

## 4. NOISE IMPACT

### 4.1 Introduction

This chapter presents the assessment of potential noise impacts which may arise during the construction, operation, restoration and aftercare stages of the WENT Landfill Extension. Noise impacts associated with the construction activities and the use of powered mechanical equipment during the construction, operation, restoration and aftercare phases would be considered.

The noise impact assessment has been conducted in accordance with the requirements of Annex 5 and Annex 13 of the TM-EIAO as well as the requirements under Clause 3.4.2 of the EIA Study Brief.

### 4.2 Environmental Legislation, Standards and Guidelines

The relevant legislation and associated guidance notes applicable to the study for the assessment of noise implications include:

- Noise Control Ordinance (NCO), Cap 400;
- TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites (TM-Places);
- Technical Memorandum on Noise from Construction Work other than Percussive Piling (TM-GW); and
- Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO).

#### 4.2.1 Construction, Restoration & Aftercare Noise

Noise during construction, restoration and aftercare phases is governed by the Noise Control Ordinance (NCO) (Cap 400) and the EIAO. Guidelines concerning the assessment methodology and relevant criteria are provided in the relevant Technical Memoranda (TMs). These TMs prescribe the maximum permitted noise levels for the use of Powered Mechanical Equipment (PME) and certain construction activities and processes, according to the type of activity or equipment used, the perceived noise climate of the area, and the working hours of equipment operation and usage. The following TMs are applicable to the control of noise from construction and restoration activities:

- TM-GW; and
- TM-EIAO.

##### 4.2.1.1 Daytime Construction Noise Standards

Noise generated by general construction works during normal working hours (i.e. 0700 to 1900 hours on any day not being a Sunday or public holiday) is governed by TM-EIAO. The recommended noise standards are presented in **Table 4.1**.

Table 4.1 Daytime construction noise limit

Uses	Noise Standard ( $L_{eq, 30 \text{ min}}$ dB(A))
Domestic Premises	75
Educational Institutions (normal periods)	70
Educational institutions (during examination periods)	65

Note: The standard above applies to uses which rely on open window for ventilation.

#### 4.2.1.2 Noise Standards for Restricted Hours

The NCO provides statutory controls on general construction works during the restricted hours (i.e. 1900 to 0700 hours from Monday to Saturday and any time on Sundays or public holidays). The use of PME for construction works during the restricted hours would require a Construction Noise Permit (CNP). The TM-GW details the procedures adopted by EPD for assessing such application. The granting of a CNP is subject to conditions stated in the permit and it may be revoked at any time for failure to comply with the permit conditions.

The study area does not fall within any designated area under the NCO, and construction noise criteria set out in the TM-GW should therefore be applicable to this project.

Maximum allowable noise levels from construction activities during restricted hours at the affected NSRs are governed by the TMs and shall not exceed the specified Acceptable Noise Levels (ANLs). These ANLs are stipulated in accordance with the Area Sensitivity Ratings (ASR) established for the NSRs, and the Basic Noise Levels (BNLs) is stated in **Table 4.2**.

**Table 4.2 BNLs for construction noise other than percussive piling**

Time Period	Basic Noise Levels for Area Sensitivity Ratings, dB(A)		
	A	B	C
All weekdays during the evening (1900 to 2300 hours), and general holidays (including Sundays) during the day and evening (0700 to 2300 hours)	60	65	70
All days during the night-time (2300 to 0700 hours)	45	50	55

#### 4.2.1.3 Construction Noise Permits

Despite any description or assessment made in this EIA Report on construction noise aspects, there is no guarantee that a CNP will be issued for the landfill construction. The Noise Control Authority will consider a well-justified CNP application, once filed, for construction works within restricted hours as guided by the relevant TMs issued under the NCO.

The Noise Control Authority will take into account contemporary conditions / situations of adjoining land uses and any previous complaints against construction activities at the site before making a decision in granting a CNP. Nothing in the EIA report shall bind the Noise Control Authority in making a decision. If a CNP is to be issued, the Noise Control Authority shall include in it any conditions demand. Failure to comply with any such conditions will lead to cancellation of the CNP and prosecution action under the NCO.

