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## 4 Noise

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### 4.1 Relevant Legislation, Standards and Criteria

#### 4.1.1 General

##### 4.1.1.1 The relevant legislation and associated guidance applicable to present the study for the assessment of noise impacts include:

- Noise Control Ordinance (NCO) (Cap.400);
- Technical Memorandum (TM) on Noise from Construction Work other than Percussive Piling (GW-TM);
- TM on Noise from Percussive Piling (PP-TM);
- TM on Noise on Construction Work in Designated Areas (DA-TM);
- TM for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites (IND-TM); and
- Environmental Impact Assessment Ordinance (EIAO) (Cap. 499) and EIAO-TM.

#### 4.1.2 Construction Noise

##### **Airborne Construction Noise During Normal Hours**

##### 4.1.2.1 The NCO provides the statutory framework for noise control in Hong Kong. Assessment procedures and standards are set out in the respective TM promulgated under NCO.

##### 4.1.2.2 For construction, there is no statutory limit on construction noise during normal hours under the NCO and related TMs. There is statutory control on construction noise between the hours 1900 and 0700 from Monday to Saturday and at any time on general holidays (including Sundays) under the NCO. To ensure a better environment, the EIAO-TM promulgated under the EIAO has imposed more stringent criteria. Daytime general construction works (excluding percussive piling) between the hours 0700 and 1900 on weekdays, i.e. non-restricted hours, is controlled under the EIAO. The EIAO-TM stipulates criteria of 65 – 75dB(A) for daytime construction activities, as shown in **Table 4.1.1**.

**Table 4.1.1** Noise standards for daytime construction activities

Uses	Noise Standards <sup>[1], [2], L<sub>eq</sub></sup> (30min) dB(A)
	0700 – 1900 hours on any day not being a Sunday or general holiday
All domestic premises including temporary housing accommodation	75
Hotel and hostels	75
Educational institutions including kindergartens, nurseries and all others where unaided voice communication is required	70 65 (During examination)

Notes:

[1] The above standards apply to uses that rely on opened windows for ventilation.

[2] The above standards should be viewed as the maximum permissible noise levels assessed at 1m from the external facade.

**4.1.2.3** In addition, reference has been made to EIAO Guidance Note No. 09/2010 on “Preparation of Construction Noise Impact Assessment under the Environmental Impact Assessment Ordinance”.

#### **Airborne Construction Noise during Restricted Hours**

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

**4.1.2.5** In addition to the general controls on the use of PME during restricted hours, the use of Specified Powered Mechanical Equipment (SPME) and the undertaking of Prescribed Construction Work (PCW) during the restricted hours in a designated area are controlled by the DA-TM. Construction plant or equipment classified as SPME under the DA-TM includes hand-held breakers, bulldozers, concrete lorry mixers, dump trucks and vibratory pokers. The PCW includes the erection or dismantling of formwork or scaffolding, hammering, loading, unloading or handling of rubble, wooden boards, steel bars, wood or scaffolding material.

**4.1.2.6** The DA-TM details the procedures that should generally be adopted by the Noise Control Authority for assessing the use of SPME during restricted hours and for determining whether a CNP would be issued.

**4.1.2.7** Maximum noise levels from construction activities during restricted hours at affected Noise Sensitive Receivers (NSRs) are controlled under the TMs and shall

not exceed the specified Acceptable Noise Levels (ANLs). These ANLs are stipulated in accordance with the Area Sensitivity Ratings established for the NSRs. The ANLs for construction works in Designated Areas are more stringent than those given in the TM-GW and summarised in **Table 4.1.2**.

**Table 4.1.2** ANLs for construction during restricted hours

Time Period	ANLs for Area Sensitive Ratings <sup>[1]</sup> , 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 (45)	65 (50)	70 (55)
All days during the night-time (2300 to 0700 hours)	45 (30)	50 (35)	55 (40)

Note:

[1] Figures in brackets are ANLs for SPME construction work in designated areas.

**4.1.2.8** As defined in the Noise Control (Construction Work Designated Areas) Notice Plan No. EPD/AN/NT-05, Tung Chung areas such as Tung Chung Crescent, Fu Tung Estate, Caribbean Coast, Yat Tung Estate, Ma Wan Chung, Wong Ka Wai, etc. are within the Designated Area (DA).

**4.1.2.9** Despite any description made in this EIA, there is no guarantee that a CNP will be issued for the project 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 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 under the NCO.

### Percussive Piling

**4.1.2.10** Under the PP-TM, CNPs are also required for percussive piling involving the use of diesel, pneumatic and / or steam hammer. This TM specifies the permitted hours and other conditions for percussive piling. The following **Table 4.1.3** lists the acceptable noise levels of percussive piling for various types of NSR.

**Table 4.1.3** ANLs for percussive piling

NSR Window Type or Means of Ventilation	ANL, dB(A)
(i) NSR (or part of NSR) with no window or other opening	100
(ii) NSR with central air conditioning system.	90
(iii) NSR with windows or other openings but without central air conditioning system	85

- 4.1.2.11** Depending on the numbers and types of piling machines and the separation from NSRs, percussive piling may be restricted to 12, 5 or 3 hours per day. For NSRs that are particularly sensitive to noise, such as hospitals, medical clinics, educational institutions and courts of law, a further reduction of 10dB(A) shall be applied to the above ANLs.

### **Blasting**

- 4.1.2.12** The administrative and procedural control of all blasting operations in Hong Kong is vested in the Mines Division of the Civil Engineering and Development Department (CEDD). The Dangerous Goods (General) Regulations, Chapter 295 also stipulates that no person shall carry out blasting unless he possesses a valid mine blasting certificate to be issued by the Mines Division of CEDD. The Superintendent of Mines will review the application on a case-by-case basis before issuing the Mine Blasting Certificate. Although there is no statutory noise level for blasting, the noise associated with the removal of debris and rocks are controlled under the EIAO-TM.

### **Groundborne Construction Noise during Normal Hours**

- 4.1.2.13** Noise arising from general construction works that may generate groundborne noise during normal working hours is governed by the EIAO-TM under the EIAO. The IND-TM under the NCO stipulates that noise transmitted primarily through the structural elements of building, or buildings, shall be 10 dB(A) less than the relevant ANLs.
- 4.1.2.14** Based on the same principle for the groundborne noise criteria (i.e. ANL-10 dB(A) under the IND-TM), the groundborne construction noise levels inside domestic premises and schools shall be limited to 65 dB(A) and 60 dB(A) respectively when compared to the EIAO-TM. A summary of groundborne construction noise criteria during normal working days is given in **Table 4.1.4**.

**Table 4.1.4** Groundborne construction noise criteria

NSR type	Noise Criteria, dB(A)
	0700 to 1900 hours on any day not being a Sunday or general holiday
All domestic premises including temporary housing accommodation	65
Hotels and hostel	
Educational institutions including kindergarten, nurseries and all others where unaided voice communication is required	60 55 (for during examination)

## Groundborne Construction Noise During Restricted Hours

**4.1.2.15** Similar to airborne construction noise during restricted hours, NCO also provides statutory control of construction work for groundborne noise during restricted hours. As discussed in the above section, same principle for groundborne noise criteria (i.e. ANL-10dB(A) under the IND-TM) shall be adopted. Therefore, table below summarizes the groundborne construction noise criteria during restricted hours.

**Table 4.1.5** Construction groundborne noise criteria during restricted hours

Time Period	Noise Criteria, dB(A) 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)	50	55	60
All days during the night-time (2300 to 0700 hours)	35	40	45

## 4.1.3 Operational Noise

**4.1.3.1** The EIAO-TM (Annex 5 of TM) has stipulated the noise standards for various noise sources as shown in the following **Table 4.1.6**. It should, however, be noted that the following noise criteria are only applicable to uses that rely on opened windows for ventilation.

**Table 4.1.6** Noise standards for operational phase

Common Uses	Noise Standards <sup>[1], [2]</sup>				
	Aircraft Noise (Noise Exposure Forecast: NEF)	Helicopter Noise $L_{max}$ dB(A) 0700-1900 hours	Road Traffic Noise $L_{10}$ (1hour) dB(A)	Rail Noise <sup>[3]</sup>	Fixed Noise Sources
All domestic premises including temporary housing accommodation	25	85	70	(a) The appropriate ANLs shown in Table 2 of the Technical Memorandum for the Assessment of Noise from Places Other than Domestic Premises, Public Places or Construction Sites and (b) $L_{max}$ (2300-0700 hours) = 85dB(A)	(a) 5dB(A) below the appropriate ANLs shown in Table 2 of the Technical Memorandum for the Assessment of Noise from Places Other than Domestic Premises, Public Places or Construction Sites, or
Hotels and hostels	25	85	70		(b) the prevailing background noise levels (For quiet areas with
Offices	30	90	70		
Educational institutions including kindergartens, nurseries and all others where unaided voice communication is required	25	85	65		
Places of public worship and courts of law	25	85	65		

Common Uses	Noise Standards <sup>[1], [2]</sup>				
	Aircraft Noise (Noise Exposure Forecast: NEF)	Helicopter Noise $L_{max}$ dB(A) 0700-1900 hours	Road Traffic Noise $L_{10}$ (1hour) dB(A)	Rail Noise <sup>[3]</sup>	Fixed Noise Sources
Hospitals, clinics, convalescences and homes for the aged, diagnostic rooms, wards	25	85	55		level 5 dB(A) below the ANL)

Notes:

- [1] The above standards apply to uses that rely on opened windows for ventilation.
- [2] The above standards should be viewed as the maximum permissible noise levels assessed at 1m from the external façade.
- [3] Rail noise is under the control of the NCO and shall comply with the ANLs laid down in the Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites. The criteria for noise transmitted primarily through the structural elements of the building or buildings should be 10dB(A) less than the relevant acceptable noise level.

### Fixed Noise Sources

**4.1.3.2** Operational noise from fixed noise sources is controlled under the IND-TM. To plan for a better environment, the EIAO-TM has specified the following requirements for the planned fixed noise sources, whichever is more stringent.

- 5dB(A) below the appropriate ANLs in the IND-TM; or
- the prevailing background noise levels.

**4.1.3.3** The ANLs for different Area Sensitivity Ratings during different periods are summarised in the following **Table 4.1.7**.

**4.1.3.4** Besides, ANL stipulated in the IND-TM will be adopted in the evaluation of potential cumulative fixed noise sources impact assessment from existing and planned fixed noise sources.

**Table 4.1.7** ANLs for fixed noise sources

Time Period	ANL, dB(A)		
	Area Sensitivity Rating A	Area Sensitivity Rating B	Area Sensitivity Rating C
Day (0700 to 1900 hours)	60	65	70
Evening (1900 to 2300 hours)	60	65	70
Night (2300 to 0700 hours)	50	55	60

**4.1.3.5** For assessing fixed noise sources, the Area Sensitivity Ratings at the NSRs are defined in accordance with the relevant TMs.



## Airborne Rail Noise

- 4.1.3.6** The noise criterion for assessing airborne rail noise is given in **Table 4.1.6**. In addition, noise level during the period between 11:00pm and 7:00am of the following day should not exceed  $L_{max}$  85dB(A). All these criteria only apply to NSRs relying on opened windows for ventilation. In addition, ANLs for each period is also presented in **Table 4.1.7**.

## Groundborne Rail Noise

- 4.1.3.7** The noise criterion for assessing groundborne rail noise is given in **Table 4.1.8**. The IND-TM under the NCO stipulates that noise transmitted primarily through the structural elements of building, or buildings, shall be 10dB(A) less than the relevant ANLs.

- 4.1.3.8** The ANLs – 10 for different Area Sensitivity Ratings during different periods are summarised in the following table.

**Table 4.1.8** ANLs – 10 for groundborne rail noise sources

Time Period	ANL – 10, dB(A)		
	Area Sensitivity Rating A	Area Sensitivity Rating B	Area Sensitivity Rating C
Day (0700 to 1900 hours)	50	55	60
Evening (1900 to 2300 hours)	50	55	60
Night (2300 to 0700 hours)	40	45	50

## 4.2 Baseline Conditions

### 4.2.1 Description of Existing Environment

- 4.2.1.1** As discussed in **Section 1**, the Project is an approximately 1.3km extension of the existing Tung Chung Line (TCL) with two new stations including Tung Chung East (TCE) Station and Tung Chung West (TCW) Station. A section of tracks in TCL will also need to be realigned to the TCE Station.

- 4.2.1.2** The at-grade TCE Station will be located approximately 2km east of the existing Tung Chung Station (TUC) at the south of the Tung Chung New Town Extension East (TCNTE East) new reclamation area near Ying Tung Estate. The noise climate near the TCE Station and the TCL Realignment are dictated by road traffic noise from North Lantau Highway (NLH), rail noise from TCL and Airport Express Line (AEL) and aircrafts approaching and departing Hong Kong International Airport (HKIA).

- 4.2.1.3** The underground TCW Station and above-ground station facilities will be located at the existing rural area – west of Yat Tung Estate. The area is an open storage

space and vegetated land with some temporary structures. The noise climate is dominated by aircrafts approaching and departing from HKIA, helicopter holding and transiting and road traffic along Yu Tung Road and Tung Chung Road.

## 4.2.2 Prevailing Noise Measurements

**4.2.2.1** Prevailing noise measurements have been conducted at Ying Tung Estate, Tung Chung Crescent, Ma Wan Chung and Yat Tung Estate in order to capture the existing noise environment near TCE Station, TCW Station, EAP / EEP. The prevailing noise measurements were conducted in January 2021 and the measurements locations are shown in **Figure 4.2.1**. The measurements conducted have captured the noise levels during different periods such as 0300 – 0500, 0700 – 0900, 1200 – 1400, 1700 – 1900, 2100 – 2300. Minimum  $L_{eq}$  was used as the parameter to establish the corresponding noise criteria and the  $L_{eq}$  was adopted as parameter in the approved EIAs reports for Expansion of Hong Kong International Airport into a Three-Runway System (AEIAR-185/2014), Proposed Comprehensive Residential and Commercial Development atop Siu Ho Wan Depot (AEIAR-213/2017) and Tung Chung New Town Extension (AEIAR-196/2016). A summary of the results is given in **Table 4.2.1**. However, due the constraints during COVID-19 pandemic at the time of noise measurement, the normal activities or commercial operations may be affected, and hence the prevailing noise measurement results may be lower than the circumstance before the pandemic. These prevailing noise measurement results are adopted to identify the fixed noise sources impact assessment criteria for conservative assessment. Re-measurement of prevailing noise could be considered during the EM&A for fixed noise sources criteria review after the COVID-19 pandemic if necessary. **Appendix 4.2.1** shows the detailed prevailing noise measurement results.

**Table 4.2.1** Prevailing noise measurements

Measurement Location <sup>[1]</sup>	Prevailing Noise Levels <sup>[2]</sup> , dB(A)		
	Day <sup>[3]</sup>	Evening <sup>[3]</sup>	Night <sup>[3]</sup>
Yat Tung Estate (PNM-YATE)	54 – 68	55 – 62	50 – 56
Ma Wan Chung (PNM-MWC)	57 – 69	56 – 63	53 – 59
Tung Chung Crescent (PNM-TCC)	62 – 77	61 – 69	52 – 65
Ying Tung Estate (PNM-YITE)	– <sup>[4]</sup>	60 – 68	54 – 66
Le Blue Deux (PNM-LED)	61 – 67	– <sup>[4]</sup>	– <sup>[4]</sup>

Notes:

[1] PNM represents prevailing noise measurement location.

[2] Noise level with 3dB(A) façade correction

[3] Day: 0700 – 0900, 1200 – 1400, 1700 – 1900 hours, Evening: 2100 – 2300 hours, Night: 0300 – 0500 hours.

[4] As there was construction work during daytime near Ying Tung Estate, Century Link and The Visionary, the measurement point was shifted the Le Blue Deux to avoid the construction works. As there was no more work after 1900 near Ying Tung Estate, evening and night-time prevailing measurement was shifted back to Ying Tung Estate.

### 4.2.3 Existing and Planned Noise Sources

#### Existing Noise Sources

**4.2.3.1** The assessment area for noise impact assessment shall generally include all areas within 300m from the boundary of the Project and the works of the Project (i.e. the associated works sites/ works areas). **Table 4.2.2** shows the key existing noise sources for cumulative impact assessments and their locations are illustrated in **Figure 4.2.2**.

**Table 4.2.2** List of key existing noise sources

Types	Noise Sources	Reference Location
Existing Noise Sources	AEL, TCL and Existing TUC & Ventilation Building	ENS01
	Ngong Ping Skyrail Tung Chung Terminal	ENS02
	North Lantau Hospital	ENS03
	Tung Chung Town Electric Substation	ENS04
	Tung Chung Fire Station	ENS05
	Sewage Pumping Station	ENS06
	Public Transport Interchange (PTI) and/or Bus Depot	ENS07

**4.2.3.2** The nature and operation of these noise sources are described as follows.

#### AEL, TCL and Existing TUC & Ventilation Building

**4.2.3.3** AEL and TCL run along the corridor at north of NLH. For the section to the east of TCE Station near Pak Mong, both the AEL and TCL share common tracks which are on ballast and there are neither barriers nor other existing screening structures. For the section between Caribbean Coast and Pak Mong, it bifurcates into 2 sets of ballast tracks. For the section to the west of TCE Station, the TCL enters into a tunnel portal near the Hei Tung street oil station while AEL continues as at-grade with a semi-enclosure. The shortest distance between the tracks and Ying Tung Estate is about 120m. Potential airborne rail noise impacts are therefore addressed in the noise assessment.

**4.2.3.4** A ventilation building is located at the existing TUC. The station is located about 40m away from Tung Chung Crescent and approximately 180m away from Fu Tung Estate. Potential fixed noise sources impacts are therefore addressed in the noise assessment.

#### Ngong Ping Skyrail Tung Chung Terminal

**4.2.3.5** Ngong Ping Skyrail Tung Chung Terminal is located at the junction of Mei Tung Street and Tat Tung Road. It serves as the terminal to connect north coast of Lantau (Po Lin Monastery and Tian Tan Buddha) and TCL. The terminal is located at approximately 1300m west of planned NSRs at TCE and 420m north of planned NSRs at TCW. Given the large separation distance between the terminal and planned NSRs, potential cumulative fixed noise sources impacts are not

anticipated. The terminal is located about 50m away from Tung Chung Crescent. Potential fixed noise sources impacts are therefore addressed in the noise assessment.

### **North Lantau Hospital**

- 4.2.3.6** North Lantau Hospital is located at the junction of Chung Yan Road and Yu Tung Road. It would accommodate outdoor noise sources such as air-cooled chillers, cooling tower, ventilation louvers, etc. The hospital site is located more than 400m east from TCW Station and the hospital was screened by the existing buildings (e.g. Yat Tung Estate) located between TCW Station and the hospital. Besides, there will not be any façade at Yat Tung Estate which will be affected by the noise sources at both TCW station and North Lantau Hospital concurrently. Thus, potential cumulative fixed noise sources impacts are not anticipated.

### **Tung Chung Town Electric Substation**

- 4.2.3.7** Tung Chung Town Electric Substation is located at the junction of Shun Tung Road, Tung Chung Waterfront Road and Chek Lap Kok South Road. The substation is located at approximately 1550m west of planned NSRs at TCE and 440m north of planned NSRs at TCW. Given the large separation distance between the terminal and planned NSRs, potential cumulative fixed noise sources impacts are not anticipated. The substation is located more than 150m away from Tung Chung Crescent. Potential fixed noise sources impacts are therefore addressed in the noise assessment.

### **Tung Chung Fire Station**

- 4.2.3.8** Tung Chung Fire Station is located at the junction of Shun Tung Road and Yu Tung Road to provide emergency service for the communities in the vicinity. Noise sources from the station operations include loudspeakers, siren, fire engine sirens, etc. These noise may cause potential nuisance to the nearby NSRs, despite their occurrences are on an as-needed basis and last for short duration only. In addition, the operation of a fire station also requires certain fixed noise sources such as condenser, transformer, etc. As the station is located more than 300m south from Emergency Access Point (EAP) / Emergency Egress Point (EEP) and 800m east from TCW Station, potential cumulative fixed noise sources impacts are not anticipated.

### **Sewage Pumping Station**

- 4.2.3.9** A sewage pumping station is located at the junction of Chun Yan Road and Yat Tung Street. The pumping station is located at approximately 60m from Yat Tung Estate. As the sewage pumping station is substantially screened by the building in

Yat Tung Estate, potential cumulative fixed noise sources impacts are not anticipated.

### Public Transport Interchange (PTI) and/or Bus Depot

**4.2.3.10** A total of 4 existing PTIs and/or bus depots are located at Tung Chung Town center and Tung Chung West. Key noise generating sources inside PTI usually include ventilation fans, idling engine and manoeuvring vehicles, etc.

**4.2.3.11** Tung Chung Town/Station Bus Terminus and Tung Chung Temporary Bus Terminus are located at approximately 70m and 200m from existing TUC respectively. Yat Tung Estate PTI is located at approximately 120m from the TCW latest alignment, while Citybus Temporary Bus Depot is located at approximately 210m from TCW Station. As the PTIs are substantially screened by the Citygate and Yat Tung Estate, potential cumulative fixed noise sources impacts are not anticipated.

### Planned Noise Sources

**4.2.3.12** Other than the key existing noise sources, there are also planned noise sources which may give rise to potential impacts on existing and future NSRs. They are listed in the table below and their locations are shown in **Figure 4.2.2**.

