so runoff would not be possible. During operation and aftercare, any uncontrolled surface run-off or “leachate breakout” would be intercepted by the surface water drainage channels and so would not cause impacts to any nearby WSRs.
- 19.3.18 Based on the findings of the EIA and SEIA for the existing NENT Landfill (NENT Landfill Final Report in 1988 and the Supplementary Environmental Impact Assessment in 1995), it is understood that groundwater resources in the area may be used for irrigation purposes and/or may also feed into local surface watercourses.
- 19.3.19 On the basis of experience gained from the development and management of the existing strategic landfills, the assumption is made that all discharges from the NLES would be controlled, such that the risk of water quality impacts during construction and operation would be managed to acceptable levels. This assumption could be further addressed by including a risk assessment (e.g. of a “leachate breakout” incident) during the detailed EIA. The design of the NLES would ensure environmental protection is maintained.

### ***Waste Management / Disposal Impacts***

- 19.3.20 Given the remote location of the site, the conceptual design has provided for a material balance, i.e., there is no significant import to site or export from site of materials. To construct the NLES, about 8.5Mcum of material would need to be excavated. The majority of this material would then be utilised to form the southern bund (2Mcum), the northern bund (3Mcum) and to elevate the areas of the base to the required levels (1.5Mcum). The surplus 2Mcum are required for a 1.5m thick layer of material for capping of the waste, for the base and sidewall lining system, and a 1m thick leachate drainage layer. This material balance has also taken into consideration the daily cover requirements.
- 19.3.21 With regard to the transportation of waste to the site, given its inland location all waste would be delivered by road vehicle and so the benefits of marine transportation cannot be realised.
- 19.3.22 Various potentially polluting materials may be stored, handled and transported to / from the site. Examples may include chemicals for waste water/leachate treatment, waste oils, fuel for plant working on the site, etc.
- 19.3.23 All waste materials would need to be stored, handled and transported in an agreed and appropriate manner that complies with the Waste Disposal Ordinance (Cap 354) and subsidiary regulations such as the Waste Disposal (Chemical Waste) (General) Regulation. For this assessment it is assumed that potential impacts from polluting goods would be controlled through appropriate design and management systems.
- 19.3.24 This site is located inland and can only be accessed by the existing road. As such, road vehicles will be the only means for waste delivery to the site. Given the use of road vehicles, the potential GHG emissions (per kg of waste transferred) from territory-wide waste delivery to this site will likely be high.

### *Ecology*

- 19.3.25 There are a number of ecologically important / sensitive sites in the environs of the NLES. Details of these and the potential for adverse effects of the NLES upon them are provided as follows. *Figure 19.1* shows the locations and extent of the ecologically sensitive areas discussed in relation to the NLES.
- 19.3.26 According to the recommendations of the Territorial Development Strategy Review prepared by the Planning Department, the majority of upland area of Robin's Nest has been identified as a potential country park. The surrounding area is botanically significant and known for its diversity of plant species. The boundary of the potential Country Park abuts the boundary of the existing NENT Landfill only at the south-east.
- 19.3.27 The area surrounding the existing NENT Landfill is botanically significant and known for its diversity of plant species. There is a particularly diverse tall scrub / semi-mature woodland habitat growing in three of the steep ravines that surround the existing landfill site, which offer protection from hill-fires<sup>2</sup> These three areas are to the immediate northwest, north and east of NENT (see *Figure 19.1*) and would not be affected by the NLES.
- 19.3.28 The upland plateau vegetation in the immediate vicinity of the existing landfill supports a number of shrub species that collectively form a habitat that is likely to be of ecological value. Vegetation around the southeast of the existing landfill that may be affected by development of the NLES includes *Baekia frutescens*, *Rhodomlytus tormentosa*, *Rhaphiolepis indica* and *Liquidambar formosana*. In this respect, any vegetation clearance to facilitate the development of the NLES would need to be preceded by a detailed vegetation survey that could subsequently be used to guide compensatory planting.
- 19.3.29 To the north of site is the Lin Ma Hang Lead Mine SSSI. This is one of the most important bat colonies in Hong Kong and would be located within the boundary of the proposed Robin's Nest Country Park. However, this site is located almost 1km from the NLES and is unlikely to be adversely affected.
- 19.3.30 Lin Ma Hang Stream is a typical lowland freshwater stream and has a rich collection of primary freshwater fish including five rare and uncommon species. Whilst it would seem that the main area of importance for these fish species is the lowland waters, developments that may affect any part of the stream catchment may potentially lead to an adverse impacts on the water quality downstream. There is a buffer of approximately 200m between the southern-most boundary of this stream (i.e., the stream's headwaters) and the northern-most extent of the NLES. Nevertheless, it considered close enough to warrant consideration of additional provisions (in the works contract) to safeguard the stream during construction of the NLES. Details of suitable ecological and stream water quality control measures are provided in Section 19.4 and shown in *Figure 19.1*.
- 19.3.31 There is a "fung shui" woodland, with several sizeable Camphor trees, located near to Wo Keng Shan village, and Bamboo Bats have been reported to have roosted there. However, this area is around 500m south of the existing NENT Landfill and the NLES does not encroach further south than the existing landfill. Therefore the "fung shui" woodland and the habitat for Bamboo Bats are unlikely to be adversely affected.
- 19.3.32 *Figure 19.1* shows the locations and extent of the ecologically sensitive areas discussed above in relation to the NLES. Apart from the ecologically significant sites and species of conservation importance, there are no other reported significant habitats or species of conservation importance within 500m of the NLES. Furthermore, there are not believed to any species of conservation importance that would be disturbed by the NLES.