#### 4.2.2 Operation Noise

##### 4.2.2.1 Road Traffic Noise

The TM-EIAO provides guidance on acceptable road traffic noise levels for uses which rely on open windows for ventilation. The relevant criteria are shown in **Table 4.3**.

**Table 4.3 Road traffic noise standards**

Uses	Road Traffic Noise, L <sub>10, 1hr</sub> dB(A)
Domestic Premises	70
Hotel and Hostels	70
Offices	70
Educational Institutions	65
Hospital & Clinics	55
Places of public worship and courts of law	65

Note: The above criteria apply to noise sensitive uses measured at 1m from external façade of premises which rely on open window for ventilation.

#### 4.2.2.2 On-Site Operation Noise

On-site operation noise sources including fixed noise sources, such as ammonia stripping plant and leachate treatment plant, on-site traffic noise due to refuse vehicle movement, waste filling and barge noise are controlled under the NCO and TM-Places. For planning purpose, the TM-EIAO has specified the following standards:

- 5 dB(A) below the appropriate ANLs in the TM-Places; or
- the prevailing background noise levels for quiet areas with ambient noise level at 5 dB(A) below the ANL.

The ANLs for different Area Sensitivity Ratings are summarised in below.

Table 4.4 Operation noise criteria for fixed noise sources

Time Period	ANL, dB(A)			ANL-5, dB(A)		
	ASR A	ASR B	ASR C	ASR A	ASR B	ASR C
Day (0700 to 1900 hours)	60	65	70	55	60	65
Evening (1900 to 2300 hours)	60	65	70	55	60	65
Night (2300 to 0700 hours)	50	55	60	45	50	55

A prevailing noise measurement has been conducted in December 2008 at Ha Pak Nai village houses which are the closest NSRs (see **Section 4.3**). A summary of the noise measurements and hence the operation noise criteria is given below.

Table 4.5 Summary of prevailing noise measurements and noise criteria for operation noise

NSR	Time Period <sup>(1)</sup>	Prevailing Noise Level, dB(A) (1)	Area Sensitivity Rating	ANL-5 dB(A) (2)	Criteria dB(A) Min. of (1) & (2)
Ha Pak Nai	Day	45 – 50	A	55	45
	Evening	43 – 44	A	55	43
	Night	37 - 40	A	45	37

Note:

<sup>(1)</sup> Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.

### 4.3 Noise Sensitive Receivers

Noise sensitive receivers (NSRs) have been identified in accordance with Annex 13 of the TM-EIAO. Both existing and planned uses during the construction, operation, restoration and aftercare periods of the WENT Landfill Extension are included as appropriate. The existing NSRs were identified through desktop review and site survey. The areas in the vicinity of the WENT Landfill Extension are not covered by any Outline Zoning Plans.

The land uses in the vicinity of the extension site include village type residential premises. The key representative NSRs for noise assessment are given in **Table 4.6** and their respective locations are shown in **Figure 4.1**.

Table 4.6 Representative noise sensitive receivers (NSRs)

NSR	Description	Use	No. of Storey	Shortest Horiz Dist to WENT Landfill Ext Boundary
NSR-1	Ha Pak Nai	Village houses	1 - 3	<ul style="list-style-type: none"> <li>• &gt; 1km from WENT Landfill Extension Boundary</li> <li>• About 300m from nearest barging location</li> </ul>
NSR-2	Lung Kwu Sheung Tan	Place of Worship	1	<ul style="list-style-type: none"> <li>• About 1km from WENT Landfill Extension Boundary</li> </ul>

## 4.4 Construction Noise Assessment

---

### 4.4.1 Assessment Methodology

Construction, restoration and aftercare noise impacts have been assessed by adopting the standard acoustic principles and the methodologies described in the relevant TMs issued under the NCO, primarily the TM-GW. The following general procedures were applied to the construction, restoration and aftercare noise assessment.