**Table 4.2.3** List of key planned noise sources

Types	Noise Sources	Reference Location
Possible Noise Sources from Project	TCL Realignment (At-grade)	PNS01a
	TCW Extension Alignment (Tunnel)	PNS01b
	TCE Station (At-grade)	PNS01c
	TCW Station (underground) and its vent shaft structures (At-grade)	PNS01d
	EAP / EEP	PNS01e
	TUC Tunnel Ventilation Fan (TVF) Louvres	PNS01f
Possible Future Noise Sources by others	Salt Water Pumping Station / Sewage Pumping Station / Pumping Station <sup>[1]</sup>	CNS01
	Fire Station <sup>[1]</sup>	CNS02
	Electric Substation <sup>[1]</sup>	CNS03
	Public Transport Interchange (PTI) <sup>[1]</sup>	CNS04
	Chung Mun Road Sewage Pumping Station <sup>[1]</sup>	CNS05
	Sports Ground <sup>[1]</sup>	CNS06
	Expansion of Hong Kong International Airport into a Three-Runway System <sup>[2]</sup>	CNS07
	Construction of TCNTE <sup>[1]</sup>	CNS08
	District Cooling System <sup>[3]</sup>	CNS09
	Additional Sewerage Rising Main and Rehabilitation of the Existing Sewage Rising Main between Tung Chung and Siu Ho Wan	CNS10
	Reprovisioning, Remedial and Improvement Works	CNS11

Notes:

[1] According to the approved EIA report for TCNTE (AEIAR-196/2016).

[2] According to the approved EIA report for Expansion of Hong Kong International Airport into a Three-Runway Systems(3RS) (AEIAR-185/2014).

[3] According to LanDAC Paper No. 07/2018 from Lantau Development Advisory Committee.

**4.2.3.13** The nature and operation of these noise sources are described as follows.

#### **Railway Alignment, Station and Associated Facilities by the Project**

**4.2.3.14** TCE Station and TCW Station are proposed at the south of TCNTE East and in the central portion of TCNTE West respectively, and will be connected to the existing TUC.

**4.2.3.15** TCE Station would be at-grade and hence airborne rail noise, airborne construction noise and fixed noise sources impact from any fixed noise source at TCE Station are therefore addressed in the assessment.

**4.2.3.16** For TCW Station, the alignment for the extension from TUC and the TCW Station would be underground and hence airborne rail noise impact is not anticipated. Noise sources impact from any fixed noise source at TCW Station and its vent shaft structures, airborne construction noise from cut-and-cover station, groundborne construction noise and groundborne rail noise impacts due to the underground tunnel are therefore addressed in the assessment.

**4.2.3.17** EAP / EEP and associated facilities are located at Shun Tung Road which is a ventilation shaft for the tunnel connecting TUC and TCW Station. Airborne construction noise and fixed noise sources impact from EAP / EEP are therefore addressed in the assessment.

**4.2.3.18** Two TVFs will be installed at existing ventilation building in TUC for the Project tunnel ventilation. These TVFs will use the existing TUC ventilation shafts and louvres for its operation. Fixed noise sources impact from TVFs linked to existing TUC louvres are therefore addressed in the assessment.

#### **Concurrent Projects**

##### *Sewage Pumping Station / Salt Water Pumping Station / Pumping Station (by others)*

**4.2.3.19** According to the approved EIA report for TCNTE (AEIAR-196/2016), Sewage Pumping Stations / Salt Water Pumping Stations are planned to cater for the demand increase in water supply and sewage load. These pumping stations would need to be operated during daytime, evening time and night-time periods. In addition, three Pumping Stations are planned at TCNTE West to discharge the treated runoff from the stormwater attenuation and treatment ponds to drainage network. These pumping stations would need to be operated during daytime, evening time and night-time periods. Their maximum Sound Power Levels (SWLs) are listed below.

- Salt Water Pumping Station / Sewage Pumping Station (PS-01) at Tung Chung Area 104: SWL – 84dB(A). The pumping station is located at more than 500m from TCE Station and substantially screened by Ying Tung Estate and the proposed development at TCNTE East. Hence, potential cumulative fixed noise sources impact is not anticipated;
- Salt Water Pumping Station / Sewage Pumping Station (PS-02) at Tung Chung Area 132: SWL – 88dB(A). The pumping station is located adjacent to the commercial buildings at TCNTE East and about 40m from Tung Chung Area 133 at TCNTE East. Hence, fixed noise sources impact is addressed in the noise assessment;
- Salt Water Pumping Station / Sewage Pumping Station (PS-05) at Tung Chung Area 61B: SWL – 75dB(A). The pumping station is located at about 300m from TCW Station and substantially screened by proposed development at TCNTE West. Hence, potential cumulative fixed noise sources impact is not anticipated;
- Salt Water Pumping Station / Sewage Pumping Station (PS-07) at Tung Chung Area 66B: SWL – 78dB(A). The pumping station is located at about 130m from Mun Tung Estate. Hence, fixed noise sources impact is addressed in the noise assessment;
- Salt Water Pumping Station / Sewage Pumping Station (PS-08) at Tung Chung Area 105: SWL – 84dB(A). The pumping station is located at more than 500m from TCE Station and substantially screened by Century Link, The Visionary and proposed development at TCNTE East. Hence, potential cumulative fixed noise sources impact is not anticipated; and
- Pumping Station (PS-06) at Tung Chung Area 45D: SWL – 67dB(A). The pumping station is located at about 65m from Mun Tung Estate. Hence, fixed noise sources impact is addressed in the noise assessment.

#### Fire Station (by others)

**4.2.3.20** According to the approved EIA report for TCNTE (AEIAR-196/2016), a fire station is proposed in the south-eastern part of TCNTE East to provide emergency service for the future community. Noise sources from the station operations include loudspeakers, siren, fire engine sirens, etc. In addition, the operation of a fire station also require certain fixed noise sources such as condenser, transformer, etc. The maximum SWL is listed below.

- Fire Station (FS-01) at Tung Chung Area 136: SWL – 97dB(A). The fire station is located at more than 500m from TCE Station and substantially screened by commercial buildings at the proposed development at TCNTE East. Hence, potential cumulative fixed noise sources impact is not anticipated.

#### Electric Substation (by others)

**4.2.3.21** According to the approved EIA report for TCNTE (AEIAR-196/2016), noise sources within electric substation consist of transformers (132/11KV) and necessary ventilation system. The maximum SWL is listed below.



- Electric Substation (EE-01) at Tung Chung Area 59: SWL – 96dB(A). The electric substation is located at about 200m from TCE Station. Hence, fixed noise sources impact is addressed in the noise assessment.

Public Transport Interchange (PTI) (by others)

**4.2.3.22** According to the approved EIA report for TCNTE (AEIAR-196/2016), four PTIs are proposed inside TCNTE East and TCNTE West. Key noise generating sources inside PTI usually include ventilation fans, idling engine and manoeuvring vehicles, etc. However, the PTI would be decked under proposed building structures and designed with no line-of-sight at the noise sensitive use and therefore their noise emissions are adequately controlled. The associated fixed noise sources impact from ventilation was considered. Their maximum SWLs are listed below and potential fixed noise sources impacts are therefore addressed in the noise assessment.

- PTI (PTI-01) at Tung Chung Area 99: SWL – 90dB(A). The PTI is located at more than 500m from TCE Station and substantially screened by Ying Tung Estate and proposed development at TCNTE East. Hence, potential cumulative fixed noise sources impact is not anticipated;
- PTI (PTI-02) at Tung Chung Area 113: SWL – 91dB(A). The PTI is located at about 40m from TCE Station. Hence, fixed noise sources impact is addressed in the noise assessment;
- PTI (PTI-03) at Tung Chung Area 133: SWL – 82dB(A). The PTI is located at more than 500m from TCE Station and screened by proposed development at TCNTE East. Hence, potential cumulative fixed noise sources impact is not anticipated; and
- PTI (PTI-07) at Tung Chung Area 38A: SWL – 86dB(A). The PTI is located at about 10m from TCW Station. Hence, fixed noise sources impact is addressed in the noise assessment.

Chung Mun Road Sewage Pumping Station (by others)

**4.2.3.23** According to the approved EIA report for TCNTE (AEIAR-196/2016), the existing Chung Mun Road Sewage Pumping Station will be upgraded. This Sewage Pumping Station is located at Chung Mun Road. The maximum SWL is listed below and potential fixed noise sources impacts are therefore been addressed in the noise assessment.

- Chung Mun Road Sewage Pumping Station (PS-04): SWL – 81dB(A). Chung Mun Road Sewage Pumping Station is located at about 70m from TCW Station. Hence, fixed noise sources impact is addressed in the noise assessment.

Sports Ground (by others)

**4.2.3.24** According to the approved EIA report for TCNTE (AEIAR-196/2016), a sports ground with a capacity to accommodate more than 10,000 persons is planned at



TCNTE East. Noise from operation of the facility and public address (PA) system are anticipated. The Sports Ground is located at more than 500m from TCE Station and screened by proposed development at TCNTE East. Hence, potential cumulative fixed noise sources impact is not anticipated.

*Expansion of Hong Kong International Airport into a Three-Runway System (3RS) (by others)*

- 4.2.3.25** Information on fixed noise sources impacts including ground running of aircraft, engine run-up facilities (ERUFs), auxiliary power units (APU), etc. has been assessed in the approved EIA report for 3RS (AEIAR-185/2014). The assessment area for the fixed noise sources impacts induced from the operation of three runway system are about 1,300m and 2,800m during day & evening and night-time periods from the project boundary of 3RS respectively. These assessment areas will encroach into the NSR location of this Project. Hence, potential fixed noise sources impacts are therefore addressed in the noise assessment.

*Construction of TCNTE (by others)*

- 4.2.3.26** According to the approved EIA report for TCNTE (AEIAR-196/2016), the tentative construction programme for TCNTE East and TCNTE West is scheduled to commence in 2017 and be completed by 2030. Further liaison has been made with respective departments to collect the latest implementation programme and population intake year. Based on these information, it is noted the construction of the new town would be commenced with construction of the Project. Hence, the cumulation construction noise impacts are addressed in the noise assessment.

*District Cooling System (by others)*

- 4.2.3.27** According to the 12<sup>th</sup> Meeting Paper of Lantau Development Advisory Committee - LanDAC Paper No. 07/2018, LC Paper No. CB(1)270/20-21(01) and Islands District Council IDC Paper No.121/2020, a District Cooling System (DCS) in Tung Chung East is proposed to provide a centralised chilled water supply for the air-conditioning systems of non-domestic development including hotels, offices, sports complexes, a police station, a fire station and retail shops. However, the DCS is located at more than 500m from TCE Station and screened by proposed development at TCNTE East, potential cumulative fixed noise sources impact is not anticipated.

*Additional Sewerage Rising Main and Rehabilitation of the Existing Sewage Rising Main between Tung Chung and Siu Ho Wan (by others)*

- 4.2.3.28** A new sewerage network independent from the existing sewerage network is proposed to avoid impacts to existing gravity sewers. This sewerage network has been planned inside both TCE and TCW and extended along Yu Tung Road and

the maintenance access road north of Siu Ho Wan Depot to Siu Ho Wan Sewage Treatment Works. The associated construction noise impacts have been addressed in this noise assessment.

*Reprovisioning, Remedial and Improvement Works (by others)*

**4.2.3.29** According to the latest information, there will be one Reprovisioning, Remedial and Improvement Work (RRIW) item in the vicinity of the Project. This RRIW item is the demolition and reprovision of the footbridge across Yu Tung Road to the south of Yat Tung Estate. The existing ramp along the northern side of Yu Tung Road would be demolished, and a new ramp along the immediate south of Yat Tung Estate will be constructed as a reprovision. The section of footbridge spanning over Yu Tung Road and the ramp along the southern side of Yu Tung Road would remain intact.

**4.2.3.30** According to the latest information, the demolition of the existing ramp and the construction of the new ramp along the northern side of Yu Tung Road would be constructed concurrently with the Project. The cumulative construction due to the construction of the RRIW will therefore be evaluated in this EIA.

## **4.3 Noise Sensitive Receivers**

**4.3.1.1** With reference to Annex 13 of the EIAO-TM, NSRs include residential uses (all domestic premises including temporary housing), institutional uses (educational institutions including kindergarten and nurseries), hospitals, medical clinics, homes for the aged, convalescent homes, places of worship, libraries, court of law, performing arts centres, auditoria and amphitheatres, country park and others.

**4.3.1.2** Representative NSRs within the assessment area have been identified with the first layer of NSRs selected for assessment. These NSRs cover all existing sensitive developments, committed and planned NSRs during construction and operational phases of the Project.

**4.3.1.3** The existing NSRs are identified by means of topographic maps, aerial photos, land status plans and site inspections. Planned / committed NSRs are identified by making reference to relevant Outline Zoning Plans (OZP) (OZP No. S/I-TCE/2, S/I-TCTC/24 and S/I-TCV/2), S.16 / S.12a Town Planning Ordinance Development Permission Area Plans, Outline Development Plans (ODP), Layout Plans and other relevant published land use plans, including plans and drawings published by the Lands Department and any land use and development applications approved by Town Planning Board in the vicinity of the Project. Recently, CEDD is undertaking a study to explore the feasibility of increasing the development intensity of the TCNTE to meet the increasing demand of the public housing supply

under separate Consultancy Services for the Design and Construction Supervision of TCNTE East and TCNTE West. The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD.

**4.3.1.4** The existing, committed and planned representative NSRs in the vicinity, which may be affected are identified in the table below and the representative Noise Assessment Points (NAPs) are illustrated in **Figure 4.3.1**. **Appendix 4.3.1** shows the photos of existing representative NSRs. **Appendix 4.3.2** summarize the Area Sensitivity Ratings of the representative NSRs for rail noise and fixed noise sources assessment.

**Table 4.3.1** Existing, committed and planned representative NSRs

No. <sup>[1]</sup>	NSR	Uses <sup>[2]</sup>	No. of Storey
Existing NSRs (Tung Chung East)			
E1	Ying Tung Estate	R	35 – 40
E2	The Visionary	R	35
E3	Caribbean Coast	R	3 – 52
E4	Le Bleu Deux	R	2 – 15
E8a	Tung Chung Crescent	R	28 – 42
E8b	Sunshine House International Pre-School (Tung Chung)	E	1
E20	Ho Yu College and Primary School	E	7
E21	Lantau North (Extension) Country Park	O	N/A <sup>[4]</sup>
Existing NSRs (Tung Chung West)			
E10	Ma Wan Chung	V	1 – 3
E11a	Yat Tung Estate	R	40 – 41
E11b	Tung Chung Catholic School Primary Section	E	8
E12	Mun Tung Estate	R	31 – 40
E15	Sheung Ling Pei	V	1 – 3
E16	Ha Ling Pei	V	1 – 3
E17	Wong Ka Wai	V	1 – 3
E21	Lantau North (Extension) Country Park	O	N/A <sup>[4]</sup>
Planned NSRs (Tung Chung East)			
P1	Residential Premises in Tung Chung East (Planned NSRs)	R	29 – 40
	Schools in Tung Chung East (Planned NSR)	E	8 <sup>[3]</sup>
P4	Tung Chung Area 113	R	31 – 58
P6	Tung Chung Area 58	R	47 <sup>[5]</sup>
P7	Tung Chung Area 54	R	40 <sup>[3]</sup>
Planned NSRs (Tung Chung West)			
P2	Residential Premises in Tung Chung West (Planned NSRs)	R	3 – 21 <sup>[3]</sup>

Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.
- [2] R – Residential Premises, E – Educational Institutions, V – Village type development, O – Others.
- [3] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted. The population intake year of each Noise Assessment Point refer to **Table 4.3.2**, **Table 4.3.4** to **Table 4.3.6**.
- [4] N/A – Not applicable.

- [5] The no. of story is referred to TPB General Papers Proposed Amendments to the Approved Tung Chung Town Centre Area Outline Zoning Plan No. S/I-TCTC/22 RNTPC Paper No. 1/20.

**4.3.1.5** Representative NSRs locations that would be affected by the airborne construction noise have been selected from **Table 4.3.1** and are summarised in **Table 4.3.2** below and the representative NAPs are shown in **Figure 4.3.2**.

**Table 4.3.2** Representative NSRs for airborne construction noise

No. <sup>[1]</sup>	NSR <sup>[2]</sup>	Uses <sup>[3]</sup>	No. of Storey	NAP <sup>[6]</sup>	Population Intake Year
Existing NSRs (Tung Chung East)					
E1	Ying Tung Estate	R	35 – 40	YTT-02f	N/A <sup>[5]</sup>
E4	Le Bleu Deux	R	2 - 15	LED-06a	N/A <sup>[5]</sup>
E8a	Tung Chung Crescent	R	28 – 42	TCC-01a, TCC-07a, TCC-09a	N/A <sup>[5]</sup>
E8b	Sunshine House International Pre-School (Tung Chung)	E	1	ESHI-01a	N/A <sup>[5]</sup>
E20	Ho Yu College and Primary School	E	7	EHYC-01a	N/A <sup>[5]</sup>
E21	Lantau North (Extension) Country Park	O	N/A <sup>[5]</sup>	LNCP-01	N/A <sup>[5]</sup>
Existing NSRs (Tung Chung West)					
E10	Ma Wan Chung	V	1-3	MWC-01a	N/A <sup>[5]</sup>
E11a	Yat Tung Estate	R	40 – 41	YTE-01a, YTE-01b, YTE-04a, YTE-05a, YTE-14a, YTE-16a	N/A <sup>[5]</sup>
E11b	Tung Chung Catholic School Primary Section	E	8	ETCCS-01a	N/A <sup>[5]</sup>
E12	Mun Tung Estate	R	31 – 40	MTE-01a	N/A <sup>[5]</sup>
E16	Ha Ling Pei	V	1 – 3	HLP-01a, HLP-02a	N/A <sup>[5]</sup>
Planned NSRs (Tung Chung East)					
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 100	R	40 <sup>[4]</sup>	A100-02j	2024
	Residential Premises in Tung Chung East – Area 116	R	32 <sup>[4]</sup>	A116-01c	2029
	Residential Premises in Tung Chung East – Area 133a	R	32 <sup>[4]</sup>	A133a-01b	2030
P4 <sup>[4]</sup>	Tung Chung Area 113	R	31 – 58 <sup>[4]</sup>	A113-01e, A113-12e	2027
P7 <sup>[4]</sup>	Tung Chung Area 54	R	40	A54-01a	2023
Planned NSRs (Tung Chung West)					
P2 <sup>[4]</sup>	Residential Premises in Tung Chung West – Area 60	R	3 <sup>[4]</sup>	A60-03a	2025

Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.
- [2] Only the first layer of NSRs has been selected for assessment.
- [3] R – Residential Premises, E – Educational Institutions, V – Village type development, O – Others.
- [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.

[5] N/A – Not applicable.

[6] NAP – Noise Assessment Point.

**4.3.1.6** Representative NSRs locations that would be affected by the groundborne construction noise have been selected from **Table 4.3.1** and are summarised in **Table 4.3.3** below and the representative NAPs are shown in **Figure 4.3.3**. The first layer of NSR has been identified for assessment. Since the selected NSR at Ma Wan Chung is directly located on the rail tunnel, it is therefore considered as the NSR in worst scenario for groundborne construction noise impact assessment.

**Table 4.3.3** Representative NSRs for groundborne construction noise

No.	NSR <sup>[1]</sup>	Uses <sup>[2]</sup>	No. of Storey	NAP <sup>[3]</sup>
Existing NSRs (Tung Chung West)				
E10	Ma Wan Chung	V	1 – 3	MWC-03a

Notes:

[1] Only the first layer of NSRs has been selected for assessment.

[2] V – Village type development.

[3] NAP – Noise Assessment Point.

**4.3.1.7** Representative NSRs locations that would be affected by the airborne rail noise have been selected from **Table 4.3.1** and are summarised in **Table 4.3.4** below and the representative NAPs are shown in **Figure 4.3.4**.

**Table 4.3.4** Representative NSRs for airborne rail noise

No. <sup>[1]</sup>	NSR <sup>[2]</sup>	Uses <sup>[3]</sup>	No. of Storey	NAP <sup>[7]</sup>	Population Intake Year
Existing NSR (TCNTE East)					
E1	Ying Tung Estate	R	35 – 40	YTT-01a, YTT-01f, YTT-02a, YTT-02e, YTT-02f, YTT-02m, YTT-02p, YTT-04a, YTT-04f	N/A <sup>[5]</sup>
E2	The Visionary	R	35	TV-03a	N/A <sup>[5]</sup>
E3	Caribbean Coast	R	3 – 52	CC-01a	N/A <sup>[5]</sup>
E21	Lantau North (Extension) Country Park	O	N/A <sup>[5]</sup>	LNCP-01	N/A <sup>[5]</sup>
Planned NSR (TCNTE East)					
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 99	R	40 <sup>[4]</sup>	A99-01b, A99-01d, A99-02b, A99-02f, A99-02s, A99-02z	2024
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 100	R	40 <sup>[4]</sup>	A100-01b, A100-01d, A100-01k, A100-01p, A100-01x, A100-02a, A100-02h, A100-02n,	2024

No. <sup>[1]</sup>	NSR <sup>[2]</sup>	Uses <sup>[3]</sup>	No. of Storey	NAP <sup>[7]</sup>	Population Intake Year
				A100-02s, A100-02t, A100-02z, A100-03b, A100-03c	
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 114	R	29 <sup>[4]</sup>	A114-01c, A114-01e, A114-01j, A114-02b, A114-02e	2029
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 115	R	29 <sup>[4]</sup>	A115-03a, A115-03d, A115-03g	2029
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 116	R	32 <sup>[4]</sup>	A116-01a, A116-01d, A116-01g, A116-02a, A116-02d	2029
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 117	R	32 <sup>[4]</sup>	A117-02b, A117-02e	2029
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 133a and Area 133c	R	32 – 37 <sup>[4]</sup>	A133a-01b, A133a-01c, A133a-01k, A133a-01q, A133a-01s, A133a-02a, A133a-02f, A133a-03q, A133a-04c, A133c-02c	2030
P4 <sup>[4]</sup>	Tung Chung at Area 113	R	31 – 58 <sup>[4]</sup>	A113-01g, A113-01k, A113-02a, A113-03a, A113-04a, A113-06a, A113-07a, A113-09a, A113-10a, A113-10d, A113-11a, A113-12a, A113-12e, A113-12k, A113-13a, A113-13b, A113-13f, A113-22g, A113-22k	2027
P6	Tung Chung Area 58	R	47 <sup>[6]</sup>	A58-01a, A58-01b	2029

Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.
- [2] Only the first layer of NSRs has been selected for assessment.
- [3] R – Residential Premises, O – Others.
- [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE West and TCNTE East,

except Area 99 and Area 100, have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.

