

7 NOISE IMPACT

7.1 Introduction

7.1.1 This section presents noise impact assessment for the construction and operational phases of the Kai Tak Development. Existing and planned noise sensitive receivers in the vicinity of the study area are determined. Potential noise quality impacts associated with the Project have been identified together with the proposed methodology for the respective impact assessments.

7.2 Environmental Legislation, Policies, Plans, Standards and Criteria

General

7.2.1 Noise impacts were assessed in accordance with the criteria and methodology given in the Technical Memoranda (TMs) under the Noise Control Ordinance (NCO), and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

7.2.2 The NCO and EIAO provide the statutory framework for noise control. Assessment procedures and standards are set out in the five TMs listed below:

- TM on Environmental Impact Assessment Process (EIAO-TM)
- TM on Noise from Construction Work other than Percussive Piling (GW-TM)
- TM on Noise from Percussive Piling (PP-TM)
- TM on Noise from Construction Work in Designated Areas (DA-TM)
- TM on Noise from Places other than Domestic Premises, Public Places or Construction Sites (IND-TM)

Construction Noise – General Construction

7.2.3 The NCO provides the statutory framework for noise control of construction work, other than percussive piling, using powered mechanical equipment (PME) between the hours of 1900 and 0700 hours or at any time on Sundays and general holiday (that is, restricted hours). Noise control on construction activities taking place at other times is subject to the *Criteria for Evaluating Noise Impact* stated in Table 1B of Annex 5 in the EIAO-TM. The noise limit is $L_{eq(30 \text{ minutes})}$ 75 dB(A) at the façades of dwellings and 70 dB(A) at the façade of schools (65 dB(A) during examinations).

7.2.4 Between 1900 and 0700 hours and all day on Sundays and public holidays, activities involving the use of PME for the purpose of carrying out construction work is prohibited unless a construction noise permit (CNP) has been obtained. A CNP may be granted provided that the Acceptable Noise Level (ANL) for the NSRs can be complied with. ANLs are assigned depending upon the area sensitive rating (ASR). The corresponding basic noise levels (BNLs) for evening and night time periods are given in **Table 7.1**.

Table 7.1 Construction Noise Criteria for Activity other than Percussive Piling

Time Period	Basic Noise Level (BNLs)		
	ASR A	ASR B	ASR C
Evening (1900 to 2300 hours) ⁽¹⁾	60	65	70
Night (2300 to 0700 hours)	45	50	55

Notes: (1) Includes Sundays and Public Holidays during daytime and evening

- 7.2.5 Despite any description or assessment made in this EIA on construction noise aspects, there is no guarantee that a Construction Noise Permit (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 Technical Memoranda issued under the Noise Control Ordinance. The Noise Control Authority will take into account of contemporary conditions / situations of adjoining land uses and any previous complaints against construction activities at the site before making his decision in granting a CNP. Nothing in this EIA shall bind the Noise Control Authority in making his decision. If a CNP is to be issued, the Noise Control Authority shall include in it any condition he thinks fit. Failure to comply with any such conditions will lead to cancellation of the CNP and prosecution action under the NCO.
- 7.2.6 Percussive piling is prohibited between 1900 and 0700 hours on any weekday not being a general holiday and at any time on Sunday or general holiday. A CNP is required for the carrying out of percussive piling between 0700 and 1900 hours on any day not being a general holiday. PP-TM sets out the requirements for working and determination of the permitted hours of operations. ANLs for percussive piling for different types of NSRs are shown in **Table 7.2**.

Table 7.2 Acceptable Noise Levels for Percussive Piling

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

Note: 10 dB(A) shall be subtracted from the ANLs shown above for NSRs which are hospitals, medical clinics, educational institutes, courts and law or other NSRs which are considered by the Authority to be particularly sensitive to noise.

- 7.2.7 In accordance with PP-TM, the permitted hours of operation for carrying out of percussive piling work, subject to the issuance of a CNP, are listed in **Table 7.3**.

Table 7.3 Permitted Hours of Operation for Percussive Piling

Amount by which Corrected Noise Level (CNL) exceeds Acceptable Noise Level (ANL), CNL-ANL	Permitted hours of operation on any day not being a general holiday
-10 dB(A) < CNL-ANL	Nil
CNL-ANL ≤ -10 dB(A)	0700 to 1900

Operational Road Traffic Noise

- 7.2.8 For road traffic noise, Annex 5, Table 1A "A Summary of Noise Criteria" of the EIAO-TM defines the criteria $L_{10(1 \text{ hour})}$ for the road traffic noise at various noise sensitive receivers (NSRs):
- 70dB(A) at the façades of residential dwellings, hotels, offices;
 - 65dB(A) at the façades of schools, places of public worship, courts of law, places where unaided voice communication is required; and
 - 55dB(A) at the façades of hospital or clinics.

- 7.2.9 If any façades of NSRs are still exposed to predicted noise levels exceeding the relevant noise criteria after the implementation of all direct mitigation measures, provision of indirect technical remedies in the form of acoustic insulation and air conditioning should be considered under the EIAO-TM and the ExCo Directive “Equitable Redress for Persons Exposed to Increased Noise Resulting from the Use of New Roads”. The eligibility for indirect technical remedies shall be tested against the following three criteria:
- the predicted overall noise level from the new road, together with other traffic noise in the vicinity must be above a specified noise level (for example, 70 dB(A) for domestic premises and 65 dB(A) for educational institutions, all in L10 (1 hour)); and
 - the predicted overall noise level is at least 1.0 dB(A) more than the prevailing traffic noise level, that is, the total traffic noise level existing before the works to construct the road commence; and
 - the contribution to the increase in the predicted overall noise level from the new road must be at least 1.0 dB(A).
- 7.2.10 For the purpose of the traffic noise assessment in this Report, the roads within 300m from the proposed project alignment were included in the assessment. All roads are described as one of the following:
- ‘Existing’ Roads: includes Prince Edward Road East, Kwun Tong Bypass and other existing roads around KTD.
 - ‘New’ Roads: includes all new roads created and roads substantially altered in KTD.
- 7.2.11 The noise contribution from “New” roads should be less than 70 dB(A) at any dwellings (less than 65 dB(A) for educational institutions and places of public worship), so as to satisfy the relevant noise criteria, and there should not be any increase in traffic noise impact. In the case of an NSR where existing noise levels already exceeded the relevant criteria, any increase in noise level contributed by the “new” roads should be less than 1.0 dB(A). The extent of ‘New’ roads under this Project has been depicted in **Appendix 3.18**.

Operational Phase Fixed Plant Noise

- 7.2.12 Fixed plant noise sources, such as cruise terminal operation, sewage pumping stations, tunnel ventilation shafts, ventilating systems for public transport interchange and electric substation, are controlled by the NCO and IND-TM with a noise criteria of 5 dB(A) below the appropriate Acceptable Noise Levels (ANL) shown in Table 3 of the TM on Noise from Places other than Domestic Premises, Public Places or Construction Sites or the prevailing background noise levels (for quiet areas with level 5dB(A) below the ANL). The ANLs for different Area Sensitivity Ratings are summarised in **Table 7.4** below.

Table 7.4 Operational Noise Criteria for Fixed Noise Sources

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

7.2.13 The Project areas are located in the proximity to well developed urban areas and the prevailing background noise level measurements at selected representative NSRs have been conducted and it is demonstrated that the prevailing background noise level are higher than ANL-5 (**Appendix 7.1**). Thus, ANL-5 has been adopted for the fixed plant noise impact assessment. The Area Sensitive Rating (ASR) of the type of area within which the NSR is located was determined for assessment. Determination of ASR was considered the below item.

- The type of area within the concerned NSR is located;
- The Influencing Factor (IF) identified;
- The Degree to which the NSR is affected by IF; and
- If applicable, nearby OZP “Industrial” or “Industrial Estates” zone

7.2.14 A summary of the Area Sensitive Rating (ASR) for the NSRs for the fixed plant noise assessment is given in **Table 7.5**.

Table 7.5 Summary of Area Sensitive Rating for NSRs for Fixed Plant Noise Assessment

NSRs	District (1)	Location	Existing / Planned Land Use	ASR (2)	Remarks
N1	KT	Cha Kwo Ling Tsuen	Residential	B	
N2	KT	Cha Kwo Ling	Residential	B	
N3	KT	Laguna City IV	Residential	C	(3) (a)
N4	KB	Buddhist Chi King Primary School	Educational	C	(3) (a)
N5	KB	S.K.H Kowloon Bay Kei Lok Primary School	Educational	C	(3) (a)
N6	KB	Richland Gardens	Residential	C	(3) (a)
N7	NCW	Luk Ching House, Choi Hung Estate	Residential	C	(3) (a)
N8	NCW	Kam Pik House, Choi Hung Estate	Residential	C	(3) (a)
N9	NCW	Pik Hoi House, Choi Hung Estate	Residential	C	(3) (a)
N10A	SPK	Rhythm Garden (Block 7)	Residential	C	(3) (b)
N10B	SPK	Rhythm Garden (Block 9)	Residential	C	(3) (b)
N11	SPK	Cognitio College	Educational	C	(3) (b)
N12	SPK	Sir Robert Black Health Centre	Clinic	C	(3) (b)
N13	SPK	Lee Kau Yan Memorial School	Educational	C	(3) (b)
N14	SPK	South Mansion	Residential	C	(3) (b)
N15	SPK	Jenford Building	Residential	C	(3) (b)
N16	KC	Parc 22	Residential	C	(3) (c)
N17	KC	Sky Tower	Residential	C	(3) (c)
N18	KC	HK Society for Blind hostel	Residential	B	
N19	TKW	Mok Cheong Street Residential District	Residential	B	
N20A	TKW	Grand Waterfront	Residential	B	
N20B	TKW	Grand Waterfront	Residential	B	
N21	TKW	Hang Chien Court	Residential	B	
N22	TKW	Wei Chien Court	Residential	B	
N23	TKW	Holly Carpenter Primary School	Educational	B	
N24	TKW	Oblate Father's Primary School	Educational	B	

NSRs	District (1)	Location	Existing / Planned Land Use	ASR (2)	Remarks
N25	TKW	Sunrise Villa	Residential	B	
N26	TKW	Wing Kwong Street Residential District	Residential	B	
N27	TKW	CCC Kei To Secondary School	Educational	B	
N28	TKW	Po Leung Kuk Ngan Po Ling College	Educational	B	
N29	TKW	Sunrise Plaza	Residential	B	
N30	TKW	Ming Lung Street	Residential	B	
N31	SPK	Canossa Primary School (San Po Kong)	Educational	B	
N32	TKW	Holy Trinity Church	Place of Public Worship	C	(3) (c)
PN1	SPK	Rhine Harbour (Planned)	Residential	C	(3) (b)
PN2	KTD	Site 1A1 (Planned)	Residential	B	
PN3	KTD	Site 1A1 (Planned)	Residential	B	
PN4	KTD	Site 1A1 (Planned)	Residential	B	
PN5	KTD	Site 1A1 (Planned)	Residential	B	
PN6A	KTD	Site 1A1 (Planned)	Residential	B	
PN6B	KTD	Site 1A1 (Planned)	Residential	B	
PN7A	KTD	Site 1A1 (Planned)	Residential	B	
PN7B	KTD	Site 1A1 (Planned)	Residential	B	
PN8	KTD	Site 1A1 (Planned)	Residential	B	
PN9	KTD	Site 1A1 (Planned)	Residential	B	
PN10	KTD	Site 1A1 (Planned)	Residential	B	
PN11	KTD	Site 1A1 (Planned)	Residential	B	
PN12	KTD	Site 1A1 (Planned)	Residential	B	
PN13	KTD	Site 1A1 (Planned)	Residential	B	
PN14	KTD	Site 1A1 (Planned)	Residential	B	
PN15	KTD	Site 1A1 (Planned)	Residential	B	
PN16	KTD	Site 1A1 (Planned)	Residential	B	
PN17	KTD	Site 1A1 (Planned)	Residential	B	
PN18	KTD	Site 1A2 (Planned)	Educational	B	
PN19	KTD	Site 1A3 (Planned)	Educational	B	
PN20	KTD	Site 1A4 (Planned)	Educational	B	
PN21	KTD	Site 1B1 (Planned)	Residential	B	
PN22	KTD	Site 1B1 (Planned)	Residential	B	
PN23A	KTD	Site 1B1 (Planned)	Residential	B	
PN23B	KTD	Site 1B1 (Planned)	Residential	B	
PN23C	KTD	Site 1B1 (Planned)	Residential	B	
PN24	KTD	Site 1B1 (Planned)	Residential	B	
PN25	KTD	Site 1B1 (Planned)	Residential	B	
PN26	KTD	Site 1B1 (Planned)	Residential	B	
PN27	KTD	Site 1B1 (Planned)	Residential	B	
PN28	KTD	Site 1B1 (Planned)	Residential	B	
PN29	KTD	Site 1B1 (Planned)	Residential	B	
PN30A	KTD	Site 1B1 (Planned)	Residential	B	
PN30B	KTD	Site 1B1 (Planned)	Residential	B	
PN31A	KTD	Site 1B1 (Planned)	Residential	B	
PN31B	KTD	Site 1B1 (Planned)	Residential	B	
PN32	KTD	Site 1B1 (Planned)	Residential	B	
PN33	KTD	Site 1B1 (Planned)	Residential	B	
PN34	KTD	Site 1B1 (Planned)	Residential	B	

NSRs	District (1)	Location	Existing / Planned Land Use	ASR (2)	Remarks
PN35	KTD	Site 1B1 (Planned)	Residential	B	
PN36	KTD	Site 1B2 (Planned)	Educational	B	
PN37	KTD	Site 1B3 (Planned)	Educational	B	
PN38	KTD	Site 1B4 (Planned)	Educational	B	
PN39	KTD	Site 1I1 (Planned)	Residential	B	
PN40	KTD	Site 1I1 (Planned)	Residential	B	
PN41	KTD	Site 1I2 (Planned)	Residential	B	
PN42	KTD	Site 1I2 (Planned)	Residential	B	
PN43	KTD	Site 1I3 (Planned)	Residential	B	
PN44	KTD	Site 1I3 (Planned)	Residential	B	
PN45	KTD	Site 1K1 (Planned)	Residential	B	
PN46	KTD	Site 1H2 (Planned)	Residential	B	
PN47	KTD	Site 1L2 (Planned)	Residential	B	
PN48	KTD	Site 1K3 (Planned)	Residential	B	
PN49	KTD	Site 1K2 (Planned)	Residential	B	
PN50	KTD	Site 1L2 (Planned)	Residential	B	
PN51	KTD	Site 1L3 (Planned)	Residential	B	
PN52	KTD	Site 1L3 (Planned)	Residential	B	
PN53	KTD	Site 1L3 (Planned)	Residential	B	
PN54	KTD	Site 1L1 (Planned)	Residential	B	
PN55	KTD	Site 2B1 (Planned)	Residential	B	
PN56	KTD	Site 2B1 (Planned)	Residential	B	
PN57	KTD	Site 2B2 (Planned)	Residential	B	
PN58	KTD	Site 2B3 (Planned)	Residential	B	
PN59	KTD	Site 2B4 (Planned)	Residential	B	
PN60	KTD	Site 2B5 (Planned)	Residential	B	
PN61	KTD	Site 2B6 (Planned)	Residential	B	
PN62	KTD	Site 2B6 (Planned)	Residential	B	
PN63	KTD	Site 4A1 (Planned)	Residential	B	
PN64	KTD	Site 4B5 (Planned)	Residential	B	
PN65	KTD	Site 5A4 (Planned)	Residential	B	
PN66	KTD	Site 5A4 (Planned)	Residential	B	
PN67	KTD	Site 5C5 (Planned)	Educational	B	
PN68	KTD	Site 5C6 (Planned)	Educational	B	
PN69	KTD	Site 1D3 (Planned)	Community Use with hostel	C	(3) (b)
PN70	KTD	Site 1D3 (Planned)	Community Use with hostel	B	
PN71	KTD	Site 1E1 (Planned)	Mixed Use	C	(3) (b)
PN72	KTD	Site 1E1 (Planned)	Mixed Use	C	(3) (b)
PN73	KTD	Site 1F1 (Planned)	Mixed Use	B	
PN74	KTD	Site 1M1 (Planned)	CDA	B	
PN75	KTD	Site 1M2 (Planned)	CDA	B	
PN76	KTD	Site 3B1 (Planned)	Undesignated	C	(3) (a)
PN77	KTD	Site 3B2 (Planned)	Undesignated	C	(3) (a)
PN78	KTD	Site 3B3 (Planned)	Undesignated	C	(3) (a)
PN79	KTD	Site 3B4 (Planned)	Undesignated	C	(3) (a)
PN80	KTD	Site 3C1 (Planned)	Hospital / Clinic	C	(3) (a)
PN81	KTD	Site 3C1 (Planned)	Hospital / Clinic	C	(3) (a)
PN82	KTD	Site 3C1 (Planned)	Hospital / Clinic	C	(3) (a)
PN83	KTD	Site 3C1 (Planned)	Hospital / Clinic	C	(3) (a)
PN84	KTD	Site 3C1 (Planned)	Hospital / Clinic	C	(3) (a)