- Determine the assessment area;
- Identify and locate representative NSRs that may be affected by the works;
- Obtain the methodology and works sequence for the construction period;
- Obtain the plant items for each corresponding works sequence;
- Determine the sound power levels (SWLs) of the plant items according to the information stated in the TM-GW or other recognised sources of reference;
- Calculate the correction factors based on the distance between the NSRs and the notional noise source positions of the work sites;
- Apply corrections for façade, distance, barrier attenuation, acoustic reflection where applicable. For assessment of NSRs exceeding 300m, atmospheric and ground corrections will be applied with reference to ISO 9613-1 “Acoustics – Attenuation of sound during propagation outdoors – Part 1 : Calculation of the absorption of sound by the atmosphere” (ie Table 1(j) for a typical air temperature of 25 deg and a typical RH of 70%) ;
- Assess the construction and restoration works noise impacts;
- Predict noise levels at the NSRs;
- Quantify the level of impact at the NSRs in accordance with TM-GW; and
- Predict the cumulative noise impacts for activities associated with the construction phasing and restoration works at the existing landfill.

### 4.4.2 Construction Plant Inventory

Chapter 2 has presented a detailed description of the key construction activities at each phase of the WENT Landfill Extension. As a conservative approach, excavation using hydraulic breakers instead of blasting has been adopted for the calculation of noise impact due to more equipment (eg excavators, hydraulic breakers etc) would be adopted. The construction of the WENT Landfill Extension would include the following activities:

- Site clearance & formation;
- Installation of liner;
- Construction of leachate treatment facilities;
- Construction of ammonia stripping plant;
- Construction of LFG treatment plant
- Cumulative construction noise impact for construction activities associated with the construction/operation in the WENT Landfill Extension and restoration in the existing WENT Landfill; and
- Restoration & Aftercare

The above construction activities will involve the use of Powered Mechanical Equipment (PME) including excavators, truck, crane truck, compactor, dozer, generator, loader, etc.

The plant inventory and their respective Sound Power Levels (SWLs) are given in **Appendix 4.1**. The plant inventory is realistic, practical and practicable in completing the works with schedule.

Prediction is made with respect to the distance of NSRs from the notional source locations. **Figure 4.2a and Figure 4.2b** show the locations of the NSRs and their respective distances from the notional sources.

#### 4.4.3 Prediction and Evaluation of Noise Impact

Assessment results indicate that, under “unmitigated” scenario, the construction noise levels at the NSRs are within the criteria. The maximum unmitigated construction noise levels against the stipulated criteria at the NSRs are shown in **Table 4.7**. Detailed results of the construction noise assessment are given in **Appendix 4.2a**.

**Table 4.7 Predicted maximum construction noise levels at the NSRs**

NSR	NSR Description	Max Predicted Noise Level, dB(A)	Criteria	Compliance (Y/N)
NSR-1	Ha Pak Nai	71	75	Y
NSR-2	Lung Kwu Sheung Tan	69	75	Y

The assessment results have demonstrated that daytime noise criteria would not be exceeded by the predicted construction noise levels under the unmitigated scenario. Good practices for the control of noise emissions from construction sites are however still recommended to further reduce any potential nuisance. These include:

- Good site practices to limit noise emissions at source;
- Use of quiet plant and working methods, whenever practicable.

The above precautionary measures should be implemented in all works sites as good practices. Detailed descriptions of these precautionary measures are given in the following sections.

##### 4.4.3.1 Good Site Practices and Noise Management Techniques

Good site practice and noise management techniques could considerably reduce the noise impact from construction site activities on nearby NSRs. The following precautionary measures should be followed during each phase of construction:

- Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme;
- Machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum;
- Plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs;
- Silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works;
- Mobile plant should be sited as far away from NSRs as possible and practicable; and
- Material stockpiles, site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.

The above good practice to further eliminate the potential of noise impact from construction equipment will be incorporated into the contract specification. The benefits of these techniques can vary according to specific site conditions and operations. The

environmental noise climate would certainly be improved through these control practices, although the improvement can only be quantified during implementation when specific site parameters are known.

#### 4.4.3.2 Use of “Quiet” Plant and Working Methods

The use of quiet plant is a feasible solution to promote better noise impact management of the works activities. It is generally known (supported by field measurement) that particular models of construction equipment are quieter than standard types given in the TM-GW. Whilst it is generally considered too restrictive to specify that the DBO Contractor has to use specific models or items of plant, it is reasonable and practicable to set plant noise performance specifications for specific PME so that some flexibility in selection of plant is allowed. A pragmatic approach would be to request that the DBO Contractor independently verifies the noise level of the plant proposed to be used and demonstrates through furnishing of these results, that the plant proposed to be used on the site meets the requirements.