[5] N/A – Not applicable.

[6] The no. of story is referred to TPB General Papers Proposed Amendments to the Approved Tung Chung Town Centre Area Outline Zoning Plan No. S/I-TCTC/22 RNTPC Paper No. 1/20.

[7] NAP – Noise Assessment Point.

**4.3.1.8** Representative NSRs locations that would be affected by the groundborne rail noise have been selected from **Table 4.3.1** and are summarised in **Table 4.3.5** below and the representative NAPs are shown in **Figure 4.3.5**.

**Table 4.3.5** Representative NSRs for groundborne rail noise

No.	NSR <sup>[1]</sup>	Uses <sup>[2]</sup>	No. of Storey	NAP <sup>[4]</sup>	Population Intake Year
Existing NSR (TCNTE East)					
E8a	Tung Chung Crescent	R	28 – 42	TCC-02a	N/A <sup>[5]</sup>
Existing NSR (TCNTE West)					
E10	Ma Wan Chung	V	1 – 3	MWC-03a	N/A <sup>[5]</sup>
E11a	Yat Tung Estate	R	40 – 41	YTE-14a	N/A <sup>[5]</sup>
Planned NSRs (Tung Chung West)					
P2	Residential Premises in Tung Chung West – Area 33	R	4 <sup>[3]</sup>	A33-05a	After the construction of the Project

Notes:

[1] Only the first layer of NSRs has been selected for assessment.

[2] R – Residential Premises, V – Village type development.

[3] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE West and TCNTE East, except Area 99 and Area 100, have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.

[4] NAP – Noise Assessment Point.

[5] N/A – Not applicable.

**4.3.1.9** Representative NSRs locations that would be affected by the fixed noise sources have been selected from **Table 4.3.1** and are summarised in **Table 4.3.6** below and the representative NAPs are shown in **Figure 4.3.6**.

**Table 4.3.6** Representative NSRs for fixed noise sources impact assessment

No. <sup>[1]</sup>	NSR <sup>[2]</sup>	Uses <sup>[3]</sup>	No. of Storey	NAP <sup>[6]</sup>	Population Intake Year
Existing NSR (TCNTE East)					
E8	Tung Chung Crescent	R	28 – 42	TCC-03a, TCC-09a	N/A <sup>[5]</sup>
E21	Lantau North (Extension) Country Park	O	N/A <sup>[5]</sup>	LNCP-01	N/A <sup>[5]</sup>
Existing NSR (TCNTE West)					
E10	Ma Wan Chung	V	1 – 3	MWC-02a	N/A <sup>[5]</sup>
E11a	Yat Tung Estate	R	40 – 41	YTE-01a, YTE-03a, YTE-15a	N/A <sup>[5]</sup>
E12	Mun Tung Estate	R	31 – 40	MTE-01b	N/A <sup>[5]</sup>
E15	Sheung Ling Pei	V	1 – 3	SLP-01a	N/A <sup>[5]</sup>
E16	Ha Ling Pei	V	1 – 3	HLP-03a	N/A <sup>[5]</sup>
E17	Wong Ka Wai	V	1 – 3	WKW-01a	N/A <sup>[5]</sup>
Planned NSR (TCNTE East)					

No. <sup>[1]</sup>	NSR <sup>[2]</sup>	Uses <sup>[3]</sup>	No. of Storey	NAP <sup>[6]</sup>	Population Intake Year
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 100	R	40 <sup>[4]</sup>	A100-02h	2024
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 114	R	29 <sup>[4]</sup>	A114-02a	2029
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 116	R	32 <sup>[4]</sup>	A116-02e	2029
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East – Area 133a	R	32 <sup>[4]</sup>	A133a-01e	2030
P4 <sup>[4]</sup>	Tung Chung at Area 113	R	31 – 58 <sup>[4]</sup>	A113-01e; A113-10a	2027
Planned NSR (TCNTE West)					
P2 <sup>[4]</sup>	Residential Premises in Tung Chung West – Area 23	R	21 <sup>[4]</sup>	A23-01a	2027
P2 <sup>[4]</sup>	Residential Premises in Tung Chung West – Area 33	R	17 <sup>[4]</sup>	A33-02a	After the construction of the Project

Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.
- [2] Only the first layer of NSRs has been selected for assessment.
- [3] R – Residential Premises, V – Village type development, O – Others.
- [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE West and TCNTE East, except Area 99 and Area 100, have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.
- [5] N/A – Not applicable.
- [6] NAP – Noise Assessment Point.

## 4.4 Airborne Construction Noise Impact Assessment

### 4.4.1 Airborne Construction Noise Impact Assessment Methodology

**4.4.1.1** The construction noise impact assessment during daytime, on weekdays other than general holidays has been assessed in accordance with the methodology in paragraphs 5.3 and 5.4 of Annex 13 of the TM.

**4.4.1.2** Construction noise assessment will be conducted based on the following procedures:

- Determine 300m from the boundary of the Project and from any works of the Project;
- Identify and locate representative NSRs that may be affected by the works;
- Obtain the construction method and work sequence for the construction period;
- Obtain the construction plant inventory for each corresponding construction work sequence;
- Determine the Sound Power Levels (SWLs) of the plant items according to the information stated in the GW-TM or other recognised sources of reference, where appropriate;



- 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;
- Predict construction noise levels at the NSRs;
- Quantify the level of impact at the NSRs, in accordance with GW-TM;
- Predict the cumulative noise impacts for any concurrent construction works (e.g. TCNTE) in the vicinity of the proposed work;
- For any exceedance of noise criteria, all practical mitigation measures such as alternative construction methodology, quiet plant, silencer, enclosure, etc, shall be examined to alleviate the predicted noise impacts as much as practicable; and
- Consideration of noise mitigation measures will follow Annex 13 of TM-EIAO and EIAO Guidance Note “Preparation of Construction Noise Impact Assessment under the Environmental Impact Assessment Ordinance” [GN 9/2010].

## 4.4.2 Identification of Construction Noise Impact

### Identification of Assessment Area and Noise Sensitive Receivers

**4.4.2.1** For construction noise, the assessment area includes area within 300m from the boundary of the Project and from any works of the Project. Representative NSRs locations that would be affected by the construction activities are summarised in **Table 4.3.2** and the representative NAPs are shown in **Figure 4.3.2**

### Inventory of Noise Sources

**4.4.2.2** Key airborne construction activities have been identified for noise assessment and summarized below:

- Construction of the above-ground TCE Station;
- Realignment of ballast tracks to the TCE Station;
- Construction of the Tunnel Boring Machine (TBM) launching shaft/ retrieval shaft near Tung Chung Crescent;
- Construction of the EAP / EEP at the artificial slope located west of Shun Tung Road;
- Construction of the underground TCW Station;
- Construction of the above-ground vent shaft structures and the station entrances at TCW Station;

- Establishment and operation of the barging facility at seawall of Tung Chung East;
- Drill-&-blast for EAP / EEP and TCW Station; and
- Works such as TTM, landscaping, minor reinstatement, material delivery, etc.

**4.4.2.3** The inventory has been confirmed by Project Proponent's construction professionals. According to the latest construction methodology, the blasting will only be conducted once per day in each location and the blasting will be subject to CEDD's control. As the blasting will last for very short duration and be infrequent, it will not cause adverse impacts to NSRs.

**4.4.2.4** These construction activities would be carried out with the use of PME including trench cutters, excavators, lorries, mobile cranes, concrete pumps, concrete mixers, etc. SWLs for each PME would be established according to GW-TM and other relevant information as appropriate. **Appendix 4.4.1** presents the SWLs for each PME.

#### **Construction Noise Control Measures Proactively Adopted**

**4.4.2.5** During the design of the construction methodology, the design team has been fully aware of the NSRs in the proximity of the works sites, in particular the launching shaft close to Tung Chung Crescent, and the EAP / EEP on the opposite of Tung Chung Crescent. In order to minimize construction noise impact as much as possible at the outset, the following control measures have been incorporated in the construction methodology and have therefore been incorporated in the "unmitigated scenario".

- Noise enclosure for the mucking out location at the TBM launching shaft / retrieval shaft near Tung Chung Crescent;
- Division of sub-zones for D-wall sequential construction works;
- Advance the construction of the station slab structure of TCW Station; and
- Screen cover for the mucking out location at the EAP/EEP near Shun Tung Road.

#### **Utilization Rates and SWLs of Powered Mechanical Equipment**

**4.4.2.6** Practically, the PMEs will not be operating for all times within a work site. The utilization rates would depend on the construction sequences, work fronts scale and construction nature. In this assessment, the utilization rates have been reviewed by the construction professionals and have been concluded to be practical for the purpose of this EIA. **Appendix 4.4.2** tabulates the adopted utilisation rates.

### 4.4.3 Prediction and Evaluation of Construction Noise Impact

#### Phases of Construction

**4.4.3.1** The construction activities involve site clearance, formation, superstructure, site reinstatement, etc. It is anticipated that the Project will be implemented in phases. The construction programme with phases of construction has been given in **Appendix 2.4**.

#### Scenarios

**4.4.3.2** An in-house program has been used for construction noise calculations. Initially, program runs have been conducted without any mitigation measures (i.e. the “Unmitigated Scenario”). If any noise level exceedance was identified, further runs would be made assuming different combinations of mitigation measures to be incorporated (i.e. the “Mitigated Scenario”).

#### Prediction of Noise Impact

**4.4.3.3** According to the latest engineering design, construction would mainly comprise the activities as described in **Section 4.4.2.2**. The corresponding SWLs of these activities have been estimated according to the PME’s SWLs and the assessment methodology in the GW-TM. **Appendix 4.1.1** presents the SWLs for each PME. **Appendix 4.4.2** gives the plant inventory adopted for each workfront and **Appendix 4.4.3** shows the locations of workfronts adopted for this construction noise assessment.

**4.4.3.4** **Appendix 4.4.4** presents the calculated unmitigated construction noise impacts at representative NSRs. The predicted construction noise impacts at the NSRs under unmitigated scenario are summarised in **Table 4.4.7** below.

**Table 4.4.7** Predicted construction noise impact at NSRs under unmitigated scenario

No. <sup>[1]</sup>	NSR	NAP <sup>[2]</sup>	Uses <sup>[3]</sup>	Leq (30min), dB(A)			Duration of Exceedance Months <sup>[8]</sup>
				Criterion <sup>[4]</sup>	Unmitigated Noise Level <sup>[5]</sup>	Exceedance <sup>[7]</sup>	
Existing NSRs (Tung Chung East)							
E1	Ying Tung Estate	YTT-02f	R	75	<b>80</b>	5	32
E4	Le Bleu Deux	LED-06a	R	75	70	-	-
E8a	Tung Chung Crescent	TCC-01a	R	75	<b>85</b>	10	47
		TCC-07a	R	75	<b>84</b>	9	43
		TCC-09a	R	75	<b>87</b>	12	59
E8b	Sunshine House International Pre-School (Tung Chung)	ESHI-01a	E	70 (65)	<b>69</b>	- (4)	- (9)
E20	Ho Yu College and Primary School	EHYC-01a	E	70 (65)	60	-	-
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[6]</sup>	77	N/A <sup>[6]</sup>	N/A <sup>[6]</sup>
Existing NSRs (Tung Chung West)							

No. <sup>[1]</sup>	NSR	NAP <sup>[2]</sup>	Uses <sup>[3]</sup>	Leq (30min), dB(A)			Duration of Exceedance Months <sup>[8]</sup>
				Criterion <sup>[4]</sup>	Unmitigated Noise Level <sup>[5]</sup>	Exceedance <sup>[7]</sup>	
E10	Ma Wan Chung	MWC-01a	V	75	<b>86</b>	11	49
E11a	Yat Tung Estate	YTE-01a	R	75	<b>91</b>	16	70
		YTE-01b	R	75	<b>83</b>	8	50
		YTE-04a	R	75	<b>87</b>	12	76
		YTE-05a	R	75	<b>78</b>	3	13
		YTE-14a	R	75	<b>86</b>	11	69
		YTE-16a	R	75	<b>86</b>	11	66
E11b	Tung Chung Catholic School Primary Section	ETCCS-01a	E	70 (65)	<b>75</b>	5 (10)	43 (48)
E12	Mun Tung Estate	MTE-01a	R	75	<b>81</b>	6	35
E16	Ha Ling Pei	HLP-01a	V	75	75	-	-
		HLP-02a	V	75	<b>76</b>	1	1
Planned NSRs (Tung Chung East)							
P1	Residential Premises in Tung Chung East (Planned NSRs)	A100-02j	R	75	<b>77</b>	2	14
		A116-01c	R	75	75	-	-
		A133a-01b	R	75	<b>76</b>	1	6
P4	Tung Chung Area 113	A113-01e	R	75	<b>80</b>	5	14
		A113-12e	R	75	<b>79</b>	4	14
P7	Tung Chung Area 54	A54-01a	R	75	70	-	-
Planned NSRs (Tung Chung West)							
P2	Residential Premises in Tung Chung West (Planned NSRs)	A60-03a	R	75	72	-	-

Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.  
 [2] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.  
 [3] R – Residential Premises, E – Educational Institutions, V – Village type development, O – Others.  
 [4] Values in parentheses indicate the noise criterion during examination period of educational institution.  
 [5] Bolded values mean exceedance of the relevant noise criteria.  
 [6] N/A - Not Applicable as there is no noise standard for Country Park stated in the EIAO-TM.  
 [7] Values in parentheses indicate the exceedance during examination period of educational institution.  
 [8] Values in parentheses indicate the duration of exceedance months during examination period of educational institution. As the examination period may vary slightly each year and not last for whole year, the actual exceedance month will be less than the predicted duration.

## TCE

**4.4.3.5** There are NAPs, such as Ying Tung Estate, Area 100, Area 113, etc, exceeding the noise criteria with the range from 1 to 5 dB(A) for residential premises. The main contribution is from foundation works, site clearance / site formation and site reinstatement for the TCE station and rail realignment.

## TCW

**4.4.3.6** There are NAPs, such as Ha Ling Pei, Yat Tung Estate, Tung Chung Catholic School Primary Section and Mun Tung Estate, exceeding the noise criteria with the range from 1 to 16 dB(A) for residential premises and educational institutions. The main contribution is from construction of diaphragm wall and structural works of TCW Station.

## **EAP / EEP and Launching Shaft / Retrieval Shaft**

**4.4.3.7** There are NAPs, such as Tung Chung Crescent and Sunshine House International Pre-School (Tung Chung) exceeding the noise criteria with the range from 4 to 12 dB(A) for residential premises and educational institutions. The main contribution is from the excavation works of the launching shaft / retrieval shaft.

### **Barging Facility**

**4.4.3.8** No NAP would exceed the noise criteria during the construction works at barging point due to the adequate distance between Le Bleu Deux (LED-06a) and the barging point (at least 130m).

## **4.4.4 Mitigation of Construction Noise Impact**

**4.4.4.1** The predicted noise levels show that the unmitigated construction noise impacts would exceed the daytime noise criteria. Mitigation measures are therefore required. The following mitigation measures have been considered:

- Good site practices to limit noise emissions at the source;
- Use of quality powered mechanical equipment (QPME);
- Use of temporary noise barriers and noise enclosure to screen noise from relatively static PMEs;
- Use of temporary movable enclosure to screen noise for the construction of diaphragm Wall near Yat Tung Estate; and
- Alternative use of plant items within on worksite, wherever practicable.

**4.4.4.2** The above mitigation measures would need to be implemented in works sites as good practices where appropriate.

**4.4.4.3** The future Contractor will be required to provide and implement sufficient direct mitigation measures with reference to the recommendations in this EIA Report or the future detailed design to achieve acceptable noise levels on the nearby NSRs. The future Contractor will also be required to prepare a Construction Noise Management Plan with reference to Section 8 and Annex 21 of the EIAO-TM as well as this EIA Report and EM&A Manual. The Construction Noise Management Plan (CNMP) shall identify the inventory of noise sources, summarise the mitigation measures to be implemented for the Project and review of the effectiveness and practicality of all proposed mitigation measures for the construction noise impact of the Project. To further mitigate construction noise impacts, quieter construction equipment / methods would be considered when necessary, including the use of quieter powered mechanical equipment for

demolition (e.g. hydraulic crusher, hand-held concrete crusher); quieter method for rock / concrete breaking (e.g. diamond wire saw, non-explosive chemical expansion agent); silent piling by Press-in method for sheet piles etc. The use of quieter construction equipment / methods, if necessary, will be further reviewed in detailed design and construction stages, and in the CNMP.

### **Good Site Management Practices**

**4.4.4.4** Good site practice and noise management techniques could considerably reduce the noise impact from construction site activities on nearby NSRs. The following measures should be practised 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 work 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 which available on construction equipment should be properly fitted and maintained during the construction works;
- spoil transportation routes should be directed away from NSRs as far as practicable;
- mobile plant should be sited as far away from NSRs as possible and practicable;
- material stockpiles, site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities;
- noise monitoring at selected NSRs should be conducted as far as practicable; and
- provide designated unloading areas at barging point away from the NSR as far as possible.

**4.4.4.5** The benefits of these techniques can vary according to specific site conditions and operations. The environmental noise climate would certainly be improved with these control practices, although the improvement can only be quantified during implementation when specific site parameters are known.

### **Use of Quality Powered Mechanical Equipment (QPME)**

**4.4.4.6** The use of quiet plant associated with the construction works is made reference to the PME listed in the TM or the QPME/ other commonly used PME listed in Environmental Protection Department (EPD) web pages as far as possible which includes the SWLs for specific quiet PME. It is generally known (supported by

field measurement) that particular models of construction equipment are quieter than standard types given in the GW-TM.

#### **Use of Movable Noise Barrier and Full Enclosure for Relatively Fixed Plant Source**

**4.4.4.7** Movable temporary noise barriers that can be located close to noisy plant and be moved concurrently with the plant along a worksite can be very effective for screening noise from NSRs. A typical design which has been used locally is a wooden framed barrier with a small-cantilevered upper portion of superficial density no less than  $7\text{kg/m}^2$  on a skid footing with 25mm thick internal sound absorptive lining. This measure is particularly effective for low level zone of NSRs. A cantilevered top cover would be required to achieve screening benefits at upper floors of NSRs.

**4.4.4.8** Movable temporary noise barriers will be used for some PME (e.g. excavator). It is anticipated that suitably designed barriers could achieve at least 5dB(A) reduction for movable plant and 10dB(A) for stationary plant.

**4.4.4.9** For the use of movable noise barrier for at-grade construction works, for example diaphragm wall installation, working space would be considered for their manoeuvrability and placement. Generally, sufficient separation between major plants during at-grade construction works is envisaged to cater for the use of temporary movable noise barriers onsite. Temporary movable noise barrier can be placed close to noise source locally as far as practicable.

**4.4.4.10** The use of standard enclosure has been considered in this assessment to shelter relatively fixed plant including water pump, etc. These standard enclosures can provide at least 15dB(A) noise reduction.

#### **Use of 3-side temporary movable enclosure to screen noise for the construction of diaphragm wall near Yat Tung Estate**

**4.4.4.11** As the workfronts of construction of diaphragm wall is in the closest proximity (i.e. approximately 10m) to the residential premises among other construction activities, 3-side temporary movable enclosure is used to house the PMEs including trench cutter for construction works of diaphragm wall at TCW Station near Yat Tung Estate. In general, the 3-side temporary movable noise enclosure will be located to position above the prospective location for the diaphragm wall panel of TCW Station. Once the 3-side temporary movable enclosure is in position, the trench cutter shall move inside the 3-side temporary movable enclosure and start the trenching for diaphragm wall panel. Once the trenching is completed, the trench cutter will move out from the 3-side temporary movable enclosure for subsequent works of diaphragm wall construction. Then, this operation will be repeated for



next diaphragm wall panel construction. This arrangement will be further reviewed in detailed design and construction stages, and also in the CNMP to be prepared by the Contractor. The enclosure should provide at least 15 dB(A) noise reduction. The design of the enclosure shall include the followings:

- Gaps and openings at joints should be avoided;
- Enclose the equipment on three sides with cover; and
- Absorptive lining should be provided at the sides facing the PME as far as practicable.