<sup>2</sup> BMT (2002). NENT Landfill Site: Terrestrial Monitoring. Annual Summary Report for the Year 2001.

19.3.33 It is noted that drainage improvement works have been proposed at Lin Ma Hang, under the Drainage Master Plan Study in the Northern New Territories. Although the findings of that study are not available to the Consultants, cumulative drainage impacts are considered unlikely, given that Lin Ma Hang village is more than 500m from the NLES. This issue should be confirmed during the detailed EIA stage.

#### ***Fisheries***

19.3.34 As the site is totally land based, there will be no impacts to marine fisheries. Furthermore, there is no (freshwater) fish-farming in the area that would be disturbed by the NLES.

#### ***Cultural Heritage***

19.3.35 Commissioned by the Antiquities and Monuments Office of the Leisure and Cultural Services Department, the Hong Kong Institute of Archaeology conducted an archaeological survey and assessment in the project area of the NLES during August and September 2001. During the survey, the archaeological team identified a "Settlement District" mainly distributed in the northern part of the project area with Tong To Shan as its centre, and dated from the first half of the 17<sup>th</sup> century to the early 20<sup>th</sup> century. Tong To Shan is situated immediately adjacent to the NLES. *Figure 19.1* indicates the areas of archaeological importance.

19.3.36 Within the Tong To Shan Settlement District, a total of 91 stone structural features were found mainly distributed in the Tong To Shan area in the east of the northern project area as well as 40 graves in the Ngong Tong area in the west of the northern project area.

19.3.37 The stone features, all built of roughly cut mountain rocks, can be classified into three major categories based on their shape and inferred function, namely building, slope-protection wall and path. The category of building includes remains of nine houses and one cistern. The houses are all characterised with rectangular shape and stone-built walls but they vary in size, room-number, height and wall decoration, suggesting different functions in use, such as residential house, animal pen or storage room. The cistern is two-layered and roughly square in shape.

19.3.38 Seventy-four slope-protection walls were found in the Settlement District. The function of the slope-protection walls would have been to protect the hill slopes from soil erosion and collapsing. But, judging from the characteristics of location, artefact association and topographic setting, these stone walls could also have been used in different ways, to protect either the terraced fields, the banks of water courses or the flat activity areas on the slope in and around the residential area.

19.3.39 Six paths were identified and were covered on the surface with flat stone slabs. Two of these paths are quite long, stretching about 300m into the surrounding woodland. One is located in the Ngong Tong area and the other, in the Tong To Shan area.

19.3.40 Forty grave sites were found in the Settlement District. Of this number, 14 graves appear to have been moved to some other site, leaving only grave pits or scattered bricks. Among the remaining graves, 20 are dated, including seven original graves and 13 re-built graves. The original graves are dated from 1874 to 1930; the re-built graves are dated from 1743 to 2000, but all the graves that have been rebuilt in the 20th century have used the original grave tablets, some dating back to the Qing dynasty.

#### ***Landscape and Visual***

19.3.41 *Landscape Planning Designations* - the area of landscape in which the site lies is designated "GB" and "OU" under the Wo Keng Shan OZP (S/NE-WKS/3) (*Figure 19.4*). The entire site area is also zoned "Conservation Area" under the Territorial Development Strategy Review 1995 Landscape Strategy. Resulting impacts on landscape planning intentions will be moderate during construction/operation and slight during afteruse.

19.3.42 *Landscape Resources* - The landscape elements of the site are already significantly prejudiced by the presence in that area of the existing NENT Landfill Stockpile and Borrow Area and comprise:

- Steep natural slopes.
- Grassland / scrub and grassland and tall scrub.
- Small areas of abandoned agricultural land.
- Short lengths of stream course (which may be ephemeral).

19.3.43 Landscape resources are shown in *Figure 19.3A*. Given the extensive disturbance that has been caused by the Stockpile and Borrow Area of the existing NENT Landfill, resulting impacts on landscape resources (all of the above) will be slight during construction/operation of the landfill and during afteruse.

19.3.44 *Landscape Character* - The site falls within the Hung Fa Leng Uplands LCA in north-east New Territories, a predominantly natural upland landscape dominated by the peak of Robin's Nest (Hung Fa Leng) at +492mPD (*Figure 19.3*). The NLES will have the effect of slightly degrading this natural landscape. However, the fact that there is already a significant landfill in this landscape will in part offset impacts on landscape character. During construction/operation of the extension, impacts on landscape character will be moderate. During afteruse, impacts on landscape character will be slight.

19.3.45 *VSRs* - Because of the location of the site, there are no large areas of population close to the site (*Figure 19.5*). Visual sensitive receivers are shown in *Tables 19.3 and 19.4*. Across much of the visual envelope close to the site, views are significantly interrupted by vegetation, buildings or small landforms. A small number of residential VSRs in villages and hikers close to the extension site will be exposed to substantial visual impacts during construction/operation phase (*Figure 19.6*). Future residents and those working in Fanling North, Ping Che and Ta Kwu Ling NDAs, of which the need and timing of development is still subject to review, will experience slight impacts. For all other VSRs, during construction/operation of the landfill, visual impacts will be slight or insubstantial. During afteruse, the landfill will appear as a largely vegetated upland landform and residual visual impacts will be reduced to insubstantial for most VSRs and slight for certain residential and recreational VSRs.