NSRs	District (1)	Location	Existing / Planned Land Use	ASR (2)	Remarks
PN85	KTD	Site 3C1 (Planned)	Hospital / Clinic	C	(3) (a)
PN86	KTD	Site 3C1 (Planned)	Hospital / Clinic	B	
PN87A	KTD	Site 3E1 (Planned)	Commercial	B	
PN87B	KTD	Site 3E1 (Planned)	Commercial	B	
PN88	KTD	Site 3D2 (Planned)	Commercial	C	(3) (a)
PN89	KTD	Site 3D2 (Planned)	Commercial	C	(3) (a)
PN90	KTD	Site 3D3 (Planned)	Commercial	C	(3) (a)
PN91A	KTD	Site 3D4 (Planned)	Commercial	C	(3) (a)
PN91B	KTD	Site 3D4 (Planned)	Commercial	C	(3) (a)
PN92	KTD	Site 3D4 (Planned)	Commercial	C	(3) (a)
PN92A	KTD	Site 3D4 (Planned) facing the existing public cargo working area	Commercial	C	(3) (a)
PN93	TKW	Sung Wong Toi Road CDA site	CDA	B	
PN94	TKW	Sung Wong Toi Road CDA site	CDA	B	
PN95	TKW	Sung Wong Toi Road CDA site	CDA	B	
PN96	KTD	Site 2A1 (Planned)	Commercial	C	(3) (b)
PN97	KTD	Site 2A2 (Planned)	Commercial	C	(3) (b)
PN98	KTD	Site 2A3 (Planned)	Commercial	C	(3) (b)
PN99	KTD	Site 2A4 (Planned)	Commercial	C	(3) (b)
PN100	KTD	Site 2A5 (Planned)	Commercial	C	(3) (b)
PN101	KTD	Site 2A6 (Planned)	Commercial	C	(3) (b)
PN102	KTD	Site 4A2 (Planned)	Commercial	B	
PN103	KTD	Site 4C1 (Planned)	Commercial	B	
PN104	KTD	Site 4C2 (Planned)	Commercial	B	
PN105	KTD	Site 4C3 (Planned)	Commercial	B	
PN106	KTD	Site 4C4 (Planned)	Commercial	B	
PN107	KTD	Site 4C5 (Planned)	Commercial	B	
PN108	KTD	Site 4A3 (Planned)	Commercial	B	
PN109	SPK	Choi Hung Road CDA Site (Planned)	CDA	B	
PN110	SPK	Ex-San Po Kong Flatted Factory	Residential	B	
PN111	SPK	Ex-San Po Kong Flatted Factory	Residential	B	
PN112	SPK	Ex-San Po Kong Flatted Factory	Residential	B	

Note: (1) KT – Kwun Tong; NTK – Ngau Tau Kok; KB – Kowloon Bay; NCW – Ngau Chi Wah;
SPK – San Po Kong; KC – Kowloon City, TKW – To Kwa Wan; HH – Hung Hom; KTD –
Kai Tak Development.

(2) All NSRs are located in Urban Area.

(3) NSR affected by “major road” that has heavy and generally continuous flow of vehicular
traffic and, in normal circumstances, means a road with an annual average daily traffic
flow in excess of 30,000.

(a) affected by Kwun Tong Bypass

(b) affected by Prince Edward Road East

(c) affected by Ma Tau Chung Road

Noise from Open Air Entertainment Activities

- 7.2.15 For the operation of the proposed Stadium Complex in KTD, the Noise Control Guidelines for Holding Open Air Entertainment Activities stipulated by EPD has to be followed. Noise level from the activity (including set up, rehearsal, main event and stage dismantling etc.) should not be more than 5 dB(A) above the background noise level, as measured at one metre from the exterior building facade of the most affected noise sensitive receivers, during day time and evening period, i.e. 0700 – 2300 hours. For the night time, i.e. 2300 – 0700 hours, noise should not be audible within nearby noise sensitive receivers.

Heliport Noise

- 7.2.16 Potential noise impact would be arisen from the operation of the heliport proposed at the tip of the former runway. According to Table 1A of Annex 5 “A Summary of Noise Criteria” in the EIAO-TM, the criteria for helicopter noise is L_{max} 90dB(A) for offices and L_{max} 85dB(A) for domestic premises, hotels, hostels, education institutes, places of worship, hospital and clinics during 0700-1900 hours. The standards apply to uses that rely on openable windows for ventilation and the standards should be viewed as the maximum permissible noise levels assessed at 1m from the external façade.

Rail Noise

- 7.2.17 Railway noise is controlled under the Noise Control Ordinance (NCO), IND-TM and EIAO-TM. The ANLs for different Area Sensitivity Ratings are summarised in **Table 7.4** above. According to Table 1A of Annex 5 “A Summary of Noise Criteria” in the EIAO-TM, the criteria for rail noise is L_{max} 85dB(A) for all sensitive receiver during 2300-0700 hours and the appropriate ANL shown in Table 2 of the TM on Noise from Places other than Domestic Premises, Public Places or Construction Sites. The standards apply to uses that rely on openable windows for ventilation and the standards should be viewed as the maximum permissible noise levels assessed at 1m from the external façade.

Marine Traffic Noise (include noise from typhoon shelters)

- 7.2.18 Marine traffic noise sources, such as marine traffic noise from operation activities on the moored vessels in typhoon shelters and manoeuvring of vessels including cruise vessels during operational phase of the proposed development. It is similar to noise from public place which vessels are free to move around and implementation control measures are not possible. It is not even possible to quantify accurately or compare to existing standard. No objective noise standard for marine traffic noise (include noise from typhoon shelters) in this EIA.

7.3 Description of the Environment

- 7.3.1 The Study Area is located in the southeastern part of Kowloon Peninsula and comprises the north apron and runway areas of the former Kai Tak Airport, existing waterfront areas at To Kwa Wan, Ma Tau Kok, Kowloon Bay, Kwun Tong and Cha Kwo Ling. It has an area of 328 ha, including 48 ha of existing built-up area adjacent to the former airport site. It also covers the Kowloon Bay, To Kwa Wan Typhoon Shelter and Kwun Tong Typhoon Shelter.
- 7.3.2 The existing land uses in adjoining areas are commercial, industrial, residential and recreational uses. Prince Edward Road East, Kwun Tong Bypass and other distributor networks are dominant noise sources in the area.

7.4 Noise Sensitive Receivers

- 7.4.1 In order to evaluate the construction and operational noise impacts from the Project, representative Noise Sensitive Receivers (NSRs) within the Study Area are identified for assessment. Only the first layer of NSRs has been identified for assessment because it would provide acoustic shielding to those receivers at further distance behind. As centrally air-conditioned buildings do not rely on opened windows for ventilation, the noise standard as stipulated in Table 1 Annex 5 of EIAO-TM would not be applicable, and hence these buildings are not selected for noise impact assessment. For example, Fire Station with quarter at Site 2A8, the quarter will most likely be centrally air-conditioned with window insulation. Therefore, Fire Station with quarter is not classified as a NSR. For the NSRs at housing sites (Site 1A and 1B), the latest site layout plan is obtained from the Hong Kong Housing Authority (HKHA). The population of intake would be around later 2012 for these two sites. **Table 7.6** and **Figure 3.2** shows the representative NSRs selected for this noise impact assessment. The photographs of the representative NSRs are shown in **Appendix 3.19**.

Table 7.6 Representative Noise Sensitive Receivers for Noise Impact Assessment

NSRs	District ⁽¹⁾	Location	Existing / Planned Land Use	Max. Building Height, m	Construction Phase	Operational Phase
N1	KT	Cha Kwo Ling Tsuen	Residential	5	✓	✓
N2	KT	Cha Kwo Ling	Residential	15	✓	✓
N3	KT	Laguna City IV	Residential	81	✓	✓
N4	KB	Buddhist Chi King Primary School	Educational	24	✓	✓
N5	KB	S.K.H Kowloon Bay Kei Lok Primary School	Educational	27	✓	✓
N6	NCW	Richland Gardens	Residential	99	✓	✓
N7	NCW	Luk Ching House, Choi Hung Estate	Residential	60	✓	✓
N8	NCW	Kam Pik House, Choi Hung Estate	Residential	21	✓	✓
N9	NCW	Pik Hoi House, Choi Hung Estate	Residential	60	✓	✓
N10A	SPK	Rhythm Garden (Block 7)	Residential	87	✓	✓
N10B	SPK	Rhythm Garden (Block 9)	Residential	87	✓	✓
N11	SPK	Cognitio College	Educational	18	✓	✓
N12	SPK	Sir Robert Black Health Centre	Clinic	9	✓	✓
N13	SPK	Lee Kau Yan Memorial School	Educational	10	✓	✓
N14	SPK	South Mansion	Residential	15	✓	✓
N15	SPK	Jenford Building	Residential	12	✓	✓
N16	KC	Parc 22	Residential	33	✓	✓
N17	KC	Sky Tower	Residential	141	✓	✓
N18	KC	HK Society for Blind hostel	Residential	9	✓	✓
N19	TKW	Mok Cheong Street Residential District	Residential	18	✓	✓
N20A	TKW	Grand Waterfront	Residential	153	✓	✓
N20B	TKW	Grand Water Front	Residential	153	✓	✓
N21	TKW	Hang Chien Court	Residential	39	✓	✓
N22	TKW	Wei Chien Court	Residential	39	✓	✓
N23	TKW	Holly Carpenter Primary School	Educational	18	✓	✓
N24	TKW	Oblate Father's Primary School	Educational	21	✓	✓
N25	TKW	Sunrise Villa	Residential	90	✓	✓
N26	TKW	Wing Kwong Street Residential District	Residential	21	✓	✓
N27	TKW	CCC Kei To Secondary School	Educational	24	✓	✓
N28	TKW	Po Leung Kuk Ngan Po Ling College	Educational	27	✓	✓
N29	TKW	Sunrise Plaza	Residential	39	✓	✓
N30A	TKW	No. 91 Ma Tau Kok Road	Residential	7	✓	
N30B	TKW	No. 3 Hing Yan Street	Residential	8		✓
N31	SPK	Canossa Primary School (San Po Kong)	Educational	3	✓	✓
N32	TKW	Holy Trinity Church	Place of Public Worship	2	✓	✓
PN1	SPK	Rhine Harbour (Planned)	Residential	130	✓	✓
PN2	KTD	Site 1A1 (Planned)	Residential	115	✓	✓
PN3	KTD	Site 1A1 (Planned)	Residential	115		✓
PN4	KTD	Site 1A1 (Planned)	Residential	115		✓
PN5	KTD	Site 1A1 (Planned)	Residential	115		✓
PN6A	KTD	Site 1A1 (Planned)	Residential	115		✓

NSRs	District ⁽¹⁾	Location	Existing / Planned Land Use	Max. Building Height, m	Construction Phase	Operational Phase
PN6B	KTD	Site 1A1 (Planned)	Residential	115		✓
PN7A	KTD	Site 1A1 (Planned)	Residential	115		✓
PN7B	KTD	Site 1A1 (Planned)	Residential	115		✓
PN8	KTD	Site 1A1 (Planned)	Residential	115		✓
PN9	KTD	Site 1A1 (Planned)	Residential	115		✓
PN10	KTD	Site 1A1 (Planned)	Residential	115		✓
PN11	KTD	Site 1A1 (Planned)	Residential	115		✓
PN12	KTD	Site 1A1 (Planned)	Residential	115		✓
PN13	KTD	Site 1A1 (Planned)	Residential	115		✓
PN14	KTD	Site 1A1 (Planned)	Residential	115		✓
PN15	KTD	Site 1A1 (Planned)	Residential	115		✓
PN16	KTD	Site 1A1 (Planned)	Residential	115		✓
PN17	KTD	Site 1A1 (Planned)	Residential	115		✓
PN18	KTD	Site 1A2 (Planned)	Educational	40		✓
PN19	KTD	Site 1A3 (Planned)	Educational	40		✓
PN20	KTD	Site 1A4 (Planned)	Educational	40		✓
PN21	KTD	Site 1B1 (Planned)	Residential	115		✓
PN22	KTD	Site 1B1 (Planned)	Residential	115		✓
PN23A	KTD	Site 1B1 (Planned)	Residential	115		✓
PN23B	KTD	Site 1B1 (Planned)	Residential	115		✓
PN23C	KTD	Site 1B1 (Planned)	Residential	115		✓
PN24	KTD	Site 1B1 (Planned)	Residential	115		✓
PN25	KTD	Site 1B1 (Planned)	Residential	115		✓
PN26	KTD	Site 1B1 (Planned)	Residential	115		✓
PN27	KTD	Site 1B1 (Planned)	Residential	115		✓
PN28	KTD	Site 1B1 (Planned)	Residential	115		✓
PN29	KTD	Site 1B1 (Planned)	Residential	115		✓
PN30A	KTD	Site 1B1 (Planned)	Residential	115		✓
PN30B	KTD	Site 1B1 (Planned)	Residential	115		✓
PN31A	KTD	Site 1B1 (Planned)	Residential	115		✓
PN31B	KTD	Site 1B1 (Planned)	Residential	115		✓
PN32	KTD	Site 1B1 (Planned)	Residential	115		✓
PN33	KTD	Site 1B1 (Planned)	Residential	115		✓
PN34	KTD	Site 1B1 (Planned)	Residential	115		✓
PN35	KTD	Site 1B1 (Planned)	Residential	115	✓	✓
PN36	KTD	Site 1B2 (Planned)	Educational	40		✓
PN37	KTD	Site 1B3 (Planned)	Educational	40		✓
PN38	KTD	Site 1B4 (Planned)	Educational	40		✓
PN39	KTD	Site 1I1 (Planned)	Residential	95		✓
PN40	KTD	Site 1I1 (Planned)	Residential	95		✓
PN41	KTD	Site 1I2 (Planned)	Residential	95		✓
PN42	KTD	Site 1I2 (Planned)	Residential	95		✓
PN43	KTD	Site 1I3 (Planned)	Residential	95		✓
PN44	KTD	Site 1I3 (Planned)	Residential	95		✓
PN45	KTD	Site 1K1 (Planned)	Residential	105		✓
PN46	KTD	Site 1H2 (Planned)	Residential	105		✓
PN47	KTD	Site 1L2 (Planned)	Residential	95		✓
PN48	KTD	Site 1K3 (Planned)	Residential	95		✓
PN49	KTD	Site 1K2 (Planned)	Residential	105		✓
PN50	KTD	Site 1L2 (Planned)	Residential	95		✓
PN51	KTD	Site 1L3 (Planned)	Residential	45		✓
PN52	KTD	Site 1L3 (Planned)	Residential	45		✓
PN53	KTD	Site 1L3 (Planned)	Residential	95		✓
PN54	KTD	Site 1L1 (Planned)	Residential	95		✓
PN55	KTD	Site 2B1 (Planned)	Residential	105		✓
PN56	KTD	Site 2B1 (Planned)	Residential	105		✓
PN57	KTD	Site 2B2 (Planned)	Residential	95		✓
PN58	KTD	Site 2B3 (Planned)	Residential	80		✓
PN59	KTD	Site 2B4 (Planned)	Residential	80		✓
PN60	KTD	Site 2B5 (Planned)	Residential	80		✓
PN61	KTD	Site 2B6 (Planned)	Residential	80		✓
PN62	KTD	Site 2B6 (Planned)	Residential	80		✓
PN63	KTD	Site 4A1 (Planned)	Residential	60		✓
PN64	KTD	Site 4B5 (Planned)	Residential	40		✓