#### **Installation of noise barrier along the site boundary to screen noise for the NSR at Ma Wan Chung**

**4.4.4.12** As the workfronts of construction of TCW Station and associated vent shaft structures are in close proximity to a residential receiver at Ma Wan Chung (MWC-01a). A noise barrier is proposed along the site boundary next to the concerned village house. The location and the section drawing of the proposed barrier is shown in **Figure 4.4.1**. The design of the barrier shall include the followings:

- Gaps and openings at joints should be avoided;
- The length of the barrier should be about 27m while the height should be about 4m; and
- Surface density of the barrier no less than 7kg/m<sup>2</sup>.

**4.4.4.13** The feasibility, practicability, programming and effectiveness of the above mitigation measures have been reviewed.

**4.4.4.14** A summary of the movable temporary noise barrier, standard enclosure, 3-side temporary movable enclosure adopted for various PMEs is given in **Appendix 4.4.1** and indicative drawings for barrier and enclosure are shown in **Appendix 4.4.5**, and the associated noise reduction is summarised in **Table 4.4.8** below.

**Table 4.4.8** Summary of barrier and standard enclosure adopted for PMEs

PME	Barrier/ Enclosure	Applied Work Locations <sup>[1]</sup>	Attenuation, dB(A)
Air Compressor	Barrier	A, B, C	-5 / -10
Bar Bender and Cutter	Barrier	A, B, C	-10
Hand Held Breaker	Barrier	A, B	-5
Breaker, excavator mounted	Barrier	B, C	-5
	Enclosure	C <sup>[2]</sup>	-15
Concrete Lorry Mixer	Barrier	A, B, C	-5
	3-side temporary movable enclosure	B <sup>[3]</sup>	-15
Concrete Mixer	Barrier	A, B, C	-5 / -10
Concrete Pump	Barrier	A, C	-10
	Enclosure	B	-15
Crawler Crane/ Gantry Crane	Barrier	C	-5



PME	Barrier/ Enclosure	Applied Work Locations <sup>[1]</sup>	Attenuation, dB(A)
Mobile Crane/ Service Crane/ Lifting Crane	Barrier	A, B, C	-5
Electric drill	Barrier	A, B, C	-5
Grinder	Barrier	A, B	-5
Dump Truck	Barrier	A, B, C	-5
Drill Rig	Barrier	A, B, C	-10
Excavator	Barrier	A, B, C	-5
Generator	Barrier	A, B, C	-5
Grout Mixer	Barrier	A	-10
Grout Pump	Barrier	A	-10
Lorry	Barrier	A, B, C	-5
Lorry, with crane/grab	Barrier	A, B	-5
Piling, diaphragm wall, bentonite filtering plant	Barrier	B, C	-10
Piling, diaphragm Wall	Barrier	B	-10
Trench Cutter	Barrier	C	-10
	3-side temporary movable enclosure	B <sup>[3]</sup>	-15
Piling, Large Dia Bored, Oscillator	Barrier	A	-10
Piling, Large Dia Bored, Reverse Circulation Drill	Barrier	B	-10
Power Rammer (Petrol)	Barrier	B, C	-10
Vibratory Poker	Barrier	A, B, C	-10
Rock Drill	Barrier	B, C	-10
Roller, Vibratory	Barrier	A, B, C	-5
Saw, Circular, Wood	Barrier	A, B, C	-10
Ventilation Fan	Barrier	C	-10
	Silencer	B	-15
Water pump	Barrier	B	-10
Water Pump (petrol)	Barrier	C	-10
Water Pump, Submersible	Barrier	C	-10

Notes:

- [1] A: TCE station and its rail track realignment work, B: TCW Station, C: EAP / EEP and Launching Shaft / Retrieval Shaft
- [2] Only the breaker, excavator mounted at launching shaft would be mitigated by full enclosure.
- [3] The 3-side temporary movable enclosure would only be applied during the construction of diaphragm wall at TCW. For Concrete Lorry Mixer, 3-side temporary movable enclosure would be applied only at the workfronts at the east side. For Trench Cutter, 3-side temporary movable enclosure would be applied at the workfronts at both the east and west side.

**4.4.4.15** With the adoption of the above mitigation measures, the construction noise impacts from different phases of construction during the construction period have been calculated in accordance with the work programme and are given in **Appendix 4.4.6**.

**4.4.4.16** **Appendix 4.4.6** presents the calculated construction noise impacts at representative NSRs. Concurrent projects, including TCNTE, RRIW and Additional Sewerage Rising Main and Rehabilitation of the Existing Sewage Rising Main between Tung Chung and Siu Ho Wan have been considered for the cumulative noise impact. The construction noise levels of TCNTE used for cumulative construction noise levels is updated according latest TCNTE

construction programme. The predicted construction noise impacts at the NSRs are summarised in the **Table 4.4.9**.

**Table 4.4.9** Predicted construction noise impact at NSRs under mitigated scenario

No. <sup>[1]</sup>	NSR	NAP <sup>[2]</sup>	Uses <sup>[3]</sup>	Leq (30min), dB(A)				Duration of Exceedance Months
				Criterion <sup>[4]</sup>	Mitigated Noise Level <sup>[5]</sup>	Cumulative Noise Level	Exceedance	
Existing NSRs (Tung Chung East)								
E1	Ying Tung Estate	YTT-02f	R	75	69	73	-	-
E4	Le Bleu Deux	LED-06a	R	75	70 <sup>[7]</sup>	70 <sup>[7,8]</sup>	-	-
E8a	Tung Chung Crescent	TCC-01a	R	75	72	72 <sup>[8]</sup>	-	-
		TCC-07a	R	75	71	71 <sup>[8]</sup>	-	-
		TCC-09a	R	75	74	74 <sup>[8]</sup>	-	-
E8b	Sunshine House International Pre-School (Tung Chung)	ESHI-01a	E	70 (65)	65	65 <sup>[8]</sup>	-	-
E20	Ho Yu College and Primary School	EHYC-01a	E	70 (65)	50	57	-	-
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[6]</sup>	66	67	N/A <sup>[6]</sup>	N/A <sup>[6]</sup>
Existing NSRs (Tung Chung West)								
E10	Ma Wan Chung	MWC-01a	V	75	73	73	-	-
E11a	Yat Tung Estate	YTE-01a	R	75	75	75	-	-
		YTE-01b	R	75	69	74	-	-
		YTE-04a	R	75	74	74	-	-
		YTE-05a	R	75	66	75	-	-
		YTE-14a	R	75	73	73	-	-
		YTE-16a	R	75	73	73	-	-
E11b	Tung Chung Catholic School Primary Section	ETCCS-01a	E	70 (65)	64	64	-	-
E12	Mun Tung Estate	MTE-01a	R	75	68	68	-	-
E16	Ha Ling Pei	HLP-01a	V	75	62	64	-	-
		HLP-02a	V	75	63	64	-	-
Planned NSRs (Tung Chung East)								
P1	Residential Premises in Tung Chung East	A100-02j	R	75	65	71	-	-
		A116-01c	R	75	63	64	-	-
		A133a-01b	R	75	64	68	-	-
P4	Tung Chung Area 113	A113-01e	R	75	68	69	-	-
		A113-12e	R	75	67	67	-	-
P7	Tung Chung Area 54	A54-01a	R	75	70 <sup>[7]</sup>	70 <sup>[7,8]</sup>	-	-
Planned NSRs (Tung Chung West)								
P2	Residential Premises in Tung Chung West	A60-03a	R	75	59	62	-	-

Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.
- [2] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.
- [3] R – Residential Premises, E – Educational Institutions, V – Village type development, O – Others.
- [4] Values in parentheses indicate the noise criterion during examination period of educational institution.
- [5] Bolded values mean exceedance of the relevant noise criteria.

- [6] N/A - Not Applicable.
- [7] As shown in **Table 4.4.7**, LED-06a and A54-01a near the Barging Point will not exceed the criterion under unmitigated scenario. Thus, the result remains unchanged as shown in unmitigated scenario (see **Table 4.4.7**). The detail calculation of the construction noise at the barging point is given in **Appendix 4.4.4**.
- [8] There is no concurrent project near NAPs. Hence, the cumulative noise is same as the mitigated noise level.

**4.4.4.17** Cumulative impacts from concurrent projects including the following construction activities were considered. The details of these concurrent projects are provided in **Section 2.11**. The plant inventories for construction of TCNTE are retrieved from approved EIA report for TCNTE (AEIAR-196/2016) and the plant inventories for construction of RRIW are provided by the construction professional for this RRIW during the preparation of the EIA report.

- Site clearance and formation activities of TCNTE;
- Construction of superstructure / internal roads / sewerage of TCNTE; and
- Construction of RRIW near Yat Tung Estate.

**4.4.4.18** From **Table 4.4.9**, construction noise impacts arising from the proposed and concurrent projects at all planned and existing NSRs including residential premises and schools during normal and examination periods can be properly mitigated by implementing the proposed noise control measures. Given the transient nature of visitor using hiking trails and mitigation measures are recommended to reduce the noise emission, adverse noise impact is not anticipated.

**4.4.4.19** The number of dwellings, classrooms and other sensitive receivers that will be exposed to noise impact exceeding the criteria set in Annex 5 in the TM is nil.

#### **4.4.5 Evaluation of Residual Construction Noise Impact**

**4.4.5.1** Construction noise impact arising from the Project at all the planned and existing NSRs including residential premises and schools during normal and examination periods can be properly mitigated by implementing the proposed noise control measures. The number of dwellings, classrooms and other sensitive receivers that will be exposed to adverse residual construction noise impact exceeding the criteria set in Annex 5 in the TM is nil.

### **4.5 Groundborne Construction Noise Impact Assessment**

#### **4.5.1 Construction Noise Impact Assessment Methodology**

**4.5.1.1** The method used to predict groundborne construction noise is based on the U.S. Department of Transportation “High-Speed Ground Transportation Noise and Vibration Impact Assessment”, 2012 / “Transit Noise and Vibration Impact Assessment Manual”, 2018.

**4.5.1.2** The vibration level  $L_{v,rms}$  at a distance  $R$  from the source is related to the vibration source level at a reference distance  $R_0$ . The conversion from vibration levels to groundborne noise levels is determined by the following factors:

- $C_{PSR}$ : Point Source Response
- $C_{building}$ : Coupling Loss into Building Structures
- $C_{floor}$ : Coupling loss per floor
- $C_{noise}$ : Conversion factor from floor vibration levels to noise levels

**4.5.1.3** The predicted groundborne noise level  $L_p$  inside the noise sensitive rooms is given by the following equation.

- $L_p = EFL + C_{PSR} + C_{building} + C_{floor} + C_{noise}$

### Reference Vibration Sources

**4.5.1.4** The Excitation Force Level (EFL) is determined by measuring TBM-induced ground vibration spectrum and its corresponding PSR. EFL is independent of the geologic characteristics. The EFL adopted from “Measurement and prediction of groundborne noise and vibration from a tunnel boring machine”, 2006.

### Point Source Response (PSR)

**4.5.1.5** The PSR determines the vibration levels or attenuation in the ground as a function of distance caused by a point source of unit force point impacts, with point source (TBM) orientated along the alignment. Project specific measurements for PSR have been conducted at Tung Chung Road North and Yat Tung Estate. Force excitation by hammer impact was performed at the bottom of the borehole having similar depth as the track level. The impact hammer was mounted at the top of the connecting pipe. The bottom side of the connecting pipe was installed with an impact head for the transmission of the hammer impact to the bottom of the borehole. Instantaneous impact forces transmitted were measured by the load cell of the impact hammer. The measured PSR for different geological characteristics have been presented in **Appendix 4.5.1**. As there is thin alluvium layer and thick granite layer at Tung Chung Road North, a lower attenuation is found. This lower attenuation PSR is adopted for groundborne construction noise at Ma Wan Chung, hence, safety factor is not considered.

### Coupling Loss into Building Structures

**4.5.1.6** This represents the change in the incident ground-surface vibration due to the presence of the piled building foundation. The values based on approved EIA for West Island Line (AEIAR-126/2008) and shown in **Appendix 4.5.2**:

- 1 to 2 storeys residential;
- 2 to 4 storeys masonry building; and
- Large masonry building on piles.

**Table 4.5.1** Loss factor for coupling into building foundation – 1 to 2 storeys residential

Frequency	One-third Octave Band Frequencies, Hz											
	3.15	4	5	6.3	8	10	12.5	16	20	25	32	40
Loss coupling factor, dB	0.0	0.0	0.0	0.0	-2.0	-5.0	-5.5	-6.5	-7.5	-8.0	-8.5	-8.5
Frequency	50	63	80	100	125	160	200	250	315	400	500	
Loss coupling factor, dB	-8.5	-8.5	-8.0	-7.5	-7.5	-7.0	-6.0	-5.0	-5.0	-5.0	-5.0	

**Table 4.5.2** Loss factor for coupling into building foundation – 2 to 4 storeys masonry building

Frequency	One-third Octave Band Frequencies, Hz											
	3.15	4	5	6.3	8	10	12.5	16	20	25	32	40
Loss coupling factor, dB	0.0	0.0	0.0	-2.0	-5.0	-7.0	-8.0	-9.5	-11.0	-12.0	-12.5	-12.5
Frequency	50	63	80	100	125	160	200	250	315	400	500	
Loss coupling factor, dB	-12.5	-12.5	-12.5	-12.0	-11.5	-11.0	-10	-8.5	-8.5	-8.5	-8.5	

**Table 4.5.3** Loss factor for coupling into building foundation – Large masonry building on piles

Frequency	One-third Octave Band Frequencies, Hz											
	3.15	4	5	6.3	8	10	12.5	16	20	25	32	40
Loss coupling factor, dB	-10.0	-10.0	-10.0	-10.0	-10.0	-10.5	-11.0	-11.5	-13.0	-14.0	-14.5	-14.5
Frequency	50	63	80	100	125	160	200	250	315	400	500	
Loss coupling factor, dB	-14.5	-14.5	-14.0	-13.0	-12.5	-12.0	-11.0	-10.0	-10.0	-10.0	-10.0	

**4.5.1.7** For structures founded on rock, there is no impedance contrast between the soil and the foundation, as a conservative approach, the Building Coupling Factor (BCF) is considered to be zero.

### Coupling Loss Per Floor

**4.5.1.8** This represents the floor-to-floor vibration transmission attenuation. In multi-storey buildings, a common value for the attenuation of vibration from floor-to-floor is approximately 1dB attenuation in the upper floor regions at low frequencies and greater than 3dB attenuation at lower floors at high frequencies. Coupling loss of 2dB reduction per floor for 1 – 5 floors and 1dB reduction per floor for 6 and above are assumed for conservative assessment.

## Conversion from Floor Vibration to Noise Levels

**4.5.1.9** Conversion from floor vibration levels to indoor reverberant noise levels is based on standard acoustic principles. The conversion factor is dependent on the surface area  $S$  of the room in  $m^2$ , the radiation efficiency  $\eta$ , the volume of the room  $V$  in  $m^3$  and the room reverberation time  $RT$  in seconds. Conversion factors for different NSR types, which include concert hall, theatres, lecture hall & recording studios, hotel guestrooms & residential units and school classrooms, and have been identified in the Kowloon Southern Link (AEIAR-083/2005), these values are summarised in the table below and adopted for the present study.

**Table 4.5.4** Conversion factors from floor vibration levels to indoor reverberant noise levels

NSR	Conversion $C_{noise}$ (dB re $1 \times 10^{-6}$ mm/s)
Concert hall, theatres, lecture hall and recording studios	-27
Hotel guestrooms and residential units	-27
School classrooms	-23

## 4.5.2 Identification of Construction Noise Impact

### Identification of Assessment Area and Noise Sensitive Receivers

**4.5.2.1** For construction noise assessment, the assessment area includes area within 300m from the boundary of the Project and from any works of the Project. Representative NSRs locations that would be affected by the construction activities are summarised in **Table 4.3.3** and the representative NAPs are shown in **Figure 4.3.3**.

### Inventory of Noise Sources

**4.5.2.2** Potential groundborne construction noise impacts during the construction phase will arise mainly from the operation of TBM for the construction of the rail tunnel extending from the existing TUC to the TCW Station. Other construction activities such as lorry movement, concreting, road paving, drill and blast for tunnelling etc. are transient and short in duration, thus are unlikely to generate significant groundborne construction noise. To assess the groundborne noise generated from the TBM, the most relevant source levels for TBM were derived by making reference to the vibration source data from other similar tunneling project – ‘Kowloon Southern Link’ (AEIAR-098/2004) by Kowloon–Canton Railway Corporation (KCRC). The validity of the inventory has been confirmed with the Project Proponent’s construction professionals.

### 4.5.3 Prediction and Evaluation of Construction Noise Impact

#### Phases of Construction

- 4.5.3.1** TBM is recommended for the construction of tunnel underneath the existing Ma Wan Chung bay area and also underneath the hill crests to the northeast of Ma Wan Chung which has a height up to +50mPD. A minimum of 1 tunnel diameter, clearance has been allowed from the seabed level or ground level to the top of the tunnel during the design of the vertical alignment of the tunnel. The depth of the track level ranges from roughly -5mPD at the existing TUC to roughly -14mPD at the proposed TCW Station.

#### Scenarios

- 4.5.3.2** Similar to airborne construction noise assessment, mitigated scenario will be conducted if the noise levels under unmitigated scenario exceed the respective criteria.

#### Prediction of Noise Impact

- 4.5.3.3** The predicted groundborne construction noise levels are given in **Appendix 4.5.3** and are summarized in the **Table 4.5.5**.

**Table 4.5.5** Predicted groundborne construction noise impact at NSRs

Table 10-10 Predicted Groundborne Vibration Noise Impact at NSRs					
No.	NAP <sup>[1]</sup>	Uses <sup>[2]</sup>	Leq (30min), dB(A)		
			Daytime Criterion	Unmitigated Noise Level	Exceedance
Existing NSRs (Tung Chung West)					
E10	MWC-03a	V	65	<45	N

Notes:

[1] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.

[2] V- Village type development.

- 4.5.3.4** As shown in **Table 4.5.5**, groundborne construction noise levels at existing NSR at Ma Wan Chung would comply with the day time (0700-1900) noise criterion of  $L_{eq(30min)}$  65 dB(A). Adverse ground-borne construction noise impact due to the use of PME would not be envisaged. The number of dwellings, classrooms and other sensitive receivers that will be exposed to noise impact exceeding the criteria set in Annex 5 in the TM is nil.

- 4.5.3.5** However, future review (e.g. in-situ measurement along the TBM operation) should be conducted by the Contractor if TBM operation in restricted hours is needed. As discussed in **Section 4.1**, a CNP would be required for constructions works during restricted works.

**4.5.3.6** As adverse groundborne construction noise impact is not anticipated, mitigation measures are not required. In case the Contractor considers there is a need for work within restricted hours, they will submit an application for CNP.

#### 4.5.4 Mitigation of Construction Noise Impact

**4.5.4.1** As adverse groundborne construction noise impact is not anticipated, mitigation measures are not required. The number of dwellings, classrooms and other sensitive receivers that will be exposed to noise impact exceeding the criteria set in Annex 5 in the TM is nil.

#### 4.5.5 Evaluation of Residual Construction Noise Impact

**4.5.5.1** Groundborne construction noise impact arising from the construction of tunnel alignment between TCW Station and TUC will be within respective criteria. Adverse residual noise impacts are thus not anticipated. The number of dwellings, classrooms and other sensitive elements that will be exposed to adverse residual noise impact exceeding the criteria set in Annex 5 in the TM is nil.

### 4.6 Airborne Rail Noise Assessment Impact Assessment

#### 4.6.1 Rail Noise Impact Assessment Methodology

**4.6.1.1** Rail noise impact ( $L_{eq}$ ) has been predicted according to “Calculation of Railway Noise (CRN) (1995)” by the UK Department of Transport. A summary of correction factors has been included in the airborne rail noise prediction model is given in **Table 4.6.1**.

**Table 4.6.1** Summary of correction factors for  $L_{eq}$

Parameters	Assumptions	Remarks
Rail deterioration	3 dB(A)	In-situ rail noise source term measurement near potential development areas at Tung Chung East area has been conducted near Ta Pang Po and thus included typical rail deterioration. Nonetheless, a 3dB(A) rail deterioration has been included for conservative assessment according to the approved EIAs for the Shatin to Central Link – Tai Wai to Hung Hom Section (AEIAR-167/2012), Shatin to Central Link – Stabling Sidings at Hung Hom Freight Yard (AEIAR-164/2012) and Tung Chung New Town Extension (AEIAR-196/2016)
Train speed	Change of Sound Exposure Level (SEL) with speed = $20 \log (V / V_{ref})$ dB(A)	$V$ and $V_{ref}$ are the average train speeds
Distance	Change of SEL with distance = $10 \log (d_1 / 25)$ dB(A)	$d_1$ is the distance between track and receiver



Parameters	Assumptions	Remarks
Deck Reflection	At-Grade ballast track = 0 dB(A) At-Grade non-ballast track = 2.5 dB(A)	According to the approved EIAs for the Shatin to Central Link – Tai Wai to Hung Hom Section (AEIAR-167/2012), Shatin to Central Link – Stabling Sidings at Hung Hom Freight Yard (AEIAR-164/2012) and Tung Chung New Town Extension (AEIAR-196/2016)
Barrier effects	As per Chart 6(a) of CRN	-
Joints / Crossovers	7dB(A)	To represent the augmentation in noise due to thermal expansion joints. Similar approach has been adopted in the approved EIAs for the Shatin to Central Link – Tai Wai to Hung Hom Section (AEIAR-167/2012), Shatin to Central Link – Stabling Sidings at Hung Hom Freight Yard (AEIAR-164/2012) and Tung Chung New Town Extension (AEIAR-196/2016)
Air absorption	$0.2 - 0.008d$ dB(A)	$d$ is the distance (m)
Train Frequency	$10\log(N_1)$	$N_1$ is the train frequency in 30 minutes Frequency (trains / direction / 30 minutes)
View Angle	$10 \log (\pi\theta/180-\cos 2\alpha \sin\theta) - 5$ dB(A)	$\alpha$ is the acute angle between a line drawn through the receiver point, parallel to the track and the line bisecting the angle view $\theta$ $\theta$ is the view angle
Façade Reflection	2.5dB(A)	-
To $L_{eq}$ (30min)	$10 \log(1 / 1800)$	-

**4.6.1.2** The computational model “RailNoise” has been agreed with EPD prior to the commencement of the assessment. The modelling methodology for propagation is based on the prediction procedures in CRN.