19.3.46 *Mitigation* - Landscape and visual mitigation is outlined in Section A and is illustrated in *Figure 19.8*.

### ***Landfill Gas***

19.3.47 The NLES is within the 250m consultation zone of the existing NENT Landfill and so a LFG Hazard Assessment would be required during the EIA stage. There are no sensitive receivers (targets) or pathways within 250m of the NLES – the upper reaches of the Lin Ma Hang Stream are not considered to be a LFG “target”. Therefore, there are no potential off-site landfill gas hazards.

19.3.48 Although the NLES would generate significant amounts of LFG during the operation and aftercare phases, it has been assumed that the landfill would be designed as a containment landfill with an efficient LFG collection system that would eliminate off-site migration.

19.3.49 Given the remote location of the site and the lack of any sizeable population nearby, the direct off-site use of LFG as an energy source, e.g., exporting via pipeline to be used as a substitute for “towngas” or LPG in surrounding communities, is not considered practical.

## **19.4 Environmental Protection Measures to be Incorporated into Design and Further Environmental Implications**

19.4.1 Environmental design measures have been identified in Section 3.8 (Part A) and generic approaches to mitigating impacts on different environmental parameters are outlined in Section 5 (Part A). Specific environmental mitigation requirements for the NLES are outlined below but are subject to the findings of the EIA:

### ***Air Quality***

- 19.4.2 It is unlikely that any construction, operation or aftercare activities would have a significant impact on ASRs, and so no air quality mitigation measures are recommended at this stage, other than good site practice.

### ***Noise***

- 19.4.3 Noise generated by the construction of the NLES is not expected to cause a significant increase to that generated by the operation of the existing NENT Landfill. There are few NSRs within 300m of the site, however, on the basis of the existing SEIA for landfill development, noise levels could exceed standard limits unless mitigated.
- 19.4.4 During construction, the topography of the site provides natural acoustic shielding, nevertheless, good site practice is recommended. This would include using only powered mechanical equipment with built-in acoustic shielding and not using percussive piling. Where necessary, temporary noise barriers and /or earth bunds could be constructed.
- 19.4.5 During operation, it is likely that the most significant noise source would be from landfill-related vehicular traffic on the internal haul roads and the access road. Minor sources would be from on-site plant such as leachate treatment works, pumps, generators and the flare. To mitigate the most significant sources, the location of fixed plant should be carefully reviewed and permanent noise barriers could possibly be placed alongside roads where necessary particularly in the vicinity of Wo Keng Shan at the entrance to the landfill.

### ***Water Quality***

#### ***NENT Leachate Management***

- 19.4.6 The existing leachate treatment plant occupies an area of approximately 4ha, and is situated approximately 1km to the north of the existing waste reception facilities. The facility comprises leachate storage and aeration lagoons and an ammonia stripper, prior to discharge to Shek Wo Hui Sewage Treatment Works (SHWSTW). Upgrading of leachate treatment facilities at the NENT Landfill has been required in order to comply with the WPCO TM standards for effluents discharged into foul sewers leading to Government STWs, regarding total nitrogen concentration. An ammonia stripper has been installed in order to allow the standard of 200mg/L for total nitrogen to be met.
- 19.4.7 The current quantities of leachate produced by the NENT Landfill range from 800 cum/day in the dry season to 1,200 cum/day in the wet season. Following completion of the landfill and final capping, this has been predicted to fall to approximately 100 m<sup>3</sup>/day. The decrease in flow is expected to happen relatively rapidly once waste placement ceases and final capping is in place.
- 19.4.8 Leachate will be generated from the NLES as soon as waste placement commences. The quantity of leachate generated by the NLES has been estimated at 600 – 1,300 m<sup>3</sup>/day, which is approximately the same as from the existing NENT Landfill. The overall quantities of leachate generated from the two landfill sites can be minimised by:
- Ensuring smooth handover between the landfills, such that there is only a limited period of “double-tipping” when waste is being placed in both sites.
  - Ensuring that capping of the existing NENT Landfill is carried out to a high standard and in the shortest possible time.
  - Commencing placement of waste at NLE and capping at the existing NENT Landfill at the start of the dry season, so capping can be completed, or be well advanced, by the beginning of the wet season.
  - Increased leachate recirculation within the existing NENT Landfill following capping to increase leachate retention time and hence smooth out any temporary peak in leachate generation.



