

4 Noise Impact

4.1 Overview

This section presents the noise assessment for the Revised Recommended Outline Development Plan (RODP) for the NENT NDA Study Area. It evaluates the potential noise implications of the proposed landuse framework, including the identification and evaluation of the construction noise, road traffic noise, helicopter noise, industrial noise and fixed noise such as shooting ranges, district cooling system, sewage pumping station, pumping station, etc. on noise sensitive receivers.

Construction noise assessment of the use of Powered Mechanical Equipment (PME) has been conducted. With the implementation of practical mitigation measures including good site management practices, use of site hoarding, use of movable noise barrier, acoustic mat and full enclosure, use of “quiet” plant and working method, construction noise impacts at most of the neighbouring noise sensitive uses would be controlled to acceptable levels. However, for some residential premises and educational institutions, noise exceedances are anticipated even after implementing all practicable mitigation measures.

Potential operational noise impacts associated with helicopter noise, industrial noise, fixed noise and road traffic noise have also been assessed. Fixed noise source sound power level limits are specified for district cooling system (DCS), sewage treatment works (STW), sewage pumping station (SPS), pumping station (PS) and sports ground/sports complex with necessary noise control measures to comply with statutory criteria. Provision of acoustic insulation with air conditioning is recommended for landuse “OU”, “G” and “Gr” (KTN D1-12, KTN D1-13, KTN F1-3, KTN F1-4) affected by helicopter noise and shooting noise near Lo Wu Classification Range. Operational road traffic noise impact on the sensitive uses outside NDA area and existing sensitive uses within NDA area would be mitigated by provision of vertical noise barriers, vertical noise barriers with cantilevered arm, low noise surfacing, semi-enclosures / full enclosures to within their respective noise criteria and where exceedances are predicted, those contribution due to project road is less than 1 dB(A) and within the respective criteria. Hence, the traffic noise impact from the project road is insignificant. Similar mitigation measures have been recommended for the planned noise sensitive uses within NDA area to comply with statutory criteria. Provision of acoustic insulation with air conditioning is recommended for the educational institution FLN C2-9 (East and south facades between 4/F to 8/F) after exhaust of all practicable noise mitigation measures.

The noise impact assessment has been conducted in accordance with the requirements of Annex 5 and Annex 13 of the Technical Memorandum on Environmental Impact Assessment Ordinance (TM-EIAO) as well as the requirements set out under clause 3.4.5 of the EIA Study Brief.

4.2 Environmental Legislation, Standards and Guidelines

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

- Noise Control Ordinance (NCO) (Cap. 400);
- Environmental Impact Assessment Ordinance (EIAO) (Cap. 499);

- Technical Memoranda (TM) on Noise from Construction Work other than Percussive Piling (TM-GW);
- TM on Noise from Percussive Piling (TM-PP);
- TM for the assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites (TM-Places); and
- TM on Noise on Construction Work in Designated Areas (TM-DA).

4.2.1 Construction Noise

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

To ensure a better environment, the TM-EIAO promulgated under the EIAO has imposed more stringent criteria. For construction, there is no statutory limit on daytime construction noise under the NCO and related TMs. Nevertheless, the TM-EIAO stipulates criteria of 65 - 75dB(A) for daytime construction activities, as shown in the **Table 4.1**.

Table 4.1 - Noise standards for construction activities

Uses	Noise Standards, L_{eq} (30 mins) dB(A) ^[1]
	0700 to 1900 hours on any day not being a Sunday or general holiday
All domestic premises including temporary housing accommodation	75
Hotels and hostels	75
Educational institutions including kindergartens, nurseries and all others where unaided voice communication is required	70 65 (During examinations)

Notes:

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

4.2.1.1 Construction Noise During Restricted Hours

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

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

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

Maximum noise levels from construction activities during restricted hours at affected Noise Sensitive Receivers (NSRs) are controlled under the TMs and shall not exceed the specified Acceptable Noise Levels (ANLs). These ANLs are stipulated in accordance with the Area Sensitivity Ratings (ASRs) established for the NSRs. The ANLs for construction works in Designated Areas are more stringent than those given in the TM-GW and are summarised in **Table 4.2**.

Table 4.2 - ANLs for construction during restricted hours

Time Period	ANLs for ASRs, dB(A)		
	A	B	C
All weekdays during the evening (1900 to 2300 hours), and general holidays (including Sundays) during the day and evening (0700 to 2300 hours)	60 (45)	65 (50)	70 (55)
All days during the night-time (2300 to 0700 hours)	45 (30)	50 (35)	55 (40)

Note:

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

As defined in the Noise Control Designated Area Plan No. EPD/AN/NT-01 and EPD/AN/NT-02, Chau Tau Tsuen, Pun Uk Tsuen, Ho Sheung Heung, Tsung Pak Long, Hak Ka Wai, Shek Wu Hui, Luen Wo Hu and Yeuk Tau are within the Designated Area.

Construction works during restricted hours might be required for the construction crossing Fanling Highway and East Rail. It is a must as required by Transport Department and the Police Force that no live traffic should be underneath the launching operation for public safety reasons. Hence, these activities could only be carried out when the roads are closed to public traffic. These construction works include Fanling Bypass, Po Shek Wu Interchange Improvement, the Pak Shek Au Interchange, new Kwu Tung Interchange and the footbridges across Fanling Highway and East Rail.

In general, the construction works which need to be conducted during restricted hours include lanes closure beneath the road, falsework and formwork erection, formwork launching and concrete casting. The works contract will require contractor to devise their own construction method and apply for a CNP prior to commencement of construction. Mitigation measures as required for compliance with the NCO requirement (e.g. implementation of work sequencing, assignation of reasonable PME and application of suitable mitigation measures at the fixed construction plant) shall be implemented by the contractor to minimise any adverse impact.

Despite any description made in the report, there is no guarantee that a CNP will be issued for the project construction. The Noise Control Authority will consider a well-justified CNP application, once filed, for construction works within restricted hours as guided by the relevant TMs issued under the NCO. The Noise Control Authority will take into account contemporary conditions / situations of adjoining land uses and any previous complaints against construction activities at the site before making a decision in granting a CNP. Nothing in the report shall bind the Noise Control Authority in making a decision. If a CNP is to be issued, the Noise Control Authority shall include in it any conditions demand. Failure

to comply with any such conditions will lead to cancellation of the CNP and prosecution under the NCO.

4.2.1.2 Percussive Piling

Under the TM-PP, CNPs are also required for percussive piling involving the use of diesel, pneumatic and / or steam hammer. This TM specifies the permitted hours and other conditions for percussive piling. **Table 4.3** lists the acceptable percussive piling noise levels for various types of NSR.

Table 4.3 - ANLs for percussive piling

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

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

To minimize the construction noise impact, alternative construction methods to replace percussive piling shall be proposed as far as practicable.

4.2.1.3 Blasting

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

In case blasting works will be involved, it should be carried out, as far as practicable, outside the sensitive hours of 7 p.m. to 7 a.m. on Monday to Saturday and any time on a general holiday, including Sunday. For blasting that must be carried out during the sensitive hours, the noise impact associated with the removal of debris and rocks should be fully assessed and adequate mitigation measures should be recommended to reduce the noise impact as appropriate.

4.2.2 Operational Noise

The TM-EIAO has stipulated the noise standards for various noise sources as shown in **Table 4.4**. It should, however, be noted that the following noise criteria are only applicable to uses that rely on opened windows for ventilation.

Table 4.4 - Noise standards for operational phase

Common Uses	Noise Standards ^[1]				
	Aircraft Noise (Noise Exposure Forecast: NEF)	Helicopter Noise L_{max} , dB(A)	Road Traffic Noise L_{10} (1hour), dB(A)	Rail Noise	Fixed Noise Sources
All domestic premises including temporary housing accommodation	25	85	70	(see Note 3) (a) The appropriate Acceptable Noise Levels shown in Table 2 of the Technical Memorandum for the Assessment of Noise from Places Other than Domestic Premises, Public Places or Construction Sites and (b) L_{max} (2300-0700 hours) = 85dB(A)	(a) 5dB(A) below the appropriate Acceptable Noise Levels (ANL) shown in Table 2 of the Technical Memorandum for the Assessment of Noise from Places Other than Domestic Premises, Public Places or Construction Sites, or (b) the prevailing background noise levels (For quiet areas with level 5 dB(A) below the ANL)
Hotels and hostels	25	85	70		
Offices	30	90	70		
Educational institutions including kindergartens, nurseries and all others where unaided voice communication is required	25	85	65		
Places of public worship and courts of law	25	85	65		
Hospitals, clinics, convalescences and homes for the aged, diagnostic rooms, wards	25	85	55		

Notes:

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

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

[3] Rail noise is under the control of the Noise Control Ordinance and shall comply with the Acceptable Noise Levels laid down in the Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites.

4.2.2.1 Fixed Noise Sources

Operational noise from fixed noise sources is controlled under the NCO's Technical Memorandum on Noise from Places other than Domestic Premises, Public Places or Construction Sites (TM-Places). To plan for a better environment, the TM-EIAO has specified the following requirement, whichever is more stringent.

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

The ANLs for different Area Sensitivity Ratings during different periods are summarised in **Table 4.5**.

Table 4.5 - ANLs for fixed noise sources

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

4.2.2.2 Road Traffic Noise Sources

The criteria for assessing road traffic noise are given in the TM-EIAO and tabulated in **Table 4.4**. For domestic premises, hotels, hostels and offices, the criterion is 70dB(A). For educational institutes and places of worship, the criterion is 65dB(A). For hospitals, clinics etc, a more stringent criterion of 55dB(A) is stipulated. It should be noted that all these criteria only apply to NSRs that rely on opened windows for ventilation. In addition, reference has been made to EIAO Guidance Note No. 12/2010 on "Road Traffic Noise Impact Under the Environmental Impact Assessment Ordinance".

4.2.2.3 Aircraft & Helicopter Noise Sources

The noise criteria for aircraft and helicopter noise are given in **Table 4.4**. NSRs should be planned beyond the NEF25 contour of aircraft noise, except for offices which should be beyond the NEF30 contour.

For helicopter noise, NSRs should be planned to ensure noise impacts are less than 85dB(A) L_{max} , except for offices which should be exposed to noise impacts less than 90dB(A) L_{max} .

Similar to the road traffic noise assessment, all these criteria only apply to NSRs relying on opened windows for ventilation.

4.2.2.4 Railway Airborne Noise Sources

The noise criterion for assessing railway noise is given in **Table 4.4**. In addition, noise level during the period between 11:00pm and 7:00am of the following day should not exceed 85 dB(A) L_{max} . Similar to the road traffic noise assessment, all these criteria only apply to NSRs relying on opened windows for ventilation.

4.3 Description of the Environment

4.3.1 Existing Environment

4.3.1.1 Kwu Tung North NDA (KTN NDA)

KTN area is predominantly rural with low population density. The noise climate within KTN is dominated by road traffic noise from Castle Peak Road and Fanling Highway. In addition, it is also affected by shooting noise and helicopter noise from Lo Wu Classification Range and Helicopter Landing Site near Ma Tso Lung. Isolated industrial operations scattered throughout KTN also contribute to the overall noise environment. These operations are small in scale only and include open storage facilities, and car stripping/repair workshops.

4.3.1.2 Fanling North NDA (FLN NDA)

FLN area is next to the existing Sheung Shui and Fanling developed towns. The noise climate within FLN is generally dominated by road traffic noise from Man Kam To Road, Jockey Club Road, Tin Ping Road, Ma Sik Road and Sha Tau Kok Road. In addition, activities in the open storage and industrial sites also contribute to the noise environment.

4.3.2 Baseline Condition

4.3.2.1 Existing Noise Sources

The baseline review generally covers a distance of 300 metres from the boundary of the Project and associated infrastructure works. **Figures 4.1** and **4.2** show an overlay of landuse proposal, locations of existing noise sources within 300m from the boundary of the Project and potential noise sources impacts to the planned NSRs. **Table 4.6** gives the shortest separation distance of the planned NSR to these existing noise sources.

Table 4.6 – Major existing noise sources and its potential impacts

Noise Source ^[1]	Shortest Separation Distance to Planned NSR, m ^[2]		Potential Noise Impacts [Y/N]	Affected NSRs ^[3]
KTN – Existing Noise Source				
Lok Ma Chau Public Transport Interchange	1200 (A1-2)		N	-
Lo Wu Classification Range (G1-1, G1-2)	170 (F1-3)		Y	P
Shek Wu Hui Sewage Treatment Works	800 (D1-5)		N	-
Lok Ma Chau Tunnel Ventilation Shaft (A1-11)	65 (A1-5)	65 (A2-4)	Y	P
Lok Ma Chau Tunnel Ventilation Shaft (A1-12)	30 (A2-7)	65 (A1-8)	Y	P
Lok Ma Chau Tunnel Ventilation Shaft (B1-5)	265 (A1-2)		Y	P
Lok Ma Chau Tunnel Ventilation Shaft (D1-2)	60 (D1-7)	90 (D1-5)	Y	P
West Ventilation Building	1100 (A1-2)		N	-
East Ventilation Building	1060 (D1-5)		N	-
LMC Spur Line	1200 (A1-2)		N	-

Noise Source ^[1]	Shortest Separation Distance to Planned NSR, m ^[2]	Potential Noise Impacts [Y/N]	Affected NSRs ^[3]
East Rail	740 (D1-5)	N	-
Lo Wu Classification Range Helicopter Landing Site (G1-1)	80 (F1-3)	Y	P
Lo Wu Camp near Lo Wu Saddle Club (G1-6)	300 (D1-11)	Y	P
Crest Hill Operation Base Helipad	760 (F1-3)	N	-
FLN – Existing Noise Source			
Shek Wu Hui Sewage Treatment Works	800 (B2-7)	N	-
Cheung Po Tau Firing Range	700 (B2-6)	N	-
East Ventilation Building	900 (B2-7)	N	-
On Lok Tsuen Industrial Area	150 (D2-12)	N	-
East Rail	1000 (B2-7)	N	-
San Wai / Tai Ling Firing Range Helipad	400 (D2-4)	N	-
Existing CLP Substation and Existing WSD Raw Water Pumping Station (A1-1)	440 (A1-4)	N	-

Note:

- [1] NDA site no. of the corresponding planned landuses are shown in parentheses.
[2] Separation distance from the noise sources to the proposed developments is based on the Revised RODP.
[3] P and E represent planned NSRs and existing NSRs respectively.