**4.6.1.3**  $L_{max}$  has been also predicted by the “RailNoise” according to “Train Noise Prediction Model” (TNPM) which adopted for Channel Tunnel Rail Link (HS1) in the UK. A summary of correction factors has been included in the airborne rail noise prediction model is given in **Table 4.6.2**.

**Table 4.6.2** Summary of correction factors for  $L_{max}$

Parameters	Assumptions	Remarks
Train speed	Change of $L_{max}$ with speed = $30 \log (V / V_{ref})$ dB(A)	$V$ and $V_{ref}$ are the average train speeds
Distance	Change of $L_{max}$ with distance = $14.5 \log (d / 25)$ dB(A)	$d$ is the distance between track and receiver, where the source height for rolling stock (non-powered sources) is 0.5m above the ground
Air absorption	$- d / 120$ dB(A)	-
Barrier effects	Absorptive barrier: $\delta \leq 0 : e^{(1.63+12\delta)}$ $\delta > 0 : 10 \log (2.5+30(\delta+0.25))$ Reflective barrier: $\delta \leq 0 : e^{(1.1958+14\delta)}$ $0 < \delta \leq 0.01 : 3.3\text{dB(A)}$ $\delta \geq 0.01 : 11\delta^{0.282}$	$\delta$ is the path difference

## 4.6.2 Identification Rail Noise Impact

### Identification of Assessment Area and Noise Sensitive Receivers

**4.6.2.1** The assessment area for airborne rail noise includes area within 300m from the boundary of the Project and the works of the Project. Representative NSRs locations that would be affected by the rail operation are summarised in **Table 4.3.4** and the representative NAPs are shown in **Figure 4.3.4**.

### Inventory of Noise Sources

**4.6.2.2** According to Clause 3.2.2 of the EIA Study Brief, further airborne rail noise measurements have been conducted to provide the actual/ updated source term data for the existing trains running on TCL and AEL. The measurement location was near Ta Pang Po, and the microphones were set at different horizontal and vertical distance from the tracks, where safety allows. Review findings in previous relevant studies have been conducted as well. A summary of actual/ updated source term and comparison of previous measurements according to the approved EIA report for Tung Chung New Town Extension (AEIAR-196/2016) and Siu Ho Wan Station and Siu Ho Wan Depot Replanning Works (AEIAR-214/2017) are given in **Appendix 4.6.1**.

**4.6.2.3** As shown in **Appendix 4.6.1**, all the corrected SEL is in the range of 75.7dB(A) to 81.9dB(A) (@ 25m, 135km/h, 1 car), whereas a SEL of 83.9 dB(A) (@ 25m, 135km/h, 1 car) was adopted in previous approved EIA studies (EIA- 029/BC, AEIAR-196/2016 and AEIAR-214/2017).

**4.6.2.4** The corrected SELs for TCL, which included both Adtranz–CAF EMU and K-Stocks Trains, are generally higher than that of AEL about 1 – 2dB(A). The operation of TCL consists of Adtranz–CAF EMU and K-Stocks Trains while the operation of AEL consists of Adtranz–CAF EMU respectively. As both of TCL and AEL are using MTR Adtranz–CAF EMU for operation, the SEL of TCL and AEL adopted in rail noise assessment should be the same.

**4.6.2.5** The corrected SELs at 25m from and 10m above track level are about 1 – 2dB(A) higher than that of other measurement locations. This is probably due to a larger angle of view being captured at a higher level and the vertical directivity of noise emitted by the train.

**4.6.2.6** The SEL of the approved the EIA Study for TCNTE (AEIAR-196/2016) is in the range of 73.0dB(A) to 79.0dB(A) at 25m with speed 135km/h for 1 car while the SEL of the approved EIA Study for Siu Ho Wan Station and Siu Ho Wan Depot Replanning Works (AEIAR-214/2017) is in the range of 71.2dB(A) to 77.8dB(A)

at 25m with speed 135km/h for 1 car. There are about 2 – 4 dB(A) variation between current measurement and the previous approved EIA studies.

**4.6.2.7** SEL of 83.9dB(A) adopted in previous EIAs is referred to Lantau and Airport Railway (LAR) Environmental Assessment Report EIA-029/BC. The train type was yet to be decided at the time of the LAR EIA, hence the noise source term assumed in the LAR EIA was based on the review outcome of the specifications / information / documents for various rolling stock types available in the market at the time. Given the TCL and AEL have been operated for years and the rolling stocks are specific, the actual SEL of the operating rolling stock should be adopted.

**4.6.2.8** After taking into the vertical directivity characteristics and the measurement variation between different EIA studies, the maximum corrected SEL (@25m, 135km/h, 1 car) is 81.9 dB(A). Given the nature of railway operation in the long run, it is considered prudent to adopt a SEL (@25m, 135km/h, 1 car) of 81.9 dB(A), which also represents a slightly conservative SEL for the purpose of this rail noise assessment. A summary of the source term parameters are shown in **Table 4.6.3**.

**Table 4.6.3** Rail noise source term to be adopted in the airborne rail noise assessment

Parameters	TCL	AEL
SEL for 1 car at 25m at 135km/h, dB(A)	81.9	81.9
SEL for 8 car at 25m at 135km/h, dB(A)	90.9	90.9
SEL for 10 car at 25m at 135km/h, dB(A)	N/A <sup>[2]</sup>	91.9
Track type	On Ballast Track	On Ballast Track
Rail	Continuously weld rail	Continuously weld rail
Speed	[1]	[1]

Note:

[1] According to **Table 4.6.4**.

[2] N/A – Not applicable. According to the latest information from MTRC, there are only 8 cars for TCL current and future operation while there are 8 cars and 10 cars for AEL current and future operation respectively. Hence, SEL for 10 cars of TCL is not applicable.

## 4.6.3 Prediction and Evaluation of Rail Noise Impact

### Scenarios

**4.6.3.1** As discussed in **Section 2.7**, the realignment of ballast tracks in the vicinity of TCE Station would need to be implemented in phases so as to maintain the operation of the existing railway system serving the local community. The implementation phases are broadly divided into 4 phases as below and shown in **Appendix 2.1**:

Scenario A:

(Q2 2023 – Q2 2027)

- Existing alignment for both TCL Down Track (DT) (train direction from Tung Chung to Hong Kong), and Up Track (UT) (train direction from Hong Kong to Tung Chung);
- Addition of 2 turnouts at DT; and

- Removal of about 80m of existing noise barriers along DT.

Scenario B:

(Q2 2027 – Q2 2029)

- Realignment for DT and existing alignment for UT;
- Complete construction of TCE Station; and
- Addition of 2 turnouts at UT.

Scenario C:

(Q2 2029 – Q1 2030)

- Realignment for both DT and UT.

Scenario D:

(Q1 2030 to Ultimate)

- Removal of all turnouts at both DT and UT.

**4.6.3.2** An unmitigated scenario is conducted on the worst operation mode representing the maximum noise emission. The operation parameters are summarized in **Section 4.6.3**. The maximum number of frequency, train length and speed as advised by the railway operator have been adopted for worst operation mode as shown in **Table 4.6.4 – Table 4.6.7**. Mitigated scenario has been conducted if unmitigated scenario exceeds respective criteria. Four scenarios have been conducted as listed below.

**4.6.3.3** Details of railway operation near TCE Station are summarized in **Table 4.6.4 – Table 4.6.7**.

**Table 4.6.4** TCL Realignment - Operational parameters for Scenario A

Parameters	TCL	AEL <sup>[1]</sup>
Maximum Train Length, m	184.2	184.2
No. of car	8	8
Frequency (Train per Hour per direction) (Daytime / Night-time)	16 / 8	8 / 8
Maximum operating speed in Tung Chung km/h	DT (existing alignment): 135 UT (existing alignment): 135	135
TCNTE Phasing <sup>[2]</sup>	Phase 1	
Year	Q2 2023 – Q2 2027	

Note:

- [1] AEL is not included in the Project and the operational parameter of AEL has been assessed for cumulative rail noise assessment.
- [2] As the TCNTE divided into 4 development phases with different population intake year. TCNTE Phasing refers to the development phases.

**Table 4.6.5** TCL Realignment - Operational parameters for Scenario B

Parameters	TCL	AEL <sup>[1]</sup>
Maximum Train Length, m	184.2	184.2
No. of car	8	8
Frequency (Train per Hour per direction) (Daytime / Night-time)	16 / 8	8 / 8
Maximum operating speed in Tung Chung km/h	DT (realigned alignment): 70 – 135 UT (existing alignment): 135	135

Parameters	TCL	AEL <sup>[1]</sup>
TCNTE Phasing <sup>[2]</sup>	Phase 1 – Phase 3 (Area 113 only)	
Year	Q2 2027 – Q2 2029	

Note:

- [1] AEL is not included in the Project and the operational parameter of AEL has been assessed for cumulative rail noise assessment.
- [2] As the TCNTE divided into 4 development phases with different population intake year. TCNTE Phasing refers to the development phases.

**Table 4.6.6** TCL Realignment - Operational parameters for Scenario C

Parameters	TCL	AEL <sup>[1]</sup>
Maximum Train Length, m	184.2	184.2
No. of car	8	8
Frequency (Train per Hour per direction) (Daytime / Night-time)	20 / 12	8 / 8
Maximum operating speed in Tung Chung km/h	DT (realigned alignment): 70 – 135 UT (realigned alignment): 70 – 135	135
TCNTE Phasing <sup>[2]</sup>	Phase 1 – Phase 3	
Year	Q2 2029 – Q1 2030	

Note:

- [1] AEL is not included in the Project and the operational parameter of AEL has been assessed for cumulative rail noise assessment.
- [2] As the TCNTE divided into 4 development phases with different population intake year. TCNTE Phasing refers to the development phases.

**Table 4.6.7** TCL Realignment - Operational parameters for Scenario D

Parameters	TCL	AEL <sup>[1]</sup>
Maximum Train Length, m	184.2	229.2
No. of car	8	10
Frequency (Train per Hour per direction) (Daytime / Night-time)	20 / 14	8 / 8
Maximum operating speed in Tung Chung km/h	DT (realigned alignment): 50 – 100 UT (realigned alignment): 50 – 120	135
TCNTE Phasing <sup>[2]</sup>	Phase 1 – Phase 4	
Year	Q1 2030 to Ultimate	

Note:

- [1] AEL is not included in the Project and the operational parameter of AEL has been assessed for cumulative rail noise assessment.
- [2] As the TCNTE divided into 4 development phases with different population intake year. TCNTE Phasing refers to the development phases.

## Prediction of Noise Impact

### 4.6.3.4

The predicted rail noise levels at the representative NSRs are presented in the table below and the rail noise prediction has included building screening such as commercial buildings at Tung Chung Area 57 for Scenario B – Scenario D, Area 129, Area 130 for Scenario D, etc., which shown in **Figure 4.6.1 to Figure 4.6.4**, which have been strategically located to provide certain screening. At-receiver mitigation measures, such as single aspect building, fixed window, fins and acoustic window, proposed in the approved the EIA Study for TCNTE (AEIAR-196/2016) and Tung Chung New Town Extension (East) – Design and Construction (Ref. PI16-01) from CEDD are considered as base case for the assessment and these proposed mitigation measures are provided in **Appendix 4.6.2**. Details of result are provided in **Appendix 4.6.3**.

**Table 4.6.8** Predicted rail noise impacts – unmitigated Scenario A

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[8]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5,7]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)
Existing NSR (Tung Chung East)										
E1	Ying Tung Estate	YTT-01a	R	C	70 / 60	85	57 / 54	77	– / –	–
		YTT-01f	R	C	70 / 60	85	60 / 58	78	– / –	–
		YTT-02a	R	C	70 / 60	85	64 / <b>62</b>	79	– / 2	–
		YTT-02e	R	C	70 / 60	85	65 / <b>62</b>	80	– / 2	–
		YTT-02f	R	C	70 / 60	85	65 / <b>62</b>	80	– / 2	–
		YTT-02m	R	C	70 / 60	85	63 / 60	79	– / –	–
		YTT-02p	R	C	70 / 60	85	58 / 55	79	– / –	–
		YTT-04a	R	C	70 / 60	85	64 / <b>61</b>	76	– / 1	–
		YTT-04f	R	C	70 / 60	85	64 / <b>61</b>	77	– / 1	–
E2	The Visionary	TV-03a	R	C	70 / 60	85	51 / 49	72	– / –	–
E3	Caribbean Coast	CC-01a	R	C	70 / 60	85	51 / 50	74	– / –	–
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[9]</sup>	N/A <sup>[9]</sup>	N/A <sup>[9]</sup>	64 / 62	72	– / –	–
Planned NSR (Tung Chung East)										
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East (Planned NSR) – Phase 1	A99-01b	R	C	70 / 60	85	54 / 51	72	– / –	–
		A99-01d	R	C	70 / 60	85	55 / 53	72	– / –	–
		A99-02b	R	C	70 / 60	85	62 / 59	74	– / –	–
		A99-02f	R	C	70 / 60	85	62 / 59	74	– / –	–
		A99-02s	R	C	70 / 60	85	59 / 56	73	– / –	–
		A99-02z	R	C	70 / 60	85	<45 / <45	<60	– / 2	–
		A100-01b	R	C	70 / 60	85	64 / <b>62</b>	75	– / 2	–
		A100-01d	R	C	70 / 60	85	64 / <b>62</b>	75	– / 1	–
		A100-01k	R	C	70 / 60	85	64 / <b>61</b>	75	– / –	–
		A100-01p	R	C	70 / 60	85	<45 / <45	70	– / –	–
		A100-01x	R	C	70 / 60	85	57 / 54	73	– / –	–
		A100-02a	R	C	70 / 60	85	60 / 58	72	– / –	–
		A100-02h	R	C	70 / 60	85	60 / 58	73	– / 2	–
		A100-02n	R	C	70 / 60	85	65 / <b>62</b>	75	– / 2	–
		A100-02s	R	C	70 / 60	85	65 / <b>62</b>	75	– / –	–
		A100-02t	R	C	70 / 60	85	51 / 48	74	– / –	–
		A100-02z	R	C	70 / 60	85	60 / 57	74	– / –	–
		A100-03b	R	C	70 / 60	85	<45 / <45	66	– / –	–
		A100-03c	R	C	70 / 60	85	46 / <45	66	– / –	–

Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.
- [2] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.
- [3] R – Residential Premises, O – Others.
- [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.
- [5] Daytime and Evening Time / Night-time.
- [6] Maximum noise level is selected along the NSR building storeys.
- [7] Bolded values mean exceedance of the relevant noise criteria.
- [8] Area Sensitivity Rating will be reviewed subject to detailed design and further assessment.
- [9] N/A - Not Applicable.

**Table 4.6.9** Predicted rail noise impacts – unmitigated Scenario B

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[8]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5,7]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)
Existing NSR (Tung Chung East)										
E1	Ying Tung Estate	YTT-01a	R	C	70 / 60	85	57 / 54	78	- / -	-
		YTT-01f	R	C	70 / 60	85	60 / 57	78	- / -	-
		YTT-02a	R	C	70 / 60	85	63 / 60	79	- / -	-
		YTT-02e	R	C	70 / 60	85	64 / <b>61</b>	80	- / 1	-
		YTT-02f	R	C	70 / 60	85	63 / <b>61</b>	80	- / 1	-
		YTT-02m	R	C	70 / 60	85	62 / 59	79	- / -	-
		YTT-02p	R	C	70 / 60	85	58 / 55	79	- / -	-
		YTT-04a	R	C	70 / 60	85	62 / 59	77	- / -	-
		YTT-04f	R	C	70 / 60	85	62 / 60	77	- / -	-
E2	The Visionary	TV-03a	R	C	70 / 60	85	50 / 48	72	- / -	-
E3	Caribbean Coast	CC-01a	R	C	70 / 60	85	49 / 48	74	- / -	-
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[9]</sup>	N/A <sup>[9]</sup>	N/A <sup>[9]</sup>	60 / 59	70	- / -	-
Planned NSR (Tung Chung East)										
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East (Planned NSR) – Phase 1	A99-01b	R	B	65 / 55	85	<45 / <45	70	- / -	-
		A99-01d	R	B	65 / 55	85	47 / <45	72	- / -	-
		A99-02b	R	B	65 / 55	85	58 / 55	74	- / -	-
		A99-02f	R	B	65 / 55	85	58 / 55	74	- / -	-
		A99-02s	R	B	65 / 55	85	52 / 49	73	- / -	-
		A99-02z	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A100-01b	R	C	70 / 60	85	56 / 54	75	- / -	-
		A100-01d	R	C	70 / 60	85	58 / 55	75	- / -	-
		A100-01k	R	C	70 / 60	85	59 / 56	75	- / -	-
		A100-01p	R	C	70 / 60	85	45 / <45	70	- / -	-
		A100-01x	R	C	70 / 60	85	56 / 53	73	- / -	-
		A100-02a	R	B	65 / 55	85	56 / 54	72	- / -	-
		A100-02h	R	C	70 / 60	85	56 / 54	73	- / -	-
		A100-02n	R	C	70 / 60	85	56 / 55	73	- / -	-
		A100-02s	R	C	70 / 60	85	55 / 53	74	- / -	-
		A100-02t	R	C	70 / 60	85	50 / 47	74	- / -	-
		A100-02z	R	C	70 / 60	85	53 / 50	73	- / -	-
		A100-03b	R	B	65 / 55	85	<45 / <45	<60	- / -	-
				A100-03c	R	B	65 / 55	85	<45 / <45	67
P4 <sup>[4]</sup>	Tung Chung at Area 113	A113-01g	R	C	70 / 60	85	62 / 60	77	- / -	-
		A113-01k	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A113-02a	R	B	65 / 55	85	56 / 53	76	- / -	-
		A113-03a	R	B	65 / 55	85	46 / <45	62	- / -	-
		A113-04a	R	B	65 / 55	85	46 / <45	66	- / -	-
		A113-06a	R	B	65 / 55	85	53 / 52	73	- / -	-
		A113-07a	R	B	65 / 55	85	54 / 52	73	- / -	-
		A113-09a	R	B	65 / 55	85	50 / 49	70	- / -	-
		A113-10a	R	B	65 / 55	85	49 / 47	72	- / -	-
		A113-10d	R	B	65 / 55	85	53 / 51	72	- / -	-
		A113-11a	R	B	65 / 55	85	58 / <b>56</b>	75	- / 1	-
		A113-12a	R	B	65 / 55	85	57 / 55	75	- / -	-
				A113-12e	R	C	70 / 60	85	61 / 59	77



No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[8]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> dB(A)	L <sub>eq</sub> (30min) dB(A) <sup>[5,7]</sup>	L <sub>max</sub> dB(A)	L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> dB(A)
		A113-12k	R	C	70 / 60	85	<45 / <45	65	- / -	-
		A113-13a	R	C	70 / 60	85	58 / 56	74	- / -	-
		A113-13b	R	C	70 / 60	85	62 / 60	74	- / -	-
		A113-13f	R	C	70 / 60	85	61 / 60	74	- / -	-
		A113-22g	R	C	70 / 60	85	60 / 58	75	- / -	-
		A113-22k	R	B	65 / 55	85	<45 / <45	<60	- / -	-
P6 <sup>[7]</sup>	Tung Chung Area 58	A58-01a	R	C	70 / 60	85	54 / 54	78	- / -	-
		A58-01b	R	C	70 / 60	85	<45 / <45	79	- / -	-

Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.  
 [2] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.  
 [3] R – Residential Premises, O – Others.  
 [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.  
 [5] Daytime and Evening Time / Night-time.  
 [6] Maximum noise level is selected along the NSR building storeys.  
 [7] Bolded values mean exceedance of the relevant noise criteria.  
 [8] Area Sensitivity Rating will be reviewed subject to detailed design and further assessment.  
 [9] N/A - Not Applicable.