NSRs	District ⁽¹⁾	Location	Existing / Planned Land Use	Max. Building Height, m	Construction Phase	Operational Phase
PN65	KTD	Site 5A4 (Planned)	Residential	60		✓
PN66	KTD	Site 5A4 (Planned)	Residential	105		✓
PN67	KTD	Site 5C5 (Planned)	Educational	40		✓
PN68	KTD	Site 5C6 (Planned)	Educational	40		✓
PN69	KTD	Site 1D3 (Planned)	Community Use with hostel	55		✓
PN70	KTD	Site 1D3 (Planned)	Community Use with hostel	55		✓
PN71	KTD	Site 1E1 (Planned)	Mixed Use	95		✓
PN72	KTD	Site 1E1 (Planned)	Mixed Use	95		✓
PN73	KTD	Site 1F1 (Planned)	Mixed Use	95		✓
PN74	KTD	Site 1M1	CDA	35		✓
PN75	KTD	Site 1M2	CDA	170		✓
PN76	KTD	Site 3B1 (Planned)	Undesignated	40		✓
PN77	KTD	Site 3B2 (Planned)	Undesignated	40		✓
PN78	KTD	Site 3B3 (Planned)	Undesignated	40		✓
PN79	KTD	Site 3B4 (Planned)	Undesignated	40		✓
PN80	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN80A	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN81	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN82	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN83	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN84	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN84A	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN85	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN86	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN87A	KTD	Site 3E1 (Planned)	Commercial	95		✓
PN87B	KTD	Site 3E1 (Planned)	Commercial	95		✓
PN88	KTD	Site 3D2 (Planned)	Commercial	95		✓
PN89	KTD	Site 3D2 (Planned)	Commercial	95		✓
PN90	KTD	Site 3D3 (Planned)	Commercial	95		✓
PN91A	KTD	Site 3D4 (Planned)	Commercial	95		✓
PN91B	KTD	Site 3D4 (Planned)	Commercial	95		✓
PN92	KTD	Site 3D4 (Planned)	Commercial	95		✓
PN92A	KTD	Site 3D4 (Planned) facing the existing public cargo working area	Commercial	95		✓
PN93	TKW	Sung Wong Toi Road CDA site	CDA	95		✓
PN94	TKW	Sung Wong Toi Road CDA site	CDA	95		✓
PN95	TKW	Sung Wong Toi Road CDA site	CDA	95		✓
PN96	KTD	Site 2A1 (Planned)	Commercial	65		✓
PN97	KTD	Site 2A2 (Planned)	Commercial	65		✓
PN98	KTD	Site 2A3 (Planned)	Commercial	65		✓
PN99	KTD	Site 2A4 (Planned)	Commercial	55		✓
PN100	KTD	Site 2A5 (Planned)	Commercial	55		✓
PN101	KTD	Site 2A6 (Planned)	Commercial	55		✓
PN102	KTD	Site 4A2 (Planned)	Commercial	40		✓
PN103	KTD	Site 4C1 (Planned)	Commercial	40		✓
PN104	KTD	Site 4C2 (Planned)	Commercial	40		✓
PN105	KTD	Site 4C3 (Planned)	Commercial	40		✓

NSRs	District ⁽¹⁾	Location	Existing / Planned Land Use	Max. Building Height, m	Construction Phase	Operational Phase
PN106	KTD	Site 4C4 (Planned)	Commercial	40		✓
PN107	KTD	Site 4C5 (Planned)	Commercial	40		✓
PN108	KTD	Site 4A3 (Planned)	Commercial	40		✓
PN109	SPK	Choi Hung Road CDA Site (Planned)	CDA	Unknown		✓
PN110	SPK	Ex-San Po Kong Flatted Factory	Residential	100		✓
PN111	SPK	Ex-San Po Kong Flatted Factory	Residential	100		✓
PN112	SPK	Ex-San Po Kong Flatted Factory	Residential	100		✓

Note: (1) KT – Kwun Tong; NTK – Ngau Tau Kok; KB – Kowloon Bay; NCW – Ngau Chi Wah; SPK – San Po Kong; KC – Kowloon City, TKW – To Kwa Wan; HH – Hung Hom; KTD – Kai Tak Development

7.5 Assessment Methodology

Construction Noise during Unrestricted Hours

- 7.5.1 The construction activities of the Project taking place concurrently within 300 m of a given NSR are considered to contribute to the cumulative impact at that NSR. Noise sources from the areas greater than this distance were excluded from the assessment.
- 7.5.2 The methodology outlined in the GW-TM was used for the assessment of construction noise (excluding percussive piling). Sound Power Levels (SWLs) of the equipment were taken from Table 3 of this TM. Where no SWL is provided in the GW-TM, reference was made to BS 5228 or other previous similar studies or from measurements taken at other sites in Hong Kong.
- 7.5.3 Referring to the construction programme of the KTD Project and other projects within the study area, it is noted that construction period of following projects in the vicinity of KTD might overlap:
- Construction of and Distributor Road;
 - Sewage pumping stations;
 - Decommissioning of Remaining Parts of the Former Kai Tak Airport;
 - Decommissioning of the Former Kai Tak Airport Other than the North Apron;
 - Construction of Local Roads;
 - 600m Runway Opening;
 - Public landing steps cum fireboat berth;
 - Dredging work for proposed cruise terminal at Kai Tak;
 - Kwun Tong Transportation Link;
 - Trunk Road T2;
 - Central Kowloon Route;
 - Shatin Centre Link;
 - Barging point for the development project at Anderson Road and etc.
- 7.5.4 The above concurrent construction activities are considered to contribute to the cumulative impact at the noise assessment points and were included in the cumulative assessment if any of these construction activities are undertaken within 300m of a given noise assessment point. Locations of notional sources and distance for NSRs are given in **Appendix 3.20**.
- 7.5.5 A positive 3 dB(A) façade correction was added to the predicted noise levels in order to account for the facade effect at each noise assessment point.

Ground-borne Noise

- 7.5.6 A part of the proposed Shatin to Central Link (SCL) within KTD site boundary would be constructed by Tunnel Boring Machine (TBM). A qualitative assessment was conducted with reference to the approved EIA reports in the EIAO Register regarding potential ground-borne noise impacts from TBM, including the Kowloon Southern Link (KSL) EIA (Register No.: AEIAR-083/2005) & Sheung Shui to Lok Ma Chau Spur Line (Register No.: AEIAR-052/2002).

Operational Road Traffic Noise

- 7.5.7 Traffic noise was predicted using the methodology provided in the UK Department of Transport Calculation of Road Traffic Noise (CRTN) 1988. The assessment was based on the projected peak hour flows for the worst year within 15 years after opening of the roads. Road traffic noise levels is presented in terms of noise levels exceeded for 10% of the one-hour period during the peak traffic flow, i.e. $L_{10,1hr}$ dB(A). The projected 2031 morning peak hour traffic flows and vehicle compositions are attached in **Appendix 3.21**. Those roads with traffic flow below 50 veh/hr were not considered in this assessment. For the Kwun Tong Transportation Link (KTTL), the capacity traffic flow was assumed for conservative assessment.
- 7.5.8 Only roads within 300m (perpendicular distance) from each NSR were considered in the assessment for that NSR.
- 7.5.9 The existing noise screening structures and mitigation measures listed below for Prince Edward Road East and Kwun Tong Bypass were taken into account in the assessment:
- Low noise surfacing on the existing Prince Edward Road East and Kwun Tong Bypass;
 - 4m high barrier along N/B of Kwun Tong Bypass and its slip road; and
 - Semi-enclosures along Kwun Tong Bypass near Richland Garden and Choi Hung Estate.
- 7.5.10 The building layout plan with mitigation measures (1.5m vertical fins) for Site 1A1 and 1B1 are provided by the Housing Department and was adopted in this assessment under the unmitigated scenario.

Operational Phase Fixed Plant Noise

- 7.5.11 Fixed plant noise source is controlled by the NCO and IND-TM with a criteria of 5dB(A) below the appropriate Acceptable Noise Levels (ANL) shown in Table 3 of the TM on Noise from Place other than Domestic Premises, Public Places or Construction Sites or the prevailing background noise levels. The following procedures were applied to the operational phase fixed plant noise assessment.
- Identify fixed plant noise;
 - Calculate the correction factors based on the distance between the NSRs and the noise source positions;
 - Apply acoustics correction factors for façade, distance, barrier attenuation, acoustic reflection where applicable;
 - Calculate the maximum allowable Sound Power Level (SWL) as the compliance criteria for each fixed noise sources; and
 - Quantify the level of impact at the NSRs in accordance with IND-TM.

Noise from Open Air Entertainment Activities

7.5.12 Open air entertainment noise assessment was conducted in accordance with the following procedures:

- Establish the open air entertainment noise level from previous relevant noise measurement data;
- Determine in accordance with standard acoustic principle and practices the representative sound power level;
- Determine the separation distance at the NSRs from the noise source;
- Apply corrections for façade, distance, barrier attenuation and acoustic reflection where applicable; and
- Quantify the level of impact at the NSRs in accordance with guidelines.

Heliport Noise

7.5.13 Potential noise impact would be arisen from the operation of the heliport proposed at the tip of the former runway. According to Table 1A of Annex 5 “A Summary of Noise Criteria” in the EIAO-TM, the criteria for helicopter noise is L_{max} 90dB(A) for offices and L_{max} 85dB(A) for domestic premises, hotels, hostels, education institutes, places of worship, hospital and clinics during 0700-1900 hours. The standards apply to uses that rely on openable windows for ventilation and the standards should be viewed as the maximum permissible noise levels assessed at 1m from the external façade.

7.5.14 Reference was made to other relevant approved EIA Report in the EIAO Register regarding potential noise impacts from heliport operation in urban area, including the *Comprehensive Feasibility Study for The Revised Scheme of South East Kowloon Development (SEKDCFS)* EIA and the EIA on Expansion of Heliport Facilities at Macau Ferry Terminal. Assessment was based on basic acoustic principle with reference to the EIAO-TM.

Rail Noise

7.5.15 Rail noise assessment was conducted in accordance with the following procedures:

- Identify noise source;
- Assess its noise impact to sensitive receiver

Marine Traffic Noise (include noise from typhoon shelters)

7.5.16 Marine traffic noise assessment was conducted in accordance with the following procedures:

- Identify noise source;
- Assess its noise impact to sensitive receiver

7.6 Identification of Environmental Impacts

Construction Phase

7.6.1 The potential construction impact arising from this Project includes construction of road network, land formation and other related works. These construction activities will involve the use of Powered Mechanical Equipment (PME) including breakers, excavators, lorries, mobile cranes, concrete truck mixers, pokers, rollers, etc. The construction noise impact assessment was carried out based on the best available construction plant inventory. The preliminary plant inventory for SCL was obtained from SCL engineer for this assessment. Mitigation measures, where required, would be formulated and the residual construction noise impact assessed. The use of PMEs adopted for the assessment is detailed in **Appendix 3.22**.

- 7.6.2 The construction activities of the Project will coincide with the barging point facilities for the Anderson Road Project. The barging point project is to be implemented by CEDD/Special Duties (Works) from Jan 2008 through Dec 2014. The barging point facilities are located at middle Runway for transporting the surplus C&D materials from the development area to receptor sites. Given the shortest notional source distance to NSR is more than 1 km, the related cumulative construction noise impact arising from these barging facilities was not assessed.

Ground-borne Noise

- 7.6.3 A part of the proposed Shatin to Central Link (SCL) within KTD site boundary would be constructed by TBM. The construction method of SCL is illustrated in **Figure 7.1**. Reference was made to the approved EIA reports in the EIAO Register regarding potential ground-borne noise impacts from TBM, including the Kowloon Southern Link (KSL) EIA (Register No.: AEIAR-083/2005), Sheung Shui to Lok Ma Chau Spur Line (Register No.: AEIAR-052/2002).
- 7.6.4 **Figure 7.1** is illustrated that two sections of SCL alignment within KTD will be constructed by TBM. The TBM will be at least 25m and 60m away from the nearest sensitive receiver at Site 1A (PN6A) and Site 2B1 (PN56). The geology at the concerned area comprises mainly alluvial material and granite which is considered similar to the geology for throughout the KSL alignment. With reference to the KSL EIA report, the ground borne noise level for the sensitive receiver is 43dB(A) at 5m away from the TBM. In addition, with reference to the Spur Line EIA, there was no noticeable effect from the Kwai Tsing tunnel which was constructed by TBM and it passed within 20m of Kwai Tsing Theatre. Given the larger separation distance in this case between the SCL TBM sections of the nearby NSRs in KTD, adverse ground borne noise impact arising from the SCL TBM is not anticipated.
- 7.6.5 As discussed in **Section 1.5** of this report, the proposed SCL is a Schedule 2 designated project under the EIAO. The proposed SCL will be designed, constructed and operated by the others. The associated environmental impacts will be adequately addressed in a further detailed EIA study to be prepared and submitted under the EIAO by the respective project proponent.

Operational Phase

- 7.6.6 Operational phase impacts will arise from the following operations:
- Road traffic noise
 - Operational phase fixed plant noise (including marine traffic noise)
 - Noise from open air entertainment activities
 - Helicopter noise
 - Rail noise
 - Marine traffic noise (include noise from typhoon shelters)

Road Traffic Noise

- 7.6.7 The proposed road network in Kai Tak Development comprises of district distributors and local distributors. Together with the existing heavily trafficked roads surrounding the development site such as Prince Edward Road East and Kwun Tong Bypass, potential impact by road traffic noise would affect the planned NSRs within the development site.

Operational Phase Fixed Plant Noise

7.6.8 **Sewage Pumping Stations (SPS):** Seven sites are planned for the construction of sewage pumping stations to serve the KTD and the hinterland. The major noise sources come from the pumps and ventilation system. Some of these sites are located close to nearby NSRs. However, all pumps will be installed underground and enclosed with a building structure according to typical design adopted by the Drainage Services Department. The design of the SPS should also avoid creating noise nuisance to the surrounding NSRs. By locating the opening of the exhaust of the ventilation system away from any NSRs and installing acoustic louvers at the exhaust could effectively attenuate the noise generated during operation of the SPS. Insurmountable noise impact to the NSRs from the operation of the SPS is therefore not expected.

7.6.9 **Electrical Substations (ESS):** Total six sites are reserved for electric substations to support the KTD. The capacities of each ESS are stated below. The major noise sources come from the transformer and ventilation system. Some of them are located close to nearby NSRs. For these ESS, the equipment which would generate noise should be enclosed in a building structure. By locating the opening of the exhaust of the ventilation system away from any NSRs and installing acoustic louvers at the exhaust could effectively attenuate the noise generated during operation of the ESS. The location of the ventilation system's opening or chillers should be located away from the NSRs as far as possible. Insurmountable noise impact to the NSRs from the operation of the ESS is therefore not expected.

<u>ESS</u>	<u>Capacities</u>
Site 1A5	132kV
Site 1D1	132kV
Site 1P4	132kV
Site 2A7	400kV
Site 5A2	132kV
Site 4D5	132kV

7.6.10 **Tunnel Ventilation Shafts:** There are five proposed tunnel ventilation shafts and one existing ventilation shaft in the vicinity of KTD. The major noise source comes from the ventilation fan inside the shaft. The locations of the ventilation shafts and the maximum sound power levels (SWLs) of the ventilation fan that are required to meet the relevant noise criteria were determined. For the ventilation shaft of Kai Tak Tunnel, a survey has been conducted to collect the SWL. The measured results are shown in **Table 7.7** below. In order to present the worst case scenario, SWL 93dB(A) was used for the calculation.

Table 7.7 Measured SWLs for Kai Tak Tunnel Ventilation Shaft

Kai Tak Airport Ventilation Shaft	Measured SWL, dB(A)
South façade	93
West façade	87
North façade	88

7.6.11 Apart from the restriction on the SWLs, the openings of the proposed ventilation shafts should be oriented such that they would be faced away from any nearby NSRs and adopt any necessary further mitigation measures like acoustic louvers and silencers. The potential noise impact at the NSRs due to the operation of the ventilation shafts is expected to be minimal with proper mitigation measures adopted.

7.6.12 **Cruise Terminal Operation:** A two-berth cruise terminal is proposed at the southern tip of the former Kai Tak Airport runway. The major noise sources from the ventilation system of cruise terminal and noise emissions from cruise would be expected during cruise mooring. Other noise sources emitted from machinery intake/uptake or ventilation inlet/outlet would also be expected during cruise hotelling.