- 19.4.9 It is possible that, in the period immediately following closure of the existing NENT Landfill and opening of the NLES, the combined average leachate flows may exceed 1,000 m<sup>3</sup>/day. For flows of this magnitude, the permitted standard for discharge to STWs is 100mg/L for total nitrogen (i.e. half of the currently permitted concentration of 200mg/L). If additional treatment is carried out to meet this standard, the overall nitrogen loading would remain constant compared to the existing situation even if the quantity of leachate generated were to double, which is not expected.
- 19.4.10 Since there may be an overlap period during which leachate is being generated both from the NLES and from the existing NENT Landfill prior to final capping, it may be necessary to increase leachate treatment capacity to cope with the temporary increase in flow as described above. This could be achieved either by increasing capacity at the existing plant or installing a separate plant for the NLES. Increased treatment capacity may be put into place at the NENT site by installing:
- Additional aeration lagoon capacity.
  - Additional ammonia stripping capacity.
- 19.4.11 The current NENT Leachate Treatment Plant occupies approximately 4ha. Assuming a similar area of 4ha is required, the only suitable areas of undeveloped flat land within close proximity to the NLES are to the north (within the Closed Boundary Area) or at Wo Keng Shan to the south of the existing waste reception facilities.
- 19.4.12 If these sites are not available, an area for the plant could be created within EPD's existing GLA adjacent to the existing waste reception facilities. The current waste transfer facilities within the Waste Reception Area are likely to become redundant following completion of the marine transfer facilities for the South East Kowloon Refuse Transfer Station that will replace the Kowloon Bay Refuse Transfer Station. Space will therefore be available within this area, and additional space could be formed by earthworks in the immediate vicinity if required. Ammonia strippers occupy a relatively small space, so the overall space required will be determined primarily by the size of the aeration lagoons. There would be the potential to site temporary aeration lagoons or tanks within the footprint of the NLES. Although they would ultimately need to be relocated to allow the void capacity to be fully utilised, the life expectancy of the landfill is such that temporary facilities may be able to operate for a number of years prior to relocation.
- 19.4.13 If leachate treatment was addressed in this manner, the effluent from the NLES Leachate treatment plant would be pumped to the existing plant where the effluent would be discharged into the intake structure of the rising main to the SWHSTW.
- 19.4.14 Currently, treated leachate is pumped to SWHSTW via a rising main for final treatment. Pumping is carried out almost continually from 0700 to 2300 hours, at a rate of between 700 and 1,200 cum/day. SWHSTW discharges into the Deep Bay catchment area. Government policy severely restricts the input of pollutants into the sensitive environment of Deep Bay.
- 19.4.15 Additional pumping capacity may be required during the overlap period, when leachate is being produced from the NENT Landfill and the NLES. The capacity of the existing pipeline would depend on the pressure rating of the pipe, and other factors such as the length of pipe, the level of particulates in the leachate, and the provision of surge tanks to prevent potential pipe failure due to surging. The capacity of the pipe is unlikely to be a constraint on the rate of leachate pumping.

- 19.4.16 The existing flow varies from 800 – 1,200 cum/day. SWHSTW currently treats approximately 70,000 cum/day (annual average), so the leachate from the existing NENT Landfill represents approximately 2% of flow. Following capping of the existing NENT Landfill, the total combined leachate flows is expected to stabilise rapidly to a level approximately 100 cum/day higher than currently. There is the possibility that SWHSTW will be upgraded to a capacity of 160,000 cum/day. The additional 100 cum/day of leachate represents approximately 0.15% of existing capacity or 0.06% of potential future capacity, in either case a very small proportion. Should double-tipping be necessary for a short time, the effect on capacity of SWHSTW will be equally small. Pollution loading in Deep Bay would remain unchanged.
- 19.4.17 If required, additional pre-treatment may be carried out to reduce nitrogen loading in the effluent on a pro-rata basis, to maintain a zero net gain in nitrogen loading from this source. This could be achieved by setting a lower outlet ammonia concentration for the ammonia stripper. Any increase in loading of metals or trace organics is unlikely to be measurable in the final effluent from the sewage treatment works, and would be well within the normal range of variability.

#### *NENT Sewerage*

- 19.4.18 The existing landfill and the NLES fall within the Deep Bay Catchment Area. Since the pollution loading of the Deep Bay and its catchment areas have well exceeded its assimilative capacity, any new facilities or development have to demonstrate that they do not impose an additional pollution loading onto Deep Bay.
- 19.4.19 In the vicinity of the existing landfill and the extension site, there is no sewage infrastructure development. Therefore all new developments are required to provide on-site sewage treatment facilities.
- 19.4.20 Sewage from the existing NENT Landfill (from site offices and facilities) is currently fed into the aeration lagoons, where it is mixed with leachate, treated and pumped to SWHSTW. The amounts of sewage generated are very small in comparison with quantities of leachate. It is proposed that sewage from the NLES would be disposed of in a similar manner. The net increase in sewage arising is expected to be minimal in comparison with daily leachate generation, and is not expected to give rise to a measurable increase in pollutant loading.

#### *NENT Surface Water Drainage*

- 19.4.21 Following restoration, drainage would run off from the landfill surface to the perimeter. The perimeter drainage channels would direct the flow to two main discharge areas located at the toe of the northern and southern bunds respectively. The drainage to the south would then follow existing drainage courses presently running through the landfill infrastructure whereas drainage to the north runs into stream courses flowing into the Sham Chun River approximately 1.5km to the north.
- 19.4.22 All water that has passed through areas containing waste should be classed as leachate, and will therefore be treated and discharged as described above. Storm water run-off generated during construction and operation of the NLES is not classed as leachate, but may contain elevated concentrations of suspended solids, as well as oils and other contaminants from road surfaces. Treatment of run-off water may be carried out using settlement tanks to remove suspended solids, and oil interceptors to remove oil and grease.
- 19.4.23 The quality of the discharge would be regulated by means of a Discharge Consent issued in accordance with the WPCO TM for discharge to inland waters. Standards for discharge into Group B Inland Waters (the general category for watercourses in largely agricultural areas) are 30mg/L of suspended solids and 10mg/L of oil and grease.