**Table 4.6.10** Predicted rail noise impacts – unmitigated Scenario C

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[8]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					Leq (30min) dB(A) <sup>[5]</sup>	Lmax, dB(A)	Leq (30min), dB(A) <sup>[5,7]</sup>	Lmax, dB(A)	Leq (30min), dB(A) <sup>[5]</sup>	Lmax, dB(A)
Existing NSR (Tung Chung East)										
E1	Ying Tung Estate	YTT-01a	R	C	70 / 60	85	56 / 54	78	- / -	-
		YTT-01f	R	C	70 / 60	85	59 / 57	78	- / -	-
		YTT-02a	R	C	70 / 60	85	61 / 59	79	- / -	-
		YTT-02e	R	C	70 / 60	85	62 / 60	80	- / -	-
		YTT-02f	R	C	70 / 60	85	62 / 60	80	- / -	-
		YTT-02m	R	C	70 / 60	85	61 / 59	79	- / -	-
		YTT-02p	R	C	70 / 60	85	58 / 56	79	- / -	-
		YTT-04a	R	C	70 / 60	85	59 / 57	77	- / -	-
		YTT-04f	R	C	70 / 60	85	60 / 58	77	- / -	-
E2	The Visionary	TV-03a	R	C	70 / 60	85	49 / 47	72	- / -	-
E3	Caribbean Coast	CC-01a	R	C	70 / 60	85	50 / 49	74	- / -	-
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[9]</sup>	N/A <sup>[9]</sup>	N/A <sup>[9]</sup>	58 / 58	70	- / -	-
Planned NSR (Tung Chung East)										
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East (Planned NSR) – Phase 1	A99-01b	R	B	65 / 55	85	<45 / <45	<60	- / -	- / -
		A99-01d	R	B	65 / 55	85	<45 / <45	69	- / -	- / -
		A99-02b	R	B	65 / 55	85	55 / 53	74	- / -	- / -
		A99-02f	R	B	65 / 55	85	56 / 53	74	- / -	- / -
		A99-02s	R	B	65 / 55	85	53 / 51	65	- / -	- / -
		A99-02z	R	B	65 / 55	85	<45 / <45	<60	- / -	- / -
		A100-01b	R	C	70 / 60	85	54 / 53	74	- / -	- / -

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[8]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5,7]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)
		A100-01d	R	C	70 / 60	85	55 / 53	74	- / -	- / -
		A100-01k	R	C	70 / 60	85	56 / 54	74	- / -	- / -
		A100-01p	R	C	70 / 60	85	<45 / <45	70	- / -	- / -
		A100-01x	R	C	70 / 60	85	53 / 51	73	- / -	- / -
		A100-02a	R	B	65 / 55	85	55 / 54	72	- / -	- / -
		A100-02h	R	C	70 / 60	85	55 / 54	73	- / -	- / -
		A100-02n	R	C	70 / 60	85	56 / 55	73	- / -	- / -
		A100-02s	R	C	70 / 60	85	54 / 53	74	- / -	- / -
		A100-02t	R	C	70 / 60	85	49 / 47	74	- / -	- / -
		A100-02z	R	C	70 / 60	85	51 / 49	73	- / -	- / -
		A100-03b	R	B	65 / 55	85	<45 / <45	<60	- / -	- / -
		A100-03c	R	B	65 / 55	85	45 / <45	67	- / -	- / -
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East (Planned NSR) – Phase 3	A114-01c	R	B	65 / 55	85	<45 / <45	63	- / -	-
		A114-01e	R	B	65 / 55	85	<45 / <45	63	- / -	-
		A114-01j	R	B	65 / 55	85	<45 / <45	63	- / -	-
		A114-02b	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A114-02e	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A115-03a	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A115-03d	R	B	65 / 55	85	47 / <45	67	- / -	-
		A115-03g	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A116-01a	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A116-01d	R	B	65 / 55	85	47 / <45	67	- / -	-
		A116-01g	R	B	65 / 55	85	46 / <45	67	- / -	-
		A116-02a	R	B	65 / 55	85	<45 / <45	67	- / -	-
		A116-02d	R	B	65 / 55	85	<45 / <45	67	- / -	-
		A117-02b	R	C	70 / 60	85	50 / 48	63	- / -	-
		A117-02e	R	C	70 / 60	85	<45 / <45	65	- / -	-
P4 <sup>[4]</sup>	Tung Chung at Area 113	A113-01k	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A113-01g	R	C	70 / 60	85	61 / 60	76	- / -	-
		A113-02a	R	B	65 / 55	85	53 / 51	72	- / -	-
		A113-03a	R	B	65 / 55	85	45 / <45	62	- / -	-
		A113-04a	R	B	65 / 55	85	46 / <45	66	- / -	-
		A113-06a	R	B	65 / 55	85	52 / 51	73	- / -	-
		A113-07a	R	B	65 / 55	85	52 / 52	73	- / -	-
		A113-09a	R	B	65 / 55	85	52 / 50	70	- / -	-
		A113-10a	R	B	65 / 55	85	49 / 48	72	- / -	-
		A113-10d	R	B	65 / 55	85	53 / 52	72	- / -	-
		A113-11a	R	B	65 / 55	85	58 / <b>56</b>	74	- / 1	-
		A113-12a	R	B	65 / 55	85	56 / 55	74	- / -	-
		A113-12e	R	C	70 / 60	85	60 / 59	76	- / -	-
		A113-12k	R	C	70 / 60	85	45 / <45	65	- / -	-
		A113-13a	R	C	70 / 60	85	57 / 56	73	- / -	-
		A113-13b	R	C	70 / 60	85	61 / 60	74	- / -	-
		A113-13f	R	C	70 / 60	85	60 / 59	74	- / -	-
		A113-22g	R	C	70 / 60	85	58 / 57	73	- / -	-
		A113-22k	R	B	65 / 55	85	<45 / <45	<60	- / -	-
P6 <sup>[7]</sup>	Tung Chung Area 58	A58-01a	R	C	70 / 60	85	54 / 54	79	- / -	-
		A58-01b	R	C	70 / 60	85	45 / <45	79	- / -	-

Notes:

[1] The assessment will only include NSRs which rely on opened windows for ventilation.

[2] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.

[3] R – Residential Premises, O – Others.

- [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.
- [5] Daytime and Evening Time / Night-time.
- [6] Maximum noise level is selected along the NSR building storeys.
- [7] Bolded values mean exceedance of the relevant noise criteria.
- [8] Area Sensitivity Rating will be reviewed subject to detailed design and further assessment.
- [9] N/A - Not Applicable.

**Table 4.6.11** Predicted rail noise impacts – unmitigated Scenario D

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[8]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance			
					Leq (30min) dB(A) <sup>[5]</sup>	Lmax, dB(A)	Leq (30min), dB(A) <sup>[5,7]</sup>	Lmax, dB(A)	Leq (30min), dB(A) <sup>[5]</sup>	Lmax, dB(A)		
Existing NSR (Tung Chung East)												
E1	Ying Tung Estate	YTT-01a	R	C	70 / 60	85	54 / 53	71	- / -	-		
		YTT-01f	R	C	70 / 60	85	58 / 57	71	- / -	-		
		YTT-02a	R	C	70 / 60	85	61 / 60	73	- / -	-		
		YTT-02e	R	C	70 / 60	85	62 / <b>61</b>	73	- / 1	-		
		YTT-02f	R	C	70 / 60	85	62 / 60	73	- / -	-		
		YTT-02m	R	C	70 / 60	85	60 / 59	73	- / -	-		
		YTT-02p	R	C	70 / 60	85	55 / 54	72	- / -	-		
		YTT-04a	R	C	70 / 60	85	60 / 59	72	- / -	-		
		YTT-04f	R	C	70 / 60	85	61 / 59	72	- / -	-		
E2	The Visionary	TV-03a	R	C	70 / 60	85	49 / 48	65	- / -	-		
E3	Caribbean Coast	CC-01a	R	C	70 / 60	85	49 / 49	67	- / -	-		
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[9]</sup>	N/A <sup>[9]</sup>	N/A <sup>[9]</sup>	59 / 59	70	- / -	-		
Planned NSR (Tung Chung East)												
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East (Planned NSR) – Phase 1	A99-01b	R	B	65 / 55	85	<45 / <45	<60	- / -	-		
		A99-01d	R	B	65 / 55	85	<45 / <45	69	- / -	-		
		A99-02b	R	B	65 / 55	85	56 / 54	67	- / -	-		
		A99-02f	R	B	65 / 55	85	56 / 55	67	- / -	-		
		A99-02s	R	B	65 / 55	85	54 / 52	66	- / -	-		
		A99-02z	R	B	65 / 55	85	<45 / <45	<60	- / -	-		
		A100-01b	R	C	70 / 60	85	55 / 53	69	- / -	-		
		A100-01d	R	C	70 / 60	85	56 / 54	69	- / -	-		
		A100-01k	R	C	70 / 60	85	57 / 55	68	- / -	-		
		A100-01p	R	C	70 / 60	85	<45 / <45	63	- / -	-		
		A100-01x	R	C	70 / 60	85	54 / 52	67	- / -	-		
		A100-02a	R	B	65 / 55	85	56 / 55	72	- / -	-		
		A100-02h	R	C	70 / 60	85	55 / 55	73	- / -	-		
		A100-02n	R	C	70 / 60	85	56 / 55	73	- / -	-		
		A100-02s	R	C	70 / 60	85	54 / 53	71	- / -	-		
		A100-02t	R	C	70 / 60	85	48 / 47	67	- / -	-		
		A100-02z	R	C	70 / 60	85	51 / 50	66	- / -	-		
				A100-03b	R	B	65 / 55	85	<45 / <45	<60	- / -	-
				A100-03c	R	B	65 / 55	85	<45 / <45	62	- / -	-
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East (Planned	A114-01c	R	B	65 / 55	85	47/ 45	65	- / -	-		
		A114-01e	R	B	65 / 55	85	<45 / <45	65	- / -	-		
		A114-01j	R	B	65 / 55	85	<45 / <45	64	- / -	-		
		A114-02b	R	B	65 / 55	85	<45 / <45	<60	- / -	-		
		A114-02e	R	B	65 / 55	85	<45 / <45	<60	- / -	-		

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[8]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> dB(A)	L <sub>eq</sub> (30min) dB(A) <sup>[5,7]</sup>	L <sub>max</sub> dB(A)	L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> dB(A)
	NSR) – Phase 3	A115-03a	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A115-03d	R	B	65 / 55	85	<45 / <45	63	– / –	–
		A115-03g	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A116-01a	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A116-01d	R	B	65 / 55	85	<45 / <45	63	– / –	–
		A116-01g	R	B	65 / 55	85	<45 / <45	62	– / –	–
		A116-02a	R	B	65 / 55	85	<45 / <45	62	– / –	–
		A116-02d	R	B	65 / 55	85	<45 / <45	62	– / –	–
		A117-02b	R	B	65 / 55	85	48 / 47	65	– / –	–
		A117-02e	R	B	65 / 55	85	<45 / <45	<60	– / –	–
P1 <sup>[4]</sup>	Residential Premises in Tung Chung East (Planned NSR) – Phase 4	A133a-01b	R	C	70 / 60	85	58 / 57	73	– / –	–
		A133a-01c	R	C	70 / 60	85	58 / 57	73	– / –	–
		A133a-01k	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A133a-01q	R	B	65 / 55	85	56 / 55	72	– / –	–
		A133a-01s	R	B	65 / 55	85	56 / <b>56</b>	73	– / 1	–
		A133a-02a	R	B	65 / 55	85	52 / 51	71	– / –	–
		A133a-02f	R	B	65 / 55	85	54 / 54	72	– / –	–
		A133a-03q	R	B	65 / 55	85	<45 / <45	72	– / –	–
		A133a-04c	R	B	65 / 55	85	47 / 45	65	– / –	–
		A133c-02c	R	B	65 / 55	85	47 / 47	71	– / –	–
P4 <sup>[4]</sup>	Tung Chung at Area 113	A113-01k	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A113-01g	R	C	70 / 60	85	62 / <b>61</b>	76	– / 1	–
		A113-02a	R	B	65 / 55	85	54 / 53	70	– / –	–
		A113-03a	R	B	65 / 55	85	<45 / <45	62	– / –	–
		A113-04a	R	B	65 / 55	85	45 / <45	62	– / –	–
		A113-06a	R	B	65 / 55	85	52 / 51	73	– / –	–
		A113-07a	R	B	65 / 55	85	52 / 52	73	– / –	–
		A113-09a	R	B	65 / 55	85	45 / 46	63	– / –	–
		A113-10a	R	B	65 / 55	85	47 / 47	68	– / –	–
		A113-10d	R	B	65 / 55	85	48 / 47	68	– / –	–
		A113-11a	R	B	65 / 55	85	55 / 55	74	– / –	–
		A113-12a	R	C	70 / 60	85	56 / 56	74	– / –	–
		A113-12e	R	C	70 / 60	85	61 / 60	76	– / –	–
		A113-12k	R	C	70 / 60	85	<45 / <45	<60	– / –	–
		A113-13a	R	C	70 / 60	85	54 / 54	73	– / –	–
		A113-13b	R	C	70 / 60	85	59 / 58	74	– / –	–
		A113-13f	R	C	70 / 60	85	60 / 59	74	– / –	–
		A113-22g	R	C	70 / 60	85	59 / 58	73	– / –	–
		A113-22k	R	B	65 / 55	85	<45 / <45	<60	– / –	–
P6 <sup>[7]</sup>	Tung Chung Area 58	A58-01a	R	C	70 / 60	85	55 / 55	76	– / –	–
		A58-01b	R	C	70 / 60	85	46 / 46	78	– / –	–

## Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.
- [2] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.
- [3] R – Residential Premises, O – Others.
- [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.
- [5] Daytime and Evening Time / Night-time.
- [6] Maximum noise level is selected along the NSR building storeys.
- [7] Bolded values mean exceedance of the relevant noise criteria.
- [8] Area Sensitivity Rating will be reviewed subject to detailed design and further assessment.

[9] N/A - Not Applicable.

**4.6.3.5** Noise contours of  $L_{eq(30min)} / L_{max}$  at 7.2mPD, 15mPD and 30mPD for all the 4 unmitigated scenarios are given in **Appendix 4.6.4** and **Appendix 4.6.5** respectively.

#### **Scenario A**

**4.6.3.6** There are NAPs, such as Ying Tung Estate and Area 99 and Area 100, exceeding noise criteria with range from 1 to 2 dB(A) for residential premises. The main contribution from TCL track near Ying Tung Estate with speed of 135km/h.

#### **Scenario B**

**4.6.3.7** There are NAPs, such as Ying Tung Estate and Area 113, exceeding noise criteria with 1 dB(A) for residential premises. The main contribution for Ying Tung Estate is from TCL track near Ying Tung Estate with speed of 135km/h. The main contribution for Area 113 is from AEL with 135km/h and TCL track at TCE Station with speed of 70km/h.

#### **Scenario C**

**4.6.3.8** There is NAP at Area 113 exceeding noise criteria with 1 dB(A) for residential premises. The main contribution for Area 113 is from AEL with 135km/h and TCL track at TCE Station with speed of 70km/h.

#### **Scenario D**

**4.6.3.9** There are NAPs, such as Ying Tung Estate, Area 113 and Area 133, exceeding noise criteria with 1 dB(A) for residential premises. The main contribution for Ying Tung Estate is from TCL track near Ying Tung Estate with speed of 80km/h. The main contribution for Tung Chung Area 113 and Area 133 is from AEL with 135km/h and TCL track near TCE Station with speed of 50 – 100km/h.

**4.6.3.10** It can be seen that most of the NSRs met the criteria except some NSRs would exceed the night-time noise criterion of 1 – 2 dB(A). Hence, mitigation measures are required.

### **4.6.4 Mitigation of Rail Noise Impact**

**4.6.4.1** As the unmitigated scenarios have exceeded the respective noise criteria, the proposed mitigation measures are shown in **Figure 4.6.1** to **Figure 4.6.4** and summarized in the table below. Indicative section drawings are provided in **Appendix 4.6.6**.

**Table 4.6.12** Proposed rail noise mitigation measures

No.	Location	Type of Mitigation Measures
<b>Scenario A</b> <sup>[1]</sup>		
S1	The existing TCL DT and UT rail track starting from the end of existing barrier after 80m removal	Speed reduction from 135km/h to 50km/h for TCL <sup>[1,2,3]</sup>
<b>Scenario B</b>		
B1	Along the realigned TCL DT	7m vertical with 3.5m cantilevered arm noise barriers <sup>[3]</sup>
B2	Within the TCE station for TCL DT and part of the realigned TCL UT	5m vertical barrier <sup>[3]</sup>
<b>Scenario C</b>		
B1	Along the realigned TCL DT	7m vertical with 3.5m cantilevered arm noise barriers <sup>[3]</sup>
B2	Within the TCE station for TCL DT and part of the realigned TCL UT	5m vertical barrier <sup>[3]</sup>
<b>Scenario D</b>		
B1	Along the realigned TCL DT	7m vertical with 3.5m cantilevered arm noise barriers <sup>[3]</sup>
B2	Within the TCE station for TCL DT and part of the realigned TCL UT	5m vertical barrier <sup>[3]</sup>

Note:

- [1] Due to operation on the existing track and construction works for site clearance & site formation, the noise barrier cannot be built at this scenario.
- [2] 135km/h has been adopted for conservative assessment for day and evening time and the speed reduction will only be required during nighttime period as a noise mitigation measure. In additional, turnouts will be added to the existing tracks for the realignment works, the operating speed for TCL needs to be reduced for engineering and safety considerations of rail operation.
- [3] Mitigation measures proposed are tentative and will be optimized in later stage.

**4.6.4.2** The predicted mitigated rail noise levels at the representative NSRs are presented in the table below. Details of result are provided in **Appendix 4.6.7**. Noise contours of  $L_{eq(30min)} / L_{max}$  at 7.2mPD, 15mPD and 30mPD for all the 4 mitigated scenarios are given in **Appendix 4.6.8** and **Appendix 4.6.9** respectively.

**Table 4.6.13** Predicted rail noise impacts – mitigated Scenario A

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[7]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5,8]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)
Existing NSR (TCNTE East)										
E1	Ying Tung Estate	YTT-01a	R	C	70 / 60	85	57 / 50	77	– / –	–
		YTT-01f	R	C	70 / 60	85	60 / 53	78	– / –	–
		YTT-02a	R	C	70 / 60	85	64 / 55	79	– / –	–
		YTT-02e	R	C	70 / 60	85	65 / 55	80	– / –	–
		YTT-02f	R	C	70 / 60	85	65 / 55	80	– / –	–
		YTT-02m	R	C	70 / 60	85	63 / 55	79	– / –	–
		YTT-02p	R	C	70 / 60	85	58 / 52	79	– / –	–
		YTT-04a	R	C	70 / 60	85	64 / 55	76	– / –	–
		YTT-04f	R	C	70 / 60	85	64 / 55	77	– / –	–
E2	The Visionary	TV-03a	R	C	70 / 60	85	51 / 45	72	– / –	–
E3	Caribbean Coast	CC-01a	R	C	70 / 60	85	51 / 50	74	– / –	–

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[7]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> dB(A)	L <sub>eq</sub> (30min) dB(A) <sup>[5,8]</sup>	L <sub>max</sub> dB(A)	L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> dB(A)
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[9]</sup>	N/A <sup>[9]</sup>	N/A <sup>[9]</sup>	64 / 62	72	- / -	-
Planned NSR (TCNTE East)										
P1	Residential Premises in Tung Chung East (Planned NSR) – Phase 1	A99-01b	R	C	70 / 60	85	54 / 48	72	- / -	-
		A99-01d	R	C	70 / 60	85	55 / 50	72	- / -	-
		A99-02b	R	C	70 / 60	85	62 / 54	74	- / -	-
		A99-02f	R	C	70 / 60	85	62 / 55	74	- / -	-
		A99-02s	R	C	70 / 60	85	59 / 52	73	- / -	-
		A99-02z	R	C	70 / 60	85	<45 / <45	<60	- / -	-
		A100-01b	R	C	70 / 60	85	64 / 58	75	- / -	-
		A100-01d	R	C	70 / 60	85	64 / 57	75	- / -	-
		A100-01k	R	C	70 / 60	85	64 / 57	75	- / -	-
		A100-01p	R	C	70 / 60	85	<45 / <45	70	- / -	-
		A100-01x	R	C	70 / 60	85	57 / 46	73	- / -	-
		A100-02a	R	C	70 / 60	85	60 / 57	72	- / -	-
		A100-02h	R	C	70 / 60	85	60 / 57	73	- / -	-
		A100-02n	R	C	70 / 60	85	65 / 59	75	- / -	- / -
		A100-02s	R	C	70 / 60	85	65 / 59	75	- / -	- / -
		A100-02t	R	C	70 / 60	85	51 / <45	74	- / -	- / -
		A100-02z	R	C	70 / 60	85	60 / 48	74	- / -	- / -
		A100-03b	R	C	70 / 60	85	<45 / <45	66	- / -	- / -
		A100-03c	R	C	70 / 60	85	46 / <45	66	- / -	- / -

Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.  
 [2] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.  
 [3] R – Residential Premises, O – Others.  
 [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.  
 [5] Daytime and Evening Time / Night-time.  
 [6] Maximum noise level is selected along the NSR building storeys.  
 [7] Area Sensitivity Rating will be reviewed subject to detailed design and further assessment.  
 [8] 135km/h has been adopted for conservative assessment for day and evening time and the speed reduction will only be required during nighttime period as a noise mitigation measure. Hence, speed reduction as a noise mitigation measure is not adopted for day and evening time.  
 [9] N/A - Not Applicable.