4.3.2.2 Planned Noise Sources

Other than the major existing noise sources within 300 metres from the boundary of the Project and associated infrastructure works, there are planned noise sources which may give rise to potential impacts on existing and planned NSRs within the 300m boundary of the Project and associated works. They are listed in **Table 4.7** and their associated locations are shown in **Figures 4.1** and **4.2**.

Table 4.7 – Planned noise sources and its potential impacts

Noise Source ^[1]	Shortest Separation Distance, m ^[2]		Potential Noise Impacts [Y/N]	Affected NSRs ^[3]
	Planned NSR	Existing NSR		
KTN - Planned Noise Source				
District Cooling System (DCS) (B1-7)	140 (A1-2)	8 (B1-3)	Y	P/E
Sports Ground / Sports Complex (F1-1)	160 (F1-3)	50 (H1-1)	Y	P/E
Sewage Treatment Works Extension - Phase 2 in FLN (A2-3)	820 (G1-8)	-	N	-
Public Transport	Topside	260	Y	P/E

Noise Source ^[1]	Shortest Separation Distance, m ^[2]		Potential Noise Impacts [Y/N]	Affected NSRs ^[3]	
	Planned NSR				Existing NSR
Interchange (A1-5)	(A1-5)		(KTN-11)		
Sewage Pumping Station (SPS) (D1-3)	135 (D1-5)	105 (D1-7)	220 (D1-9)	Y	P/E
Sewage Pumping Station (SPS) (F1-2)	95 (F1-3)		35 (KTN-45)	Y	P/E
Electricity Sub-station (ESS) (B2-4)	50 (B2-5)		90 (KTN-11)	Y	P/E
Fire Station cum Ambulance Depot (E1-6)	170 (A3-3)		30 (E1-8)	Y	P/E
FLN - Planned Noise Source					
Sewage Treatment Works Extension - Phase 2 (A2-3)	660 (B2-7)		85 (A1-3)	Y	E
Parking and Operation Facilities for Environmental Friendly Transport System (B2-2)	40 (B2-6)	45 (B2-7)	115 (FN-18)	Y	P / E
Weapon Training Division (A1-11)	120 (B2-6)		12 (FN-12)	Y	P / E
Public Transport Interchange (PTI) (D2-9)	Topside (D2-9)		220 (FN-5)	Y	P / E
Public Transport Interchange (PTI) (B3-6)	Topside (B3-6)		245 (FN-21)	Y	P/E
Reprovision of Temporary Wholesale Market (D1-6)	200 (D2-12)		45 (FN-2)	Y	P
Pumping Station (PS) (A1-2)	1060 (B2-6)		14 (A1-3)	Y	E
Sewage Pumping Station (SPS) (A1-6)	420 (B2-6)		50 (A1-9)	Y	E
Sewage Pumping Station (SPS) (B1-4)	65 (B1-7)		145 (FN-10)	Y	P/E
Sewage Pumping Station (SPS) (B2-3)	145 (B2-7)		110 (FN-18)	Y	P/E
Sewage Pumping Station (SPS) (C2-3)	220 (B3-12)		190 (FN-22)	Y	P/E
Electricity Sub-station (B2-5)	45 (B2-7)		155 (FN-18)	Y	P/E
Other Planned Noise Source					
Northern Link	-		-	N	-
Express Rail Link	-		-	N	-

Note:

- [1] NDA site no. of the corresponding planned landuses are shown in parentheses.
 [2] Separation distance from the noise sources to the proposed developments is based on the Revised RODP.
 [3] P and E represent planned NSRs and existing NSRs respectively.

4.4 Potential Concurrent Project

The potential concurrent projects that would have cumulative environmental impacts during the construction and operational phases of NDA is given in **Section 2**. The following concurrent projects are relevant for the assessment of cumulative noise assessment.

- Construction Phase – Planning and Engineering Study on Development of Lok Ma Chau Loop
- Construction Phase - Construction of Cycle Tracks and the associated Supporting Facilities from Sha Po Tsuen to Shek Sheung River
- Operational Phase – Planning and Engineering Study on Development of Lok Ma Chau Loop
- Operational Phase – Liantang/ Heung Yuen Wai Boundary Control Point and Associated Works
- Operational Phase – Land Use Planning for the Closed Area
- Operational Phase – Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling (Stage 2)

The cumulative impact due to construction of road network from KTN to Lok Ma Chau Loop (LMC Loop) and cycle track near Fanling Highway section have been included in the assessment. Any fixed noise sources planned under LMC Loop would be located at more than 1.5 km from the NSRs of concern. Cumulative impacts from fixed noise sources are therefore not anticipated. The induced traffic from both LMC Loop, Liantang Highway, widening of Tolo Highway/Fanling Highway and Closed Area has been included in the cumulative assessment.

4.5 Noise Sensitive Receivers

4.5.1 Noise Sensitive Receivers Outside NDA

Representative NSRs within 300m from the boundary of the Project and associated infrastructure works but outside the NDA region, as defined by the TM-EIAO and NCO, have been identified with the first layer of NSRs selected for assessment.

The existing NSRs are identified by means of topographic maps, aerial photos, land status plans and several site surveys. Planned/Committed NSRs are identified by making reference to relevant Outline Zoning Plans (OZP), Outline Development Plans, Recommended Outline Development Plan, Layout Plans and other relevant published lanuse plans, including any alternative development proposal(s) identified or recommended in the course of the EIA study. Locations of the representative NSRs are shown in **Figures 4.3 to 4.5** and are tabulated in **Tables 4.8 and 4.9**. Locations of assessment points (APs), photos and formation levels are presented in **Appendix 4.1**.

Table 4.8 - NSRs outside KTN NDA

NSR	Locations	AP	Use ^[1]
KTN-1	St. Paul's House of Prayer, De La Salle Secondary School (N.T.), Ascot Park	R1001-1020	W, E, R
KTN-2	Kam Tsin Village Ho Tung School, Village near Kan Tsin Road	R1021-1040	E, R
KTN-4	Casas Domingo	R1041-1060	R

NSR	Locations	AP	Use ^[1]
KTN-7 ^[3]	Lady Ho Tung Welfare Centre	R1061-1080	H
KTN-9	Valasis	R1081-1100, R3013-3015	R
KTN-11	Europa Garden Phase I	R1101-1120	R
KTN-12	Scattered Village Houses West of Europa Garden Phase I	R1121-1140	R
KTN-20	Ma Tso Lung	R1161-1180, R3000-3001, R8113	R
KTN-32	Tsung Pak Long,	R1181-1200, R8500	R
KTN-33	Ma Tso Lung San Tsuen	R1201-1220, R8101	R
KTN-45	Ma Tso Lung	R1501-1507, R3002	R
KTN-46	Scattered Village Houses at Northern Boundary of KTN	R1241-1260, R8100	R
KTN-48	Golf Parkview	R1281-1300	R
KTN-49	Scattered Village Houses along Chau Tau Tsuen	R1141, R1301-1320	R
KTN-50	Scattered Village Houses along Kwu Tung Road	R1321-1322, R1681-1682	R
KTN-P2 ^[2]	KTS/267 Proposed House	R1541-1560	R
KTN-P6 ^[2]	Village near Chau Tau Tsuen	R1521-1540	R

Notes:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] Planned NSRs outside KTN NDA.
- [3] Lady Ho Tung Welfare Centre is temporarily closed.

Table 4.9 - NSRs outside FLN NDA

NSR	Locations	AP	Use ^[1]
FN-1	Wing Ning Tsuen	R4001-4020	R
FN-2	Wing Ning Wai	R4021-4040	R
FN-3	San Uk Tsuen	R4041-4060	R
FN-4	The Sisters of the Precious Blood Children Village	R4061-4080	IC
FN-5	Kan Lung Tsuen	R4081-4100	R
FN-6	Siu Hang Tsuen	R4101-4120	R
FN-7	Siu Hang San Tsuen	R4121-4140	R
FN-8	Scattered Village Houses North of Proposed Potential Ecopark	R4141-4160	R
FN-10	Scattered Village Houses in Sheung Shui Wa Shan	R4161-4180, R8504-8506	R
FN-11	Hung Kiu San Tsuen	R4181-4200	R
FN-12	Tin Hau Ancient Temple, Village near Hung Kiu San Tsuen	R4201-4220, R8502	W, R
FN-13	Ancestor of Lui Temple (Tak Yeung Tong)	R4221-4240	W
FN-18	Man Kok Village	R4241-4260, R8016, R9027	R
FN-20	Fung Kai No. 2 Secondary School	R4261-4280	E
FN-21	Tin Ping Shan Tsuen	R4281-4300	R

NSR	Locations	AP	Use ^[1]
FN-22	Woodland Crest	R4301-4320	R
FN-23	On Kwok Villa	R4321-4340	R
FN-26	Good View New Village	R4341-4360	R
FN-27	Scattered Village Houses East of Good View New Village	R4361-4380	R
FN-29	Wing Fok Centre	R4381-4400	R
FN-30	Wong Fai Centre	R4401-4420	R
FN-31	Belair Monte and Green Code	R4421-4440	R
FN-37	Sheung Pak Tsuen and Tai Yuen Tsuen	R4441-4460	R
FN-38	Fung Kai No. 1 Secondary School	R4461-4480, R8017	E
FN-39	Fung Kai Primary School	R4481-4500	E
FN-40	Noble Hill	R4501-4520	R
FN-46	Fung Kai Liu Man Shek Tong Secondary School	R4521-4540	E
FN-50	The Church of Christ in China Sheung Shui Church	R5801-5802	W
FN-51	Tsui Lai Garden	R5821-5823	R
FN-52	The Cornwall	R5832	R
FN-53	Pui Ling School	R5836	E
FN-54	Fung Kai Care and Attention Home for the Elderly	R5841	IC
FN-55	Lee Chi Tat Memorial School	R5861-5862	E
FN-56	Sam Sheung Temple	R5881-5883	W
FN-57	Union Plaza	R5901-5902	R
FN-58	Louver Mansion	R5961-5962	R
FN-59	Luen Cheong Building	R5921	R
FN-60 ^[2]	Proposed Site for Housing Development	R6001-6002	R
FN-61	Shek Wu Hui Jockey Club Clinic	R6041-6060	IC
FN-62	Tai Ping Estate	R6061-6080	R
FN-63	Grand Tower and Fu Kwai Building	R6081-6100	R
FN-64	Fanling Rhenish Church Secondary School, Fan Leng Lau Garden	R6101-6120, R8019	E, R
FN-65	Buddhist Ma Kam Chan Memorial English Secondary School	R6121-6140	E
FN-66	Fanling Garden	R6141-6160	R
FN-67	Tai Po Servants Quarters	R6161-6180	R
FN-68	Sunningdale Garden	R6181-6200	R
FN-69	Yuk Yin Public School	R6201-6220	E
FN-70	Yuk Po Court	R6221-6240	R
FN-71	Buddhist Chan Shi Wan Primary School	R6241-6260	E
FN-72	Fu Wing Mansion	R6261-6280	R
FN-73	Shek Wu Hui Public School	R6281-6300	E
FN-74	S. K. H. Chan Young Secondary School	R6301-6320	E
FN-75	Grand Regentville	R6321-6340	R
FN-76	Alliance Primary School Sheung Shui	R6341-6360	E
FN-77	Sheung Shui Police Married Quarters	R6361-6380	R
FN-83	Scattered Village Houses near Cheung Po Tau	R8503	R
FNE-1	Tai Tau Leung	R1361-1380	R
FNE-2	Choi Yuen Estate	R1381-1400	R
FNE-3	Buddhist Li Chong Yuet Ming Nursing	R1401-1420	IC, W, R

NSR	Locations	AP	Use ^[1]
	Home for the Elderly, Mother of Christ Church, Tai Ping Estate		
FNE-4	Village Houses near Hing Yan Tsuen	R1421-1440	R
FNE-5	San Fung Avenue	R1441-1460	R
FNE-6	Hing Yan Tsuen, Sheung Shui Seventh Day Adventist Church	R1461-1480	R, W
FNE-8	Tsui Lai Garden	R1501-1520	R
FNE-10	Hak Ka Wai	R1181, R8500	R
FS-1	Scattered Village Houses East of Ma Wat River and West of Wing Ning Wai	R4541-4560	R
FS-4	Village Houses between Wing Ning Wai and Ma Wat Estate	R4561-4580	R
FS-5	Ma Wat Tsuen	R4581-4600	R
FS-6	Scattered Village Houses near Ma Wat Tsuen	R4601-4620	R
FS-9	Tsung Him School, Tsung Kyam Kindergarten and Tsung Kyam Church, Shung Him Tong Tsuen	R4621-4640, R8521	E, R
FS-10	Shung Him Tong Tsuen	R4641-4660, R8522	R
FS-11	Scattered Village Houses in Tong Hang	R4661-4680, R8509	R
FS-12	Scattered Village Houses at Wong Kong Shan	R4681-4700, R8020	R
FS-13	Tong Hang Tung Chuen	R4701-4720, R8510-8512	R
FS-14	Drawing View	R4721-4740	R
FS-15	Wo Hop Shek San Tsuen, Regalia Villa	R4741-4760, R8513	R
FS-16	Scattered Village Houses along MTRC and Fanling Highway	R4761-4780, R8018	R
FS-17	Scattered Village Houses East of Wo Hop Shek San Tsuen	R4781-4800, R8515	R
R TH1 ^[3]	Scattered Village Houses of Kau Lung Han San Wai	R TH1	R
R TH2 ^[3]	Scattered Village Houses of Kau Lung Han San Wai	R TH2	R
R TH4 ^[3]	Scattered Village Houses of Kau Lung Han Lo Wai	R TH4	R
R TH5 ^[3]	Scattered Village Houses of Kau Lung Han Lo Wai	R TH5	R
R TH6 ^[3]	Scattered Village Houses of Kau Lung Han Lo Wai	R TH6	R
R KT1 ^[3]	Scattered Village Houses of Kau Lung Han San Wai	R KT1	R
R KT2 ^[3]	Scattered Village Houses of Kau Lung Han San Wai	R KT2	R
R KT3 ^[3]	Scattered Village Houses of Kau Lung Han San Wai	R KT3	R
R KLHSW ^[3]	Scattered Village Houses of Kau Lung Han San Wai	R KLHSW	R
R SR7N ^[4]	Scattered Village Houses along Fanling Highway	R SR7N	R
R SR77 ^[4]	Scattered Village Houses in Yuen Leng	R SR77	R

NSR	Locations	AP	Use ^[1]
R FLNBP1 ^[3]	Cyber Domaine	R FLNBP1	R
R WHS1 ^[4]	Scattered Village Houses East of Wo Hop Shek San Tsuen	R WHS1	R
R NWP1 ^[3]	Scattered Village Houses North of Nam Wa Po	R NWP1	R
R NWP2 ^[3]	Scattered Village Houses North of Nam Wa Po	R NWP2	R
R SR8 ^[3]	Scattered Village Houses West of Wo Hop Shek San Tsuen	R SR8	R
R SR12 ^[3]	Scattered Village Houses North of Nam Wa Po	R SR12	R

Notes:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] Planned NSRs outside FLN NDA.
- [3] Locations refer to EIA-190/2010 Liantang / Heung Yuen Wai Boundary Control Point and Associated Works.
- [4] Locations refer to EP-324/2008 Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling.