- 7.6.13 Public Transport Interchange (PTI): There are total of four PTIs located within the Kai Tak Development site. They are located in Site 1F2, 4D2, 6A4 and 5B2. Sites 6A4 and 5B2 are existing PTIs located next to the Kwun Tong Ferry Pier and Kowloon City Ferry Pier.
- 7.6.14 The PTI at Site 5B2 may be upgraded and modified after construction of CKR. In case of upgrade and modify, some general considerations should be taken during the planning stages including (i) avoid locating open-form PTI in proximity to noise sensitive uses; (ii) consider adopting a complete podium decking over the PTI; (iii) take into account the potential locations of ingress/egress and consequent noise disturbances due to traffic routings, particularly during sensitive hours; and (iv) give consideration to adopting administrative controls to avoid the noise impact from PTI.
- 7.6.15 The nearest NSR to the PTI at Site 1F2 and Site 4D2 are located with a distance of about 47 m at Site 1F1 and 130 m at Site 4B5. For Site 1F1, as stated in OZP No. S/K22/2, a special design requirement is incorporated for this site facing the Station Square such that the residential element should commensurate with the commercial element in form. The layout of the affected NSRs at Site 1F1 could be designed to avoid the noise sensitive uses facing the PTI or providing the noise sensitive uses with window insulation and air conditioning. The top of the PTI is proposed to develop with a commercial building which could provide noise screening to the nearby NSRs. Furthermore, general considerations during the planning stages including (i) avoid locating open-form PTI in proximity to noise sensitive uses; (ii) consider adopting a complete podium decking over the PTI; (iii) take into account the potential locations of ingress/egress and consequent noise disturbances due to traffic routings, particularly during sensitive hours; and (iv) give consideration to adopting administrative controls to avoid the noise impact from PTI should be considered. Therefore, adverse noise impact due to PTI at the NSRs is not expected.
- 7.6.16 The other noise source comes from the ventilation system of the PTI. The locations of the ventilation system and the maximum sound power levels (SWLs) of the ventilation fan that are required to meet the relevant noise criteria were determined. Apart from the restriction on the SWLs, the openings of the proposed ventilation shafts should be oriented such that they would be faced away from any nearby NSRs and adopt any necessary further mitigation measures like acoustic louvers and silencers. The potential noise impact at the NSRs due to the operation of the ventilation shafts is expected to be minimal with proper mitigation measures adopted.
- 7.6.17 Fixed Plant Noise from Railway and Railway Station: The proposed Shatin to Central Link (SCL) and its stations would be at Site 1F (Kai Tak Station) and Site 2D (To Kwan Wan Station). Two ventilation buildings are proposed at the both To Kwan Wan Station and Kai Tak Station and identified as fixed plant noise sources. The locations of the ventilation shafts and the maximum sound power levels (SWLs) of the ventilation fan that are required to meet the relevant noise criteria were determined. Apart from the restriction on the SWLs, the openings of the proposed ventilation shafts should be oriented such that they would be faced away from any nearby NSRs and adopt any necessary further mitigation measures like acoustic louvers and silencers. The potential noise impact at the NSRs due to the operation of the ventilation shafts is expected to be minimal with proper mitigation measures adopted.
- 7.6.18 Fixed Plant Noise from Environmental Friendly Transportation System (EFTS) Depot: The proposed EFTS is located at the Metro Park. The depot of EFTS would be in the form of an enclosed building structure. The potential noise impact at the NSRs due to the operation of the EFTS depot is expected to be minimal with proper mitigation measures adopted.
- 7.6.19 As discussed in **Section 1.5** of this report, the proposed EFTS Depot is a Schedule 2 designated project under the EIAO. The proposed EFTS will be designed, constructed and operated by the others. The associated environmental impacts will be adequately addressed in a further detailed EIA study to be prepared and submitted under the EIAO by the respective project proponent.

- 7.6.20 Fire Station and Ambulance Depot (FSAD): The proposed locations of the fire station and ambulance depot are located at Site 2A8 and Site 3C2. The distance to the nearest NSRs to FSAD at Site 2A8 namely N15 and PN60 are 103m and 107m, respectively. For the FSAD located at Site 3C2, the distance to the nearest NSRs (PN86) is about 30m.
- 7.6.21 Noise sources associated with these stations would be related to the emergency response of the stations and would include the station loudspeakers, siren and the vehicle sirens. Noise from fire stations may sometimes be disturbing particularly during emergency duties. Yet such occurrences are of short duration and infrequent, and could not be avoided when emergencies occur. The sirens are intended to warn surrounding emergency, so that priority may be given to them. Emergency vehicles could also be assisted in their response by installation of “hurry call” or other signalisations at intersection along the route.
- 7.6.22 The noise impact at NSR PN60 can be screened by the building structure at Site 2A6. Adverse noise impact is therefore not anticipated.
- 7.6.23 For NSR PN86, it is confirmed with Food and Health Bureau that the proposed hospital site will provide with window insulation and air conditioning, adverse noise impacts due to FSAD at this NSR is not expected. The documentation of confirmation from the Food and Health Bureau is included in **Appendix 18.1**.
- 7.6.24 The “C” area sensitivity rating was identified for N15 and considering that it is already affected by the existing high traffic noise level along Prince Edward Road East. In addition, the noise event from FSAD would be short term. The time-averaged noise level for Leq, 30 min would be low. Administrative measures would be adopted by the Director of Fire Services to minimize the noise impact to nearby NSRs. Adverse noise impact due to FSAD is not expected.
- 7.6.25 Noise from Sports Activity at Stadium: Site 2D is reserved for the development of a Stadium Complex. The location of the Stadium Complex has been planned with considerations of protection of view corridor, accessibility by public transport and provision of sufficient buffer distance to the nearby NSRs. Noise from stadiums for sporting activities may include both the crowd noise and public address broadcast (PA).
- 7.6.26 District Cooling System Plant (DCSP): Total two sites (Site 1N2 and Site 4C1) are reserved for DCSP. The major noise sources come from the pump system. The DCSP at Site 4C1 would be installed below ground. Adverse noise impact at the nearby NSRs is not expected. For the DCSP at Site 1N2, the nearest NSRs are PN34 & PN38. For this DCSP, the equipment which would generate noise should be enclosed in a building structure. By locating the opening of the exhaust of the ventilation system away from any NSRs and installing acoustic louvers at the exhaust could effectively attenuate the noise generated during operation of the DCSP. The location of the ventilation system’s opening should be located away from the NSRs as far as possible. Insurmountable noise impact to the NSRs from the operation of the DCSP is therefore not expected.
- 7.6.27 Public Cargo Working Area (PCWA): Existing Kwun Tong Cargo Working Area is located at Hoi Bun Road, Kwun Tong. The major noise sources would be loading and unloading of containers and goods handling. For those nearest planned NSRs at Site 3D4, the commercial development will most likely be centrally air-conditioned, and it could also be designed to avoid sensitive façade facing to the noise sources or incorporate hotel-like service apartment with the provision of central air conditioning. Adverse noise impacts at this site due to the operation of PCWA are not expected.
- 7.6.28 Other Fixed Noise Sources: With reference to the RODP dated May 2008, no Concrete Batching Plants, Construction Material Handling Facilities, Open Car/Lorry Park and Refuse Transfer Station are located within the Kai Tak Development.

Noise from Open Air Entertainment Activities

- 7.6.29 Site 2D is reserved for the development of a Stadium Complex. The location of the Stadium Complex has been planned with considerations of protection of view corridor, accessibility by public transport and provision of sufficient buffer distance to the nearby NSRs.
- 7.6.30 The major noise sources associated with the Stadium Complex include the use of loudspeakers and the crowd. With reference to the findings of SEKDCFS EIA report, there will be no significant noise impact on NSRs if the main stadium incorporated the retractable roof design. The retractable roof of the main stadium could provide screening effect on noise impact, nearby NSRs without direct line-of-sight of the spectator area of the main stadium could be benefited from this.
- 7.6.31 As discussed in **Section 1.5** of this report, the outdoor sporting facility of the proposed Stadium Complex is a Schedule 2 designated project under the EIAO. The proposed Stadium Complex will be designed, constructed and operated by the others. The associated environmental impacts will be adequately addressed in a further detailed EIA study to be prepared and submitted under the EIAO by the respective project proponent.

Heliport Noise

- 7.6.32 A heliport is proposed at the tip of the former Kai Tak Airport runway. The closest NSR to the heliport is located at a distance of more than 700 m in Site 4B5. With reference to the *CFS for the Revised Scheme of SEKD (2001)*, a 300 m setback of the heliport from the NSR is required. Hence the current buffer distance of 700 m allowed in the RODP should be sufficient to attenuate the noise impact generated by the operation of the heliport to meet the HKPSG noise criteria of $L_{max} 85 \text{ dB(A)}$. The flight path should be so designated to reduce noise impacts. However, as the proposed heliport is located adjacent to the proposed Runway Park, some forms of barrier could be considered to minimise the potential noise impacts of heliport operation on the pedestrians / visitors at the Runway Park despite the Runway Park is not considered as a NSR.
- 7.6.33 For the helicopter landing/take-off at Hong Kong Aviation Club (HKAC), according to the latest development schedule of KTD, the helipad should cease operation prior to occupation of the residential site (i.e. on or before 2012). Therefore, no helicopter noise impact arising from HKAC during operational phase of the Project.

Rail Noise

- 7.6.34 The proposed Shatin to Central Link (SCL) and its stations would be at Site 1F (Kai Tak Station) and Site 2D (To Kwan Wan Station). The SCL line would be underground and hence operational railway noise impact is not expected.
- 7.6.35 EFTS is proposed to be introduced to operate as a major internal mode of transport within Kai Tak Development. It is proposed to provide feeder services between SCL Kai Tak Station, SCL To Kwan Wan Station and the Tourism Node. As discussed in Section 2, two options of alignment of EFTS were studied. The alignment of EFTS for both options are shown in **Figure 7.2**.
- 7.6.36 Several modes of EFTS, including light rail transit (LRT), trolley bus, automatic people mover (APM), monorails, and electric / LPG bus, were investigated during feasibility study. For conservative noise assessment, the rail based EFTS was assumed for rail noise assessment. The tentative train operation mode is listed below.
- Operation Hour: 6am to 12mid-night
 - Train frequency: 14 train/hr for peak hour and 4 train/hr for non-peak hour for each direction

- 7.6.37 As discussed in **Section 1.5** of this report, the proposed ETFS is a Schedule 2 designated project under the EIAO if the selected system is rail type. The proposed ETFS will be designed, constructed and operated by the others. The associated environmental impacts will be adequately addressed in a further detailed EIA study to be prepared and submitted under the EIAO by the respective project proponent.

Marine Traffic Noise (include noise from typhoon shelters)

- 7.6.38 Noise impacts arising from operation activities on the moored vessels in typhoon shelters and manoeuvring of vessels at the proposed cruise terminal from the typhoon shelters may vary with the composition and type of the vessels. The potential noise impact is likely come from the engine noise and operation activities of individual vessel in operation. It is similar to noise from public place which vessels are free to move around and implementation control measures are not possible.
- 7.6.39 Noise from Marine Traffic: With reference to approved SEKDCFS EIA Report, the measured daytime noise level of marine traffic at Hung Hom waterfront was about 59.9 dB(A) in Leq (30min). The measured noise level was associated with several kinds of vessel manoeuvring, such as speed boats, cargo ships, ferries, tug boats, etc. Given measured noise level was low and the marine traffic during night-time would likely be much lower. Therefore, adverse noise impact from marine traffic is not anticipated.
- 7.6.40 Noise from Typhoon Shelters: A comparison of typhoon shelters of different typhoon shelters is presented in below **Table 7.8**. The locations of the typhoon shelters are shown in **Figure 7.3**.

Table 7.8 A Comparison of Typhoon Shelters in Relation to NSRs in Hong Kong

Typhoon Shelters (TS)	Distance to the nearest NSRs, m	
	Boundary of TS	Centre of TS
Yau Ma Tei TS	140	860
Sam Ka Tsuen TS	200	320
Shek Tong Mei TS	100	170
Causeway Bay TS	140	500
Aberdeen TS	150	250
Kwun Tong TS	110 (Site 3D4 – PN92 Commercial) 250 (Site 4B5 – PN64 Residential)	280 (Site 3D4 – PN92 Commercial) 450 (Site 4B5 – PN64 Residential)
To Kwa Wan TS	280 (N23 - Education) 380 (N22 – Residential)	540 (N23 Education) 700 (N22 – Residential)

Note: PN92 is for commercial use with no domestic plot ratio.

Kwun Tong Typhoon Shelter

- 7.6.41 The existing Kwun Tong Typhoon Shelter is located to the southeast of Site 3D4 with about 110m separation distance between the nearest NSR and the boundary of the typhoon shelter. With reference to the SEKDCFS EIA Report, the measured noise level of existing typhoon shelter at Kwun Tong is about 68.8 dB(A) in Leq (30min). Taking into account the distance attenuation effect associated with a buffer distance of about 110m between the Kwun Tong Typhoon Shelter and the nearest NSR, the noise level at the nearest NSR would be minimal. Given no domestic plot ratio on Site 3D4, the land use of NSR would be commercial with sensitive uses and all affected NSRs are commercial NSRs which will most likely be centrally air-conditioned. Other measures such as the layout of the affected NSRs could be designed to avoid the noise sensitive uses facing the major noise sources or providing the noise sensitive uses, like hotel, with window insulation and air conditioning. Adverse noise impact at the site is not expected.

To Kwa Wan Typhoon Shelter

- 7.6.42 The existing To Kwa Wan Typhoon Shelter is located to the southeast of Site 5C with about 280m separation distance between the nearest NSR (Holy Carpenter Primary School) and the boundary of the typhoon shelter. As the nature of this typhoon shelter is similar to the Kwun Tong Typhoon Shelter, the same noise level of 68.8 dB(A) in L_{eq} (30min) was adopted for the assessment. Taking into account the distance attenuation effect associated with a buffer distance of about 280m between the To Kwa Wan Typhoon Shelter and the nearest NSR, the noise level at the nearest NSR would be minimal.

7.7 Prediction and Evaluation of Environmental Impacts

Construction Phase

- 7.7.1 For normal daytime working hours, exceedances of the construction noise criteria (L_{eq} (30-min) 75 dB(A) for residential uses and 70 dB(A) for educational institutions (65 dB(A) during examinations)) are predicted at representative NSRs in the absence of mitigation measures. Details of construction noise calculations and results are presented in **Appendix 3.23**. The assessment results show that the predicted cumulative noise levels related to the concurrent construction works of the Project are in the range of 45 to 92 dB(A) L_{eq} (30-min). A summary of the unmitigated construction noise levels of the representative NSRs during normal daytime working hours within the construction period of the Project is listed in **Table 7.9**. Noise mitigation measures would therefore be required to reduce noise levels at the NSRs for compliance with the noise standard.

Table 7.9 Summary of Cumulative Unmitigated Construction Noise Levels at Representative NSRs During Normal Daytime Working Hours

NSR	Noise Criteria, dB(A)	Predicted Unmitigated Construction Noise Levels during Normal Daytime Working Hour (L_{eq} (30-min), dB(A))	Exceedance, dB(A)
N1	75	54 - 81	6
N2	75	54 - 77	2
N3	75	56 - 73	0
N4	65/70*	64 - 76	11/6
N5	65/70*	63 - 78	13/8
N6	75	61 - 81	6
N7	75	59 - 87	12
N8	75	58 - 81	6
N9	75	58 - 79	4
N10	75	58 - 84	9
N11	65/70*	59 - 84	19/14
N12	75	60 - 84	9
N13	65/70*	60 - 82	17/12
N14	75	60 - 89	14
N15	75	60 - 86	11
N16	75	59 - 78	3
N17	75	60 - 82	7
N18	75	63 - 83	8
N19	75	62 - 82	7
N20A	75	61 - 76	1
N20B	75	61 - 82	7
N21	75	61 - 82	7
N22	75	60 - 80	5
N23	65/70*	60 - 91	26/21
N24	65/70*	59 - 70	5/0
N25	75	58 - 78	3
N26	75	57 - 74	0
N27	65/70*	57 - 74	9/4
N28	65/70*	57 - 76	11/6
N29	75	57 - 72	0
N30	75	62 - 80	5
N31	65/70*	45 - 58	0
N32	75	59 - 79	4
PN1	75	60 - 84	9
PN2	75	66 - 92	17
PN35	75	69 - 81	10

Note: *For normal daytime working hours, the noise criteria are 70 dB(A) and 65 dB(A) for normal teaching periods and examination periods, respectively.