#### *Waste Management*

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

### ***Ecology***

- 19.4.25 Due to the close proximity of the Lin Ma Hang Stream and the boundary of the proposed Robin's Nest Country Park to the NLES, special provision should be included within the contract documents to ensure that these sensitive areas are afforded maximum protection. Suitable measures that may be taken to protect the upper reaches of the Lin Ma Hang stream include construction of a cut-off trench or channel along the northern boundary of the potential NLES site, and that should be subject to more detailed investigation at the EIA stage as to their practicability. This would divert drainage / run-off from the eastern portion of landfill extension into storm drains outside the Lin Ma Hang stream catchment via adequately designed sediment removal facilities (i.e., silt / sediment traps).
- 19.4.26 The various measures outlined in the ProPECC Note 1/94 on *Construction Site Drainage*, and particularly the various means to control surface run-off, should also be implemented.
- 19.4.27 As vegetation clearance would be necessary for development of the NLES, revegetation works should be carried out at suitable locations and using suitable native species. The exact location of revegetation activities and the species to be used should be determined at the detailed EIA Study stage of the project after a detailed vegetation survey and habitat mapping has been conducted. The revegetation works should adopt a "landscape ecology" approach in that planting proposals should be co-developed by a competent landscape architect with support from a botanist / vegetation ecologist.

### ***Fisheries***

- 19.4.28 As the site is totally land based, there will be no impacts to marine fisheries. Furthermore, there is no (freshwater) fish-farming in the area that would be disturbed by the NLES.

### ***Cultural Heritage***

- 19.4.29 The Tong To Shan Settlement District is a site of great cultural and historical significance. This settlement district has been preserved well, reflecting many aspects of human life in Hong Kong during a period of nearly 300 years, and this district, therefore, can become an ideal field for the multi-disciplinary study of the late historical period in Hong Kong history.
- 19.4.30 Because of the high cultural heritage value of the Tong To Shan Settlement (TTSS) district, the primary approach to developing the NLES has been to avoid the archaeological site altogether. However, due to its location and the need to provide a minimum landfill capacity to achieve the aims of the Study, total avoidance of the TTSS is not considered to be a viable option. As such the schematic design prepared under this Study has been developed to reduce the overlap between the site boundary for the NLES and the TTSS as far as practicable (see *Figure 19.1*). However, whilst impacts have been minimised, in order to accommodate the NLES it is likely that some of the graves in the Ngong Tong area as well as portions of two stone paths and one slope protection wall in the TTSS would be directly impacted.
- 19.4.31 In addition to the revisions to the boundary of the NLES, a number of options have been considered to minimise the impacts upon the TTSS, these are discussed and described in Appendix II and include:
- *Preservation In situ by Burial Beneath the Landfill*: This approach leaves the affected relics where they are, but assumes they could be exhumed later if desired. However this option is constrained due the fact that the relics are at ground-level and are vulnerable to damage from construction of the landfill. Any later exhumation, would also damage the integrity of the landfill, and could result in uncontrolled release of leachate through the base liner.

- *Preservation Insitu Using a Cavern Structure:* This approach leaves the affected relics where they are, and allows access to them through a cavern specially constructed in the earth embankment to the north of the landfill. This option, would allow the relics to be preserved insitu, without being damaged. However, there are a number of uncertainties in relation to cost-effectiveness, practicality and overall feasibility. In addition, significant protection measures would be required to mitigate the hazards associated with landfill gas ingress into the caverns.
- *Preservation by Detailed Recording, Burial and Display:* This approach includes the preparation of detailed photographic, cartographic and video records of the affected relics, with selected artefacts displayed in a location and manner, which promotes community understanding and knowledge of Hong Kong's archaeology and cultural heritage. The remaining portion of the site would then be used for construction of the NLES. This option is the most feasible and practicable approach, although it is also the least preferred, as it would result in the loss of some relics, as well as a portion of the TTSS for future investigations.

19.4.32 As part of an EIA and the development of the design, opportunities to maximise the preservation of archaeological features of the TTSS should be pursued. For those portions of the stone footpaths and slope protection walls in the TTSS that cannot be preserved insitu, a suitable plan for rescue excavation should be drawn up for approval by AMO. In the Ngong Tong area, grave sites that cannot be avoided by the NLES should be surveyed and any considered to be worthy of preservation (eg. due to early dating or unique structural styles) should be included in the rescue excavation plan. All excavation works should be completed (to the satisfaction of AMO) prior to commencement of any construction works. All graves and portions of slope protection walls should be recorded and photographed during excavation.

19.4.33 The arrangements for ensuring the long-term management of the archaeological features is subject to agreement between the project proponent and EPD.

#### ***Landscape & Visual***

19.4.34 It is envisioned that the restored site would blend in with the restoration of the original NENT Landfill, and that both should blend in with the surrounding natural landscape. If the restored landfill is to be made available for low-intensity recreational use, hiking trails and panoramic lookout points with viewing pavilions could be provided.