4.5.2 Planned Noise Sensitive Receiver Within NDA

Other than the NSRs identified in **Section 4.5.1**, the Revised RODP has proposed a number of different landuses within the NDAs. Some of these landuses are considered as NSRs under the TM-EIAO. These NSRs are tabulated in **Tables 4.10** and **4.11**, and their locations are shown in **Figures 4.6** and **4.7**. Locations of assessment points and formation levels are shown in **Appendix 4.1**.

Table 4.10 - Future NSRs within KTN NDA

NSR ^[1]	AP ^[8]	Use ^[2]	Remarks ^[3]
A1-2	R2500-2520, R8010	PRH	Local Rehousing
	R6161-6187	E	Kindergartens
	R6661-6687	IC	Social Welfares Facilities
A1-4	R2521-2540	R	N/A
	R6261-6271	E	Kindergartens
A1-5	R2541-2560, R8005-8007, R9013	CDA	Public Transport Interchange
	R6301-6320	E	Kindergartens
A1-6	R2561-2580, R8112	R	N/A
	R6331-6351	E	Kindergartens
	R6831-6851	IC	Social Welfares Facilities
A1-8	R2581-2600, R9012	HOS	N/A
	R6381-6392	E	Kindergartens
A1-9	R2601-2620	R	N/A
A2-2	R2621-2640, R8000-8004	PRH	N/A
	R6201-6249	E	Kindergartens
	R6701-6749	IC	Social Welfares Facilities
A2-4	R2641-2660, R3028-3029 ^[7] , R9010	R, HOS	N/A
	R6141-6153	E	Kindergartens
A2-5	R2660-2680	R	N/A
	R6581-6592	IC	Social Welfares Facilities

NSR ^[1]	AP ^[8]	Use ^[2]	Remarks ^[3]
A2-7	R2681-2700, R9011	PRH	Neighbourhood Elderly Community Centre
	R6101-6128	E	Kindergartens
A2-9	R2701-2720	R	N/A
A2-11	R3221-3240	E	Primary School
A2-12	R3241-3260	E	Primary School
A2-13	R3261-3280	E	Secondary School
A3-1	R3281-3300, R3020 ^[7]	E	Primary School
A3-2	R3301-3320, R3021 ^[7]	E	Secondary School
A3-3	R2721-2740, R3022 ^[7]	PRH, R	Day Care Centre for the Elderly
	R6001-6062	E	Kindergartens
	R6501-6562	IC	Social Welfares Facilities
A3-4	R3381-3400, R9003	E	Primary School
A3-6	R2741-2760	R	N/A
A3-7 ^[4]	R2141, R3008	R	Fung Kong Garden
B1-3	R3017, R8110	R	Green Belt and Amenity
B1-9	R8104	R	Green Belt and Amenity
B2-5	R3401-3420	E	Primary School
B2-6	R3421-3440	E	Secondary School
B2-7	R3441-3460, R8008-8009, R9035	E	Primary School
B2-8	R6781-6783	IC	Social Welfares Facilities
B2-10	R2761-2780, R8105, R8111 ^[7]	CDA, E	N/A
	R6861-6867	IC	Social Welfares Facilities
B3-7	R8107	R	N/A
B3-16 ^[9]	-	OU	Visitor Centre
C1-3 ^[4]	R2021-2040	CDA	Enchi Lodge
C1-4 ^[4]	R2001, R2102-2103, R3012	R	Yin Kong
D1-5	R3481-3500, R3803	R	N/A
D1-7	R2781-2800, R8106 ^[7]	R	N/A
D1-9	R2041-2060, R3009-3010, R8201-8208	R	Ho Sheung Heung, Hau Ku Shek Ancestral Hall, Hung Shing Temple & Pai Fung Temple and Sin Wai Nunnery
D1-11	R2821-2840	R	N/A
D1-12	R9004	Gr	Potential Activity Centre
D1-13	R9005	Gr	Potential Activity Centre
E1-2	R2861-2880	E	Primary School
E1-3	R3701-3720, R9002	G	District Headquarters, District Headquarters Associated Married Staff Quarters, Divisional Police Station and Reprovisioning of Fan Garden Junior Police Officers' Police Married Quarters
E1-4	R3721-3740	E	Secondary School
F1-3 ^[6]	R2841-2860, R9001	OU	Reserve for Supporting of Lok Ma Chau Loop Development
F1-4 ^[5]	R9000	G	Lung Kai Public School
G1-3	R3006-3007 ^[4]	R	N/A
H1-1 ^[4]	R1421, R8108, R9021	R	N/A

Note:

[1] Based on Revised RODP shown in **Appendix 2.1**.

- [2] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [3] N/A means no remarks.
- [4] Existing NSRs to be retained in Revised RODP.
- [5] Adaptive uses of the existing Lung Kai Public School.
- [6] The current landuse is reserved for future support for Lok Ma Chau Loop Development in KTN NDA, the landuse status is yet to be known exactly. As a conservative analysis, the landuse has been assumed residential in the assessment.
- [7] Existing NSRs to be resumed after completion of NDA development.
- [8] Assessment point locations according to Class Assessment Document for Standard Schools from Architectural Services Department dated on 31 August 1998.
- [9] Provision of acoustic insulation with air conditioning has been assumed in current assessment.

Table 4.11 - Future NSRs within FLN NDA

NSR ^[1]	AP ^[6]	Use ^[2]	Remarks ^[3]
A1-2 ^[5]	R8508	R	Future Pumping Station for Sheung Shui Water Treatment Works
A1-3 ^[4]	R9025-9026	R	N/A
A1-4 ^[4]	R4801-4802, R8507	W	Man Ming Temple
A1-8	R4961-4963, R9028	G, E	Police Driving and Traffic Training Division
A1-9 ^[4]	R9028	R	N/A
A1-11	R4981-4983	G, E	Weapons Training Division
B1-7	R5001-5006, R9031	R	N/A
B1-8	R5021	R	N/A
B1-9	R5041	R	N/A
B2-6	R5061-5064	PRH	N/A
B2-7	R5081-5083	PRH	N/A
	R7001-7014	IC	Social Welfares Facilities
	R7501-7514	E	Kindergartens
B2-11	R5101-5104	PRH	N/A
B2-12	R5121-5123	PRH	N/A
	R7051-7064	IC	Social Welfares Facilities
B3-2	R5141-5143	PRH	N/A
B3-3	R5161-5164, R8700	PRH	N/A
	R7101-7117	IC	Social Welfares Facilities
B3-4	R5181-5182	E	Primary School
B3-5	R5201-5202	E	Primary School
B3-6	R5221-5223	R	Public Transport Interchange
	R7651-7656	E	Kindergartens
B3-7	R5231-5234	R	N/A
B3-9	R5241-5242	R	N/A
B3-10	R5261-5262	E	Secondary School
B3-12	R5281-5283	E	Primary School
C2-6	R7201-7204	IC	Social Welfares Facilities
C2-7	R5291-5292	E	Primary School
C2-9	R5295-5297	E	Secondary School
D1-3	R4151-4154	R	N/A
D2-2	R5301-5306	HOS	N/A
D2-4	R5321-5326, R8701-8702	R	N/A
D2-6	R5341-5343, R8703	PRH	N/A
D2-9	R5361-5369, R8600-	PRH	Public Transport Interchange,

NSR ^[1]	AP ^[6]	Use ^[2]	Remarks ^[3]
	8601, R8704 ^[5]		
	R7451-7497	IC	Social Welfares Facilities
	R7951-7997	E	Kindergartens
D2-12	R5381-5386	R	N/A
D3-1a	R5401-5405	R	N/A
D3-1b	R5406-5410	HOS	N/A
D3-1c	R5411-5414	R	N/A
	R7751-7763	E	Kindergartens
D3-3	R5421-5424	R	N/A
D3-4	R5441-5444, R8021-8022 ^[5]	R	N/A
	R7901-7913	E	Kindergartens
D3-5	R8705 ^[5]	R	N/A
D3-6	R5461-5465	R	N/A
	R7801-7820	E	Kindergartens
D3-7	R5481-5483, R8520 ^[5] , R8023 ^[5]	R	N/A
D3-8	R5501-5508, R8519 ^[5]	PRH	N/A
	R7851-7875	E	Kindergartens
D3-11	R5521-5522, R8602-8603	E	Secondary School
D3-12	R5541-5543	E	Primary School

Note:

[1] Based on Revised RODP shown in **Appendix 2.1**.

[2] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.

[3] N/A means no remarks.

[4] Existing NSRs to be retained in Revised RODP.

[5] Existing NSRs to be resumed after completion of NDA development.

[6] Assessment point locations according to Class Assessment Document for Standard Schools from Architectural Services Department dated on 31 August 1998.

All of the proposed hotels, hospitals/clinics and offices in the ROPD will be assumed to adopt central air-conditioning system design. These proposed uses are therefore not considered as NSRs.

4.6 Assessment Methodology

4.6.1 Construction Phase

4.6.1.1 General Procedures

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

- Determine the 300 meters from the boundary of the Project and associated infrastructure works;
- Identify and locate representative NSRs that may be affected by the works;
- Obtain the construction method and work sequence for the construction period;

- Obtain the construction plant inventory for each corresponding construction work sequence;
- Determine the Sound Power Levels (SWLs) of the plant items according to the information stated in the TM-GW or other recognised sources of reference, where appropriate;
- Calculate the correction factors based on the distance between the NSRs and the notional noise source positions of the work sites;
- Apply corrections for façade, distance, barrier attenuation, acoustic reflection where applicable;
- Predict construction noise levels at the NSRs;
- Quantify the level of impact at the NSRs, in accordance with TM-GW; and
- Predict the cumulative noise impacts for any concurrent construction works in the vicinity of the proposed work.

4.6.1.2 Locations of Representative NSRs

For construction noise assessment, representative NSR locations that would be affected by the construction activities have been selected from **Tables 4.8 to 4.11** and are summarised in **Table 4.12** below.

Table 4.12 - Representative NSRs for construction noise assessment

NSR	AP	Use ^[1]
KTN		
KTN-2	R1024	R
KTN-9	R3013-3015	R
KTN-11	R1103, R1105	R
KTN-12	R1122	R
KTN-20	R3000-3001, R8113	R
KTN-33	R8101	R
KTN-45	R3002	R
KTN-46	R8100	R
KTN-48	R1282	R
KTN-49	R1141, R1301	R
KTN-50	R1321-1322	R
A1-2	R8010	PRH
A1-5	R8005-8007	CDA
A1-6	R8112	R
A2-2	R8000-8004	PRH
A2-4	R3028-3029	R
A3-1	R3020	E
A3-2	R3021	E
A3-3	R3022	R
A3-7	R2141, R3008	R
B1-3	R8110	R
B1-9	R8104	R
B2-7	R8008-8009	E
B2-10	R8105, R8111	CDA, E
B3-7	R8107	R
C1-4	R2102-2103, R3012	R
D1-7	R8106	R

NSR	AP	Use ^[1]
D1-9	R2042, R2046, R3009-3010, R8201-8208	R
G1-3	R3006-3007	R
H1-1	R1412, R1421, R8108	R
KTN-P2	R1541, R1544	R
FLN		
FN-2	R4023	R
FN-3	R4046	R
FN-5	R4082	R
FN-7	R4123	R
FN-8	R4153	R
FN-10	R4161, R4162, R8504-8506	R
FN-11	R4181	R
FN-12	R8502	R
FN-18	R4242, R8016	R
FN-22	R4316	R
FN-23	R4321	R
FN-26	R4343, R4346	R
FN-29	R4389	R
FN-30	R4401	R
FN-31	R4421, R4426	R
FN-38	R8017	E
FN-40	R4506-4507	R
FN-64	R8019	R
FN-83	R8503	R
FNE-1	R1363, R1367	R
FNE-2	R1382	R
FNE-10	R8500	R
FS-4	R4562	R
FS-6	R4602	R
FS-9	R4622, R8521	E, R
FS-10	R8522	R
FS-11	R8509	R
FS-12	R8020	R
FS-13	R8510-8512	R
FS-14	R4722	R
FS-15	R8513	R
FS-16	R8018	R
FS-17	R8514, R8515	R
A1-2	R8508	R
A1-4	R8507	W
A1-8	R4962	E
A1-11	R4981	E
B3-3	R8700	PRH
D2-4	R8701-8702	PRH
D2-6	R8703	PRH
D2-9	R8600, R8601, R8704	PRH
D3-4	R8021, R8022	R
D3-5	R8705	R
D3-7	R8520, R8023	R
D3-8	R8519	PRH
D3-11	R8602, R8603	E

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.

Construction noise impacts of both existing and planned NSRs have been assessed according to the implementation phasing of the NDA development.

4.6.1.3 Implementation Programme

The implementation programme showing the construction period for first stage of infrastructure and development (3rd Quarter 2013 – 4th Quarter 2025), infrastructure and development – phase 1 (Early 2014 – End 2031) and infrastructure and development – phase 2 (Early 2017 – End 2031) is shown in **Appendix 4.2**.