Operational Phase

7.7.2 Operational phase impacts will arise from the following operations:

- Road traffic noise
- Operational phase fixed plant noise
- Noise from open air entertainment activities
- Helicopter noise
- Rail noise
- Marine traffic noise (include noise from typhoon shelters)

Road Traffic Noise

- 7.7.3 The proposed road network in Kai Tak Development comprises of district distributors and local distributors. Together with the existing heavily trafficked roads surrounding the development site such as Prince Edward Road East and Kwun Tong Bypass, potential impact by road traffic noise would affect the planned NSRs within the development site.
- 7.7.4 Traffic noise levels have been predicted at representative noise assessment points including existing residential, institutional uses, and future uses on planned receivers. **Appendix 3.24** gives the breakdown of the noise contributions from the new roads and existing roads at all representative existing and planned NSRs for the RODP as well as for the Through Road L3 alternative option. Sample output files for 10 representative assessment points are included in **Appendix 3.25**. Road-plots of the traffic noise model, the existing low noise surfacing and noise barrier are shown in **Appendix 3.25**.
- 7.7.5 Without the noise mitigation measures in place, the predicted noise levels at the identified NSRs would range from 42 to 87 dB(A) L_{10} (1-hour). The following paragraphs discuss the potential noise impacts at difference area of NSRs under this study.
- 7.7.6 **Existing NSRs (N1 to N32) and Planned (NSR PN1, PN93 – PN95 & PN109):** The predicted noise levels at all existing NSRs (except N21 to N23) and planned NSR PN1, PN93 to PN95 & PN109 exceeded the noise criterion of 70 dB(A) or 65 dB(A) for schools or 55dB(A) for clinics. However, the noise exceedances are caused by the existing roads. The 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A).
- 7.7.7 For the existing school and clinic, the on-site survey has revealed that all of these NSRs have already been noise insulated with air-conditioners. With the provision of air-conditioners, it is considered that the traffic noise impact would be minimised by keeping the windows closed. Therefore, traffic noise impact at these NSRs would be insignificant. Hence, direct mitigation measures on 'New' roads are not required as they would not be effective in improving the noise environment at the sensitive receivers.
- 7.7.8 **Site 1A:** The predicted noise levels at PN6A, PN6B, PN7A, PN18, PN19, PN20 & PN20A exceeded the noise criterion of 70 dB(A) or 65 dB(A) for schools. However, the noise exceedances are caused by the existing roads. The 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A). In addition, the piling work has already been completed at Site 1A1, alternative land use arrangement for this site is considered not feasible. The low-rise nature of schools will make any noise mitigation measures such as cantilever barriers more effective than for the case of high-rise domestic development. There is not enough non-sensitive uses e.g. carpark, commercial uses as noise screen. Hence, direct mitigation measures on 'New' roads are not required as they would not be effective in improving the noise environment at the sensitive receivers.
- 7.7.9 Under the Through Road L3 alternative option, the predicted noise levels at Site 1A are similar to the basic option without through road except PN19A & PN20A. The predicted noise level at PN19A & PN 20A exceeded the noise criterion of 65dB(A) and increased by up to 8 dB(A) when compared with the basic option. Mitigation measures should be considered for Through Road L3 to minimise the associated noise impact, alternatively, the layout of the affected schools could be designed to avoid sensitive façade facing the major traffic noise sources or provided with window insulation and air conditioning.

- 7.7.10 **Site 1B1:** The predicted noise levels at PN23A to PN23C, PN26, PN29, PN30A to PN31B & PN33 exceeded noise criterion of 70 dB(A). It is identified that the 'New' road noise contribution to the overall noise level would be more than 1.0 dB(A). The major noise source is Road L2 and Kwun Tong Bypass that contributed significant traffic noise impact to these NSRs. Hence, direct mitigation measures on 'New' road (Road L2) are required to reduce the traffic noise impact.
- 7.7.11 **Site 1B2 to 1B4:** The predicted overall noise levels at PN36, PN37 & PN38 exceeded the noise criterion of 65 dB(A). The 'New' roads noise contribution to the overall noise levels would be more than 1.0 dB(A). The major noise sources are Road L2 and Road L4. Hence, direct mitigation measures at Road L2 and Road L4 are required for the affected NSRs.
- 7.7.12 **Site 1I1:** The predicted overall noise levels at PN39 & PN40 exceeded the noise criterion of 70 dB(A). The 'New' road noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings. Hence, direct mitigation measures at Road L4 would be required to reduce the noise impact from 'New' roads for PN39 & PN40.
- 7.7.13 **Site 1L2 and 1L3:** The predicted overall noise levels at PN50, PN51 & PN52 exceeded the noise criterion of 70 dB(A). The 'New' road (Road D2) noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings. Hence, direct mitigation measures at Road D2 would be required to reduce the noise impact from 'New' roads for PN50, PN51 & PN52.
- 7.7.14 **Site 2B6:** The predicted noise levels at planned NSRs for PN61 & PN62 exceeded the noise criterion of 70 dB(A). However, the noise exceedances are caused by the existing roads. The 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A). Hence, direct mitigation measures on 'New' roads are not required as they would not be effective in improving the noise environment at the sensitive receivers.
- 7.7.15 **Site 5A4:** The predicted noise levels at planned NSRs for PN65 and PN66 exceeded the noise criterion of 70 dB(A). However, the noise exceedances are caused by the existing roads. The 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A). Hence, direct mitigation measures on 'New' roads are not required as they would not be effective in improving the noise environment at the sensitive receivers.
- 7.7.16 **Site 3C (Hospital / Clinic):** The predicted noise levels at planned NSRs for PN80 to PN86 exceeded the noise criterion of 55 dB(A). However, the noise exceedances are caused by both existing road, the planned Road T2 and local road.
- 7.7.17 **Other Sites within KTD area:** The predicted traffic noise impacts for other planned NSRs PN69 – PN108 (except PN93-95) within KTD area are summarized in **Table 7.10**. The noise exceedances are caused by both existing road and "New" roads. All the affected NSRs are either commercial uses, mixed uses or community uses and allowed some noise sensitive uses. For PN71-73 and PN87-92, the land use allows domestic uses which will require planning permission from the Town Planning Board. These planning applications should include assessments on the traffic noise impact to demonstrate that the proposed development would not result in adverse impact for the development.

Table 7.10 Summary of Traffic Noise Impact for Other Sites within KTD area

NSR	Location	Planned Land Use	Major Noise Sources	Noise Level Above criterion, dB(A)		
				70	65	55
PN69	Site 1D3	Community Use with hostel	Prince Edward Road East	✓	✓	✓
PN70	Site 1D3	Community Use with hostel	Road D1	✓	✓	✓
PN71	Site 1E1	Mixed Use	Prince Edward Road East & Road D1	✓	✓	✓
PN72	Site 1E1	Mixed Use	Prince Edward Road East	✓	✓	✓
PN73	Site 1F1	Mixed Use	Road D1	✓	✓	✓
PN74	Site 1M1	CDA	Prince Edward Road East	✓	✓	✓
PN75	Site 1M2	CDA	Prince Edward Road East	✓	✓	✓
PN76	Site 3B1	Undesignated	Kwun Tong Bypass & Road T2	✓	✓	✓
PN77	Site 3B2	Undesignated	Kwun Tong Bypass & Road T2	✓	✓	✓
PN78	Site 3B3	Undesignated	Kwun Tong Bypass & Road T2	✓	✓	✓
PN79	Site 3B4	Undesignated	Kwun Tong Bypass & Road T2	✓	✓	✓
PN87A	Site 3E1	Commercial with sensitive uses	Lam Chak Street	✓	✓	✓
PN87B	Site 3E1	Commercial with sensitive uses	Road D3 & D4			✓
PN88	Site 3D2	Commercial with sensitive uses	Cheung Yip Street	✓	✓	✓
PN89	Site 3D2	Commercial with sensitive uses	Kwun Tong Bypass	✓	✓	✓
PN90	Site 3D3	Commercial with sensitive uses	Cheung Yip Street	✓	✓	✓
PN91A	Site 3D4	Commercial with sensitive uses	Kai Hing Road & Kwun Tong Bypass	✓	✓	✓
PN91B	Site 3D4	Commercial with sensitive uses	Kai Hing Road & Kwun Tong Bypass			✓
PN92	Site 3D4	Commercial with sensitive uses	Kai Hing Road	✓	✓	✓
PN96	Site 2A1	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN97	Site 2A2	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN98	Site 2A3	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN99	Site 2A4	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN100	Site 2A5	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN101	Site 2A6	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN102	Site 4A2	Commercial with sensitive uses	Road L12 Road L13		✓	✓
PN103	Site 4C1	Commercial with sensitive uses	Road L13		✓	✓
PN104	Site 4C2	Commercial with sensitive uses	Road L13		✓	✓
PN105	Site 4C3	Commercial with sensitive uses	Road L13		✓	✓
PN106	Site 4C4	Commercial with sensitive uses	Road L13		✓	✓

NSR	Location	Planned Land Use	Major Noise Sources	Noise Level Above criterion, dB(A)		
				70	65	55
PN107	Site 4C5	Commercial with sensitive uses	Road L13		✓	✓
PN108	Site 4A3	Commercial with sensitive uses	Road L12		✓	✓

- 7.7.18 **Ex-San Po Kong Flatted Factory:** The predicted overall noise levels at PN111 & PN112 exceeded the noise criterion of 70 dB(A). The 'New' road (slip road from Prince Edward Road East to San Po Kong) noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings. Hence, mitigation measure would be required to reduce the noise impact from 'New' roads for PN111 & PN112.

Operational Phase Fixed Plant Noise

- 7.7.19 **Sewage Pumping Stations (SPS):** Section 4.3 of this report assessed the operational noise impacts from the proposed SPSs. The locations of the ventilation fans and the maximum sound power levels (SWLs) required to meet the relevant noise criteria were determined. The operation noise impacts from SPSs ventilation fans can be effectively mitigated by implementing noise control treatment at source during the design stage and residual operation noise impacts are not anticipated.
- 7.7.20 **Electrical Substations (ESS):** The major noise source comes from the transformer and ventilation system inside and enclosed in the ESSs building structure. The locations of the exhaust fans and the maximum sound power levels (SWLs) required to meet the relevant noise criteria were determined. Table 7.11 shows the proposed locations of the ESS and the required sound power level for the nearest affected NSRs to achieve noise compliance. The detailed calculation is shown in Appendix 7.2. The 400kV substation and transmission line are a Schedule 2 DP and its environmental impact will be fully addressed in separate EIA study.

Table 7.11 Predicted Maximum Allowable Sound Power Levels for ESS

ESS	Likely affected NSRs	ASRs	Approx Distance to NSR, m	Sound Power Level (SWL, dB(A)) required at source in order to meet the criteria	
				Daytime	Nighttime
Site 1A5	PN18	B	15	86	-
Site 1D1	PN2	B	209	108	98
Site 1P4	PN52	B	83	80	80
Site 2A7	PN61	B	49	76	76
Site 4D5	PN64	B	404	94	89
Site 5A2	N18	B	50	75	75
Site 5A2	N19	B	44	75	75
Site 5C2	N24	B	5	76	-

- 7.7.21 The above SWL criteria should be implemented and refined during the detailed design stage of the respective ESS by the contractor(s). Any new NSRs should also be identified and incorporated into the design as necessary. The contractor(s) shall install sound attenuators, noise barriers and acoustic enclosures as appropriate to ensure that the specified maximum SWLs in the above Table 7.11 are achieved. The performance of the sound attenuators shall be obtained by comparing the total SWL of noise emanating from the facade and the specified maximum SWL specified in the above Table 7.11. The predicted noise levels at NSRs due to cumulative fixed plant operations are presented in Table 7.12.

Table 7.12 Summary of Predicted Operational Noise Levels

NSR	NSR Description	ASRs	Predicted Noise Level, dB(A) / ANL, dB(A)	
			Daytime	Nighttime
N18	HK Society for Blind hostel	B	60 / 60	49 / 50
N19	Mok Cheong Street Residential District	B	60 / 60	50 / 50
N24	Oblate Father's Primary School	B	60 / 60	-
PN18	Site 1A2 (Planned)	B	60 / 60	-
PN2	Site 1A1 (Planned)	B	60 / 60	50 / 50
PN52	Site 1L3 (Planned)	B	60 / 60	50 / 50
PN61	Site 2B6 (Planned)	B	60 / 60	50 / 50
PN64	Site 4B5 (Planned)	B	60 / 60	50 / 50

- 7.7.22 Vehicular Tunnel Ventilation Shafts: Tunnel Ventilation shafts are normally required at each end of the underground tunnels. Potential noise sources are associated with the fan systems. Analysis has been conducted to quantify the preliminary near-field SWL criteria (**Appendix 7.2**). A summary of the SWL criteria which is recommended for incorporation into the contract specification is given in **Table 7.13**.

Table 7.13 Predicted Maximum Allowable Sound Power Levels for Ventilation Shafts

Ventilation Shafts	Likely affected NSRs	ASRs	Approx Distance to NSR, m	Sound Power Level (SWL, dB(A)) required at source in order to meet the criteria	
				Daytime	Nighttime
Road T2 (South façade)	PN63	B	445	106	96
Road T2 (South façade)	PN80	C	90	106	96
CKR at Site 5B1 (North façade)	N20B	B	51	93	83
CKR at Site 5B1 (South façade)	N21	B	22	86	76
CKR at Site 1P3	PN52	B	215	103	89

- 7.7.23 The above SWL criteria should be implemented and refined during the detailed design by the respective project proponent. Any new NSRs should also be identified and incorporated into the design as necessary. The project proponent shall install sound attenuators, noise barriers and acoustic enclosures as appropriate to ensure that the specified maximum SWLs in the above **Table 7.13** could be achieved. The performance of the sound attenuators shall be obtained by comparing the total SWL of noise emanating from the facade and the specified maximum SWL specified in the above **Table 7.13**. The predicted noise levels at NSRs due to cumulative fixed plant operations (include ESSs and SPSS) are presented in **Table 7.14**.

Table 7.14 Summary of Predicted Operational Noise Levels

NSR	NSR Description	ASRs	Predicted Noise Level, dB(A) / ANL, dB(A)	
			Daytime	Nighttime
N20B	Grand Waterfront	B	60 / 60	50 / 50
N21	Hang Chien Court	B	60 / 60	50 / 50
PN52	Site 1L3 (Planned)	B	60 / 60	50 / 50
PN63	Site 4A1 (Planned)	B	51 / 60	41 / 50
PN80	Site 3C (Planned)	C	65 / 65	55 / 55

7.7.24 Ventilation Shafts of SCL: The locations of the ventilation fans and the maximum sound power levels (SWLs) required to meet the relevant noise criteria were determined. **Table 7.15** shows the assumed locations of the ventilation shafts of SCL and the required sound power level for the nearest affected NSRs to achieve noise compliance. The detailed calculation is shown in **Appendix 7.2**.

Table 7.15 Predicted Maximum Allowable Sound Power Levels for SCL Ventilation Shafts

Ventilation Shafts	Likely affected NSRs	ASRs	Approx Distance to NSR, m	Sound Power Level (SWL, dB(A)) required at source in order to meet the criteria	
				Daytime	Nighttime
South Vent. Shaft at Kai Tak Station	PN45	B	77	96	86
North Vent. Shaft at Kai Tak Station	PN46	B	74	95	85
South Vent. Shaft at To Kwa Wan Station (South)	PN94, PN62	B	35, 209	93	83
North Vent. Shaft at To Kwa Wan Station (North)	PN62	B	232	108	98
Ventilation shaft at Site 5B6	N20B	B	51	93	83
Ventilation shaft at Site 5B6	N21	B	22	86	76

7.7.25 The above SWL criteria should be implemented and refined during the detailed design stage of SCL. Any new NSRs should also be identified and incorporated into the design as necessary. The project proponent of SCL shall install sound attenuators, noise barriers and acoustic enclosures as appropriate to ensure that the specified maximum SWLs in the above **Table 7.15** would be achieved. The performance of the sound attenuators shall be obtained by comparing the total SWL of noise emanating from the facade and the specified maximum SWL specified in the above **Table 7.15**. The predicted mitigated noise levels at those NSRs likely to be affected by the fixed plant noise of the SCL ventilation shafts are presented in **Table 7.16**.