## 19.5 Summary

19.5.1 A summary of the SEA for the NLES is provided in *Tables 19.1 and 19.2*:

**Table 19.1: NENT Landfill Extension SEA**

Impacts		Score	Commentary
<b>Air Quality Assessment</b>			
1	Distance to areas of air sensitive land use	-	>10 village houses in Tong To Shan Tsuen and Wo Keng Shan are within 500m of the site.
2	Presence of topographic features which could decrease or exacerbate impacts	○	The site lies within the Deep Bay Airshed. The site is enclosed by hills, 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	○	Winds blow both towards and away from ASRs. No prevailing wind direction has been identified.
4	Cumulative impacts of relevant emissions (TSP (construction), NO <sub>x</sub> , CO, SO <sub>2</sub> – LFG Flare) taking into account ambient conditions	-	The site is located in a remote area, with no known developments (existing or planned) within 5km of the NLES. During construction of the NLES, the existing NENT Landfill would be operating, however, during operation of the NLES the original landfill would be closed.
5	Total Emissions of Air Pollutants from the territory-wide waste transportation between the RTs and the site	--	The site is only accessible by road and hence all waste will be delivered by road vehicle.
6	Overall impact	-	The NLES is in a remote location, far from urban areas and there are few habitations in the vicinity. There are no known developments planned for the area and so cumulative impacts are not expected to be severe. Road traffic will be the only mean accessing to the site (for waste delivery). The overall impact on air quality is therefore considered to be <b>'Negative – Low'</b> .
<b>Noise Assessment</b>			
1	Distance to areas of noise sensitive land use	-	>10 village houses in Tong To Shan Tsuen and Wo Keng Shan are within 300m of the site.
2	Topographic features (only applicable if there are NSRs within 300m)	-	Line of sight to Wo Keng Shan & Tong To Shan Tsuen. The site is surrounded by hills, and which are expected to provide attenuation of noise.
3	Cumulative impacts of developments within 300m	○	The site is located in a remote area, with no known developments (existing or planned) within 300m of the NLES. During construction of the NLES, the existing NENT Landfill would be operating, however, during operation of the NLES the original landfill would be closed.
4	Overall Impact	○ / -	The NLES is in a remote location, far from urban areas and there are few habitations in the vicinity. There are no known developments planned for the area and so cumulative impacts are not expected to be severe. The NSRs are predicted to require some form of mitigation. The overall impact on noise levels is therefore could be <b>'Neutral / Negative – Low'</b> .

Impacts	Score	Commentary
<b>Water Quality Assessment</b>		
1	Watercourse diversion	○ No watercourses diversions are likely to be necessary during the works.
2	Potential for sediment contaminant release	- The landfill would be constructed in a relatively steep area and so sediment-laden run-off is a potential issue during construction. The landfill would be designed to minimise run-off, and to channel it through control measures, such as sedimentation tanks, prior to discharge, thereby minimising potential impacts.
3	Potential impacts on WSRs (including increase or exceedance of WQOs)	- The valley of Lin Ma Hang Stream is close to the landfill boundary and is considered to be a sensitive receiver.
4	Potential impacts on groundwater	○ Based on the findings of the EIA for the existing NENT Landfill, it is understood that groundwater resources in the area may be used for irrigation purposes. Impacts on groundwater quality would be minimised by design – e.g. use of an impermeable liner that would prevent the discharge leachate into groundwater beneath the site.
5	Potential cumulative impacts (potential for concurrent projects to exacerbate preceding impacts)	○ There are no other known projects in the vicinity that would exacerbate the impacts generated by this project.
6	Overall impact	○ The NLES is in a remote location, far from urban areas, and so the local watercourses are of high quality. Of particular note in this regard is the Lin Ma Hang Stream. There are no known developments planned for the area and so cumulative impacts are not expected to be severe. The overall impact on water quality is considered to be <b>'Neutral'</b> .
<b>Waste Management Assessment</b>		
1	Balance of materials (surplus / deficit of public fill needed for landfill development)	○ The NLES has been designed to have a balance of cut and fill.
2	GHG emissions from mode of transport for delivery of waste to the site from RTSS	- - There is no marine access to the site and so all waste would be delivered by road vehicle.
3	Overall impact	- The NLES is in a remote location, and this has necessitated a material balance. However, there is no marine access and so all waste would have to be delivered by road. The overall impact on waste management is considered to be <b>'Negative – Low'</b> .

Impacts		Score	Commentary
<b>Ecological Assessment</b>			
1	Potential for secondary environmental impacts on 'Areas of Absolute Exclusion'	-	The site is adjacent to a proposed Country Park at Robin's Nest.
2	Affects an important habitat	- / --	The site is some 200m from the upper reaches of the ecologically sensitive Lin Ma Hang Stream. Particular care will be needed in order to prevent impacts upon this sensitive habitat.  There is also potential for transient effects upon an important terrestrial habitat in the area (i.e. ecologically important vegetation). However, with adequate planning and implementation, potential impacts can likely be compensated for in the medium-term.
3	Affects a species of conservation importance	-	Unless mitigated, it is possible that the works could impact upon sensitive species of freshwater fish within Lin Ma Hang Stream. With mitigation however, it is considered that impacts on the downstream water quality (and hence aquatic resources within) can be avoided.
4	Potential for cumulative ecological impacts on sites of recognised value	○	Cumulative impacts are considered unlikely, since there are not believed to be any significant developments in the vicinity of the site, other than the existing NENT Landfill.
5	Overall impact	-	The NLES is in a remote location, far from urban areas, and so the local ecology is of high quality. There are particular concerns regarding the proposed Robin's Nest Country Park and Lin Ma Hang Stream, although the project boundary has been revised to avoid direct footprint impacts. Also, the effectiveness of mitigation is considered to be high. The overall impact on ecology is thus considered to be <b>'Negative – Low'</b> .
<b>Fisheries Assessment</b>			
1	Potential for secondary environmental impacts on 'Areas of Absolute Exclusion'	○	Land based site – no impact anticipated.
2	Affects an important mariculture/ fisheries resources (including spawning / nursery ground)	○	Land based site – no impact anticipated.
3	Potential for cumulative fisheries impacts on sites of recognised value	○	Land based site – no impact anticipated.
4	Overall impact	○	This is a land based site and so there will be no fisheries impacts, i.e., <b>'Neutral'</b> .