4.6.1.4 Construction Noise Assessment Tool

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

4.6.2 Operational Phase

Operational Road Traffic Noise

4.6.2.1 General Assessment Methodology

Road traffic noise calculation is based on the method of UK Department of Transport “Calculation of Road Traffic Noise (CRTN)”. The predicted noise levels at the sensitive receivers include 2.5dB(A) facade reflection and correction factors of effects due to gradient, distance, view angle, road surface and barriers. The standard 0.8m solid parapet along viaduct has also been included in the assessment.

The computer programme, RoadNoise 2000, has been used to model traffic noise from road networks. It complies with the CRTN developed by the UK Department of Transport. The road traffic noise will be presented in terms of noise levels exceeded for 10% of the one-hour period during peak traffic flow [i.e. $L_{10(1hr)}$ dB(A)].

According to the EIA Study Brief, calculations of future road traffic noise will be based on the peak hourly flow for the maximum traffic projected within a 15 years period upon commencement of operation of the proposed road networks. The traffic projection will take into account the induced traffic due to the operation of planned roads and committed projects. Since the commencement year for all roads in the NDA network is Year 2029, the assessment year for road traffic noise is taken as Year 2044 (i.e. 15 years after the road opening). **Figures 4.3 to 4.5** show the areas within 300m from the boundary of the Project and associated infrastructure works which would be modelled by CRTN.

According to EPD’s Guidance Note 12/2010, traffic noise impact is considered significant if the traffic noise level at the NSRs with the project is greater than that of without the project at the design year (i.e. Year 2044) by 1.0 dB(A) or more. The following scenarios have been conducted:

- Predicted overall noise levels with the project scenario after 15 years upon commissioning of all road improvement scheme (i.e. Year 2044); and
- Predicted overall noise levels without the project scenario at the same year (i.e. without modification in Year 2044)

Where the predicted noise impacts with the project exceed the noise criteria and are greater than that for without the project by 1.0 dB(A), direct mitigation measures shall be considered on the proposed road to reduce the noise from the improved road to a level that:

- Is not higher than the 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 standard (i.e. not more than 1.0 dB(A))

According to EPD's Guidance Note 12/2010, in the case where NSRs are still exposed to noise levels exceeding the relevant noise criteria after the implementation of all direct mitigation measures, the total number of existing dwellings, classrooms and other noise sensitive elements which may qualify for indirect technical remedies, the associated costs and any implications for such implementation should be identified and estimated. The eligibility of the affected premises for indirect technical remedies is determined with reference to the following three criteria:

- the predicted overall noise level must be above a specified noise level (e.g. 70 dB(A) for domestic premises and 65 dB(A) for education institutions, all in $L_{10,(1hr)}$ dB(A));
- the predicted overall noise level is at least 1.0 dB(A) more than the prevailing traffic noise level, i.e. the total traffic noise level existing before the works to construct the road were commenced; and
- the contribution to the increase in the predicted overall noise level from the road project must be at least 1.0dB(A).

For planned sensitive uses of the proposed development areas which are also subject to potential road traffic noise impacts, the overall noise levels for maximum projected traffic within 15 years after the commissioning of all road improvement schemes (i.e. Year 2044) have been predicted. In the case where the planned NSRs are potentially exposed to excessive noise levels, direct mitigation measures shall be proposed to mitigate to within the relevant noise criteria.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. Should the facilities be proposed where exceedance is anticipated, provision of acoustic insulation with air conditioning should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable.

In addition to the road traffic noise assessment for maximum projected traffic flow within 15 years from the commencement of operation of all the proposed road networks (Commencement of all proposed road networks would be at Year 2029, i.e. Year 2044 is selected for assessment for maximum projected traffic flow), the commencement year of some

Schedule 2 Designated Project (DP) roads will be before Year 2029 and therefore, the interim year (i.e. 15 years after each DP road opening) are thus selected for assessment. The following interim years have been predicted:

- Road traffic noise assessment for KTN at Years 2036 and 2043 (15 years after completion of DP3 and DP4); and
- Road traffic noise assessment for FLN at Year 2038 (15 years after completion of Fanling Bypass Eastern Section).

4.6.2.2 Locations of Representative NSRs

For operational road traffic noise assessment, representative NSRs locations have been selected from **Tables 4.8 to 4.11** and are summarised in **Table 4.13** below.

Table 4.13 - Representative NSRs for operational noise assessment

NSR	AP	Use ^[1]
KTN		
KTN-1	R1001-1020	W, E, R
KTN-2	R1021-1040	E, R
KTN-4	R1041-1060	R
KTN-7	R1061-1080	H
KTN-9	R1081-1100	R
KTN-11	R1101-1120	R
KTN-12	R1121-1140	R
KTN-20	R1161-1180	R
KTN-32	R1181-1200	R
KTN-33	R1201-1220	R
KTN-45	R1221-1240, R1501-1502	R
KTN-46	R1241-1260	R
KTN-48	R1281-1300	R
KTN-49	R1301-1320	R
KTN-50	R1681-1682	R
KTN-P2	R1541-1560	R
KTN-P6	R1521-1540	R
A1-2	R2500-2520	PRH
A1-4	R2521-2540	R
A1-5	R2541-2560	CDA
A1-6	R2561-2580	R
A1-8	R2581-2600	HOS
A1-9	R2601-2620	R
A2-11	R3221-3240	E
A2-12	R3241-3260	E
A2-13	R3261-3280	E
A2-2	R2621-2640	PRH
A2-4	R2641-2660	HOS
A2-5	R2660-2680	R
A2-7	R2681-2700	PRH
A2-9	R2701-2720	R
A3-1	R3281-3300	E
A3-2	R3301-3320	E
A3-3	R2721-2740	PRH

NSR	AP	Use ^[1]
A3-4	R3381-3400	E
A3-6	R2741-2760	R
A3-7	R2141	R
B2-10	R2761-2780	CDA
B2-5	R3401-3420	E
B2-6	R3421-3440	E
B2-7	R3441-3460	E
C1-4	R2101-2120	R
D1-11	R2821-2840	R
D1-5	R3481-3500	R
D1-7	R2781-2800	R
E1-2	R2861-2880	E
E1-3	R3701-3720	G
E1-4	R3721-3740	E
E1-8	R1507	R
F1-3	R2841-2860	OU
H1-1	R1503-1506	R
FLN		
FN-1	R4001-4020	R
FN-2	R4021-4040	R
FN-3	R4041-4060	R
FN-4	R4061-4080	IC
FN-5	R4081-4100	R
FN-6	R4101-4120	R
FN-7	R4121-4140	R
FN-8	R4141-4160	R
FN-10	R4161-4180	R
FN-11	R4181-4200	R
FN-12	R4201-4220	R, W
FN-13	R4221-4240	W
FN-18	R4241-4260	R
FN-20	R4261-4280	E
FN-21	R4281-4300	R
FN-22	R4301-4320	R
FN-23	R4321-4340	R
FN-26	R4341-4360	R
FN-27	R4361-4380	R
FN-29	R4381-4400	R
FN-30	R4401-4420	R
FN-31	R4421-4440	R
FN-37	R4441-4460	R
FN-38	R4461-4480	E
FN-39	R4481-4500	E
FN-40	R4501-4520	R
FN-46	R4521-4540	E
FN-50	R5801-5802	W
FN-51	R5821-5823	R
FN-52	R5832	R
FN-53	R5836	E

NSR	AP	Use ^[1]
FN-54	R5841	IC
FN-55	R5861-5862	E
FN-56	R5881-5883	W
FN-57	R5901-5902	R
FN-58	R5921	R
FN-59	R5961	R
FN-60	R6001-6002	R
FN-61	R6041-6060	IC
FN-62	R6061-6080	R
FN-63	R6081-6100	R
FN-64	R6101-6120	E
FN-65	R6121-6140	E
FN-66	R6141-6160	R
FN-67	R6161-6180	R
FN-68	R6181-6200	R
FN-69	R6201-6220	E
FN-70	R6221-6240	R
FN-71	R6241-6260	E
FN-72	R6261-6280	R
FN-73	R6281-6300	E
FN-74	R6301-6320	E
FN-75	R6321-6340	R
FN-76	R6341-6360	E
FN-77	R6361-6380	R
FNE-1	R1361-1380	R
FNE-2	R1381-1400	R
FNE-3	R1401-1420	IC, W
FNE-4	R1421-1440	R
FNE-5	R1441-1460	R, W
FNE-6	R1461-1480	R
FNE-8	R1501-1520	R
FS-1	R4541-4560	R
FS-4	R4561-4580	R
FS-5	R4581-4600	R
FS-6	R4601-4620	R
FS-9	R4621-4640	E
FS-10	R4641-4660	R
FS-11	R4661-4680	R
FS-12	R4681-4700	R
FS-13	R4701-4720	R
FS-14	R4721-4740	R
FS-15	R4741-4760	R
FS-16	R4761-4780	R
FS-17	R4781-4800	R
A1-4	R4801-4802	W
A1-8	R4961-4980	G
A1-11	R4981-5000	G
B1-7	R5001-5020	R
B1-8	R5021-5040	R

NSR	AP	Use ^[1]
B1-9	R5041-5060	R
B2-6	R5061-5080	PRH
B2-7	R5081-5100	PRH
B2-11	R5101-5120	PRH
B2-12	R5121-5140	PRH
B3-2	R5141-5160	PRH
B3-3	R5161-5180	PRH
B3-4	R5181-5200	E
B3-5	R5201-5220	E
B3-6	R5221-5230	R
B3-7	R5231-5240	R
B3-9	R5241-5260	R
B3-10	R5261-5280	E
B3-12	R5281-5290	E
C2-7	R5291-5294	E
C2-9	R5295-5300	E
D1-3	R4151-4154	OU
D2-2	R5301-5320	HOS
D2-4	R5321-5340	R
D2-6	R5341-5360	PRH
D2-9	R5361-5380	PRH
D2-12	R5381-5400	R
D3-1a	R5401-5405	R
D3-1b	R5406-5410	HOS
D3-1c	R5411-5420	R
D3-3	R5421-5440	R
D3-4	R5441-5460	R
D3-6	R5461-5480	R
D3-7	R5481-5500	R
D3-8	R5501-5520	PRH
D3-11	R5521-5540	E
D3-12	R5541-5560	E
R TH1	R TH1	R
R TH2	R TH2	R
R TH4	R TH4	R
R TH5	R TH5	R
R TH6	R TH6	R
R KT1	R KT1	R
R KT2	R KT2	R
R KT3	R KT3	R
R KLHSW	R KLHSW	R
R SR7N	R SR7N	R
R SR77	R SR77	R
R FLNBP1	R FLNBP1	R
R WHS1	R WHS1	R
R NWP1	R NWP1	R
R NWP2	R NWP2	R
R SR8	R SR8	R
R SR12	R SR12	R

Notes:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.

Operational Fixed Noise Sources

4.6.2.3 General Assessment Methodology

Fixed noise sources assessment will be conducted in accordance with the following procedures:

- Identify and locate the fixed noise sources;
- Identify and locate representative NSRs that may be affected by the fixed noise sources;
- Determine the noise criteria for both daytime and nighttime;
- Use standard acoustic principle for attenuation and directivity;
- Apply corrections for tonality, impulsiveness and intermittency in accordance with TM-Places, as appropriate;
- Predict the cumulative noise impacts of other noise sources on the NSRs; and
- Establish the maximum allowable SWL as the compliance criteria for each fixed noise sources.

All of the existing fixed noise sources such as Lo Wu Classification Range (KTN G1-1, KTN G1-2), Lok Ma Chau Ventilation Shafts (KTN A1-11, KTN A1-12, KTN B1-5, KTN D1-2) and Reprovision of Temporary Wholesale Market (FLN D1-6) will be conducted by noise measurement. As there is no information on the planned fixed noise sources such as Public Transport Interchange (KTN A1-5, FLN D2-9, FLN B3-6), Electricity Sub-station (KTN B2-4, FLN B2-5), Parking and Operation Facilities for Environmental Friendly Transport System (FLN B2-2), only qualitative assessment has been conducted. However, for some standard noise sources such as District Cooling System (KTN B1-7), Sewage Treatment Works Extension – Phase 2 (FLN A2-3), Sewage Pumping Station (KTN D1-3, KTN F1-2, FLN A1-6, FLN B1-4, FLN B2-3, FLN C2-3), Pumping Station (FLN A1-2) and Sports Ground / Sports Complex (KTN F1-1), quantitative assessment has been made reference to the approved EIA such as Main Arena of the 2008 Olympic Equestrian Event EIA Report (EIA-118/2005), Tuen Mun Area 54 Sewage Pumping Station EIA (EIA-150/2008).

4.6.2.4 Locations and Criteria of Representative NSRs

With the proposed development in place, the background noise level (BNL) for KTN and FLN would no longer be the same as the current condition. It is anticipated that the landuse will be similar to that of nearby existing development. Hence, the BNL of the proposed development will refer to that of nearby existing development. The background noise measurement locations are summarized in **Table 4.14** and shown in **Appendix 4.3**. For noise monitoring locations NM-1 to NM-6, noise measurements were conducted to establish the background noise conditions for NSRs in which the future landuse characteristics would be

changed upon NDA developments. For NM-7 to NM-10, the measurement results would be used to establish the BNL for NSRs in which the future landuse characteristics would not be changed upon NDA developments.

Table 4.14 – Noise measurement locations for the criteria of existing and proposed development

Monitoring Locations ^[1]	BNL ^[2] , L _{eq} dB(A)	
	Day & Evening ^[3]	Night ^[3]
Belair Monte (NM-1)	69	61
Wing Fai Centre (NM-2)	68	62
Wing Fok Centre Near Ma Sik Road (NM-3)	67	62
Regentville (NM-4)	65	63
Wing Fok Centre Near Wo Muk Road (NM-5)	67	61
Woodland Crest (NM-6)	64	60
Pak Shek Au (NM-7)	69	61
Ma Tso Lung Road north of Sheung Shui Community Sports (NM-8)	51	46
Man Kok Village (NM-9)	53	50
Ma Tso Lung Road near Lo Wu Classification Range (NM-10)	54	46
Wing Ning Wai (NM-11)	— ^[4]	50

Note:

[1] NM represents noise measurement location.