The use of quiet plant associated with the construction works is prescribed in British Standard “Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 : Noise : 2009” which contains the SWLs for specific quiet PME. It should be noted that while various types of silenced equipment could be found in Hong Kong, EPD when processing a CNP application for evening or night time works may choose to apply the noise data stipulated in the TM-GW as appropriate. CNP applications which contain sufficient details of any particularly quiet items of PME or any special noise control measures which the CNP applicant proposes to employ on the site may be given special consideration by the Noise Control Authority.

Routine noise monitoring will be stipulated in the EM&A requirement to counter check the noise performance at NSR, and the preference for adopting quiet plant will be stipulated when the noise impact from construction activities exceed the limit level.

#### 4.4.4 Daytime Cumulative Construction Noise Impacts

The restoration work of the existing WENT Landfill would however overlap with the initial phases of the WENT Landfill Extension. It is therefore required to consider the cumulative construction noise impacts.

SWLs of 128dB(A) have been adopted for the installation of final capping and 122dB(A) for planting and landscaping. Assessment results indicate that the cumulative noise impacts at NSR 1 (ie Ha Pak Nai) would be dominated by the construction noise from the restoration works at the existing WENT Landfill. It should however be noted that the restoration works of the existing WENT Landfill site would be implemented separately by another contractor under separate contract.

In order to assess the cumulative construction noise impacts due to the restoration work of the existing WENT Landfill which would also be conducted in phases, it is assumed that the equivalent noise sources would be about 50m from the point of the nearest site boundary measured along the line between the approximate geographical centre of the site and the point on the site boundary nearest to the NSRs at Ha Pak Nai and Lung Kwu Sheung Tan. **Appendix 4.2b** presents the detailed cumulative construction noise calculations. The following table summarises the predicted cumulative construction noise impacts.

Table 4.8 Cumulative construction noise impacts

NSR	NSR Description	Max Predicted Noise Level, dB(A)	Criteria	Compliance (Y/N)
NSR-1	Ha Pak Nai	79	75	N
NSR-2	Lung Kwu Sheung Tan	69	75	Y

It should however be noted that there is limited information on the restoration works of the existing WENT Landfill which is not part of the WENT Landfill Extension. The construction methodology and programme for their restoration is very uncertain at this stage and very conservative assumptions have been made for this cumulative assessment, especially it has been assumed that the notional noise source would be at 50m from the nearest site boundary closer to NSR at Ha Pak Nai. Despite the exceedance of the cumulative construction noise impacts by considering very conservative assumptions, the construction noise impacts caused by the WENT Landfill Extension would comply with the criterion (see Section 4.4.3). It is anticipated that the contractor for the restoration works of the existing WENT Landfill would take necessary steps to ensure that there are no adverse construction noise impacts on neighbouring NSRs including but not limited to NSR at Ha Pak Nai.

#### 4.4.5 “What if IWMF not proceed”

The feasibility of IWMF is still being conducted and there is no decision on the implementation programme and site selection. In case the IWMF is not located at the middle ash lagoon, the boundary of the WENT Landfill Extension would be further expanded to include the middle lagoon. The assessment so far has assumed that the noise sources are close to the waste boundary which is much closer to the sensitive receivers. Hence, even the middle ash lagoon is employed for the IWMF, the worst case environmental impacts have already been addressed in the current assessment and no additional impact on the sensitive receivers would be generated.

### 4.5 Road Traffic Noise Assessment

---

#### 4.5.1 Assessment Methodology

Road traffic noise calculation method is based on the UK Department of Transport “Calculation of Road Traffic Noise (CRTN)”. The predicted noise levels at the sensitive receivers include 2.5dB(A) facade reflection and correction factors for effects due to gradient, distance, view angle, road surface and barriers.

The CRTN compliance computer programme, RoadNoise 2000, has been used to model traffic noise on the road networks. Road traffic noise levels are presented in terms of noise levels exceeded for 10% of the one-hour period during the peak traffic flow, i.e.  $L_{10,1hr}$  dB(A).