Impacts	Score	Commentary	
<b><i>Cultural Heritage Assessment</i></b>			
1	Important cultural (Declared, Deemed or Graded sites) / archaeological sites	--	The Tong To Shan Settlement District is immediately adjacent to the site. Some graves in the Ngong Tong area are located within the site.
2	Potential for archaeological value	-	The site area has been occupied from the 17 <sup>th</sup> Century onwards and it is likely that additional archaeological structures, albeit minor, remain undiscovered in the area.
3	Potential for cumulative heritage Impacts on sites of recognised value	0	There is a limited potential for cumulative impacts.
4	Overall impact	--	The NLES site contains a number of archaeological sites, whilst the majority of the Tong To Shan Settlement District is now excluded from the footprint of the site, the cultural heritage impact is considered to be ' <b>Negative – High</b> '.



Impacts	Score	Commentary
<b><i>Landscape and Visual Impact Assessment</i></b>		
1	Implications for landscape planning and designations	-
2	Landscape resources	-
3	Landscape character	- / - -
4	Visual	-

Impacts		Score	Commentary
5	Overall Impact	-	<p>Overall, landscape and visual impacts will be <b>'Negative – Low'</b>, for the following reasons:</p> <p>The extension is not compatible with existing landscape planning intentions for the area.</p> <ul style="list-style-type: none"> <li>Landscape resources on the site are not of particular sensitivity.</li> <li>Landscape character is of medium sensitivity, and is degraded by the presence of the existing landfill. Once complete, the restored landfill will not be inconsistent with the scale or character of existing landscape.</li> <li>Visual VSRs are very few in number, often distant from the extension site and often transient.</li> <li>The site will eventually be restored to simulate natural landforms/vegetation, but this will take time (decades).</li> </ul>
<b>Landfill Gas Assessment</b>			
1	Distance between the new / extended landfill and SRs	○	Other than buildings associated with the existing landfill, the nearest sensitive receivers are >250m away.
2	Number of receivers within 250m (i.e. Consultation Zone)	○	Other than buildings associated with the existing landfill, the nearest sensitive receivers are >250m away.
3	Man-made / natural pathways for LFG migration	-	There are believed to be man-made pathways in the vicinity of the site, consisting of the services leading to the existing landfill. However, the pathways via these services to sensitive receivers are long and indirect. Faults are present in the vicinity of the site, but these do not lead directly to sensitive receivers.
4	Additional utilisation of LFG to reduce GHG emissions	○	There are no potential off-site users of LFG at this time.
5	Overall impact	○	There are no particular issue regarding LFG and so the impact is considered to be <b>'Neutral'</b> .

**Table 19.2: Summary of NENT Landfill Extension SEA**

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

**Table 19.3: Assessment of Significance of Visual Impacts for NENT Landfill Extension During Construction / Operation Phase (Note: All impacts adverse unless otherwise noted)**

VSR	Key Visually Sensitive Receiver (VSR)	Approx. Minimum Distance Between VSR and Source(s)	Nos. of Receivers (order of magnitude only)	Magnitude of Impact During Construction (Negligible, Small, Intermediate, Large)	Receptor Sensitivity (Low, Medium, High)	Impact Significance before Mitigation (Insubstantial, Slight, Moderate, Substantial)	Significance of Residual Impacts (Insubstantial, Slight, Moderate, Substantial)
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**Residential Receivers**

VR72	Tong To Shan Tsuen	0.3km	None (abandoned)	N/A	N/A	N/A	N/A
VR73	Lin Ma Hang	0.6km	Very Few	Intermediate	High	Substantial	Substantial
VR74	Wo Keng Shan	0.6km	Very Few	Large	High	Substantial	Substantial
VR75	Ping Yueng	1.8km	Very Few	Small	High	Moderate	Moderate
VR76	Ping Che	1.9km	Few	Small	High	Moderate	Moderate
VR77	Villages west of Ping Che Road including Ha Shan Kai Wat / Sheung Shan Kai Wat / Hung Lung Hang / Lei Uk / Tai Po Lin / Chow Tin Tsuen	2.3km-3.5km approx	Few	Small	High	Moderate	Slight
VR78	Villages south of Sha Tau Kok Road including Kwan Tei and Ma Liu Shui San Tsuen	3.5km-5.5km approx	Few	Negligible	High	Insubstantial	Insubstantial
VR79	High-rise buildings in eastern Fanling	5km approx	Very Few	Small	High	Moderate	Slight
VR80	High-rise buildings in Shenzhen	3km approx	Many	Small	High	Moderate	Slight
VR81	Future Residents of Fanling North NDA	5-6km	Very Few	Negligible	High	Insubstantial	Insubstantial
VR92	Residents of Heung Yuen Wai	1.3km	Few	Intermediate	High	Moderate to substantial	Slight to moderate

VSR	Key Visually Sensitive Receiver (VSR)	Approx. Minimum Distance Between VSR and Source(s)	Nos. of Receivers (order of magnitude only)	Magnitude of Impact During Construction (Negligible, Small, Intermediate, Large)	Receptor Sensitivity (Low, Medium, High)	Impact Significance before Mitigation (Insubstantial, Slight, Moderate, Substantial)	Significance of Residual Impacts (Insubstantial, Slight, Moderate, Substantial)
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**Occupational Receivers**