[2] Measurements (30 minutes interval) conducted in October 2010, March 2011, April 2011, May 2012 and January 2013 (between 0500 to 0700, 0900 – 1100, 1400 – 1600, 1700 – 2000, 2100 – 2300, 0100 - 0300). The Type 1 sound level meter was checked with a calibrator before and after the background noise measurement to confirm that the measurement values are acceptable. The microphone with windscreen was set at 1.2m above ground level at free field condition. During background noise measurement, the weather was fine with slight wind. Averaged measured BNL is adopted. The measured BNL major consists of road traffic noise and community noise.

[3] Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700.

[4] Only night time operation between 2300 – 0700 for the existing wholesale market.

For operational fixed noise assessment, representative NSRs locations are summarised in **Tables 4.15** and **4.16** below with the proposed noise criterion for each assessment point.

Table 4.15 - Representative NSRs for fixed noise assessment (KTN)

NSR	Time Period	AP	ASR	ANL-5, dB(A) [A]	BNL, dB(A) [B]	Reference NM ^[1]	Criteria, dB(A) Min. of [A] & [B]
Lo Wu Classification Range KTN G1-1, KTN G1-2^[2]							
A3-3	Daytime	R2721	B	60	64	NM-6	60
A3-4	Daytime	R9003	B	60	64	NM-6	60
D1-11	Daytime	R2830	B	60	64	NM-6	60
D1-12	Daytime	R9004	B	60	54	NM-10	54
D1-13	Daytime	R9005	B	60	54	NM-10	54
E1-3	Daytime	R9002	B	60	64	NM-6	60
E1-4	Daytime	R3721	B	60	64	NM-6	60
F1-3	Daytime	R9001	B	60	54	NM-10	54
F1-3	Daytime	R2841	B	60	54	NM-10	54
F1-3	Daytime	R2843	B	60	54	NM-10	54
F1-4	Daytime	R9000	B	60	54	NM-10	54
Lok Ma Chau Tunnel Ventilation Shaft KTN A1-11, KTN A1-12							

NSR	Time Period	AP	ASR	ANL-5, dB(A) [A]	BNL, dB(A) [B]	Reference NM ^[1]	Criteria, dB(A) Min. of [A] & [B]
A1-5	Day & Evening	R9013	B	60	64	NM-6	60
	Night			50	60		50
A2-4	Day & Evening	R9010	B	60	64	NM-6	60
	Night			50	60		50
A2-7	Day & Evening	R9011	B	60	64	NM-6	60
	Night			50	60		50
A1-8	Day & Evening	R9012	B	60	64	NM-6	60
	Night			50	60		50
Lok Ma Chau Tunnel Ventilation Shaft KTN B1-5							
A1-2	Day & Evening	R2504	B	60	64	NM-6	60
	Night			50	60		50
Lok Ma Chau Tunnel Ventilation Shaft KTN D1-2							
D1-7	Day & Evening	R2781	B	60	64	NM-6	60
	Night			50	60		50
D1-5	Day & Evening	R3803	B	60	64	NM-6	60
	Night			50	60		50
D1-7	Day & Evening	R2782	B	60	64	NM-6	60
	Night			50	60		50
District Cooling System KTN B1-7							
B1-3	Day & Evening	R3017	C ^[3]	65	69	NM-7	65
	Night			55	61		55
A1-2	Day & Evening	R2504	B	60	64	NM-6	60
	Night			50	60		50
Sports Ground / Sports Complex KTN E1-6 ^[4]							
F1-3	Day & Evening	R2848	B	60	54	NM-10	54
KTN-45	Day & Evening	R1501	B	60	54	NM-10	54
H1-1	Day & Evening	R9021	B	60	54	NM-10	54
Sewage Pumping Station KTN D1-3							
D1-5	Day & Evening	R3803	B	60	64	NM-6	60
	Night			50	60		50
D1-7	Day & Evening	R2781	B	60	64	NM-6	60
	Night			50	60		50
D1-7	Day & Evening	R2782	B	60	64	NM-6	60
	Night			50	60		50
Sewage Pumping Station KTN F1-2							

NSR	Time Period	AP	ASR	ANL-5, dB(A) [A]	BNL, dB(A) [B]	Reference NM ^[1]	Criteria, dB(A) Min. of [A] & [B]
F1-3	Day & Evening	R2848	B	60	54	NM-10	54
	Night			50	46		46
KTN-45	Day & Evening	R1501	B	60	54	NM-10	54
	Night			50	46		46

Note:

- [1] NM – Noise measurement location.
 [2] Lo Wu Classification Ranges operates in daytime only (from 0830 to 1830 on Monday to Friday and 0830 to 1430 on Saturday).
 [3] NSR is affected by Fanling Highway.
 [4] Sports Ground / Sports Complex operates during daytime and evening time only.

Table 4.16 - Representative NSRs for fixed noise assessment (FLN)

NSR	Time Period	AP	ASR	ANL-5, dB(A) [A]	BNL, dB(A) [B]	Reference NM ^[1]	Criteria, dB(A) Min. of [A] & [B]
Sewage Plant Works Extension - Phase 2 FLN A2-3							
FN-18	Day & Evening	R9027	B	60	53	NM-9	53
	Night			50	50		50
A1-4 ^[2]	Day & Evening	R4802	B	60	53	NM-9	53
A1-3	Day & Evening	R9025	B	60	53	NM-9	53
	Night			50	50		50
A1-3	Day & Evening	R9026	B	60	53	NM-9	53
	Night			50	50		50
Pumping Station FLN A1-2							
A1-3	Day & Evening	R9025	B	60	53	NM-9	53
	Night			50	50		50
A1-3	Day & Evening	R9026	B	60	53	NM-9	53
	Night			50	50		50
Sewage Pumping Station FLN A1-6							
A1-9	Day & Evening	R9028	B	60	53	NM-9	53
	Night			50	50		50
Sewage Pumping Station FLN B1-4							
B1-7	Day & Evening	R9031	B	60	64	NM-6	60
	Night			50	60		50
FN-10	Day & Evening	R4161	B	60	64	NM-6	60
	Night			50	60		50
Sewage Pumping Station FLN B2-3							
B2-7	Day & Evening	R9035	B	60	64	NM-6	60
	Night			50	60		50

NSR	Time Period	AP	ASR	ANL-5, dB(A) [A]	BNL, dB(A) [B]	Reference NM ^[1]	Criteria, dB(A) Min. of [A] & [B]
FN-18	Day & Evening	R4242	B	60	64	NM-6	60
	Night			50	60		50
Sewage Pumping Station FLN C2-3							
B3-12	Day & Evening	R5283	B	60	64	NM-6	60
	Night			50	60		50
FN-22	Day & Evening	R4316	B	60	64	NM-6	60
	Night			50	60		50

Note:

[1] NM – Noise measurement location

[2] FLN A1-4 Man Ming Temple is closed during night time period.

4.6.2.5 Lo Wu Classification Range

Noise measurements were carried out to establish the SWL during firing practices at Lo Wu Classification Range (KTN G1-1 and KTN G1-2). The predicted noise levels have been assessed according to standard acoustic principles.

4.6.2.6 Lok Ma Chau Railway Tunnel Ventilation Shaft

Lok Ma Chau Railway Tunnel Ventilation Shafts are located at KTN A1-11, KTN A1-12, KTN B1-5 and KTN D1-2. Noise measurements were conducted at the boundary of the ventilation shafts to evaluate their potential impact to the planned NSRs KTN A1-2, KTN A1-5, KTN A1-8, KTN A2-4, KTN A2-7, KTN D1-5 and KTN D1-7.

4.6.2.7 District Cooling System

Given that there is no information on the planned DCS, the maximum allowable SWL of future planned DCS KTN B1-7 has been determined by backward calculation based on the separation distance and noise criteria, taking into account the facade and tonality corrections.

4.6.2.8 Sewage Treatment Plant

Given that there is no information on the planned Sewage Treatment Works, the maximum allowable SWL of future planned Sewage Treatment Works FLN A2-3 has been determined by backward calculation based on the separation distance and noise criteria, taking into account the facade, tonality corrections.

4.6.2.9 Sewage Pumping Station / Pumping Station

Given that there is no information on the planned SPS / PS, the maximum allowable SWL of future planned SPS KTN D1-3, KTN F1-2, FLN A1-6, FLN B1-4, FLN B2-3, FLN C2-3 and PS FLN A1-2 has been determined by backward calculation based on the separation distance and noise criteria, taking into account the facade, tonality corrections.

4.6.2.10 Crowd Noise and Public Address (PA) System

The landuse of KTN F1-1 is reserved for the development of Sports Ground / Sports Complex. The assessment has made reference to the measurement data in the approved Main Arena of the 2008 Olympic Equestrian Event EIA Report (EIA-118/2005). Noise survey of crowd

noise and PA system were carried out at the grandstand and adjacent areas during a horse racing day. The measured noise levels of crowd and PA noise are about 73 dB(A) at 1.2m above floor level.

Crowd and PA noise assessment have then been conducted in accordance with the following procedures:

- Establish the crowd and PA noise level from previous relevant noise measurement data measured by the approved Main Arena of the 2008 Olympic Equestrian Event EIA Report;
- Determine in accordance with standard acoustic principle and practices the representative SWL;
- Determine the separation distance at the NSRs from the noise source;
- Apply corrections for façade, distance, barrier attenuation and acoustic reflection where applicable;
- Quantify the level of impact at the NSRs in accordance with TM-Places; and
- Predict the cumulative noise impacts of other noise sources on the NSRs where applicable.

Helicopter Noise

4.6.2.11 General Assessment Methodology

Helicopter noise will be generated during manoeuvring over the helipad and during lateral (approach/departure) flight. Operational modes that may generate noise have been considered. Helicopter noise is considered as a 'point' source and is evaluated based on standard acoustic principle of point source propagation. Corrections are applied for the distance attenuation, façade, barrier or topographical effect where applicable.

4.6.2.12 Without Lateral Movements

Helicopter manoeuvring above the helipad includes several modes:

- 'Hovering' – helicopter turns on the spot over the helipad to achieve the desirable orientation for touchdown / lift-off;
- 'Touchdown' – helicopter descends on to the helipad surface;
- 'Idling' – helicopter remains on the helipad surface with its rotary blades kept running; and
- 'Lift-off' – helicopter ascends vertically from the helipad surface to achieve a hover before departure.

The approved Environmental Impact Assessment Study for Helipad at Yung Shue Wan, Lamma Island (EIA-114/2005) identified that L_{max} is smaller when the helicopter is idling (with rotors on) on the ground than the L_{max} when the helicopter is in the air without lateral movement (either during hovering or lift-off mode). The L_{max} for helicopter Super Puma AS332 L2 and EC155 B1 in the air were identified to be 90.6dB(A) and 87.7dB(A) respectively, at a reference distance of 150m. L_{max} for Super Puma AS332 L2 and EC155 B1 are given in **Table 4.17**.

Table 4.17 - Helicopter noise data: Without lateral movement

Configuration	L _{max} , dB(A) ^[1]		Remarks
	Super Puma AS332 L2	EC155 B1	
Helicopter on ground, Idling	82.0	80.0	Free-field measurements at reference distance of 150m
Helicopter in the air	90.6 ^[2]	87.7 ^[3]	

Notes:

[1] Reference EIA Study for Helipad at Yung Shue Wan, Lamma Island (EIA-114/2005).

[2] Noise level was measured during the hovering mode (free field).

[3] Noise level was measured during lift-off mode (free field).

4.6.2.13 With Lateral Movements

The International Civil Aviation Organisation (ICAO) has a stipulated noise standard for helicopters with lateral movement for different flying modes including approach, take-off and flyover. The helicopter noise assessment made reference to the ICAO standard as the worst case scenario. The same approach has also been adopted in Environmental Impact Assessment Study (Helipad at Yung Shue Wan, Lamma Island, EIA-114/2005). They are shown in **Table 4.18** below.

Table 4.18 - Helicopter noise data: With lateral movements

Flying mode	ICAO Max Noise Level			
	Super puma AS332 L2		EC155 B1	
	EPNdB	L _{max} , dB(A) ^[1]	EPNdB	L _{max} , dB(A) ^[1]
Approach	100.7	87.7	97.9	84.9
Take-off	99.7	86.7	96.9	83.9
Flyover	98.7	85.7	95.9	82.9

Notes:

[1] L_{max} = EPNdB-13, with reference to "Transportation Noise Reference Book" (Nelson, 1987).

4.6.2.14 Locations and Criteria of Representative NSRs

For helicopter noise assessment, representative NSRs locations are summarised in **Table 4.19** below with the proposed noise criterion for each assessment point.

Table 4.19 - NSRs for Lo Wu Classification Range HLS

NSR	AP	Use ^[1]	Criteria, dB(A)
A3-3	R2721	PRH	85
A3-4	R9003	E	
D1-11	R2830	R	
D1-12	R9004	Gr	
D1-13	R9005	Gr	
E1-3	R9002	G	
E1-4	R3721	E	
F1-3	R2841	OU	
F1-3	R2843	OU	
F1-3	R9001	OU	
F1-4	R9000	G	

Notes:

[1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home

Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.

4.7 Identification of Impacts

4.7.1 Construction Phase

Construction noise assessment has been conducted for the Project which includes the following Designated Projects (DP):

KTN NDA

- San Tin Highway and Fanling Highway Kwu Tung Section Widening (between San Tin Interchange and Po Shek Wu Interchange) (Major Improvement) (DP1);
- Castle Peak Road Diversion (Major Improvement) (DP2);
- KTN NDA Road P1 and P2 (New Road) and associated new Kwu Tung Interchange (New Road) and Pak Shek Au Interchange Improvement (Major Improvement) (DP3);
- KTN NDA Road D1 to D5 (New Road) (DP4);
- New Sewage Pumping Stations (SPS) in KTN NDA (DP5);
- Proposed railway station and associated facilities in KTN NDA (To be conducted under other separated studies (DP 6); and
- Utilization of Treated Sewage Effluent from Shek Wu Hui Sewage Treatment Works (SWHSTW) (DP7);

FLN NDA

- Utilization of Treated Sewage Effluent from Shek Wu Hui Sewage Treatment Works (SWHSTW) (DP7);
- Po Shek Wu Interchange Improvement (Major Improvement) (DP8);
- Fanling Bypass Western Section (New Road) (DP9);
- Fanling Bypass Eastern Section (New Road) (DP10);
- Shek Wu Hui Sewage Treatment Works – Further Expansion at FLN NDA (DP11);
- Reprovision of Temporary Wholesale market in FLN NDA (DP12); and
- New Sewage pumping stations (SPS) in FLN NDA (DP13)

The major construction works would include the following activities:

- Site formation activities;
- Construction of infrastructure within NDAs;
- External access route improvement works; and
- Construction of service reservoir

These construction activities will involve the use of PME including bulldozers, rock drill, air compressor, etc.