#### 4.5.2 Prediction of Road Traffic Noise Impacts

Off-site road traffic noise levels have been predicted based on the traffic data forecast. The off-site receivers that need to be considered include the existing villages houses along Lung Kwun Tan Road.

Lung Kwun Tan Road is a public road for refuse vehicles to the existing WENT Landfill. Besides refuse vehicles, other vehicular type traffic would also use this road to access various villages in the vicinity (see **Figure 4.3**).

According to the information, with the existing WENT Landfill facility, the traffic flow along Lung Kwun Tan Road is generally increasing. With the commencement of the operation for Phase 1 WENT Landfill Extension in end 2010s, the traffic along Lung Kwun Tan Road would be similar to that before it comes into operation. This scenario is considered a reasonable base case for comparison of future off-site traffic noise since the prevailing traffic noise level is influenced by the total traffic on Lung Kwun Tan Road on which refuse vehicles are using already. The traffic would slightly increase since then until reaching its maximum value at end 2020s.

Traffic forecast has concluded there would be only 18% increase for a 10 year period from end 2010s to end 2020s. The following table summaries the traffic flow along Lung Kwun Tan Road before the implementation of the WENT Landfill Extension and the maximum traffic flow.

Table 4.9 Peak Traffic flow data at Lung Kwu Tan Road

	Peak Traffic Flow	
	Before Landfill Extension at end 2010s	After Landfill Extension at end 2020s
No. of Refuse Vehicle / hour	118	141
No. of Light Vehicle / hour	193	226
Total No. of Vehicle / hour	311	367
Percentage of Heavy Vehicle	38%	38%
Speed, kph	50	50

The predicted facade noise levels at the existing NSRs are presented in **Table 4.10**. Roadplot files are shown in **Appendix 4.3**. Results indicate that, while the total noise impacts would exceed the noise criterion, there would not be significant increase (ie < 1.0dB(A) increase) in the road traffic noise. Hence, additional noise mitigation measures are not required.

Table 4.10 Predicted maximum traffic noise levels at NSRs along Lung Kwu Tan Road

NSR	Description	Use	No. of Storey	Noise Criteria dB(A)	Predicted Noise Level, L <sub>10</sub> dB(A)		Difference dB (A)
					Before Landfill Extension at end 2010s	After Landfill Extension at end 2020s	
NSR-2	Lung Kwu Sheung Tan	Village houses	3	70	66.8	67.5	0.7
NSR-3a	Pak Long	Village houses	3	70	72.8	73.5	0.7
NSR-3b	Tin Hau Temple at Pak Long	Temple	1	65	68.7	69.4	0.7
NSR-4	Sha Kong Po	Village houses	3	70	72.0	72.7	0.7
NSR-5	Lung Tsai	Village houses	3	70	70.2	70.9	0.7

## 4.6 On-Site Operation Noise Assessment

### 4.6.1 Noise Sources

Key operation noise sources within the WENT Landfill Extension include the following:

- Leachate treatment plant;
- Ammonia stripping plant;
- LFG treatment plant;
- Refuse vehicle movement;
- Waste filling activities; and
- Barges.

Where possible, reference has been made to the approved EIA for NENT Landfill Extension for SWLs of the above plant. Supplementary noise measurements were also conducted for those items not covered in the NENT Landfill Extension EIA. For the barges, there are existing 6 berths along the seafront (see **Figure 4.4**). They are currently used by different contractors including HATS (for future STF), NLTS, WKTS, OITF, IWTS and IETS. Other than the berth for WKTS which is most frequently used and has been installed with a gantry crane, all the other berths rely on the container handling equipment on the barge to load and unload the containers. According to the latest operation information from the berth operators, the operating mode of the berths is as follows:



Berth	Daytime	Evening	Night-time
HATS (STF)	✓ (0730 - 1930)		X
NLTS	✓ (0830 - 0920)	X	X
WKTS	✓ (0730 - 1930)		X
OITF	✓ (1100 - 1430)	X	X
IWTS		✓ (2100 - 1800)	
IETS		✓ (2130 - 1700)	

All the above noise emission inventories of the landfill site operation are summarized in **Table 4.11**.