Table 7.16 Summary of Predicted Operational Noise Levels

NSR	NSR Description	ASRs	Predicted Noise Level, dB(A) / ANL, dB(A)	
			Daytime	Nighttime
PN94	Sung Wong Toi Road CDA site	B	60 / 60	50 / 50
N20B	Grand Water Front	B	60 / 60	50 / 50
N21	Hang Chien Court	B	60 / 60	50 / 50
PN45	Site 1K1 (Planned)	B	57 / 60	47 / 50
PN46	Site 1H2 (Planned)	B	56 / 60	46 / 50
PN62	Site 2B6 (Planned)	B	59 / 60	49 / 50

- 7.7.26 The proposed Road T2 Tunnel, CKR and SCL will be constructed by the other project proponent. The fixed noise source will be adequately addressed in a separate EIA report to be prepared and submitted under the EIAO by the other project proponent.
- 7.7.27 Cruise Terminal Operation: The proposed cruise terminal is located at the southeast end of the previous Kai Tak Runway. The length of the berthing structure is about 1 km. It is planned to accommodate two cruise vessels. Fixed plant noise associated with the cruise terminal operation include the fixed plant noise from the cruise ships operation and the from the ventilation system of the cruise terminal. The nearest NSR to the proposed cruise terminal is located in Site 4C5 (NSR PN107) for commercial site with sensitive use and Site 4B5 (NSR PN64) for residential site. The distance from the nearer cruise vessel (measured from the centre of the cruise vessel) to the nearest NSR is about 150m. The distance from the further cruise vessel is about 400 m. In addition, the commercial NSRs located at Site 4C5 which will most likely be centrally air-conditioned. The layout of the affected NSRs could be designed to avoid the noise sensitive uses facing the major noise sources or providing the noise sensitive use, like hotel, with window insulation and air conditioning. Adverse noise impact at this site is not expected.
- 7.7.28 With regards to the fixed plant noise from cruise ships operation, with reference to the *Head Technical Report, Airborne Noise*, the noise level of a cruise is about 63 dB(A) in Leq(30min) at 100m distance from operational cruise. The noise level of 63 dB(A) was representative for in-berth and idling activity and thus adopted for predicting daytime noise levels. Furthermore, the nearest residential NSR, Site 4B5 of 45mPD, will be partially screened from the cruise vessels by the cruise terminal building of 35mPD.
- 7.7.29 With regards to the noise emission associated with the ventilation system of the cruise terminal, the SWL criteria stated in **Table 7.17** below should be reviewed during the detailed design stage of Cruise Terminal. Any new NSRs should also be identified and incorporated into the design as necessary. It is anticipated that the detailed design of the cruise terminal will incorporate the appropriate good practices to minimise the nuisance of any fixed plant noise on the neighbouring NSRs and fulfil the EIAO-TM and NCO criteria.

Table 7.17 Predicted Maximum Allowable Sound Power Levels for Cruise Terminal Ventilation

Ventilation System	Likely affected NSRs	ASRs	Approx Distance to NSR, m	Sound Power Level (SWL, dB(A)) required at source in order to meet the criteria	
				Daytime	Nighttime
Cruise Terminal	PN64	B	145	95	90
Cruise Terminal	PN107	B	160	95	-

- 7.7.30 The predicted mitigated noise levels at those NSRs likely to be affected by the fixed plant noise from the cruise terminal operation are presented in **Table 7.18**. The detailed calculation is shown in **Appendix 7.2**.

Table 7.18 Summary of Predicted Operational Noise Levels

NSR	NSR Description	ASRs	Predicted Noise Level, dB(A) / ANL, dB(A)	
			Daytime	Nighttime
PN64	Site 4B5 (Planned) Residential	B	60 / 60	50 / 50
PN107	Site 4C5 (Planned) Commercial with sensitive use	B	63 / 60	-

- 7.7.31 From **Table 7.18**, no adverse fixed noise impact for PN64. However, exceedance was found at NSR PN107. Given that this affect NSRs are commercial with sensitive use which will most likely be centrally air-conditioned and not rely on opened windows for ventilation, adverse fixed noise impact at these NSRs are not expected. Alternatively, the layout of the site for NSR PN107 may be arranged in a way to avoid the sensitive façade of the sensitive use facing the cruise terminal to avoid unacceptable fixed noise impacts from the cruise terminal operation.
- 7.7.32 EFTS Depot: The location of the depot and the maximum sound power levels (SWLs) required to meet the relevant noise criteria were determined. **Table 7.19** shows the assumed locations of the depot and the required sound power level for the nearest affected NSRs to achieve noise compliance. The detailed calculation is shown in **Appendix 7.2**.

Table 7.19 Predicted Maximum Allowable Sound Power Levels for EFTS Depot

Ventilation Shafts	Likely affected NSRs	ASRs	Approx Distance to NSR, m	Sound Power Level (SWL, dB(A)) required at source in order to meet the criteria	
				Daytime	Nighttime
EFTS Depot	PN108	B	55	97	87

Note: This prediction is for indicative purpose only as Site 4A3 is planned for commercial use. Any noise sensitive uses like hotel at this site will most likely be provided with central air-conditioning.

- 7.7.33 The above SWL criteria should be implemented and refined during the detailed design stage of the depot. Any new NSRs should also be identified and incorporated into the design as necessary. The project proponent of the EFTS depot shall install sound attenuators, noise barriers and acoustic enclosures as appropriate to ensure that the specified maximum SWLs in the above **Table 7.19** would be achieved. The performance of the sound attenuators shall be obtained by comparing the total SWL of noise emanating from the facade and the specified maximum SWL specified in the above **Table 7.19**. The predicted mitigated noise levels at those NSRs likely to be affected by the fixed plant noise of the EFTS depot are presented in **Table 7.20**. The EFTS depot is a Schedule 2 DP and its environmental impact will be fully addressed in separate EIA study.

Table 7.20 Summary of Predicted Operational Noise Levels

NSR	NSR Description	ASRs	Predicted Noise Level, dB(A) / ANL, dB(A)	
			Daytime	Nighttime
PN108	Site 4A3 (Planned)	B	60 / 60	50 / 50

Note:

This prediction is for indicative purpose only as Site 4A3 is planned for commercial use. Any noise sensitive uses like hotel at this site will most likely be provided with central air-conditioning.

- 7.7.34 **Public Transportation Interchange (PTI):** The locations of the ventilation fans and the maximum sound power levels (SWLs) required to meet the relevant noise criteria were determined. **Table 7.21** shows the assumed locations of the ventilation system of PTIs and the required sound power level for the nearest affected NSRs to achieve noise compliance. The detailed calculation is shown in **Appendix 7.2**.

Table 7.21 Predicted Maximum Allowable Sound Power Levels for PTI Ventilation System

Ventilation Shafts	Likely affected NSRs	ASRs	Approx Distance to NSR, m	Sound Power Level (SWL, dB(A)) required at source in order to meet the criteria	
				Daytime	Nighttime
PTI at Site 1F2	PN73	B	47	88	78
PTI at Site 4D2	PN64	B	130	95	90
PTI at Site 4D2	PN107	B	160	95	-

Note:

This prediction for PN107 at Site 4A3 is for indicative purpose only as Site 4C5 is planned for commercial use. Any noise sensitive uses like hotel at this site will most likely be provided with central air-conditioning.

- 7.7.35 The above SWL criteria should be implemented and refined during the detailed design stage of PTI. Any new NSRs should also be identified and incorporated into the design as necessary. The developer of PTI shall install sound attenuators, noise barriers and acoustic enclosures as appropriate to ensure that the specified maximum SWLs in the above **Table 7.21** would be achieved. The performance of the sound attenuators shall be obtained by comparing the total SWL of noise emanating from the facade and the specified maximum SWL specified in the above **Table 7.21**. The predicted mitigated noise levels at those NSRs likely to be affected by the fixed plant noise of the PTI ventilation system are presented in **Table 7.22**.

Table 7.22 Summary of Predicted Operational Noise Levels

NSR	NSR Description	ASRs	Predicted Noise Level, dB(A) / ANL, dB(A)	
			Daytime	Nighttime
PN73	Site 1F1 (Planned)	B	56 / 60	46 / 50
PN64	Site 4B5 (Planned)	B	60 / 60	50 / 50
PN107	Site 4C5 (Planned)	B	63 / 60	-

Note:

This prediction for PN107 at Site 4A3 is for indicative purpose only as Site 4C5 is planned for commercial use. Any noise sensitive uses like hotel at this site will most likely be provided with central air-conditioning.

- 7.7.36 From **Table 7.22**, no adverse fixed noise impact for PN64. However the exceedance was found at NSR PN107. Given that this affect NSRs are commercial with sensitive use which will most likely be centrally air-conditioned and not rely on opened windows for ventilation, adverse fixed noise impact at these NSRs are not expected. Alternatively, the layout of the site for NSR PN107 may be arranged in a way to avoid the sensitive façade of the sensitive use facing the PTI to avoid unacceptable fixed noise impacts from the PTI.
- 7.7.37 **Noise from Sports Activity at Stadium:** Site 2D is reserved for the development of a Stadium Complex. The location of the Stadium Complex has been planned with considerations of protection of view corridor, accessibility by public transport and provision of sufficient buffer distance to the nearby NSRs. Noise from stadiums for sporting activities may include both the crowd noise and public address broadcast (PA).

7.7.38 Noise surveys for crowd noise and PA system were carried out at the grandstand and adjacent areas during a horseracing day and the measurement results are presented in the approved Main Arena of the 2008 Olympic Equestrian Event EIA Report. The measured noise level of crowd and PA noise is about 73 dB(A) at 1.2m above floor level. It is considered that the potential noise generated from sports activities would be similar or lower than that generated from horseracing event. For the purpose of assessing the potential noise impacts from sports activity at the Stadium Complex (including the main stadium and the secondary stadium), 73 dB(A) measured at horseracing event is therefore taken as a conservative assumption. As mentioned above, the retractable roof of the main stadium could provide screening effect to the noise impact and reduce noise levels at nearby NSRs. The SEKDCFS EIA Report stated retractable roof can achieve about 25 dB(A) reduction. As conservative approach, 10 dB(A) reduction for retractable roof at main stadium was adopted for assessment.

7.7.39 The predicted noise levels at those NSRs likely to be affected by the sports activity at the Stadium Complex (including the main stadium and the secondary stadium) are presented in **Table 7.23**. The detailed calculation is shown in **Appendix 7.3**.

Table 7.23 Summary of Predicted Operational Noise Levels

NSR	NSR Description	ASRs	Predicted Noise Level, dB(A) / ANL, dB(A)	
			Daytime	Nighttime
PN48	Site 1K3 (Planned)	B	58 / 60	-
PN52	Site 1L3 (Planned)	B	60 / 60	-
PN65	Site 5A4 (Planned) façade facing to Stadium Complex	B	57 / 60	-

7.7.40 With the mitigation measures such as retractable roof or other equivalent measures to be implemented for the main stadium, noise impact due to the sports activity to be held in the stadium is not likely to be significant and fulfil day time and evening period noise criteria. However, due to the more stringent noise criteria during night-time (after 11pm), the acceptability of the operation of the Stadium Complex after 11pm should be demonstrated by noise impact assessment during its detailed design stage.

7.7.41 District Cooling System Plant (DCSP): The major noise source comes from the pump system inside and enclosed in the DCSP building structure. The locations of the exhaust fans and the maximum sound power levels (SWLs) required to meet the relevant noise criteria were determined. **Table 7.24** shows the proposed locations of the DCSP and the required sound power level for the nearest affected NSRs to achieve noise compliance. The detailed calculation is shown in **Appendix 7.2**.

Table 7.24 Predicted Maximum Allowable Sound Power Levels for DCSP

DCSP	Likely affected NSRs	ASRs	Approx Distance to NSR, m	Sound Power Level (SWL, dB(A)) required at source in order to meet the criteria	
				Daytime	Nighttime
Site 1N2	PN34	B	75	99	89
Site 1N2	PN38	B	70	99	89
Site 4C1	PN103	B	5	76	66

Note:

This prediction for PN103 at Site 4C1 is for indicative purpose only as Site 4C1 is planned for commercial use. Any noise sensitive uses like hotel at this site will most likely be provided with central air-conditioning.

- 7.7.42 The above SWL criteria should be implemented and refined during the detailed design stage of the respective DCSP by the contractor(s). Any new NSRs should also be identified and incorporated into the design as necessary. The contractor(s) shall install sound attenuators, noise barriers and acoustic enclosures as appropriate to ensure that the specified maximum SWLs in the above **Table 7.24** are achieved. The performance of the sound attenuators shall be obtained by comparing the total SWL of noise emanating from the facade and the specified maximum SWL specified in the above **Table 7.24**. The predicted noise levels at NSRs due to DCSP operations are presented in **Table 7.25**.

Table 7.25 Summary of Predicted Operational Noise Levels

NSR	NSR Description	ASRs	Predicted Noise Level, dB(A) / ANL, dB(A)	
			Daytime	Nighttime
PN34	Site 1B1	B	59 / 60	49 / 50
PN38	Site 1B4	B	60 / 60	-
PN103	Site 4C1	B	60 / 60	50 / 50

Note:

This prediction for PN103 at Site 4C1 is for indicative purpose only as Site 4C1 is planned for commercial use. Any noise sensitive uses like hotel at this site will most likely be provided with central air-conditioning.

Noise from Open Air Entertainment Activities

- 7.7.43 Site 2D is reserved for the development of a Stadium Complex. The location of the Stadium Complex has been planned with considerations of protection of view corridor, accessibility by public transport and provision of sufficient buffer distance to the nearby NSRs. For the secondary stadium, noise from secondary stadium for sporting activities may include both the crowd noise and public address broadcast (PA). The potential noise impacts associated with sporting activities was assessed as fixed noise source and described above.
- 7.7.44 The major noise source come from the main stadium includes the use of loudspeakers and the crowd. The buffer distance between the main stadium and the NSRs varies from 200 to over 500 m which could attenuate the noise impact significantly.
- 7.7.45 As the retractable roof of the main stadium could provide screening effect to the noise impact and reduce noise levels at nearby NSRs.
- 7.7.46 With reference to approved SEKDCFS EIA Report, noise measurements from concerts in Hong Kong Stadium previously showed that the typical noise levels in $L_{eq(15mins)}$ of about 170 m away from Hong Kong Stadium was 73-75dB(A) or equal to SWL 125dB(A). It is likely that noise from the proposed main stadium would affect nearby NSRs if mitigation measures such as retractable roof or enclosure were not adopted. The SEKDCFS EIA Report also proposed retractable roof to mitigate the impact from noisy events and it can achieve about 25dB(A) reduction. For conservative approach, 10dB(A) reduction was adopted for assessment.
- 7.7.47 With reference to the above, the typical noise levels generated by open air entertainment activities at the NSRs were assessed. The distance to the nearest NSRs surrounding the main stadium and the potential noise impacts predicted with 10dB(A) reduction (with a retractable roof) were summarised in **Table 7.26**. The detailed calculation is shown in **Appendix 7.4**.

Table 7.26 Predicted Potential Noise Impact from the Main Stadium on the Nearest NSRs

Likely affected NSRs	ASRs	Approx. Distance to NSR, m	Predicted Noise Impact, Leq(15min), dB(A)
PN48	B	345	59
PN52	B	300	60
PN65 (façade facing to Stadium Complex)	B	215	63

- 7.7.48 The background noise level in urban area is around 60 dB(A) or more in general. With the mitigation measures such as retractable roof or other equivalent measures to be implemented for the main stadium, noise impact due to the activities to be held in the main stadium is not likely to be significant and fulfil day time and evening period noise criteria (ie. noise level not more than 5 dB(A) above the background noise level, as measured at one metre from the exterior building façade of the affected NSRs). However, due to the more stringent noise criteria during night-time (after 11pm), the acceptability of the operation of the Stadium Complex after 11pm should be demonstrated by noise impact assessment during its detailed design stage. The main stadium is a Schedule 2 DP and its environmental impact will be fully addressed in separate EIA study.

Heliport Noise

- 7.7.49 With reference to a number of approved EIA reports, the measured / predicted Lmax are shown in **Table 7.27** below.

Table 7.27 Summary of Helicopter Noise Emission Data

Model	Lmax, dB(A)	Measurement distance, m	SWL, dB(A)
EC155B ⁽¹⁾	87.7	150	139
AS332 L2 ⁽¹⁾	90.6	150	142
Sikorsky S76 ⁽²⁾	100	25	136
Black Hawk S70 ⁽²⁾	100	25	136
S76C+ ⁽³⁾	86	264	142

Note: (1) Data extracted from Final EIA Study for Helipad at Yung Shue Wan, Lamma Island, 2006

(2) Data extracted from Agreement No. CE 32/99 SEKDCFS EIA Study

(3) EIA Study for the Expansion of Heliport Facilities at Macau Ferry Terminal, 2005

- 7.7.50 With reference to basic acoustic principles and based on the noise level for a AS332 L2 and S76C+ helicopter, a setback distance of about 286 m to the nearest residential premises is required in order to meet the EIAO-TM noise standard of 85 dB(A) Lmax (domestic premises) for helicopter noise. From **Table 7.27**, it is noted that for other helicopters, which is quieter than the AS332 L2 and S76C+ helicopters, smaller set-back distances from the proposed helipads would be required. The distance between the permanent helipad and the closest residential NSR (PN64) is about 700 m with an estimated 80dB(A) Lmax at PN64. Therefore, it is considered that the proposed helipad locations would comply with the helicopter noise criteria at the nearest NSRs, adverse helicopter noise impact would not be anticipated.