The adopted utilisation rates and the associated PME are summarized in **Table 4.20**.

Table 4.20 - Utilisation rates of PME

PME	Typical Utilisation Rate (%)
Air Compressor	100
Asphalt Paver	100
Breaker, Handheld	100
Bar Bender, Cutter	100
Bulldozer	100
Concrete Lorry Mixer	70-100
Concrete Pump	100
Mobile Crane	100
Compactor, Vibratory	100
Dump Truck	70-100
Excavator, Backhole	100
Mini Backhoe	100
Generator	100
Grout Mixer	100
Grout Pump	100
Hoist, Petrol	100
Lorry	100
Piling, Large Bored Pile	100
Vibratory Poker	100
Rock Drill (Crawler Mounted)	100
Rock Drill (Hand Held)	100
Roller	100
Saw, Circular Wood	100
Saw, Chain, Hand-held	100
Water Pump	100
Vertical Band Drain Installation Rig	100

The adopted utilisation rates, SWLs and the associated PME are presented in **Appendix 4.4**. Construction plant inventory has been confirmed with project proponent. All the superstructures for residential developments (including private and public housing) would not be included in the assessment as the construction programme for the site development (**Appendix 4.2**) is in preliminary stage, the exact PME and construction method are not confirmed yet. In addition, all the predicted noise levels have included cumulative site formation construction activities which are more conservative in the construction noise levels prediction. Hence, superstructure of the residential developments has not been included.

4.7.2 Operational Phase

Operational noise assessment has been conducted for the Project which includes the following Designated Projects (DP):

The following DPs have been included in the operational noise assessment:

KTN NDA

- San Tin Highway and Fanling Highway Kwu Tung Section Widening (between San Tin Interchange and Po Shek Wu Interchange) (Major Improvement) (DP1);

- Castle Peak Road Diversion (Major Improvement) (DP2);
- KTN NDA Road P1 and P2 (New Road) and associated new Kwu Tung Interchange (New Road) and Pak Shek Au Interchange Improvement (Major Improvement) (DP3);
- KTN NDA Road D1 to D5 (New Road) (DP4);
- New Sewage Pumping Stations (SPS) in KTN NDA (DP5);
- Proposed railway station and associated facilities in KTN NDA (To be conducted under other separated studies (DP 6); and
- Utilization of Treated Sewage Effluent from Shek Wu Hui Sewage Treatment Works (SWHSTW) (DP7);

FLN NDA

- Utilization of Treated Sewage Effluent from Shek Wu Hui Sewage Treatment Works (SWHSTW) (DP7);
- Po Shek Wu Interchange Improvement (Major Improvement) (DP8);
- Fanling Bypass Western Section (New Road) (DP9);
- Fanling Bypass Eastern Section (New Road) (DP10);
- Shek Wu Hui Sewage Treatment Works – Further Expansion at FLN NDA (DP11);
- Reprovision of Temporary Wholesale market in FLN NDA (DP12); and
- New Sewage pumping stations (SPS) in FLN NDA (DP13)

The major operational activities would include the following noise sources:

- Fixed noise;
- Helicopter noise; and
- Road traffic noise

4.7.2.1 **Fixed Noise Sources**

KTN

The existing fixed noise sources that might have potential impacts on the future planned landuse within KTN include Lok Ma Chau Tunnel Ventilation Shafts (KTN A1-11, KTN A1-12, KTN B1-5 and KTN D1-2) and Lo Wu Classification Range (KTN G1-1, G1-2) as shown in **Table 4.6**. Lok Ma Chau Tunnel Ventilation Shafts are located at around 30m from the nearest planned landuse. Lo Wu Classification Range is located at around 185m from the nearest planned landuse. Existing noise measurements have been conducted to determine the fixed noise levels at NSRs. The potential impacts will be assessed in **Section 4.8**.

Other existing fixed noise sources such as Lok Ma Chau Public Transport Interchange, Shek Wu Hui Sewage Treatment Works, West Ventilation Building and East Ventilation Building are located at more than 800m from the planned NSRs, and hence fixed noise impacts are not anticipated. In addition, there is existing minor noise sources such as refuse collection points, petrol filling station, etc scattered near KTN. Due

to the small operation in nature, and hence fixed noise impacts are not anticipated.

In addition, a District Cooling System (DCS) (KTN B1-7), a Sports Ground / Sports Complex (KTN F1-1) and Sewage Pumping Station (SPS) (KTN D1-3 and KTN F1-2) are planned within KTN as shown in **Table 4.7**. The DCS (KTN B1-7) will be located at 8m from the existing NSRs KTN B1-3 and 140m from the planned NSRs KTN A1-2 while the Sport Ground / Sports Complex (KTN F1-1) is located at 50m from existing NSRs KTN H1-1 and 160m from the planned NSRs KTN F1-3. SPS at KTN D1-3 will be located at 220m from the existing NSRs KTN D1-9 and 135m and 105m from the planned NSRs KTN D1-5 and KTN D1-7, respectively. SPS at KTN F1-2 will be located at 35m from the existing NSRs KTN-45 and 150m from the planned NSRs KTN F1-3. As there is no information on the planned DCS and SPS, the maximum SWL has been determined by backward calculation based on the separation distance and noise criteria taking into account the façade and tonality corrections. The potential impacts will be assessed in **Section 4.8**.

For the planned Sewage Treatment Works Extension - Phase 2 (FLN A2-3) in FLN, the separation distance between STW and planned NSRs within KTN are more than 800m, and hence fixed noise impacts are not anticipated.

Noise sources from Electrical Substation (ESS) (KTN B2-4) consist of transformer (132/11kV) and ventilation system. The technology today can provide low noise transformer that can be used for open installation. Such installations are evident in many districts of Hong Kong and they are proven to be suitable for open installation from noise emission perspective. Ventilation system can be equipped with sound attenuators or acoustic louvers for proper noise control design. Hence, the potential fixed noise impacts are not anticipated.

Fire station cum ambulance depot (KTN E1-6) is proposed east of Fung Kong Shan to provide emergency service for the public. Noise sources from depot operations include loudspeakers, siren, fire engine sirens, etc. Though of short duration, these noises may be a potential nuisance to the nearby NSRs, despite, their occurrences being infrequent and on as needs basis. As the depot is located at 30m from the existing NSRs KTN-E1-8 and 170m from the planned NSRs KTN A3-3, potential nuisance is also not anticipated from fire station cum ambulance depot.

Fixed noise sources in PTIs are primarily due to the ventilation fans, idling engine and manoeuvring vehicle, etc. Currently, there are no layouts indicating the detailed design of the PTIs, therefore quantitative assessment is not possible. As the PTIs (KTN A1-5) will be covered, their noise emission will therefore be adequately controlled. External ventilation openings can be equipped with sound attenuators or acoustic louvers for proper noise control design. Hence, noise impacts are not expected from the PTIs during operational phase. In addition, the location of ingress and egress of the facilities should be planned in order to avoid adverse noise impacts to the adjacent area in detail design stage.

There would not be any potential noise sources at the proposed flushing water reservoir, fresh water reservoir and utilization of treated sewage effluent from Shek Wu Hui Sewage Treatment Works. Therefore, fixed noise impacts are not expected during operational phase. In addition, planned minor noise sources such as refuse collection points, petrol

filling station, etc scattered inside KTN. Due to the small operation in nature, and hence fixed noise impacts are not anticipated.

FLN

Existing fixed noise such as Shek Wu Hui Sewage Treatment Works, Cheung Po Tau Firing Range, CLP substation and WSD Raw Water Pumping Station and East Ventilation Building around FLN shown in **Table 4.6** are located at a separation distance more than 400m. Hence fixed noise impacts are not anticipated. In addition, there is existing minor noise sources such as refuse collection points, petrol filling station, etc scattered near FLN. Due to the small operation in nature, and hence fixed noise impacts are not anticipated.

Given that the distance between the On Lok Tsuen industrial area in FLN and the planned NSRs is about 150m and will be blocked by existing buildings, e.g. Belair Monte (FN-31) and Grand Regentville (FN-75), On Lok Tsuen industrial area is considered insignificant.

In addition to the existing noise sources, planned noise sources as shown in **Table 4.7** might have potential impact on the existing and planned NSRs within FLN. These include Parking and Operation Facilities for Environmental Friendly Transport System (FLN B2-2), reprovision of Temporary Wholesale Market Agricultural Products (FLN D1-6), Sewage Treatment Works Extension - Phase 2 (FLN A2-3), Weapon Training Division (FLN A1-11), SPS (FLN A1-6, FLN B1-4, FLN B2-3 and FLN C2-3), PS (FLN A1-2) and PTI (FLN D2-9).

The separation distances from planned NSRs (FLN B2-7) and existing NSRs (FLN A1-3) to the proposed Sewage Treatment Works Extension - Phase 2 (FLN A2-3) are about 660m and 85m respectively. The SPS / PS (FLN A1-2, FLN A1-6, FLN B1-4, FLN B2-3 and FLN C2-3) will be located at 14m, 50m, 65m, 110m, 190m from the existing NSRs FLN A1-3, FLN A1-9 FN-10, FN-18, FN-22 and nearest distance at 65m from the planned NSRs. As there is no information on the planned Sewage Treatment Works Extension – Phase 2 and SPS / PS, the maximum SWL has been determined by backward calculation based on the separation distance and noise criteria taking into account the façade and tonality corrections. The potential impacts will be assessed in **Section 4.8**.

The relocation of North District Temporary Wholesale Market for Agricultural Products (FLN D1-6) might generate noise nuisance. A site visit has been conducted in existing wholesale market during the night time operation period. The noise levels during the operation of wholesale market at Wing Ning Wai (FN-2) is about 50 dB(A) at free-field condition. Location of background noise measurement is given in **Appendix 4.3** (NM-11). There is neither public address equipment nor loudhailer being used during the site visit. No extraction fan and water cooling towers are used. In addition, no open auction (shouting) is observed. Temporary structure as office with fan coil units is observed. Lorry manoeuvring for loading and unloading activities inside the wholesale market accounts for the major noise source. The separation distance to the nearest existing NSRs (FN-2) is about 45m currently, which is more or less the same as the separation distance for the future planned landuse. The nearest planned NSRs (FLN D2-12) are at about 200m away. Therefore noise impacts on existing and planned NSRs are not anticipated.

The separation distances from planned NSRs (FLN B2-6, FLN B2-7) and existing NSRs (FN-18) to the proposed Parking and Operation Facilities for Environmental Friendly Transport System (FLN B2-2) are about 40m

and 115m respectively. The potential noise impacts on NSRs due to their operation is subject to the design, activities and could be minimized by the use of enclosure and proper mitigation measures such as barrier, silencer, louvers orientation, etc. Therefore, adverse noise impacts on both existing and planned NSRs are not anticipated. In addition, the location of ingress and egress of the facilities should be planned in order to avoid adverse noise impacts on the adjacent area in detail design stage.

The Weapon Training Division (FLN A1-11) is a firing range proposed for the weapon training of Hong Kong Police Force (HKPF). The separation distance from the planned NSRs (FLN B2-6) and existing NSRs (FN-12) are about 160m and 12m respectively. As the training complex will be fully enclosed, their noise emission will therefore be adequately controlled. External ventilation openings can be equipped with sound attenuators or acoustic louvers for proper noise control design. Hence, noise impacts are not expected from the training complex during operational phase.

Noise sources from ESS (FLN B2-5) consist of transformer (132/11kV) and ventilation system. The technology today can provide low noise transformer that can be used for open installation. Such installations are evident in many districts of Hong Kong and they are proven to be suitable for open installation from noise emission perspective. Ventilation system can be equipped with sound attenuators or acoustic louvers for proper noise control design. Hence, the potential fixed noise impact is not anticipated.

Fixed noise sources in PTIs are primarily due to the ventilation fans, idling and manoeuvring vehicles, etc. Currently, there are no layouts indicating the detailed design of the PTIs, therefore quantitative assessment is not possible. As the PTIs (FLN D2-9 and FLN B3-6) will be covered, their noise emission will therefore be adequately controlled. External ventilation openings can be equipped with sound attenuators or acoustic louvers for proper noise control design. Hence, noise impacts are not expected from the PTIs during operational phase. In addition, the location of ingress and egress of the facilities should be planned in order to avoid adverse noise impacts to the adjacent area in detail design stage.

There would not be any potential noise sources at the proposed flushing water reservoir, fresh water reservoir and utilization of treated sewage effluent from Shek Wu Hui Sewage Treatment Works. Therefore, fixed noise impacts are not expected during operational phase. In addition, planned minor noise sources such as refuse collection points, petrol filling station, etc scattered inside FLN. Due to the small operation in nature, and hence fixed noise impacts are not anticipated.

4.7.2.2 Rail Noise

Existing rail noise source such as Lok Ma Chau Spur Line and East Rail as shown in **Table 4.6** are located at a separation distance more than 700m. Hence rail noise impacts are not anticipated.

In addition, proposed Northern Link (NOL) and Express Rail Link are the planned rail noise source as shown in **Table 4.7**.

Northern Link

The NOL will connect with the existing West Rail and LMC Spur Line. However, the NOL alignment has not yet been finalised and is still under

investigation. No updated information was available at the time of preparing this report. Nevertheless, the environmental impacts of NOL are subject to the statutory approval under the EIAO process will comply with the TM-EIAO. Adverse noise impacts from NOL are therefore not expected.