**Table 4.11** Noise inventories for the landfill site operation

Plant	SWL/unit dB(A)	Qty	Util, %	Total SWL dB(A)	Period
Lechate treatment plant (WENT) *	75	1	100%	75	I
Lechate treatment plant (WENT Ext) *	75	1	100%	75	I
Ammonia stripping plant (WENT) *	88	1	100%	88	I
Ammonia stripping plant (WENT Ext) *	88	1	100%	88	I
LFG Treatment Plant (WENT) #	95	1	100%	95	I
LFG Treatment Plant (WENT Ext) #	95	1	100%	95	I
Refuse Veh – Daytime *	97	183	100%	120	II
Refuse Veh – Evening *	97	90	100%	117	III
Waste Filling – Daytime *					
<i>Compactor (CNP050)</i>	105	2	100%	108	II
<i>Dump truck, e.g.5.5 tonne &lt; gross vehicle weight≤38 tonne, (CNP068)</i>	105	1	100%	105	II
<i>Dozer (CNP030)</i>	115	2	100%	118	II
<i>Backhoe (CNP081)</i>	112	1	100%	112	II
Waste Filling – Evening *					
<i>Compactor (CNP050)</i>	105	1	100%	105	III
<i>Dump truck, e.g.5.5 tonne &lt; gross vehicle weight≤38 tonne, (CNP068)</i>	105	1	100%	105	III
<i>Dozer (CNP030)</i>	115	1	100%	115	III
<i>Backhoe (CNP081)</i>	112	1	100%	112	III
Grantry Crane	98	1	50% - 80% <sup>[1]</sup>	95-97 <sup>[2]</sup>	II & III
Barges – Daytime #	98 - 100	5	80% <sup>[1]</sup>	97-99 <sup>[2]</sup>	II
Barges – Evening #	98 - 100	3	50% <sup>[1]</sup>	95-97 <sup>[2]</sup>	III
Barges – Night-time #	98 - 100	2	50% <sup>[1]</sup>	97 <sup>[2]</sup>	IV

Note :

I – Daytime, evening and night-time

II – Daytime

III – Evening

IV – Night-time

\* - Based on SWLs adopted in the approved NENT EIA Report

# - Based on site measurements

[1] This % of utilization is conservative based on site observation and discussion with existing operators

[2] As observed on site, the sound power level was dominated by the impact noise of the containers on the vehicles. Nevertheless, the noise measurements conducted had included all different noise sources, including the winch, grantry and the engine exhaust of barges.

Hence, for the daytime and evening period, the worst case scenario would be with the barges for NLTS and WTKS operating together. During night-time, the barge at IWTS and IETS would wait until next daytime period for loading and unloading. The process would be completed by 1800 and 1700 respectively. Therefore, the barges would be idling during the night-time period and the possible noise impact has been estimated.

#### 4.6.2 Assessment Methodology

The following general procedures have been adopted for the operation noise assessment.

- Determine the assessment area;
- Identify and locate representative NSRs that may be affected by the works;
- Obtain the plant items;
- Determine the sound power levels (SWLs) of the plant for various noise sources;
- Calculate the correction factors based on the distance between the NSRs and the noise source positions;
- Apply any corrections for façade, distance, barrier attenuation, acoustic reflection where applicable. For assessment of NSRs exceeding 1000m, atmospheric correction of -3dB(A) / km will be applied with reference to ISO 9613 (this correction was adopted in the approved EIA for NENT Landfill Extension); and
- Quantify the level of impact at the NSRs in accordance with TM-Places.

For the waste filing operation, all PME's will operate at the bottom of valley during the early stage of tipping operation. Natural topography will provide sufficient screening effect for all NSRs. The worst-case scenario will only be occurred at the later stage when the bottom part of the valley is filled up. However, the topography of the restored WENT Landfill Extension would still provide screening for the nearest NSRs at Ha Pak Nai.