Rail Noise

- 7.7.51 The alignment of EFTS is shown in **Figure 7.2**. For conservative noise assessment, the rail based EFTS was assumed for rail noise assessment. Reference was made to the approved EIA reports in the EIAO Register regarding potential noise impacts from railway operation in urban area, including the SEKDCFS EIA, Light Rail Transit (LRT) Extension in Tin Shui Wai Reserve Zone and Grade Separation of the LRT with Pui To Road and Tsing Lung Road in Tuen Mun (Register No.: AEIAR-027/1999) and East Rail Extension – Tai Wai to Ma On Shan (MOS) Rail (Register No.: AEIAR-028/1999).
- 7.7.52 With reference to the findings of LRT EIA report, there will be no significant noise impacts on NSRs at horizontal distance of 10m to 40m which is similar to the situation in KTD. As shown in **Figure 7.2**, most of the NSRs are not planned within 10m buffer distance of the two proposed alignment options for EFTS. Given the maximum speed, train frequency of the EFTS is slower and lower than LRT rail, adverse noise impact from EFTS is not anticipated. For those NSRs with horizontal separation distance from EFTS of less than 10m (the section outside hotel sites Site 4A2 and Site 4C1 to 4C5 along ex-Runway and the section along the public promenade outside commercial site Site 3D4 in Kowloon Bay), the mitigation measures adopted in MOS Rail could be considered for the EFTS to further reduce the noise impact, if required. The measures adopted in MOS rail include multi-plenum system and vertical noise barrier at the all elevated sections of the alignment on viaduct. The rail based EFTS is a Schedule 2 DP and its environmental impact will be fully addressed in separate EIA study if the selected system is rail type.

7.8 Mitigation of Environmental Impacts

Construction Phase

- 7.8.1 In order to reduce the excessive noise impacts at the affected NSRs during normal daytime working hours, mitigation measures such as adopting quiet powered mechanical equipment, movable noise barriers and temporary noise barriers are recommended. The contractor(s) may be able to obtain particular models of plant that are quieter than the PME's given in GW-TM. It is considered too restrictive to specify that a contractor has to use specific items of plant for the construction operations. It is practical to specify the total SWL of all plant to be used on site so that the contractor(s) is allowed some flexibility to select plant to suit his needs.
- 7.8.2 The use of quiet plant associated with the construction works is prescribed in British Standard "Noise Control on Construction and Open Sites, BS5228: Part 1: 1997" which contains the SWLs for specific quiet PME. The SWLs for quiet PMEs adopted for the assessment are detailed in **Appendix 3.26**.
- 7.8.3 To alleviate the construction noise impact on the affected NSRs, movable noise barrier for Asphalt Paver, Breaker, Excavator and Hand-held breaker and full enclosure for Air Compressor, Bar Bender, Concrete Pump, Generator and Water Pump are proposed. Movable temporary noise barriers that can be located close to noisy plant and be moved iteratively 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 14kg/m² 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. It is anticipated that suitably designed barriers could achieve at least 5 – 10 dB(A) reduction. For a conservative assessment, only a reduction of 5dB(A) is assumed. A sketch of typical temporary noise barrier and enclosure are illustrated in **Figure 3.13**.

- 7.8.4 The use of full enclosure has been considered in this assessment to shelter relatively static plant including air compressor, bar bender, concrete pump, generator and water pump. These enclosures can provide about 10 dB(A) noise reduction.
- 7.8.5 Noise reduction from the use of mitigation measures including quiet plant, noise barrier and enclosure for construction plants as described above has been applied in the assessment. Detailed results of construction noise assessment for “mitigated” scenario are given in **Appendix 3.27**. The predicted cumulative noise levels and the exceedances over daytime construction noise criteria are summarised in the following **Table 7.28**.

Table 7.28 Summary of Cumulative Mitigated Construction Noise Levels at Representative NSRs During Normal Daytime Working Hours

NSR	Noise Criteria, dB(A)	Predicted Mitigated Construction Noise Levels during Normal Daytime Working Hour (L_{eq} (30-min) dB(A))	Exceedance, dB(A)	Duration, Month
N1	75	41 - 71	0	0
N2	75	42 - 70	0	0
N3	75	43 - 67	0	0
N4	65/70*	51 - 68	3/0	Examination Period
N5	65/70*	51 - 70	5/0	Examination Period
N6	75	49 - 73	0	0
N7	75	46 - 75	0	0
N8	75	45 - 73	0	0
N9	75	45 - 71	0	0
N10	75	45 - 75	0	0
N11	65/70*	47 - 75	10/5	66 include examination period
N12	75	47 - 74	0	0
N13	65/70*	47 - 74	9/4	66 include examination period
N14	75	47 - 78	3	12
N15	75	47 - 75	0	0
N16	75	46 - 70	0	0
N17	75	47 - 75	0	0
N18	75	50 - 76	1	7
N19	75	50 - 75	0	0
N20A	75	48 - 70	0	0
N20B	75	48 - 78	3	60
N21	75	48 - 78	3	60
N22	75	48 - 75	0	0
N23	65/70*	47 - 86	21/16	24 include examination period
N24	65/70*	47 - 64	0/0	0
N25	75	45 - 71	0	0
N26	75	45 - 68	0	0
N27	65/70*	45 - 68	3/0	Examination Period
N28	65/70*	44 - 70	5/0	
N29	75	44 - 66	0	0
N30	75	50 - 74	0	0
N31	60/70*	32 - 51	0	0
N32	75	46 - 70	0	0
PN1	75	47 - 75	0	0
PN2	75	58 - 86	11	39
PN35	75	62 - 73	0	0

Note: *For normal daytime working hours, the noise criteria are 70 dB(A) and 65 dB(A) for normal teaching periods and examination periods, respectively.

- 7.8.6 With the exception of NSRs N4, N5, N11, N13, N14, N18, N20B, N21, N23, N27, N28 & PN2, the predicted mitigated construction noise levels arising from the Project at all other NSRs selected for construction noise impact assessment would comply with the EIAO-TM construction noise criteria.

Operational Phase

Road Traffic Noise

- 7.8.7 Direct mitigation measures would be proposed for 'New' roads if there would be adverse environmental impact. If the NSRs are affected by noise from other existing roads, direct mitigation measures are required to reduce the noise from the 'New' roads to a level that it

- is not higher than the noise standard; and
- has no significant contribution to the overall noise from other existing roads, if the cumulative noise level (i.e. noise from the new road together with other existing roads) exceeds the noise standard.

- 7.8.8 As discussed in above, direct mitigation measures on some 'New' roads would be required to mitigate the noise impact at Site 1A2 to 1A4 (Road L3 through Road), Site 1B (Road L2 & L4), Site 1I1 (Road L4), Site 1L2 (Road D2), Site 1L3 (Road D2) & Site 2A6 (Road L9). A figure shown the direct noise mitigation measures are presented in **Figure 3.14**. The detailed mitigation measures are discussed below:

- 7.8.9 **Site 1A2 to 1A4 (School Site):** the predicted overall noise levels at PN19, PN20 & PN20A exceeded the noise criterion of 65dB(A). In view of the site constraint, provision of noise tolerant building is not feasible. The layout of these planned schools may be arranged in a way to avoid the sensitive facades of the classrooms facing Roads L2 and L3 or as the last resort all the classrooms should be noise insulated with air-conditioners to avoid unacceptable traffic noise impacts from the surrounding road network.

- 7.8.10 Under the Through Road L3 alternative option, the predicted overall noise levels at PN19A & PN20A exceeded the noise criterion of 65 dB(A). Low noise surfacing is proposed for a section of Road L3 to minimize the traffic noise impact. With the proposed low noise surfacing, PN19A and PN20A facing the Through Road L3 would comply with the noise criteria. Yet the layout of these planned schools should still be arranged in a way to avoid the sensitive facades of the classrooms facing Road L2 or as the last resort all the classrooms should be noise insulated with air-conditioners to avoid unacceptable traffic noise impacts from the surrounding road network.

- 7.8.11 **Site 1B1:** It is identified that the 'New' road noise contribution to the overall noise level is more than 1.0dB(A) for PN23A to PN23C, PN26, PN29, PN30A to PN31B & PN33. The major noise source is Road L2 and Kwun Tong Bypass that contributed significant traffic noise impact on these NSRs even incorporated 1.5m vertical fins next to the sensitive facades.

- 7.8.12 As to reduce the traffic noise impact further, a number of mitigation measures have been reviewed. Owing to the site constraint, setback of buildings to west direction is not feasible. By rotating buildings orientation can reduce the view angle of flats at one wing, but on the other hand also increase the view angle of some flats on the other wings. It is therefore considered ineffective to reduce the noise levels. Noise tolerant buildings as a noise barrier have already been provided in front of those affected NSRs for screening the traffic noise impact from Road L2. Therefore, provision of noise barrier along Road L2 is ineffective and a section of low noise surfacing on Road L2 is proposed. In addition to the source treatment and low noise surfacing, 1.2m to 1.7m structural fins are also proposed at the location next to the sensitive facades of the affected dwellings. The proposed extent of low noise surfacing and structural fins locations are shown in **Figure 3.14**.

- 7.8.13 **Site 1B2 to 1B4 (School Site):** The predicted overall noise levels at PN36, PN37 & PN38 exceeded the noise criterion of 65 dB(A). The 'New' roads noise contribution to the overall noise levels would be more than 1.0 dB(A). The major noise sources are Road L2 and Road L4. In view of the site constraint, provision of noise tolerant building is not feasible. The layout of these planned schools may be arranged in a way to avoid the sensitive facades of the classrooms facing Roads L2 and L4 or as the last resort all the classrooms should be noise insulated with air-conditioners to avoid unacceptable traffic noise impacts from the surrounding road network. In addition, a section of low noise surfacing on Roads L2 and L4 are proposed. The extent of low noise surfacing is shown in **Figure 3.14**.
- 7.8.14 **Site 1I1:** The predicted overall noise levels at PN39 & PN40 exceeded the noise criterion of 70 dB(A). The 'New' road noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings.
- 7.8.15 In order to reduce the traffic noise impact, a number of mitigation measures have been reviewed. Owing to the site constraint, noise tolerant buildings are not feasible. By rotating buildings orientation can reduce the view angle of flats, but on the other hand also increase the view angle of some flats on the surrounding roads. It is therefore considered ineffective to reduce the noise levels. Therefore, low noise surfacing for a section of Road L4 and setback of the building within the site by about 5m to the southwest direction are proposed. The extent of low noise surfacing is shown in **Figure 3.14**. For the other effective mitigation measures such as special building design & architectural features / balcony, it would be subject to further investigation by the future developer.
- 7.8.16 **Site 1L2 and 1L3:** The predicted overall noise levels at PN50, PN51 & PN52 exceeded the noise criterion of 70 dB(A). The 'New' road noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings.
- 7.8.17 In order to reduce the traffic noise impact, a number of direct mitigation measures have been reviewed. By rotating building orientation can reduce the view angle of flats, but on the other hand also increase the view angle of some flats on the surrounding roads. Setback of the building by about 35m to the northwest direction at Site 1L3 and 5m at Site 1L2 are proposed as mitigation measures for traffic noise impact. For the other effective mitigation measures such as special building design & architectural features / balcony, it would be subject to further investigation by the future developer.
- 7.8.18 **Site 2B6:** The predicted noise levels at planned NSRs for PN61 & PN62 exceeded the noise criterion of 70 dB(A). However, the noise exceedances are caused by the existing roads. In the view of the 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A). Mitigation measures in the form of special building design (include noise tolerant building & single aspect building design) could be considered to reduce the traffic noise impact.
- 7.8.19 The proposed mitigation measures in the form of special building design include: (i) avoid any sensitive façades with openable window facing the existing Kowloon City Road network and (ii) for the sensitive facades facing the To Kwa Wan direction, either setback the facades by about 5m to the northeast direction or do not provide the facades with openable window. The identified special building design have been agreed with the Planning Department and the Lands Department. For the other effective mitigation measures such as other special building design & architectural features / balcony, it would be subject to further investigation by the future developer. The traffic noise mitigation measures are illustrated in **Figure 3.15**.

- 7.8.20 **Site 5A4:** The predicted noise levels at planned NSRs for PN65 and PN66 exceeded the noise criterion of 70 dB(A). However, the noise exceedances are caused by the existing roads. In the view of the 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A). Mitigation measures such as special building design (include noise tolerant building & single aspect building design) could be considered to reduce the traffic noise impact. It should be noted that the existing traffic noise impacts on the existing NSRs in Site 5A4 are not within the scope of this EIA study.
- 7.8.21 The proposed mitigation measures in the form of special building design include: (i) avoid any sensitive facades with openable window facing the existing To Kwa Wan Road or (ii) provision of 17.5m high noise tolerant building fronting To Kwa Wan Road and restrict the height of the residential block(s) located at less than 55m away from To Kwa Wan Road to no more than 25m above ground. The identified special building design have been agreed with the Planning Department and the Lands Department. For the other effective mitigation measures such as other special building design & architectural features / balcony, it would be subject to further investigation by the future developer. The traffic noise mitigation measures are illustrated in **Figure 3.15**.
- 7.8.22 **Site 3C (Hospital / Clinic):** The predicted noise levels at planned NSRs for PN80 to PN86 exceeded the noise criterion of 55 dB(A). As confirmed with Food and Health Bureau, the proposed hospital site will provide with window insulation and air conditioning, adverse traffic noise impacts at these NSRs are not expected. The documentation of confirmation from Food and Health Bureau is shown in **Appendix 18.1**.
- 7.8.23 **Other Sites within KTD area:** The predicted noise levels at planned NSRs for PN69 to PN108 (except PN93 – PN95) exceeded the noise criterion of 55, 65 & 70 dB(A). The noise contribution is from existing and "New" road. All the affected NSRs are either commercial uses or the like, mixed uses or community uses and allowed some noise sensitive uses. Given that most affected NSRs are commercial uses which will most likely be centrally air-conditioned, the layout of the affected NSRs could be designed to avoid the noise sensitive uses facing the major traffic noise sources or providing the noise sensitive uses, like hotel, with window insulation and air conditioning. Adverse traffic noise impacts at these NSRs are not expected.
- 7.8.24 With reference to the OZP, a special design requirement should be incorporated for Site 1F1 facing the Station Square such that the residential element should commensurate with the commercial element in form as stated in OZP. The residential development could accommodate high quality hotel-like service apartment with its design and appearance befitting the image of the Kai Tak Center and commensurate with those premier commercial / office developments to its west and east. Adverse traffic noise impacts at these NSRs are not expected.
- 7.8.25 For those planned NSRs at Site 1E1, the residential development could be designed to avoid sensitive façade facing to the noise sources or incorporate hotel-like service apartment with provision of central air conditioning. Adverse traffic noise impacts at these NSRs are not expected.
- 7.8.26 For those planned domestic NSRs at Site 3D2 to 3D4 and Site 3E1, the residential development could be designed to avoid sensitive façade facing to the noise sources or incorporate hotel-like service apartment with provision of central air conditioning. Adverse traffic noise impacts at these NSRs are not expected. Furthermore, the planning applications should include assessments on the relevant technical and environmental concerns and demonstrate that the proposed development would not result in adverse traffic noise impact.

7.8.27 **Ex-San Po Kong Flatted Factory:** The predicted overall noise levels at PN111 & PN112 exceeded the noise criterion of 70 dB(A). The 'New' road noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings.

7.8.28 In order to reduce the traffic noise impact, a number of direct mitigation measures have been reviewed. The proposed mitigation measures in the form of special building design should avoid any sensitive façades with openable window facing the slip road from Prince Edward Road East to San Po Kong. The traffic noise mitigation measures are illustrated in **Figure 3.15**. Since the proposed development is still subject to detailed design and the layout is yet to be finalised, other alternative effective mitigation measures including special building design for the development and at-source mitigation measures for the surrounding new local roads may also be considered respectively by the developer (namely the Housing Department) and the implementation and maintenance agents of the surrounding new local roads in the future.

7.8.29 **Appendix 3.28** presents the breakdown of noise contribution from the "New" roads and existing roads at all representative NSRs when all the proposed mitigation measures are in place. With these proposed measures in place, the predicted overall noise levels at all the representative NSRs comply with the noise criterion.

Operational Phase Fixed Plant Noise

7.8.30 **Sewage Pumping Stations (SPS):** The main sources of noise for SPS are pumps and ventilation system. The detailed design should incorporate the following good practice in order to minimise the nuisance on the neighbouring NSRs.

- The exhaust of the ventilation system and any opening of the building should be located facing away from any NSRs;
- Louver or other acoustic treatment equipment could also be applied to the exhaust exit of the building; and
- Pumps and mechanical ventilation are either underground or enclosed within a structure or building.

7.8.31 **Electrical Substations (ESS):** The major noise sources for ESS are the transformer and ventilation system. The transformer should be located inside and enclosed in the ESS building structure. The detailed design should incorporate the following good practice in order to minimise the nuisance on the neighbouring NSRs. The 400kV substation and transmission line are a Schedule 2 DP and its environmental impact and mitigation measures, if any, will be fully addressed in separate EIA study.