**Table 4.6.14** Predicted rail noise impacts – mitigated Scenario B

Table 10.1-1: Predicted Noise Impacts Mitigated Scenario D										
No. <sup>[1]</sup> ]	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[9]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					Leq (30min) dB(A) <sup>[5]</sup>	Lmax, dB(A)	Leq (30min), dB(A) <sup>[5,7]</sup>	Lmax, dB(A)	Leq (30min), dB(A) <sup>[5]</sup>	Lmax, dB(A)
Existing NSR (TCNTE East)										
E1	Ying Tung Estate	YTT-01a	R	C	70 / 60	85	55 / 53	75	- / -	-
		YTT-01f	R	C	70 / 60	85	59 / 56	76	- / -	-
		YTT-02a	R	C	70 / 60	85	61 / 58	77	- / -	-
		YTT-02e	R	C	70 / 60	85	62 / 59	79	- / -	-
		YTT-02f	R	C	70 / 60	85	62 / 59	79	- / -	-
		YTT-02m	R	C	70 / 60	85	61 / 58	77	- / -	-
		YTT-02p	R	C	70 / 60	85	57 / 55	76	- / -	-
		YTT-04a	R	C	70 / 60	85	59 / 57	75	- / -	-



No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[9]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					Leq (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)	Leq (30min), dB(A) <sup>[5,7]</sup>	L <sub>max</sub> , dB(A)	Leq (30min), dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)
		YTT-04f	R	C	70 / 60	85	60 / 57	76	- / -	-
E2	The Visionary	TV-03a	R	C	70 / 60	85	46 / <45	67	- / -	-
E3	Caribbean Coast	CC-01a	R	C	70 / 60	85	49 / 48	74	- / -	-
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[10]</sup>	N/A <sup>[10]</sup>	N/A <sup>[10]</sup>	60 / 59	70	- / -	-
Planned NSR (TCNTE East)										
P1	Residential Premises in Tung Chung East (Planned NSR) – Phase 1	A99-01b	R	B	65 / 55	85	<45 / <45	70	- / -	-
		A99-01d	R	B	65 / 55	85	47 / <45	71	- / -	-
		A99-02b	R	B	65 / 55	85	54 / 51	73	- / -	-
		A99-02f	R	B	65 / 55	85	54 / 51	73	- / -	-
		A99-02s	R	B	65 / 55	85	50 / 47	72	- / -	-
		A99-02z	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A100-01b	R	C	70 / 60	85	52 / 50	74	- / -	-
		A100-01d	R	C	70 / 60	85	54 / 52	74	- / -	-
		A100-01k	R	C	70 / 60	85	55 / 53	74	- / -	-
		A100-01p	R	C	70 / 60	85	<45 / <45	66	- / -	-
		A100-01x	R	C	70 / 60	85	49 / 46	71	- / -	-
		A100-02a	R	B	65 / 55	85	55 / 54	72	- / -	-
		A100-02h	R	C	70 / 60	85	54 / 53	73	- / -	-
		A100-02n	R	C	70 / 60	85	55 / 54	73	- / -	-
		A100-02s	R	C	70 / 60	85	52 / 51	71	- / -	-
		A100-02t	R	C	70 / 60	85	<45 / <45	67	- / -	-
		A100-02z	R	C	70 / 60	85	46 / <45	69	- / -	-
P4 <sup>[4]</sup>	Tung Chung at Area 113	A100-03b	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A100-03c	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A113-01k	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A113-01g	R	C	70 / 60	85	61 / 59	77	- / -	-
		A113-02a	R	B	65 / 55	85	55 / 52	76	- / -	-
		A113-03a	R	B	65 / 55	85	46 / <45	62	- / -	-
		A113-04a	R	B	65 / 55	85	46 / <45	62	- / -	-
		A113-06a	R	B	65 / 55	85	53 / 51	73	- / -	-
		A113-07a	R	B	65 / 55	85	53 / 52	73	- / -	-
		A113-09a	R	B	65 / 55	85	49 / 48	69	- / -	-
		A113-10a	R	B	65 / 55	85	49 / 47	70	- / -	-
		A113-10d	R	B	65 / 55	85	53 / 51	72	- / -	-
		A113-11a	R	B	65 / 55	85	57 / 55	75	- / -	-
		A113-12a	R	B	65 / 55	85	56 / 55	75	- / -	-
		A113-12e	R	C	70 / 60	85	60 / 59	76	- / -	-
		A113-12k	R	C	70 / 60	85	<45 / <45	65	- / -	-
		A113-13a	R	C	70 / 60	85	57 / 55	73	- / -	-
P6	Tung Chung Area 58	A113-13b	R	C	70 / 60	85	60 / 59	74	- / -	-
		A113-13f	R	C	70 / 60	85	60 / 59	74	- / -	-
		A113-22g	R	C	70 / 60	85	59 / 57	75	- / -	-
		A113-22k	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A58-01a	R	C	70 / 60	85	54 / 54	78	- / -	-
		A58-01b	R	C	70 / 60	85	<45 / <45	79	- / -	-

Notes:

[1] The assessment will only include NSRs which rely on opened windows for ventilation.

- [2] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.
- [3] R – Residential Premises, O – Others.
- [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.
- [5] Daytime and Evening Time / Night-time.
- [6] Maximum noise level is selected along the NSR building storeys.
- [7] Bolded values mean exceedance of the relevant noise criteria.
- [8] Fixed window / single aspect building is adopted in Area 58. The mitigation measures are referred to TPB General Papers Proposed Amendments to the Approved Tung Chung Town Centre Area Outline Zoning Plan No. S/I-TCTC/22 RNTPC Paper No. 1/20.
- [9] Area Sensitivity Rating will be reviewed subject to detailed design and further assessment.
- [10] N/A - Not Applicable.

**Table 4.6.15** Predicted rail noise impacts – mitigated Scenario C

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[9]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5,7]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)
Existing NSR (TCNTE East)										
E1	Ying Tung Estate	YTT-01a	R	C	70 / 60	85	54 / 52	72	- / -	-
		YTT-01f	R	C	70 / 60	85	58 / 56	75	- / -	-
		YTT-02a	R	C	70 / 60	85	56 / 55	73	- / -	-
		YTT-02e	R	C	70 / 60	85	59 / 57	79	- / -	-
		YTT-02f	R	C	70 / 60	85	60 / 58	80	- / -	-
		YTT-02m	R	C	70 / 60	85	60 / 58	75	- / -	-
		YTT-02p	R	C	70 / 60	85	57 / 55	74	- / -	-
		YTT-04a	R	C	70 / 60	85	53 / 52	72	- / -	-
		YTT-04f	R	C	70 / 60	85	54 / 53	72	- / -	-
E2	The Visionary	TV-03a	R	C	70 / 60	85	45 / <45	65	- / -	-
E3	Caribbean Coast	CC-01a	R	C	70 / 60	85	50 / 49	74	- / -	-
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[10]</sup>	N/A <sup>[10]</sup>	N/A <sup>[10]</sup>	58 / 58	70	- / -	-
Planned NSR (TCNTE East)										
P1	Residential Premises in Tung Chung East (Planned NSR) – Phase 1	A99-01b	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A99-01d	R	B	65 / 55	85	<45 / <45	69	- / -	-
		A99-02b	R	B	65 / 55	85	46 / <45	61	- / -	-
		A99-02f	R	B	65 / 55	85	46 / <45	62	- / -	-
		A99-02s	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A99-02z	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A100-01b	R	C	70 / 60	85	48 / 47	69	- / -	-
		A100-01d	R	C	70 / 60	85	49 / 48	69	- / -	-
		A100-01k	R	C	70 / 60	85	49 / 47	67	- / -	-
		A100-01p	R	C	70 / 60	85	<45 / <45	63	- / -	-
		A100-01x	R	C	70 / 60	85	<45 / <45	61	- / -	-
		A100-02a	R	B	65 / 55	85	53 / 52	72	- / -	-
		A100-02h	R	C	70 / 60	85	52 / 52	73	- / -	-
		A100-02n	R	C	70 / 60	85	53 / 53	72	- / -	-
		A100-02s	R	C	70 / 60	85	51 / 51	71	- / -	-
		A100-02t	R	C	70 / 60	85	<45 / <45	66	- / -	-
		A100-02z	R	C	70 / 60	85	<45 / <45	61	- / -	-
				A100-03b	R	B	65 / 55	85	<45 / <45	<60

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[9]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> dB(A)	L <sub>eq</sub> (30min) dB(A) <sup>[5,7]</sup>	L <sub>max</sub> dB(A)	L <sub>eq</sub> (30min) dB(A) <sup>[5]</sup>	L <sub>max</sub> dB(A)
		A100-03c	R	B	65 / 55	85	<45 / <45	<60	– / –	–
P1	Residential Premises in Tung Chung East (Planned NSR) – Phase 3	A114-01c	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A114-01e	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A114-01j	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A114-02b	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A114-02e	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A115-03a	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A115-03d	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A115-03g	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A116-01a	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A116-01d	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A116-01g	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A116-02a	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A116-02d	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A117-02b	R	C	70 / 60	85	<45 / <45	62	– / –	–
		A117-02e	R	C	70 / 60	85	<45 / <45	<60	– / –	–
P4 <sup>[4]</sup>	Tung Chung at Area 113	A113-01k	R	B	65 / 55	85	<45 / <45	<60	– / –	–
		A113-01g	R	C	70 / 60	85	57 / 57	76	– / –	–
		A113-02a	R	B	65 / 55	85	49 / 48	71	– / –	–
		A113-03a	R	B	65 / 55	85	45 / <45	62	– / –	–
		A113-04a	R	B	65 / 55	85	46 / <45	66	– / –	–
		A113-06a	R	B	65 / 55	85	51 / 50	73	– / –	–
		A113-07a	R	B	65 / 55	85	51 / 51	73	– / –	–
		A113-09a	R	B	65 / 55	85	51 / 49	69	– / –	–
		A113-10a	R	B	65 / 55	85	49 / 47	70	– / –	–
		A113-10d	R	B	65 / 55	85	53 / 52	72	– / –	–
		A113-11a	R	B	65 / 55	85	56 / 55	74	– / –	–
		A113-12a	R	B	65 / 55	85	55 / 54	74	– / –	–
		A113-12e	R	C	70 / 60	85	58 / 57	76	– / –	–
		A113-12k	R	C	70 / 60	85	45 / <45	65	– / –	–
		A113-13a	R	C	70 / 60	85	56 / 55	73	– / –	–
		A113-13b	R	C	70 / 60	85	59 / 58	73	– / –	–
		A113-13f	R	C	70 / 60	85	58 / 57	73	– / –	–
		A113-22g	R	C	70 / 60	85	55 / 55	73	– / –	–
		A113-22k	R	B	65 / 55	85	<45 / <45	<60	– / –	–
P6	Tung Chung Area 58	A58-01a	R	C	70 / 60	85	54 / 54	79	– / –	–
		A58-01b	R	C	70 / 60	85	45 / <45	79	– / –	–

## Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.
- [2] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.
- [3] R – Residential Premises, O – Others.
- [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.
- [5] Daytime and Evening Time / Night-time.
- [6] Maximum noise level is selected along the NSR building storeys.
- [7] Bolded values mean exceedance of the relevant noise criteria.
- [8] Fixed window / single aspect building is adopted in Area 58. The mitigation measures are referred to TPB General Papers Proposed Amendments to the Approved Tung Chung Town Centre Area Outline Zoning Plan No. S/I-TCTC/22 RNTPC Paper No. 1/20.
- [9] Area Sensitivity Rating will be reviewed subject to detailed design and further assessment.
- [10] N/A - Not Applicable.

**Table 4.6.16** Predicted rail noise impacts – mitigated Scenario D

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[9]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					Leq (30min) dB(A) <sup>[5]</sup>	Lmax, dB(A)	Leq (30min), dB(A) <sup>[5,7]</sup>	Lmax, dB(A)	Leq (30min), dB(A) <sup>[5]</sup>	Lmax, dB(A)
Existing NSR (TCNTE East)										
E1	Ying Tung Estate	YTT-01a	R	C	70 / 60	85	52 / 51	66	- / -	-
		YTT-01f	R	C	70 / 60	85	56 / 55	71	- / -	-
		YTT-02a	R	C	70 / 60	85	57 / 56	73	- / -	-
		YTT-02e	R	C	70 / 60	85	59 / 58	73	- / -	-
		YTT-02f	R	C	70 / 60	85	59 / 58	73	- / -	-
		YTT-02m	R	C	70 / 60	85	58 / 57	72	- / -	-
		YTT-02p	R	C	70 / 60	85	54 / 53	68	- / -	-
		YTT-04a	R	C	70 / 60	85	53 / 53	72	- / -	-
		YTT-04f	R	C	70 / 60	85	55 / 54	72	- / -	-
E2	The Visionary	TV-03a	R	C	70 / 60	85	<45 / <45	<60	- / -	-
E3	Caribbean Coast	CC-01a	R	C	70 / 60	85	49 / 48	67	- / -	-
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[10]</sup>	N/A <sup>[10]</sup>	N/A <sup>[10]</sup>	59 / 59	70	- / -	-
Planned NSR (TCNTE East)										
P1	Residential Premises in Tung Chung East (Planned NSR) – Phase 1	A99-01b	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A99-01d	R	B	65 / 55	85	<45 / <45	69	- / -	-
		A99-02b	R	B	65 / 55	85	46 / <45	60	- / -	-
		A99-02f	R	B	65 / 55	85	46 / 45	60	- / -	-
		A99-02s	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A99-02z	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A100-01b	R	C	70 / 60	85	49 / 48	69	- / -	-
		A100-01d	R	C	70 / 60	85	49 / 48	69	- / -	-
		A100-01k	R	C	70 / 60	85	49 / 48	67	- / -	-
		A100-01p	R	C	70 / 60	85	<45 / <45	<60	- / -	-
		A100-01x	R	C	70 / 60	85	<45 / <45	<60	- / -	-
		A100-02a	R	B	65 / 55	85	53 / 53	72	- / -	-
		A100-02h	R	C	70 / 60	85	53 / 53	73	- / -	-
		A100-02n	R	C	70 / 60	85	54 / 54	72	- / -	-
		A100-02s	R	C	70 / 60	85	51 / 51	71	- / -	-
		A100-02t	R	C	70 / 60	85	<45 / <45	<60	- / -	-
		A100-02z	R	C	70 / 60	85	<45 / <45	60	- / -	-
		A100-03b	R	B	65 / 55	85	<45 / <45	<60	- / -	-
A100-03c	R	B	65 / 55	85	<45 / <45	<60	- / -	-		
P1	Residential Premises in Tung Chung East (Planned NSR) – Phase 3	A114-01c	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A114-01e	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A114-01j	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A114-02b	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A114-02e	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A115-03a	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A115-03d	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A115-03g	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A116-01a	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A116-01d	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A116-01g	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A116-02a	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A116-02d	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A117-02b	R	B	65 / 55	85	<45 / <45	<60	- / -	-

No. <sup>[1]</sup>	NSR	NAP <sup>[2,4]</sup>	Uses <sup>[3]</sup>	Area Sensitivity Rating <sup>[9]</sup>	Criterion		Predicted Noise Levels <sup>[6]</sup>		Exceedance	
					L <sub>eq</sub> (30min), dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5,7]</sup>	L <sub>max</sub> , dB(A)	L <sub>eq</sub> (30min), dB(A) <sup>[5]</sup>	L <sub>max</sub> , dB(A)
		A117-02e	R	B	65 / 55	85	<45 / <45	67	- / -	-
P1	Residential Premises in Tung Chung East (Planned NSR) – Phase 4	A133a-01b	R	C	70 / 60	85	55 / 55	73	- / -	-
		A133a-01c	R	C	70 / 60	85	55 / 55	73	- / -	-
		A133a-01k	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A133a-01q	R	B	65 / 55	85	53 / 53	72	- / -	-
		A133a-01s	R	B	65 / 55	85	53 / 53	73	- / -	-
		A133a-02a	R	B	65 / 55	85	50 / 50	71	- / -	-
		A133a-02f	R	B	65 / 55	85	52 / 51	72	- / -	-
		A133a-03q	R	B	65 / 55	85	<45 / <45	69	- / -	-
		A133a-04c	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A133c-02c	R	B	65 / 55	85	47 / 46	70	- / -	-
P4 <sup>[4]</sup>	Tung Chung at Area 113	A113-01k	R	B	65 / 55	85	<45 / <45	<60	- / -	-
		A113-01g	R	C	70 / 60	85	58 / 58	76	- / -	-
		A113-02a	R	B	65 / 55	85	49 / 48	68	- / -	-
		A113-03a	R	B	65 / 55	85	<45 / <45	62	- / -	-
		A113-04a	R	B	65 / 55	85	45 / <45	62	- / -	-
		A113-06a	R	B	65 / 55	85	51 / 51	73	- / -	-
		A113-07a	R	B	65 / 55	85	52 / 52	73	- / -	-
		A113-09a	R	B	65 / 55	85	45 / <45	63	- / -	-
		A113-10a	R	B	65 / 55	85	47 / 46	66	- / -	-
		A113-10d	R	B	65 / 55	85	47 / 46	68	- / -	-
		A113-11a	R	B	65 / 55	85	54 / 54	74	- / -	-
		A113-12a	R	B	65 / 55	85	55 / 55	74	- / -	-
		A113-12e	R	C	70 / 60	85	59 / 59	76	- / -	-
		A113-12k	R	C	70 / 60	85	<45 / <45	<60	- / -	-
		A113-13a	R	C	70 / 60	85	53 / 53	73	- / -	-
		A113-13b	R	C	70 / 60	85	57 / 56	73	- / -	-
		A113-13f	R	C	70 / 60	85	58 / 57	73	- / -	-
		A113-22g	R	C	70 / 60	85	56 / 56	73	- / -	-
		A113-22k	R	B	65 / 55	85	<45 / <45	<60	- / -	-
P6	Tung Chung Area 58	A58-01a	R	C	70 / 60	85	55 / 55	76	- / -	-
		A58-01b	R	C	70 / 60	85	46 / 46	78	- / -	-

## Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.
- [2] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.
- [3] R – Residential Premises, O – Others.
- [4] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.
- [5] Daytime and Evening Time / Night-time.
- [6] Maximum noise level is selected along the NSR building storeys.
- [7] Bolded values mean exceedance of the relevant noise criteria.
- [8] Fixed window / single aspect building is adopted in Area 58. The mitigation measures are referred to TPB General Papers Proposed Amendments to the Approved Tung Chung Town Centre Area Outline Zoning Plan No. S/I-TCTC/22 RNTPC Paper No. 1/20.

[9] Area Sensitivity Rating will be reviewed subject to detailed design and further assessment.

[10] N/A - Not Applicable.

**4.6.4.3** For the county park, given the transient nature of visitor using hiking trails and mitigation measures are recommended to reduce the noise emission, adverse noise impact is not anticipated.

**4.6.4.4** For the receiver at the residential development, with the mitigation measures proposed, the total number of dwellings, classrooms and other noise sensitive receivers that will be exposed to noise impact exceeding the criteria set in Annex 5 in the TM is nil.

## **4.6.5 Evaluation of Residual Rail Noise Impact**

**4.6.5.1** With the proposed mitigation measures, all the representative NSRs will be within the respective noise criteria. The number of dwellings, classrooms and other sensitive receivers that will be exposed to adverse residual construction noise impact exceeding the criteria set in Annex 5 in the TM is nil

## **4.7 Groundborne Rail Noise Impact Assessment**

### **4.7.1 Rail Noise Impact Assessment Methodology**

**4.7.1.1** The current prediction methodology recommended by the U.S. Department of Transportation “High-Speed Ground Transportation Noise and Vibration Impact Assessment”, 2012 / “Transit Noise and Vibration Impact Assessment Manual”, 2018, has been adopted in the noise assessment study. The manual is intended to provide guidance in preparing and reviewing the noise and vibrations sections of environmental submittals to the US Government.

The basic equation describing the model, in decibels, is

$$L = FDL + LSR + TIL + TCF + BCF + BVR + CTN + TOC + SAF,$$

Where the prediction components are:

- L : Ground borne vibration or noise level within the structure, re: 1μ-in/sec or 20μ-Pascal
- FDL : Force density level for the train stock in TCL, re: 1 lb/in<sup>0.5</sup>
- LSR : Unit force incoherent line source response for the ground, re: 1μ-in/sec
- TIL : Trackform attenuation or insertion loss, relative level
- TCF : Vibration coupling between the tunnel and the ground for soil based tunnels, relative level

- BCF : Vibration coupling loss factor between the soil and the foundation, relative level
- BVR : Building vibration reduction or amplification within a structure from the foundation to the occupied areas, relative level
- CTN : Conversion from floor and wall vibration to noise, 1  $\mu$ -in/sec to 20  $\mu$ -Pascal
- TOC : Turnout and Crossover Factor
- SAF : Safety margin to account for wheel/rail condition and projection uncertainties

**4.7.1.2** Predictions are based on assuming the closest distance along the alignment to the building foundation of the receiver.

#### **Force Density Level (FDL)**

**4.7.1.3** The vibration source strength level (Force Density Level) for train operations between TUC and TCW Station has been determined from in-situ measurement for trains of existing TCL. The FDL measurement was conducted at Siu Ho Wan Depot. For the test train vibration measurement, accelerometers were placed at the rail and on ground surface at various setbacks from the alignment. FDL was determined by subtracting train induced vibration by LSR in logarithmic scale according to U.S. Department of Transportation “High-Speed Ground Transportation Noise and Vibration Impact Assessment”, 2012 / “Transit Noise and Vibration Impact Assessment Manual”, 2018. Measured FDL is shown in **Appendix 4.7.2.**

#### **Line Source Response (LSR)**

**4.7.1.4** The basic quantity required for the determination of LSR is the vibration response caused by a unit point source impact, which is defined as the PSR. Given the PSR is along the alignment over the length of the train, the LSR follows directly by incoherent integration of the PSR over the length of the train. The LSR has been determined from in-situ measurement along the proposed underground alignment. The LSR measurements are conducted at Tung Chung Road North and Yat Tung Estate. Force excitation by hammer impact was performed at the bottom of the borehole having similar depth as the track level. The impact hammer was mounted at the top of the connecting pipe. The bottom side of the connecting pipe was installed with an impact head for the transmission of the hammer impact to the bottom of the borehole. Instantaneous impact forces transmitted were measured by the load cell of the impact hammer. Measured LSR is shown in **Appendix 4.5.1.**



## Trackform Insertion Loss (TIL)

**4.7.1.5** The TIL for various trackform types of existing MTR alignments had been presented in previous EIA reports, which includes SCL – Tai Wai to Hung Hom Section (AEIAR-167/2012) and West Island Line (AEIAR-126/2008). Wherever appropriate, these TIL may be adopted in the present study include the following and are shown in **Appendix 4.7.1**:

Type 0 : Direct fixation

Type 1 : BCT trackform with Alternative 1 baseplate (BCT)

Type 2 : Floating Slab Trackform (FST)

## Tunnel Coupling Factor (TCF)

**4.7.1.6** With reference to the “High-Speed Ground Transportation Noise and Vibration Impact Assessment” 2012 / “Transit Noise and Vibration Impact Assessment Manual” 2018, a 3dB and 5dB reduction in groundborne noise level with reference to bored tunnel in soil would be assumed for cut-and-cover tunnels and station structures respectively.