The use of quieter equipment/plant is a feasible solution to promote better noise impact management of the works activities. It is generally known (supported by field measurement) that particular models of powered mechanical equipment are quieter than standard types given in the TM-GW. Whilst it is generally considered too restrictive to specify that the DBO Contractor have to use specific models or items of equipment/plant, it is reasonable and practicable to set noise performance specifications for specific equipment/plant so that flexibility in selection of equipment is allowed. A pragmatic approach would be to request that the DBO Contractor independently verifies the noise level of the equipment/plant to be used and demonstrates through furnishing of these results, that the equipment/plant to be used on the site meets the requirements. The preference for adopting quieter equipment/plant will be stipulated in the contract specification. It shall be applied whenever practicable to further eliminate the potential of noise impact from construction activities.

#### 4.6.3 On-Site Operation Noise Impacts

Assessment results indicate that, without any noise mitigation measures, the operation noise impact at NSR 1 (ie Ha Pak Nai) will exceed the noise criteria by 4dB(A) during the Day-time, 2dB(A) during Evening and 3dB(A) during Night-time periods. A summary of the predicted noise impacts is given below and given in **Appendix 4.4**.

Table 4.12 Predicted operation noise impacts (Unmitigated)

NSR	Period	Daytime Noise Impacts, dB(A)		
		Impact	Criterion	Exceedance
NSR-1 (Ha Pak Nai)	Day-time	49	45	4
	Evening	45	43	2
	Night-time	40	37	3

It should be noted that some 3-storey high containers have been erected at the edge of the eastern berth. These containers could block the direct line of sight from NSR 1 and a screening effect of 5dB(A) from the berths could be provided. Therefore, the operation noise should meet the criterion shown on **Table 4.12**. However, there may be chance that the containers, as well as the screening effect, would be removed. To this, in order to mitigate the noise impacts, it is proposed to build a noise bund of about 3.5m tall along the north eastern seafront of the existing WENT Landfill (see **Figure 4.5**). This bund would be designed to block the direct line of sight from the receiver. Further analysis shows that this 3.5m noise bund would provide a path difference of 0.1m which equals to -9dB(A) (see

**Appendix 4.5).** The height (3.5 m) of the noise bund is indicative only and the exact height will depend on the tidal condition and the height of the engine above the deck of each barge.

A summary of the mitigated operation noise impacts is given below. **Figure 4.6** shows the topographic screening for the refuse vehicles and waste filling activities. It can be seen that the receiver would be screened and hence a correction factor of -10dB(A) has been adopted.

Table 4.13 Predicted operation noise impacts (Mitigated)

NSR	Period	Daytime Noise Impacts, dB(A)		
		Impact	Criterion	Exceedance
NSR-1 (Ha Pak Nai)	Day-time	44	45	-
	Evening	43	43	-
	Night-time	35	37	-

[Note] For the gantry crane for WKTS, screening effect has not been taken into account.

It can therefore be seen from the above table that, by implementing additional noise mitigation measures, if the containers have been removed, the noise impacts at Ha Pak Nai would comply with the respective noise criteria and there are no residual noise impacts. Detailed calculations are given in **Appendix 4.4**.

#### 4.6.4 "What if IWWMF not proceed"

Similar to that of construction phase, the assessment so far has assumed that the noise sources are close to the waste boundary which is much closer to the sensitive receivers. Hence, even the middle ash lagoon is employed for the IWWMF, the worst case environmental impacts have already been addressed in the current assessment and no additional impact on the sensitive receivers would be generated.

## 4.7 Conclusion

Potential noise sources and representative NSRs for the construction and operation phases have been identified. Noise prediction has been conducted to assess the impact with reference to established methodologies.

### 4.7.1 Construction, Restoration and Aftercare Phases

The assessment has been conducted based on daytime noise criteria specified in the TM-EIAO. It is predicted that the construction noise impacts associated with the construction activities on the Project site would not exceed the criteria. No adverse construction noise impact is anticipated.

### 4.7.2 Operation Phase

Road traffic noise assessment results indicate that the WENT Landfill Extension would not significantly increase the traffic noise impacts on the residential premises along Lung Kwu Tan Road and hence mitigation measures are not required.

A 3.5m high noise bund (about 150m long) along the existing eastern seawall of the existing WENT Landfill would be required to comply with the noise criteria during daytime, evening and night-time periods. Good maintenance practice shall also be maintained by the DBO Contractor to ensure all the mechanical equipment (eg winch) would not generate excessive noise.