Express Rail Link

With reference to the approved EIA Study “Hong Kong Section of Guangzhou – Shenzhen – Hong Kong Express Rail Link” (EIA-169/2009), there will be no railway stations along the alignment except at the West Kowloon Terminus. The proposed railway runs across the Mai Po Area through tunnels to minimise environmental impacts during operation. As the proposed alignment is located at more than 3500m west of KTN NDA, potential rail noise impacts are therefore not anticipated.

4.7.2.3 Helicopter Noise

A total of four existing helicopter landing sites (HLS) have been identified within the NDAs. One landing site, Lo Wu Classification Range, is currently used for fire-fighting and police training. The other sites are either closed or used for emergency situations only. They are summarised in **Table 4.21** and the locations of four existing HLS are shown in **Figures 4.1** and **4.2**.

Table 4.21 - Helicopter landing site at NENT NDA

Helicopter landing site	Remarks
Crest Hill Operation Base at Crest Hill	Use for emergency maintenance only ^[1]
Lo Wu Classification Range (or Lo Wu Range) at Tai Shek Mo	Operational use including fire-fighting and training ^[1]
Lo Wu Camp at Lo Wu (near Tsong Yuen)	Site closed ^[1]
San Wai/Tai Ling Firing Range	No longer used for daily operations and will only be used under emergency situations as confirmed by Security Bureau ^[2]

Notes:

- [1] Reference - Government Flying Service Memo Ref: AIR/10/14(3) dated 29 September 2008 (**Appendix 4.5**).
- [2] Reference - Secretary of Security (Memo Ref.() in SBCR 12/1488/95 Pt.3 dated March 3, 2009 (**Appendix 4.6**).

Under the Revised RODP, no new helipad has been proposed within the NDA. The previously proposed helipad of Police Driving and Traffic Training Division (FLN A1-8) at FLN NDA is no longer considered under the Revised RODP. Only helicopter noise impacts of existing Lo Wu Classification Range HLS (KTN G1-1) on KTN NDA are of concern and have been assessed in **Section 4.8**.

Lo Wu classification Range HLS

The Lo Wu Classification Range at Tai Shek Mo is used for fire-fighting and police training. The average landing frequency is about 3.0 per month, based on past five-year records as shown in **Table 4.22** below. Both aircraft type Super Puma AS332 L2 and EC155 B1 are used at Lo Wu Classification Range HLS. Training will normally be 0700 – 1900 with only one helicopter and the duration of training normally lasted for one and a half hours. The usage and duration is shown in **Appendices 4.7** and **4.8** (Government Flying Service Memo Ref: AIR/10/14(4) dated 17

March 2011 and Hong Kong Police Force Memo Ref. 74 in CP Con 151/47 Pt.2 dated 4 July 2011). Moreover, it is noted that due to security reason, the frequency and operational details (including the use of two helicopters) of the helipad both before and after 1900 could not be released by HKPF (**Appendix 4.8** refers).

Table 4.22 - Annual landing frequency at Lo Wu Classification Range HLS

Year	Landing per annum	Average Landing per month
2006	30	2.5
2007	21	1.8
2008	43	3.5
2009	52	4.3
2010	36	3.0
2006-2010	-	3.0

According to the operator, the helicopters would land anywhere within the site of Lo Wu Classification Range HLS (Blocks 1 to 4 as shown in **Figure 4.8**) provided that it is safe for landing. The helicopters will fly at any direction depending on wind direction. Government Flying Service (GFS) advised that with the operation of KTN NDA, the helicopter will approach/take off either from west (preferred path) or northeast (when preferred path is not favourable) of the HLS to avoid high terrain to the east and the power line to the south. **Figure 4.8** shows the ranges of the approach and departure paths.

According to GFS Helipad Specification Guidelines, the helicopter approach and departure trajectory is on a slope of 8% within 245m from the edge of the helipad and there should be nothing underneath the path. Beyond 245m, the slope can be increased to 12.5%.

In accordance with the Civil Aviation Ordinance, CAP 448C, Air Navigation (Hong Kong) Order 1995, Schedule 14, Section II. 5 Low Flying, except with the permission in writing from the Chief Executive and in accordance with any conditions therein specified a helicopter should not fly over a congested area of a city, town or settlement below a height of 1,500 feet (about 455m) above the highest fixed object within 2,000 feet (about 610m) of the helicopter.

4.7.2.4 Road Traffic Noise

Figures 4.3 to 4.5 show the proposed road network for the NDA. The proposed road networks include planned internal roads within NDA, modification of existing Fanling Highway and connecting roads to NDA. In addition, the proposed road networks also include the connecting roads to LMC Loop which are being investigated under the study of Planning and Engineering Study on Development of Lok Ma Chau Loop. Other major roads encroaching and in the vicinity from the boundary of the Project include Ma Tso Lung Road, Ho Sheung Heung Road, Fanling Highway, Jockey Club Road, Po Shek Wu Road, San Wan Road, Sha Tau Kok Road, Fanling Bypass and Liantang Highway. Small access roads connecting villages are common in the boundary of the Project as well. Hence, road traffic noise impact on both existing and planned NSRs will be assessed accordingly.

4.8 Evaluation of Impacts

4.8.1 Construction Phase

4.8.1.1 Assessment Results of Construction Noise under Unmitigated Scenario

According to the engineering design, construction would mainly comprise of the activities as described in **Section 4.7.1**. The corresponding SWLs of these activities have been estimated according to the PME's SWL and the assessment methodology in the TM-GW. **Appendix 4.4** presents the SWLs for each PME and **Appendix 4.2** shows the construction programme. **Appendix 4.9** provides the plant inventory adopted for each workfront and **Appendix 4.10** provides the distance between the notional sources and the NSRs.

Appendix 4.11 presents the calculated construction noise impacts at selected representative NSRs. The predicted construction noise impacts at the NSRs under unmitigated scenario are summarised in **Table 4.23** below. Monthly construction noise impacts from each workfronts are presented in **Appendix 4.12**.

Table 4.23 - Predicted construction noise impact at NSRs under unmitigated scenario

Unmitigated scenario						
NSR	AP	Uses ^[1]	L _{eq} (30 mins), dB(A)			Duration of Exceedence Months ^[6]
			Noise Criteria ^[2]	Unmitigated Noise Level ^[3]	Exceedence	
KTN						
KTN-2	R1024	R	75	79	4	28
KTN-9	R3013	R	75	85	10	30
	R3014	R	75	85	10	50
	R3015	R	75	85	10	34
	R1103	R	75	81	6	40
KTN-11	R1105	R	75	86	11	40
	R1122 ^[5]	R	75	81	6	16
KTN-12	R1122 ^[5]	R	75	81	6	16
KTN-20	R3000	R	75	88	13	70
	R3001	R	75	66	0	0
	R8113	R	75	79	4	8
	R8101	R	75	81	6	8
KTN-33	R8101	R	75	81	6	8
KTN-45	R3002 ^[5]	R	75	87	12	26
KTN-46	R8100 ^[5]	R	75	87	12	14
KTN-48	R1282	R	75	76	1	10
KTN-49	R1141	R	75	81	6	16
	R1301	R	75	74	0	0
	R1321 ^[5]	R	75	77	2	16
KTN-50	R1322	R	75	78	3	16
	R8010	PRH	75	84	9	70
A1-2	R8010	PRH	75	84	9	70
A1-5	R8005	CDA	75	89	14	22
	R8006	CDA	75	82	7	22
	R8007	CDA	75	82	7	18
	R8112	R	75	75	0	0
A1-6	R8112	R	75	75	0	0
A2-2	R8000	PRH	75	79	4	44
	R8001	PRH	75	86	11	105
	R8002	PRH	75	85	10	105
	R8003	PRH	75	84	9	113
	R8004	PRH	75	83	8	10

NSR	AP	Uses ^[1]	L _{eq} (30 mins), dB(A)			Duration of Exceedence Months ^[6]
			Noise Criteria ^[2]	Unmitigated Noise Level ^[3]	Exceedence	
A2-4	R3028	R	75	81	6	30
	R3029	R	75	81	6	30
A3-1	R3020	E	70(65)	79	9(14)	42(11)
A3-2	R3021	E	70(65)	71	1(6)	24(21)
A3-3	R3022	R	75	78	3	24
A3-7	R2141	R	75	87	12	26
	R3008	R	75	84	9	26
B1-3	R8110	R	75	85	10	82
B1-9	R8104	R	75	87	12	83
B2-10	R8105	CDA	75	80	5	24
	R8111	E	70(65)	82	12(17)	24(9)
B2-7	R8008	E	70(65)	75	5(10)	36(9)
	R8009	E	70(65)	78	8(13)	34(9)
	R8107	R	75	78	3	6
C1-4	R2102	R	75	76	1	36
	R2103	R	75	79	4	18
	R3012	R	75	78	3	18
D1-7	R8106	R	75	79	4	6
D1-9	R2042 ^[5]	R	75	79	4	39
	R2046	R	75	84	9	7
	R3009	R	75	73	0	0
	R3010 ^[5]	R	75	85	10	28
	R8201	R	75	80	5	24
	R8202	R	75	90	15	4
	R8203	R	75	92	17	7
	R8204	R	75	88	13	3
	R8205	R	75	92	17	6
	R8206	R	75	84	9	7
	R8207	R	75	89	14	7
	R8208	R	75	72	0	0
G1-3	R3006	R	75	85	10	32
	R3007	R	75	80	5	29
H1-1	R1412	R	75	85	10	26
	R1421	R	75	85	10	50
	R8108	R	75	84	9	26
KTN-P2	R1541	R	75	84	9	28
	R1544	R	75	84	9	28
FLN						
FN-2	R4023	R	75	83	8	61
FN-3	R4046	R	75	81	6	48
FN-5	R4082	R	75	80	5	24
FN-7	R4123	R	75	78	3	34
FN-8	R4153	R	75	79	4	24
FN-10	R4161	R	75	76	1	14
	R4162	R	75	77	2	26
	R8504	R	75	79	4	22
	R8505	R	75	78	3	26
	R8506	R	75	81	6	25
FN-11	R4181	R	75	85	10	28
FN-12	R8502	R	75	80	5	28
FN-18	R4242	R	75	88	13	30

NSR	AP	Uses ^[1]	L _{eq} (30 mins), dB(A)			Duration of Exceedence Months ^[6]
			Noise Criteria ^[2]	Unmitigated Noise Level ^[3]	Exceedence	
FN-18	R8016	R	75	79	4	24
FN-22	R4316	R	75	82	7	40
FN-23	R4321	R	75	84	9	12
FN-26	R4343	R	75	82	7	32
	R4346	R	75	80	5	14
FN-29	R4389	R	75	84	9	26
FN-30	R4401	R	75	86	11	36
FN-31	R4421	R	75	85	10	54
	R4426	R	75	85	10	30
FN-38	R8017	E	70(65)	77	7(12)	48(18)
FN-40	R4506	R	75	84	9	14
	R4507	R	75	82	7	14
FN-64	R8019	R	75	81	6	24
FN-83	R8503	R	75	71	0	0
FNE-1	R1363	R	75	81	6	24
	R1367	R	75	84	9	18
FNE-2	R1382	R	75	84	9	18
FNE-10	R8500	R	75	80	5	24
FS-4	R4562	R	75	80	5	37
FS-6	R4602	R	75	77	2	24
FS-9	R4622	E	70(65)	79	9(14)	24(6)
	R8521	R	75	77	2	24
FS-10	R8522	R	75	86	11	24
FS-11	R8509	R	75	88	13	24
FS-12	R8020	R	75	76	1	12
FS-13	R8510	R	75	79	4	24
	R8511	R	75	86	11	12
	R8512	R	75	78	3	24
FS-14	R4722	R	75	71	0	0
FS-15	R8513	R	75	82	7	24
FS-16	R8018	R	75	76	1	24
FS-17	R8514	R	75	87	12	24
	R8515	R	75	87	12	24
A1-2	R8508	R	75	92	17	24
A1-4	R8507	W	75	78	3	24
A1-8	R4962	E	70(65)	72	2(7)	6(2)
A1-11	R4981	E	70(65)	77	7(12)	77(21)
B3-3	R8700	PRH	75	73	0	0
D2-4	R8701	R	75	76	1	10
	R8702	R	75	74	0	0
D2-6	R8703	PRH	75	72	0	0
D2-9	R8600	PRH	75	75	0	0
	R8601	PRH	75	79	4	73
	R8704	PRH	75	87	12	18
D3-4	R8021	R	75	91	16	65
	R8022	R	75	82	7	30
D3-5	R8705	R	75	85	10	18
D3-7	R8023	R	75	84	9	30
	R8520	R	75	93	18	30
D3-8	R8519	PRH	75	88	13	30
D3-11	R8602	E	70(65)	82	12(17)	8(2)

NSR	AP	Uses ^[1]	L _{eq} (30 mins), dB(A)			Duration of Exceedance Months ^[6]
			Noise Criteria ^[2]	Unmitigated Noise Level ^[3]	Exceedance	
	R8603	E	70(65)	81	11(16)	8(4)

Notes:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] Values in parentheses indicate the noise criterion during examination period of educational institution. Relevant environmental standards/ criteria: TM-EIAO noise standards for construction noise.
- [3] Bolded values mean exceedance of the noise criteria.
- [4] Values in parentheses indicate the exceedance during examination period of educational institution.
- [5] Cumulative impacts arisen from Lok Ma Chau Loop development and cycle tracks construction have been included.
- [6] In general practice, examination period should only last for 2 weeks with 4 examinations per year, i.e. about 2 months. For assessment purpose, examination period of 3 months per year would be assumed as worst case scenario.

It can be seen from the above table that exceedances of noise criteria range from 1 to 18 dB(A) for residential premises and from 1 to 17 dB(A) for educational institutions. Mitigation measures are therefore required.