- The exhaust of the ventilation system and any opening of the building should be located facing away from any NSRs; and
- Louver or other acoustic treatment equipment could also be applied to the exhaust exit of the building.

7.8.32 **Tunnel Ventilation Shafts:** The main sources of noise are the ventilation fans. The detailed design should incorporate the following good practice in order to minimise the nuisance on the neighbouring NSRs.

- The exhaust of the ventilation system and any opening of the building should be located facing away from any NSRs; and
- Louver or other acoustic treatment equipment could also be applied to the exhaust exit of the building.

- 7.8.33 Cruise Terminal: The main sources are fixed plant noise from ventilation system of cruise terminal and the cruise ships operation. It is anticipated that the detailed design of the cruise terminal will incorporate the appropriate good practices to minimise the nuisance of any fixed plant noise on the neighbouring NSRs and fulfil the EIAO-TM and NCO criteria.
- 7.8.34 or the exceedance at NSR PN107, given that this affect NSRs are commercial with sensitive use which will most likely be centrally air-conditioned and not rely on opened windows for ventilation, adverse fixed noise impact at these NSRs are not expected. Alternatively, the layout of the site for NSR PN107 may be arranged in a way to avoid the sensitive façade of the sensitive use facing the cruise terminal to avoid unacceptable fixed noise impacts from the cruise terminal operation.
- 7.8.35 EFTS Depot: The main sources of noise are the maintenance and ventilation system. The detailed design should incorporate the following good practice in order to minimise the nuisance on the neighbouring NSRs. The EFTS depot is a Schedule 2 DP and its environmental impact and mitigation measures, if any, will be fully addressed in separate EIA study
- The exhaust of the ventilation system and any opening of the building should be located facing away from any NSRs; and
 - Louver or other acoustic treatment equipment could also be applied to the exhaust exit of the building.
- 7.8.36 Noise from Sports Activity at Stadium: Further study has to be carried out in the detailed design stage of the Stadium Complex to ensure the compliance to the relevant noise criteria with any necessary mitigation measures. The mitigation measures such as retractable roof or other equivalent measures would be considered for the main stadium. With incorporation of proper mitigation measures such as retractable roof and acoustics engineering for the sound system, adverse noise impact from the main stadium on the neighbouring NSRs is not expected.

Noise from Open Air Entertainment Activities

- 7.8.37 Further study has to be carried out in the detailed design stage of the Stadium Complex to ensure the compliance to the relevant noise criteria with any necessary mitigation measures. The mitigation measures such as retractable roof or other equivalent measures would be considered for the main stadium. With incorporation of proper mitigation measures such as retractable roof, fixed roof and acoustics engineering for the sound system, adverse noise impact from the main stadium on the neighbouring NSRs is not expected. The main stadium is a Schedule 2 DP and its environmental impact and mitigation measures, if any, will be fully addressed in separate EIA study

Helipad Noise

- 7.8.38 As mentioned in **Sections 7.7**, adverse noise impact from the proposed helipad would not be expected at the nearest NSR. Mitigation measures are not required.

Rail Noise (EFTS)

- 7.8.39 There will be no significant noise impacts on NSRs arising from Environmental Friendly Transportation Link (EFTS) at horizontal distance of 10 m away from rail line. As to further reduce the noise impact arising from the EFTS, the mitigation measures adopted in Ma On San (MOS) Rail could be considered for the EFTS, if required. The measures adopted in MOS rail include the multi-plenum system and vertical noise barrier at the all elevated sections of the alignment on viaduct. The rail based EFTS is a Schedule 2 DP and its environmental impact and mitigation measures, if any, will be fully addressed in separate EIA study if the selected system is rail type.

7.9 Evaluation of Residual Impacts

Construction Phase

- 7.9.1 With the exception of N4, N5, N11, N13, N14, N18, N20B, N21, N23, N27, N28 & PN2, the construction noise levels at other NSRs selected for construction noise impact assessment are predicted to comply with the noise standards stipulated in the EIAO-TM with the implementation of the proposed mitigation measures. Residual impacts at these affected NSRs are summarised in **Table 7.29**. It should be noted that the tabulated residual noise levels are the predicted noise levels assuming the NSRs with opened windows.
- 7.9.2 The on-site survey has revealed that N4, N5, N11, N13, N23, N27 and N28 have already been noise insulated with air-conditioners. With the provision of air-conditioners, it is considered that the noise impact would be minimized by keeping the windows closed during the construction activities. Notwithstanding this, due to more stringent noise criterion of 65 dB(A), it is recommended that particularly noisy construction activities, especially those associated with the construction of subway at Choi Hung Road, district distributor road (D1), local roads (L1, L2, L3, L4, L7, L8, L9, L11, L15, L16, L17 and L19), rebuild Kai Tak Nullah, landscape elevated walkway (LW-02, LW-03 & LW-04), SCL & CKR, should be scheduled to avoid examination periods of these NSRs as far as practicable. The Contractor should liaise with the school representative(s) to obtain the examination schedule so as to avoid noisy construction activities during school examination period.

Table 7.29 Construction Noise Residual Impacts

NSR	Exceedance of the EIAO-TM Criterion		Construction Activity Causing Exceedance	Approximate duration of Exceedance
	65 dB(A)	70 dB(A)		
N4	3 (Jul 2010 to Dec 2015)	0	<ul style="list-style-type: none"> Local Roads L2, L3, L15 and associated footpaths at North Apron; Local Roads L4; and SCL 	Examination Period
N5	5 (Jul 2010 to Dec 2015)	0	<ul style="list-style-type: none"> Local Roads L2, L3, L15 and associated footpaths at North Apron; Local Roads L4; and SCL 	Examination Period
N11	10 (Sept 2009 to Apr 2010 and Jul 2010 to Dec 2015)	5 (Jul 2010 to Dec 2015)	<ul style="list-style-type: none"> Construction of Road D1 Local Roads L1, L2, L3, L11, L15 and associated footpaths at North Apron Drainage, Sewerage & Watermain Construction of Footbridge at Rhythm Garden (LW-04) Rebuild Kai Tak Nullah Construction of Landscape Walkway LW-02 SCL 	66 month include examination period
N13	9 (Sept 2009 to Apr 2010 and Jul 2010 to Dec 2015)	4 (Jul 2010 to Dec 2015)	<ul style="list-style-type: none"> Construction of Road D1 Local Roads L1, L2, L3, L11, L15 and associated footpaths at North Apron Drainage, Sewerage & Watermain Construction of Footbridge at Rhythm Garden (LW-04) Construction of Landscape Walkway LW-03 	66 month include examination period

NSR	Exceedance of the EIAO-TM Criterion		Construction Activity Causing Exceedance	Approximate duration of Exceedance
	65 dB(A)	70 dB(A)		
			<ul style="list-style-type: none">Underground Shopping Street (SB-01)Upgrading of Pumping Station PS1Rebuild Kai Tak NullahConstruction of Landscape Walkway LW-02SCL	
N23	21 (Jan 2012 to Dec 2016)	16 (Jan 2015 to Dec 2016)	<ul style="list-style-type: none">Construction of Local Road L17 (Jan 2015 to Dec 2016)CKR (Jan 2012 to Dec 2016)	24 month include examination period
N27	3 (Jan 2015 to Dec 2016)	0	<ul style="list-style-type: none">Construction of local road L19	Examination Period
N28	5 (Jan 2015 to Dec 2016)	0	<ul style="list-style-type: none">Construction of local road L19	Examination Period
NSR	Exceedance of the EIAO-TM Criterion		Construction Activity Causing Exceedance	Approximate duration of Exceedance
	75 dB(A)			
N14	2 (Jan 2015 to Dec 2015)		<ul style="list-style-type: none">Construction of Road D1, L7, L8, L9 & L16Underground Shopping Street (SB-01)	12 month
N18	1 (Jan 2015 to July 2015)		<ul style="list-style-type: none">SCL	7 month
N20B	3 (Jan 2012 to Dec 2016)		<ul style="list-style-type: none">CKR	60 month
N21	3 (Jan 2012 to Dec 2016)		<ul style="list-style-type: none">CKR	
PN2	11 (Oct 2012 to Dec 2015)		<ul style="list-style-type: none">SCL	39 month

- 7.9.3 For the N18, N20B, N21 & PN2, the exceedance is due to the CKR and SCL projects. In this assessment, it has been assumed that all PME items are operating and gathered within a worksite for a conservative assessment. There are uncertainties on the prediction of construction noise impact from CRK and SCL since the detailed construction method and arrangement of PME items are not available during the course of this EIA study. Therefore, the detailed mitigation measures and duration of residual impact would be subject to the detailed construction programme and activities of the respective projects. Furthermore, both the proposed CKR and SCL projects are Schedule 2 designated projects under the EIAO. The associated environmental impacts will be adequately addressed in further detailed EIA studies to be prepared and submitted under the EIAO by the respective project proponents.

- 7.9.4 In addition to the above-mentioned mitigation measures, the good site practices listed below shall be adopted by all the contractors to further ameliorate the noise impacts. Although the noise mitigating effects are not easily quantifiable and the benefits may vary with the site conditions and operating conditions, good site practices are easy to implement and do not impact upon the works schedule.
- Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program.
 - Mobile plant, if any, should be sited as far away from NSRs as possible.
 - Machines and plant (such as trucks) that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum.
 - Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs.
 - Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.
- 7.9.5 During school examination periods, the daytime construction noise criterion is 65dB(A) which is lower than the normal daytime school criterion of 70dB(A). Scheduling of construction works outside school examination period to less intrusive periods would definitely reduce the overall noise impacts at the NSRs and for ensuring compliance with the construction noise criterion at some of the NSRs. The Contractor shall liaise with the school representative(s) to obtain the examination schedule and avoid noisy construction activities during school examination period.

Operational Phase

- 7.9.6 With the proposed noise mitigation measures in place, the 'New' road noise contributions to the overall noise levels at all representative NSRs would be less than 1.0 dB(A) and the 'New' road noise levels would all be below the relevant noise criteria. No adverse noise impacts arising from the 'New' roads would be predicted at any of the representative NSRs. Noise exceedances at the representative NSRs, if any, would be due to the existing roads. The effectiveness of direct mitigation measures, in terms of the number of residential dwellings and classrooms that will either be protected or benefited (by at least 1 dB(A)), has been shown in **Appendix 3.29**.
- 7.9.7 Residual fixed plant noise impacts are not anticipated. In order to ensure compliance of the operational noise level with the stipulated noise standards in TM, noise commissioning tests for all major fixed noise sources should be included in the Contract Document.
- 7.9.8 No residual noise impact from Open Air Entertainment Activities, proposed heliport and rail noise would be expected.

7.10 Environmental Monitoring and Audit

Construction Phase

- 7.10.1 An EM&A programme is recommended to be established according to the expected occurrence of noisy activities. All the recommended mitigation measures for daytime normal working activities should be incorporated into the EM&A programme for implementation during construction. Details of the programme are provided in the EM&A Manual.

Operational Phase

- 7.10.2 The assessment has indicated that the noise from fixed plant noise would comply with the EIAO-TM standards. As part of the design process, however, monitoring of operational noise from the proposed fixed plants during the testing and commissioning stage would be recommended to verify the maximum sound power levels as suggested in this EIA.

- 7.10.3 No adverse noise impact from operation of the Project is anticipated, therefore, no environmental monitoring and audit is proposed.

7.11 Summary

- 7.11.1 This assessment has predicted the construction noise impacts of the Project during normal daytime working hours, taking into account other expected concurrent projects. The predicted unmitigated noise levels would range from 42 to 92 dB(A) at the representative NSRs. With the use of quiet PME, movable barriers and temporary barriers, the noise levels at the NSRs selected for construction noise impact assessment except NSRs N4, N5, N11, N13, N14, N18, N20B, N21, N23, N27, N28 & PN2 would comply with the construction noise standard.
- 7.11.2 Having exhausted practicable noise mitigation measures, NSRs N4, N5, N11, N13, N14, N18, N20B, N21, N23, N27, N28 & PN2 would exceed the noise criteria. However, some of these affected NSRs are schools (N4, N5, N11, N13, N23, N27 and N28) and they all have been noise insulated with air conditioners. By keeping the windows closed during construction activities, noise impacts at the indoor environment of these NSRs can be avoided. Notwithstanding this, it is recommended that the particularly noisy construction activities should be scheduled to avoid examination periods of these NSRs as far as practicable.
- 7.11.3 This impact assessment does indicate some noise exceedances for limited periods of time even with the consideration of all practicable mitigation measures. During the actual construction period, as much as practically possible should be done to reduce the construction noise, and on-going liaison with all concerned parties and site monitoring should also be conducted during the course of the construction period.
- 7.11.4 A construction noise EM&A programme is recommended to check the compliance of the noise criteria during normal daytime working hours.
- 7.11.5 The potential road traffic noise impacts have been assessed based on the worst case traffic flows in 2031. Without any noise mitigation measures in place, the predicted noise levels at the NSRs would range from 40 to 87 dB(A). Practicable traffic noise mitigation measures are therefore formulated for the planned NSRs with predicted noise levels exceeding the EIAO-TM traffic noise criteria.
- 7.11.6 Mitigation measures in the form of structural fins, low noise surfacing, special building design and building setback are proposed to mitigate the traffic noise impacts at Sites 1B1, 1I1, 1L2, 1L3, 2B6 & 5A4 and ex-San Po Kong Flatted Factory. The potential traffic noise impact at these sites are contributed by both existing and 'New' roads. With the proposed noise mitigation measures, the predicted overall noise levels at these NSRs would comply with the noise criterion.
- 7.11.7 For those noise sensitive uses located within the planned sites of commercial, mixed use, and hospital / clinic, it is recommended that the noise sensitive uses should either be located away from the traffic-noise affecting facades of the site or, as the last resort, the sensitive uses should be noise insulated with air-conditioners to avoid unacceptable traffic noise impacts from the surrounding road network. For Site 1E1, 1F1, 3D2 to 3D4 and 3E1, the land use allows domestic uses which will require planning permission from the Town Planning Board. These planning applications should include assessments on the traffic noise impact to demonstrate that the proposed development would not result in adverse impact for the development.
- 7.11.8 For school sites 1A2, 1A3, 1A4, 1B2, 1B3 & 1B4, the layout of these planned schools should be arranged in a way to avoid the sensitive facades of the classrooms facing Roads L2, L3 and L4, or as the last resort all the classrooms should be noise insulated with air-conditioners to avoid unacceptable traffic noise impacts from the surrounding road network.

- 7.11.9 For those affected existing NSRs, the 'New' road noise contributions to the overall noise levels would be less than 1.0 dB(A) and the 'New' road noise levels would all be below the relevant noise criteria, although the overall noise levels would still exceed the relevant noise criteria. However, it should be noted that such noise exceedances at the representative NSRs are due to the existing roads. Hence, direct mitigation measures on 'New' roads are not required as they would not be effective in improving the noise environment at the sensitive receivers.
- 7.11.10 Operational noise impacts from fixed plant noise can be effectively mitigated by implementing noise control treatment at source during the design stage and residual operational noise impacts are not anticipated. The need for noise measurement during commissioning of fixed noise sources should be included in the Contract Document.
- 7.11.11 Noise impacts from Open Air Entertainment Activities, namely those from the proposed main stadium, can be effectively mitigated by installation of retractable roof or the main stadium could consider a fixed roof design. With proper design measures, the noise impact due to the activities to be held in the main stadium is not likely to be significant.
- 7.11.12 The distance between the proposed helipad and the nearest planned residential NSR at Site 4B5 is about 700 m with an estimated L_{max} level of 80dB(A) at this NSR. Therefore, it is considered that the proposed helipad locations would comply with the helicopter noise criteria at the nearest NSRs and adverse helicopter noise impact would not be anticipated.
- 7.11.13 With the implementation of practicable noise mitigation measures and/or a buffer distance of not less than 10m between the proposed Environmental Friendly Transportation Link (EFTS) (if decided to be a railway form in the future) and the nearby NSRs, adverse rail noise impacts at the NSRs would not be anticipated. Example of practicable noise mitigation measures including those adopted in Ma On San (MOS) Rail namely the use of multi-plenum system and vertical noise barrier at the all elevated sections of the alignment on viaduct.
- 7.11.14 The operation activities of the marine traffic noise (include noise from typhoon shelters) may vary with the composition and type of the vessels. The potential noise impact is likely coming from the engine noise and operation activities of individual vessel in operation. It is similar to noise from public place which vessels are free to move around and implementation control measures are not possible. Nevertheless, given the large separation distance between the typhoon shelters and the nearby NSRs, the noise level from the marine traffic noise (include noise from typhoon shelters) at the NSRs would be minimal.