## Building Coupling Factor (BCF)

**4.7.1.7** This factor is recommended by the “High-Speed Ground Transportation Noise and Vibration Impact Assessment” / “Transit Noise and Vibration Impact Assessment Manual”. The BCF can refer to **Table 4.5.1** to **Table 4.5.3**.

## Building Vibration Response (BVR)

**4.7.1.8** The BVR is introduced to account for the floor-to-floor vibration attenuation. The corrections for resonance amplification due to floor, wall and ceiling spans for all buildings are presented in the table below as “BVR resonance”. A -2dB attenuation per floor is adopted for the first 5 floors as “BVR – UP”. This is in line with the “High-Speed Ground Transportation Noise and Vibration Impact Assessment” 2012 / “Transit Noise and Vibration Impact Assessment Manual” 2018.

**Table 4.7.1** Building amplification values to be adopted

Frequency	One-third Octave Band Frequencies, Hz											
	3.15	4	5	6.3	8	10	12.5	16	20	25	32	40
Loss coupling factor, dB	0.0	0.0	0.0	1.0	2.0	3.0	4.0	5.0	6.0	6.0	6.0	6.0
Frequency	50	63	80	100	125	160	200	250	315	400	500	
Loss coupling factor, dB	5.8	5.4	5.2	5.0	4.8	4.0	3.0	2.0	1.0	0.7	0.7	

### Conversion To Noise (CTN)

- 4.7.1.9** A +2dB correction is assumed for conversion of vibration (re.:  $10^{-6}$ in/sec) to noise (re.: 20  $\mu$ Pa). This is in line with previously approved EIA report (e.g. Shatin to Central Link - Hung Hom to Admiralty Section (AEIAR-166/2012), Shatin to Central Link - Mong Kok East to Hung Hom Section (AEIAR-165/2012), Shatin to Central Link - Stabling Sidings at Hung Hom Freight Yard(AEIAR-164/2012)).

### Turnout and Crossover Factor (TOC)

- 4.7.1.10** At points and crossings, where the wheel transitions from one rail to another, the sudden loading/unloading of the leading and trailing rails results in increased broadband vibration levels over that of plain line continuous rail. In addition, it is not possible to machine grind the rails through either the points or crossings, so surface deterioration compared with that of the placed track, is often evident.
- 4.7.1.11** The increase in vibration level at turnouts and crossings is not easily characterized. For standard level turnouts and crossings receiving average maintenance, the “High-Speed Ground Transportation Noise and Vibration Impact Assessment” 2012 / “Transit Noise and Vibration Impact Assessment Manual”, 2018 recommends a correction of 10dB. For modern inclined turnouts in good condition, where impact loads are lessened, it was found through measurement that a correction of 5dB is often more appropriate.

### Safety Factor

- 4.7.1.12** An attempt has been made to estimate the other components of the prediction as accurately as possible, neither underestimating nor overestimating their effect. According the approved EIA for Shatin to Central Link - Tai Wai to Hung Hum Station (AEIAR-167/2012), the safety factor is determined as 5 dB for NSRs where site-specific LSR data is available and the use of measured FDL. This SAF has been reviewed when the measurement data for FDL and LSR is obtained and analysed.

## 4.7.2 Identification of Rail Noise Impact

### Identification of Assessment Area and Noise Sensitive Receivers

- 4.7.2.1** The assessment area for groundborne rail noise includes area within 300m from the boundary of the Project and the works of the Project. Representative NSRs locations that would be affected by the rail operation are summarised in **Table 4.3.5** and the representative NAPs are shown in **Figure 4.3.5**.

## Inventory of Noise Sources

**4.7.2.2** FDL measurement was conducted at Siu Ho Wan Depot and the measurement results are adopted for the calculations. The FDL measurement result is shown in **Appendix 4.7.2**.

## 4.7.3 Prediction and Evaluation of Rail Noise Impact

### Scenarios

**4.7.3.1** The rail noise impact assessment including the unmitigated scenario and mitigated scenario have been conducted with respect to the criteria set in Annex 5 of the TM. The interim/ worst operation modes representing the maximum noise emission have been assessed. Day and night scenarios have been conducted as shown in **Table 4.7.2**.

**4.7.3.2** Details of railway operation for the tunnel section are summarized in **Table 4.7.2**. As the train frequency of TCL is highest in Scenario D stated in **Section 4.6.3.3**, the operation parameters in Scenario D are adopted, except operating speed as the maximum speed for underground section is planned as 80km/hr.

**Table 4.7.2** Operation parameters for the tunnel section

Operation Parameters	Tung Chung Line Extension
Maximum Train Length, m	184.2
No. of car	8
Frequency (Train per Hour per direction) (Daytime / Night-time)	20 / 14
Maximum operating speed, km/h	80

### Prediction of Noise Impact

**4.7.3.3** The predicted groundborne rail noise levels are given in **Appendix 4.7.3** and are summarized in the **Table 4.7.3**. The geological profile is given in **Appendix 4.7.4**.

**Table 4.7.3** Predicted groundborne rail noise impact at NSRs

No.	NSR <sup>[1]</sup>	NAP	Uses <sup>[2]</sup>	Area Sensitivity Rating	Leq (30min), dB(A)		
					Criterion <sup>[3]</sup>	Unmitigated Noise Level <sup>[3]</sup>	Exceedance
Existing NSRs(TCNTE East)							
E8a	Tung Chung Crescent	TCC-02a	R	B	55 / 45	<30 / <30	N
Existing NSR (TCNTE West)							
E10	Ma Wan Chung	MWC-03a	V	B	55/ 45	37 / 35	N
E11a	Yat Tung Estate	YTE-14a	R	B	55/ 45	32 / 30	N
Planned NSRs (Tung Chung West)							
P2	Residential Premises in Tung Chung West (Planned NSRs)	A33-05a	R	B	55/ 45	38 / 36	N

Notes:

- [1] NAP- Noise Assessment Point. Only the first layer of NSRs has been selected for assessment.
- [2] R – Residential Premises, V– Village type development.
- [3] Daytime and Evening Time / Night-time.

**4.7.3.4** As shown in **Table 4.7.3**, groundborne rail noise levels at representative NSRs would comply with the noise criteria. Adverse ground-borne rail noise impact due to underground railway operation would not be envisaged. The number of dwellings, classrooms and other sensitive receivers that will be exposed to noise impact exceeding the criteria set in Annex 5 in the TM is nil.

#### **4.7.4 Mitigation of Rail Noise Impact**

**4.7.4.1** As the groundborne rail noise levels comply with relevant criteria, mitigation measures are not required. However, contingency measures which TIL are shown in **Appendix 4.7.1** would be adopted subject to further review:

- Baseplated Concrete Tie (BCT) Trackform; and
- Floating Slab Track (FST).

#### **4.7.5 Evaluation of Residual Rail Noise Impact**

**4.7.5.1** Groundborne rail noise impact arising from the underground railway operation will be within respective criteria. Adverse residual noise impacts are thus not anticipated. The number of dwellings, classrooms and other sensitive elements that will be exposed to adverse residual noise impact exceeding the criteria set in Annex 5 in the TM is nil.

### **4.8 Fixed Noise Sources Impact Assessment**

#### **4.8.1 Fixed Noise Sources Impact Assessment Methodology**

**4.8.1.1** Fixed noise sources impact assessment will be conducted based on the following procedures:

- Determine the assessment area;
- Identify and locate representative NSRs that may be affected by the noise sources;
- Determine the noise criteria for both daytime and nighttime;
- Use standard acoustic principle for attenuation and directivity;
- Adopt correction of tonality, impulsiveness and intermittency as stipulated in TM-places;

- Calculate the noise impacts using assumed plant inventories and utilisation schedule, if available; and
- Cumulative impacts will be included.

**4.8.1.2** The assessment has been based on the best available information and will be updated during the preparation of EIA process. However, given the nature of the study, some of the detailed information may not be available by the time of EIA preparation. In such case, maximum sound power levels (SWLs) of the fixed noise sources has been predicted.

## **4.8.2 Identification of Fixed Noise Sources Impact**

### **Identification of Assessment Area and Noise Sensitive Receivers**

**4.8.2.1** The assessment area for fixed noise source includes area within 300m from the boundary of the Project and the works of the Project. Representative NSRs locations that would be affected by the fixed noise source are summarised in **Table 4.3.6** and the representative NAPs are shown in **Figure 4.3.6**.

### **Inventory of Noise Sources**

**4.8.2.2** Key existing and planned noise sources have been discussed in **Section 4.2.3** and a summary of the fixed noise source is shown in **Figure 4.2.2**. The inventory of noise source (TUC TVF Louvres, TCE Station / TCW Station and its vent shaft structures / EAP / EEP) has been confirmed with the Project Proponent's railway operation professionals:

#### Existing Fixed Noise Sources (by others)

- AEL, TCL and existing TUC;
- Ngong Ping Skyrail Tung Chung Terminal;
- North Lantau Hospital;
- Town Chung Town Electric Substation;
- Tung Chung Fire Station;
- Sewage Pumping Station; and
- PTI and/ or Bus Depot.

#### Planned Fixed Noise Sources (The Project)

- TUC TVF Louvres, TCE Station / TCW Station and its vent shaft structures / EAP / EEP

#### Planned Fixed Noise Sources (By others)

- Salt Water Pumping Station / Sewage Pumping Station / Pumping;
- Fire Station;
- Electric Substation;
- PTIs;
- Chung Mun Road Sewage Pumping Station;
- Sports Ground;
- Planned Third Runway of HKIA; and
- District Cooling System.

### 4.8.3 Prediction and Evaluation of Fixed Noise Sources Impact

#### Scenarios

**4.8.3.1** The fixed noise source impact assessment of worst operation mode representing the maximum noise emission has been conducted with respect to the criteria set in Annex 5 of the TM. The worst operation mode with 100% operation has been predicted based on backward calculation of separation distance. Hence, the maximum Sound Power Levels of the ventilation louvres for EAP / EEP, TUC TVF Louvres, TCE and TCW Stations have been predicted regardless of the percentage usage. Validity of the operation modes have been confirmed with the Project Proponent's railway operation professionals.

**4.8.3.2** Cumulative impacts from operation of 3RS and the planned noise source from the TCNTE have been included.

#### Prediction of Noise Impact

**4.8.3.3** The predicted maximum allowable noise level for each fixed noise source in  $L_{eq}$  (30min) is shown in **Table 4.8.1** below and the calculation and locations of fixed noise sources are given in **Appendix 4.8.1**.

**Table 4.8.1** Predicted maximum allowable noise level

Reference Location	Source ID	Description	Maximum Allowable SWL, dB(A)	
			Daytime and Evening Time	Night-time
PNS01c	TCE-01	TCE Station Louvre	97	87
PNS01c	TCE-02	TCE Station Louvre	92	82
PNS01c	TCE-03	TCE Station Louvre	92	82
PNS01c	TCE-04	TCE Station Louvre	92	82
PNS01c	TCE-05	TCE Station Louvre	93	83
PNS01c	TCE-06	TCE Station Louvre	92	82
PNS01c	TCE-07	TCE Station Louvre	92	82

Reference Location	Source ID	Description	Maximum Allowable SWL, dB(A)	
			Daytime and Evening Time	Night-time
PNS01c	TCE-08	TCE Station Louvre	92	82
PNS01c	TCE-09	TCE Station Louvre	92	82
PNS01c	TCE-10	TCE Station Louvre	92	82
PNS01c	TCE-11	TCE Station Louvre	92	82
PNS01c	TCE-12	TCE Station Louvre	99	89
PNS01c	TCE-13	TCE Station Louvre	99	89
PNS01c	TCE-14	TCE Station Louvre	93	83
PNS01c	TCE-15	TCE Station Louvre	93	83
PNS01c	TCE-16	TCE Station Louvre	92	82
PNS01c	TCE-17	TCE Station Louvre	99	89
PNS01c	TCE-18	TCE Station Louvre	99	89
PNS01c	TCE-19	TCE Station Louvre	99	89
PNS01c	TCE-20	TCE Station Louvre	98	88
PNS01c	TCE-21	TCE Station Louvre	93	83
PNS01c	TCE-22	TCE Station Louvre	93	83
PNS01c	TCE-23	TCE Station Louvre	93	83
PNS01e	EAP/EEP-01	Ventilation Shaft	95	85
PNS01d	TCW-01	TCW Station North Vent Shaft Louvre	80	70
PNS01d	TCW-02	TCW Station North Vent Shaft Louvre	82	72
PNS01d	TCW-03	TCW Station North Vent Shaft Louvre	85	75
PNS01d	TCW-04	TCW Station North Vent Shaft Louvre	82	72
PNS01d	TCW-05	TCW Station North Vent Shaft Louvre	83	73
PNS01d	TCW-06	TCW Station North Vent Shaft Louvre	91	81
PNS01d	TCW-07	TCW Station North Vent Shaft Louvre	88	78
PNS01d	TCW-08	TCW Station Entrance A Louvre	91	81
PNS01d	TCW-09	TCW Station South Vent Shaft Louvre	84	74
PNS01d	TCW-10	TCW Station South Vent Shaft Louvre	84	74
PNS01d	TCW-11	TCW Station South Vent Shaft Louvre	88	78
PNS01d	TCW-12	TCW Station South Vent Shaft Louvre	83	73
PNS01d	TCW-13	TCW Station South Vent Shaft Louvre	80	70
PNS01f	TUC-01	TUC TVF Louvre	92	82
PNS01f	TUC-02	TUC TVF Louvre	92	82

**4.8.3.4** The predicted noise levels in  $L_{eq}$  (30min) dB(A) at the representative assessment points have been presented on tables and plans of suitable scale. The predicted noise levels from fixed noise sources are given in **Appendix 4.8.1** and are summarized in the **Table 4.8.2**.



**Table 4.8.2** Predicted fixed noise sources impact at NSRs

No. <sup>[1]</sup>	NSR <sup>[2]</sup>	NAP <sup>[3]</sup>	Uses <sup>[4]</sup>	Area Sensitivity Rating	Leq (30min), dB(A) - Cumulative		
					Criteria <sup>[7]</sup>	Predicted noise level <sup>[7]</sup>	Exceedance
Existing NSRs (Tung Chung East)							
E8	Tung Chung Crescent	TCC-03a	R	B	65 / 55	60 / 53	N
		TCC-09a	R	B	65 / 55	60 / 53	N
E21	Lantau North (Extension) Country Park	LNCP-01	O	N/A <sup>[6]</sup>	N/A <sup>[6]</sup>	57 / 49	N/A <sup>[6]</sup>
Existing NSRs (Tung Chung West)							
E10	Ma Wan Chung	MWC-02a	R	B	65 / 55	50 / 50	N
E11a	Yat Tung Estate	YTE-01a	R	B	65 / 55	60 / 53	N
		YTE-03a	R	B	65 / 55	54 / 51	N
		YTE-15a	R	B	65 / 55	58 / 52	N
E12	Mun Tung Estate	MTE-01b	R	B	65 / 55	52 / 51	N
E15	Sheung Ling Pei	SLP-01a	V	B	65 / 55	50 / 50	N
E16	Ha Ling Pei	HLP-03a	V	B	65 / 55	51 / 50	N
E17	Wong Ka Wai	WKW-01a	V	B	65 / 55	51 / 50	N
Planned NSRs (Tung Chung East)							
P1 <sup>[5]</sup>	Residential Premises in Tung Chung East (Phase 1)	A100-02h	R	C	70 / 60	55 / 48	N
P1 <sup>[5]</sup>	Residential Premises in Tung Chung East (Phase 3)	A114-02a	R	B	65 / 55	52 / 48	N
		A116-02e	R	B	65 / 55	52 / 47	N
		A133a-01e	R	C	70 / 60	54 / 49	N
P4 <sup>[5]</sup>	Tung Chung at Area 113	A113-01e	R	C	70 / 60	61 / 52	N
		A113-10a	R	B	65 / 55	61 / 55	N
Planned NSRs (Tung Chung West)							
P2 <sup>[5]</sup>	Residential Premises in Tung Chung West	A23-01a	R	B	65 / 55	52 / 50	N
		A33-02a	R	B	65 / 55	61 / 53	N

Notes:

- [1] The assessment will only include NSRs which rely on opened windows for ventilation.  
 [2] Only the first layer of NSRs has been selected for assessment.  
 [3] NAP- Noise Assessment Point.  
 [4] R – Residential Premises, O – Others.  
 [5] The latest Recommended Outline Development Plan (RODP), updated population intensity and planning parameter, updated population intake years of TCNTE East and TCNTE West have been collated from CEDD and PlanD. For Area 99 and Area 100, the layouts provided by HD on 5 August 2021 were adopted.  
 [6] N/A – Not applicable.  
 [7] Daytime and Evening Time / Night-time

#### 4.8.3.5 The assessment will cover the cumulative fixed noise sources impact associated with the operation of the proposed project on existing, committed and planned NSRs within the assessment area.

**4.8.3.6** The total number of dwellings, classrooms and other noise sensitive receivers that will be exposed to noise impact exceeding the criteria set in Annex 5 in the TM is nil.

#### **4.8.4 Mitigation of Fixed Noise Sources Impact**

**4.8.4.1** With the properly selection of the equipment and installation of acoustic attenuators, such as enclosure and silencer, the maximum allowable SWL can be achieved. As adverse fixed noise sources impact is not anticipated, mitigation measures are not required. The number of dwellings, classrooms and other sensitive receivers that will be exposed to noise impact exceeding the criteria set in Annex 5 in the TM is nil.

#### **4.8.5 Evaluation of Residual Fixed Noise Sources Impact**

**4.8.5.1** Fixed noise sources impact arising from ventilation louvres of EAP / EEP, TUC, TCE and TCW Stations of the Project and other cumulative noise impacts will be within respective criteria. Adverse residual noise impacts are thus not anticipated. The number of dwellings, classrooms and other sensitive elements that will be exposed to adverse residual noise impact exceeding the criteria set in Annex 5 in the TM is nil.

**4.8.5.2** To ensure that the nearby NSRs will not be subject to adverse fixed noise source impact, further review on the maximum allowable SWLs will be carried out according to the detailed design.

### **4.9 Conclusion**

**4.9.1.1** This Section presents the cumulative impacts of the noise impact assessment for the Project. Representative NSR and assessment methodology to be adopted are outlined. Potential concurrent projects and sources during construction and operational phases have also been identified.

**4.9.1.2** The assessment methodology presented is in line with the requirement stipulated in the EIA Study Brief and the EIAO-TM.

#### **Airborne Construction Noise**

**4.9.1.3** Noise arising from the construction activities of the Project would have unavoidable potential impact on the NSRs located in the vicinity of the works areas. Unmitigated construction noise levels at the representative NSRs are predicted, which are found to be the range of 1 to 16 dB(A).

**4.9.1.4** Mitigation measures are recommended to reduce the noise levels to within the EIAO-TM noise criterion, including good site practices, quieter plant, silencer, movable noise barrier, noise enclosure. With the recommended mitigation measures in place, noise levels at all the planned and existing NSRs including residential premises and schools during normal and examination periods comply with the EIAO-TM daytime construction noise criterion.

**4.9.1.5** According to the latest design, drill-&-blast may be required for the construction of EAP / EEP and TCW Station. However, the blasting is only once per day in each location with very short duration and infrequent and will not cause adverse impacts to NSRs.

#### **Groundborne Construction Noise**

**4.9.1.6** Groundborne construction noise impact arising from the construction of tunnel alignment between TCW Station and TUC will be within respective criteria. Adverse residual noise impacts are thus not anticipated.

#### **Airborne Rail Noise**

**4.9.1.7** Noise arising from the rail of the project would have unavoidable potential impact on the nearby NSRs. Unmitigated airborne rail noise levels at the representative NSRs are predicted, which are found to be in the range of 1 to 2 dB(A).

**4.9.1.8** Mitigation measures are recommended to reduce the noise levels to within the EIAO-TM noise criterion, including noise barrier and speed reduction. With the recommended mitigation measures in place, noise levels of the NSRs are predicted to comply with the EIAO-TM rail noise criteria.

#### **Groundborne Rail Noise**

**4.9.1.9** Groundborne rail noise impact arising from the underground rail operation will be within respective criteria. Adverse residual noise impacts are thus not anticipated.

#### **Fixed Noise Sources Impact**

**4.9.1.10** Maximum allowable sound power levels emitted from ventilation louvres of EAP / EEP, TUC, TCE and TCW Stations of the Project have been predicted. With the proper selection of plant and adoption of acoustic treatment, such as enclosure and silencer, the NSRs located in the vicinity of EAP / EEP, TUC, TCE and TCW Stations will not be affected by the noise from those louvres of the Project and the other fixed noise sources from TCNTE.