VR82	Workers east of Ping Che Road	0.5km-2.5km	Very Few	Intermediate	Low	Moderate	Slight
VR83	Workers west of Ping Che Road	2km-3.5km	Few	Small	Low	Slight	Insubstantial
VR84	Military personnel in Barracks on Sha Tau Kok Road	3.8km	Few	Negligible	Low	Insubstantial	Insubstantial
VR85	High-rise buildings in Shenzhen	3km approx	Many	Small	Low	Slight	Insubstantial
VR 86	Future workers of Ping Che / Ta Kwu Ling NDA	1-2km	Few	Intermediate	Low	Moderate	Slight

**Recreational Receivers**

VR87	Hikers on Robins Nest	2km	Very Few	Intermediate	Medium	Moderate	Moderate
VR88	Hikers in Pat Sin Leng Country Park	3km-6km	Very Few	Small	Medium	Slight	Insubstantial
VR89	Hikers on Pak Tai To Yan	9.5km	Very Few	Negligible	Medium	Insubstantial	Insubstantial

**Travelling Receivers**

VR90	Ping Che Road	1.9km-2.5km	Few	Small	Low	Slight	Insubstantial
VR91	Sha Tau Kok Road	2.8km-5km	Many	Small	Low	Slight	Insubstantial

**Notes:** Assessment of Impacts does not account for possible off-site visual mitigation, which may have the effect of reducing certain impacts further.  
Locations of most important visual sensitive receivers shown in Figure 19.5.

**Table 19.4: Assessment of Significance of Visual Impacts for NENT Landfill Extension During Afteruse Phase (Year 10 after Restoration)**  
(Note: All impacts adverse unless otherwise noted)

	Key Visually Sensitive Receiver (VSR)	Approx. Minimum Distance Between VSR and Source(s)	Nos. of Receivers (order of magnitude only)	Magnitude of Impact During Afteruse (Negligible, Small, Intermediate, Large)	Receptor Sensitivity (Low, Medium, High)	Impact Significance before Mitigation (Insubstantial, Slight, Moderate, Substantial)	Significance of Residual Impacts (Insubstantial, Slight, Moderate, Substantial)
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**Residential Receivers**

VR72	Tong To Shan Tsuen	0.3km	None (abandoned)	N/A	N/A	N/A	N/A
VR73	Lin Ma Hang	0.6km	Very Few	Intermediate	High	Substantial	Slight
VR74	Wo Keng Shan	0.6km	Very Few	Large	High	Substantial	Slight
VR75	Ping Yueng	1.8km	Very Few	Small	High	Moderate	Insubstantial
VR76	Ping Che	1.9km	Few	Small	High	Moderate	Insubstantial
VR77	Villages west of Ping Che Road including Ha Shan Kai Wat/ Sheung Shan Kai Wat/ Hung Lung Hang/ Lei UK/ Tai Po Lin/ Chow Tin Tsuen	2.3km-3.5km approx	Few	Negligible	High	Slight	Insubstantial
VR78	Villages south of Sha Tau Kok Road including Kwan Tei and Ma Liu Shui San Tsuen	3.5km-5.5km approx	Few	Negligible	High	Insubstantial	Insubstantial
VR79	High-rise buildings in eastern Fanling	5km approx	Very Few	Small	High	Slight	Insubstantial
VR80	High-rise buildings in Shenzhen	3km approx	Few	Small	High	Slight	Insubstantial
VR 81	Future Residents of Fanling North NDA	5-6km	Very Few	Negligible	High	Insubstantial	Insubstantial
VR 92	Residents of Heung Yuen Wai	1.3km	Few	Small	High	Moderate	Slight to Insubstantial

	Key Visually Sensitive Receiver (VSR)	Approx. Minimum Distance Between VSR and Source(s)	Nos. of Receivers (order of magnitude only)	Magnitude of Impact During Afteruse (Negligible, Small, Intermediate, Large)	Receptor Sensitivity (Low, Medium, High)	Impact Significance before Mitigation (Insubstantial, Slight, Moderate, Substantial)	Significance of Residual Impacts (Insubstantial, Slight, Moderate, Substantial)
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**Occupational Receivers**

VR82	Workers east of Ping Che Road	0.5km-2.5km	Very Few	Small	Low	Slight	Insubstantial
VR83	Workers. west of Ping Che Road	2km-3.5km	Few	Negligible	Low	Insubstantial	Insubstantial
VR84	Military personnel in Barracks on Sha Tau Kok Road	3.8km	Few	Negligible	Low	Insubstantial	Insubstantial
VR85	High-rise buildings in Shenzhen	3km approx	Few	Small	Low	Insubstantial	Insubstantial
VR 86	Future workers of Ping Che / Ta Kwu Ling NDA	1-2km	Few	Small	Low	Slight	Insubstantial

**Recreational Receivers**

VR87	Hikers on Robins Nest	2km	Very Few	Intermediate	Medium	Moderate	Slight
VR88	Hikers in Pat Sin Leng Country Park	3km-6km	Very Few	Negligible	Medium	Insubstantial	Insubstantial
VR89	Hikers on Pak Tai To Yan	9.5km	Very Few	Negligible	Medium	Insubstantial	Insubstantial

**Travelling Receivers**

VR90	Ping Che Road	1.9km-2.5km	Few	Negligible	Low	Insubstantial	Insubstantial
VR91	Sha Tau Kok Road	2.8km-5km	Many	Negligible	Low	Insubstantial	Insubstantial

**Notes:** Assessment of Impacts does not account for possible off-site visual mitigation, which may have the effect of reducing certain impacts further.  
Locations of most important visual sensitive receivers shown in Figure 19.5.