4.8.2 Operational Phase

4.8.2.1 Assessment Results of Road Traffic Noise under Unmitigated Scenario at Year 2044

A computer plot of the road scheme and a plan showing the location of existing roads, new roads and other roads are presented in **Appendix 4.13**, and the road hierarchy is shown in **Appendix 4.14**. Details of traffic data for the “with project” and “without project” scenarios in 2044 are given in **Appendix 4.15**. The traffic data for all assessment years used in the noise assessment has been endorsed by Transport Department as given in **Appendix 4.15**. As discussed in **Section 4.6.2.1**, the road project has been considered significant if the traffic noise impact on the NSRs with the project case is greater than that of the without project case at the design year (i.e. Year 2044) by 1.0 dB(A) or more. The following scenarios have been conducted:

- Predicted overall noise levels with the project scenario after 15 years upon commissioning of all road improvement scheme (i.e. Year 2044); and
- Predicted overall noise levels without the project scenario at the same year (i.e. without modification in Year 2044)

This applies to all existing and planned NSRs outside and within the non-development area of NDA and mitigation measures are required where the road project has significant impacts. The above scenario is however not applicable to future NSRs within NDA since they would not exist for “without project scenario”. For these future NSRs (i.e. R1001-R3740, R4961-R5543), mitigation measures are required to ensure compliance with the noise criterion.

In the present assessment, low noise road surfacing is assumed throughout the roads with a speed greater than 70 km/h. This assumption

is based on Highways Department's Guidance Notes RD/GN/10A which recommends friction course road surfacing (noise reducing surface) to be provided for roads with a legal speed limit greater than 70 km/h, i.e. existing Fanling Highway and new roads with speed greater than 70 km/h. Roads adopting low noise surfacing are shown in **Appendix 4.16** for KTN and FLN respectively. The extent of low noise surfacing extent has been confirmed by Highways Department as shown in **Appendix 4.17**. In addition, there are some retrofitting noise barrier projects along Fanling Highway which would interface with this Project and they have also been considered according to the latest information as attached in **Appendix 4.18**. As the exact programme of PWP works are not confirmed yet, all the retrofitting noise barrier in PWP works have been assumed to be fully implemented at the assessment years.

Noise mitigation measures from other concurrent development projects between Island House Interchange and Fanling, i.e. EP-404/2011 "Agreement No. CE 45/2008 (CE) Liantang/ Heung Yuen Wai Boundary Control Point and Associated Works Environmental Impact Assessment Report" and EP324-2008 "Agreement No. CE 58/2000 Design and Construction Assignment for Widening of Tolo Highway/Fanling Highway" have been incorporated in the assessment. The noise mitigation measures proposed by these two EIAs are shown in **Appendix 4.19**. Sample calculation for road traffic noise assessment is shown in **Appendix 4.19a**. The sample calculation includes the unmitigated scenario at Year 2044. The road traffic noise assessment has allowed setback distance and other mitigation requirements such as podium and noise tolerant buildings for planned residential buildings and schools as shown in **Appendix 4.19b**.

Appendix 4.20 presents the road traffic noise impacts on NSRs and identifies the locations where direct noise mitigation measures should be provided on the proposed road project in order to alleviate the adverse noise impacts at those affected NSRs. **Tables 4.24** and **4.25** summarise the noise level for KTN and FLN respectively.

KTN

Table 4.24a – Predicted road traffic noise level under unmitigated scenario at KTN in Year 2044 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
KTN-1	R1001-1020	W, E, R	65 - 70	65 - 79	N	Y
KTN-2	R1021-1040	E, R	65 - 70	67 - 84	N	Y
KTN-4	R1041-1060	R	70	65 - 67	Y	N
KTN-7	R1061-1080	H	55	74 - 75	N	Y
KTN-9	R1081-1100	R	70	56 - 69	Y	N
KTN-11	R1101-1120	R	70	65 - 83	N	Y
KTN-12	R1121-1140	R	70	76	N	Y
KTN-20	R1161-1180	R	70	24 - 26	Y	N
KTN-32	R1181-1200	R	70	66 - 83	N	Y

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
KTN-33	R1201-1220	R	70	61 - 62	Y	N
KTN-45	R1221-1240, R1501-1507	R	70	66 - 67	Y	N
KTN-46	R1241-1260	R	70	49 - 50	Y	N
KTN-48	R1281-1300	R	70	74 - 85	N	Y
KTN-49	R1301-1320	R	70	69 - 70	Y	N
KTN-50	R1681-1682	R	70	76 - 79	N	Y
KTN-P2	R1541-1560	R	70	75 - 81	N	Y
KTN-P6	R1521-1540	R	70	64 - 75	N	Y
A1-2	R2500-2520	PRH	70	66 - 74	N	Y
A1-4	R2521-2540	R	70	67 - 72	N	Y
A1-5	R2541-2560	CDA	70	66 - 72	N	Y
A1-6	R2561-2580	R	70	70 - 72	N	Y
A1-8	R2581-2600	HOS	70	68 - 73	N	Y
A1-9	R2601-2620	R	70	65 - 74	N	Y
A2-2	R2621-2640	PRH	70	64 - 76	N	Y
A2-4	R2641-2660	HOS	70	66 - 70	Y	N
A2-5	R2660-2680	R	70	64 - 68	Y	N
A2-7	R2681-2700	PRH	70	43 - 69	Y	N
A2-9	R2701-2720	R	70	61 - 75	N	Y
A2-11	R3221-3240	E	65	67 - 70	N	Y
A2-12	R3241-3260	E	65	67 - 69	N	Y
A2-13	R3261-3280	E	65	70 - 72	N	Y
A3-1	R3281-3300	E	65	71	N	Y
A3-2	R3301-3320	E	65	60 - 61	Y	N
A3-3	R2721-2740	PRH	70	58 - 72	N	Y
A3-4	R3381-3400	E	65	63 - 65	Y	N
A3-6	R2741-2760	R	70	64 - 73	N	Y
A3-7	R2141	R	70	56	Y	N
B2-5	R3401-3420	E	65	68 - 71	N	Y
B2-6	R3421-3440	E	65	73 - 79	N	Y
B2-7	R3441-3460	E	65	67 - 68	N	Y
B2-10	R2761-2780	CDA	70	48 - 74	N	Y
C1-3	R2021-2040	CDA	70	74 - 83	N	Y
C1-4	R2001, R2101-2120	R	70	58 - 77	N	Y
D1-5	R3481-3500	R	70	68	Y	N
D1-7	R2781-2800	R	70	63 - 75	N	Y
D1-9	R2040-2060	R	70	57 - 69	Y	N
D1-11	R2821-2840	R	70	61 - 73	N	Y
E1-2	R2861-2880	E	65	65 - 68	N	Y
E1-3	R3701-3720	G	70	64 - 72	N	Y
E1-4	R3721-3740	E	65	62	Y	N
F1-3	R2841-2860	OU	70	54 - 69	Y	N
E1-8	R1507	R	70	74	N	Y
H1-1	R1503-1506, R1508	R	70	68 - 76	N	Y

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when “With Project Overall Noise Level does not comply with the Noise Criteria” AND, either “With Project – Without Project Overall Noise Level > 1dB(A)” or “New Roads exceeds Noise Criteria” or “New Roads Contribution > 1 dB(A)”.
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

From **Table 4.24a**, NSRs at St. Paul’s House of Prayer, De La Salle Secondary School (N.T.), Ascot Park (KTN-1), Kam Tsin Village Ho Tung School, Village near Kam Tsin Road (KTN-2), Lady Ho Tung Welfare Centre (KTN-7), Europa Garden Phase I (KTN-11), Scattered Village Houses West of Europa Garden Phase I (KTN-12), Tsung Pak Long (KTN-32), Golf Parkview (KTN-48), Scattered Village Houses along Kwu Tung Road (KTN-50), KTS/267 Proposed House (KTN-P2), Village near Chau Tau Tsuen (KTN-P6), planned NSRs A1-2, A1-4, A1-5, A1-6, etc. would exceed the respective criteria. The direct mitigation measures (except KTN-7) are discussed in **Section 4.9.2.1**.

The existing Lady Ho Tung Welfare Centre (KTN-7) is now temporarily closed, with no known re-opening schedule. Hence, mitigation measures are not proposed for this NSR.

Table 4.24b – Road traffic noise sensitivity analysis for potential locations of social welfare facilities under unmitigated scenario at KTN in Year 2044

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6661-6700	H	55	41 - 77	N	Y
A1-6	R6831-6880	R	70	22 - 72	N	Y
A2-2	R6701-6750	R	70	29 - 76	N	Y
A2-5	R6581-6600	R	70	22 - 71	N	Y
A3-3	R6501-6600	R	70	30 - 72	N	Y
B2-8	R6781-6800	R	70	67 - 70	Y	N
B2-10	R6861-6900	R	70	67 - 80	N	Y

Note:

- [1] R – residential; H – Home for the Aged;
- [2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.24b**, planned NSRs at B2-8 would comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding relevant noise criterion, mitigation measures are required.

Table 4.24c – Road traffic noise sensitivity analysis for potential locations of kindergartens under unmitigated scenario at KTN in Year 2044

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6161-6200	E	65	41 - 77	N	Y
A1-4	R6261-6300	E	65	29 - 72	N	Y
A1-5	R6301-6330	E	65	17 - 72	N	Y
A1-6	R6331-6380	E	65	22 - 72	N	Y
A1-8	R6381-6400	E	65	27 - 72	N	Y
A2-2	R6201-6250	E	65	29 - 76	N	Y
A2-4	R6141-6160	E	65	24 - 72	N	Y
A2-7	R6101-6130	E	65	15 - 71	N	Y
A3-3	R6001-6100	E	65	30 - 72	N	Y

Note:

[1] E – educational;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.24c**, all planned NSRs would not comply with relevant noise criterion. Mitigation measures are required.

FLN

Table 4.25a – Predicted road traffic noise level under unmitigated scenario at FLN in Year 2044 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
FNE-1	R1361-1380	R	70	65 - 82	N	Y
FNE-2	R1381-1400	R	70	64 - 82	N	Y
FNE-3	R1401-1420	I/C, W	55-70	68 - 79	N	Y
FNE-4	R1421-1440	R	70	66 - 73	N	Y
FNE-5	R1441-1460	R, W	70	73 - 80	N	N
FNE-6	R1461-1480	R	65-70	74 - 78	N	N
FNE-8	R1501-1520	R	70	68 - 75	N	N
FN-1	R4001-4020	R	70	62 - 64	Y	N
FN-2	R4021-4040	R	70	61 - 70	Y	N
FN-3	R4041-4060	R	70	66 - 74	N	Y
FN-4	R4061-4080	I/C	70	53 - 62	Y	N
FN-5	R4081-4100	R	70	58 - 62	Y	N
FN-6	R4101-4120	R	70	58 - 59	Y	N
FN-7	R4121-4140	R	70	56 - 62	Y	N
FN-8	R4141-4160	R	70	65 - 75	N	Y
FN-10	R4161-4180	R	70	65 - 66	Y	N
FN-11	R4181-4200	R	70	72 - 76	N	N
FN-12	R4201-4220	R, W	65-70	68 - 71	N	Y
FN-13	R4221-4240	W	65	55 - 56	Y	N
FN-18	R4241-4260	R	70	71 - 75	N	N
FN-20	R4261-4280	E	65	60 - 67	N	N
FN-21	R4281-4300	R	70	71 - 74	N	N
FN-22	R4301-4320	R	70	64 - 75	N	N
FN-23	R4321-4340	R	70	63 - 72	N	N

NSR	AP	Use ^[1]	L _{10 (1 hr)} Criterion ^[3]	dB(A) Predicted Noise Level	Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
FN-26	R4341-4360	R	70	66 - 74	N	Y
FN-27	R4361-4380	R	70	68 - 71	N	Y
FN-29	R4381-4400	R	70	68 - 72	N	Y
FN-30	R4401-4420	R	70	65 - 76	N	N
FN-31	R4421-4440	R	70	54 - 72	N	Y
FN-37	R4441-4460	R	70	72 - 77	N	N
FN-38	R4461-4480	E	65	57 - 73	N	N
FN-39	R4481-4500	E	65	70	N	N
FN-40	R4501-4520	R	70	61 - 75	N	N
FN-46	R4521-4540	E	65	65 - 74	N	N
FS-1	R4541-4560	R	70	63 - 78	N	Y
FS-4	R4561-4580	R	70	62 - 69	Y	N
FS-5	R4581-4600	R	70	57 - 64	Y	N
FS-6	R4601-4620	R	70	61 - 65	Y	N
FS-9	R4621-4640	E	65	59 - 61	Y	N
FS-10	R4641-4660	R	70	59 - 72	N	Y
FS-11	R4661-4680	R	70	66 - 69	Y	N
FS-12	R4681-4700	R	70	70 - 72	N	N
FS-13	R4701-4720	R	70	72	N	N
FS-14	R4721-4740	R	70	64 - 77	N	N
FS-15	R4741-4760	R	70	57 - 77	N	Y
FS-16	R4761-4780	R	70	71 - 76	N	Y
FS-17	R4781-4800	R	70	70 - 79	N	Y
A1-4	R4801-4802	W	65	53 - 56	Y	N
A1-8	R4961-4980	G	65	65 - 68	N	Y
A1-11	R4981-5000	G	65	64 - 66	N	Y
B1-7	R5001-5020	R	70	38 - 73	N	Y
B1-8	R5021-5040	R	70	60	Y	N
B1-9	R5041-5060	R	70	60	Y	N
B2-6	R5061-5080	PRH	70	64 - 67	Y	N
B2-7	R5081-5100	PRH	70	47 - 68	Y	N
B2-11	R5101-5120	PRH	70	63 - 68	Y	N
B2-12	R5121-5140	PRH	70	44 - 66	Y	N
B3-2	R5141-5160	PRH	70	63 - 68	Y	N
B3-3	R5161-5180	PRH	70	50 - 67	Y	N
B3-4	R5181-5200	E	65	62 - 66	N	Y
B3-5	R5201-5220	E	65	61	Y	N
B3-6	R5221-5230	R	70	63 - 65	Y	N
B3-7	R5231-5240	R	70	57 - 65	Y	N
B3-9	R5241-5260	R	70	63 - 66	Y	N
B3-10	R5261-5280	E	65	55 - 63	Y	N
B3-12	R5281-5290	E	65	63 - 65	Y	N
C2-7	R5291-5294	E	65	66 - 68	N	Y
C2-9	R5295-5300	E	65	67 - 76	N	Y
D2-2	R5301-5320	HOS	70	66 - 75	N	Y
D2-4	R5321-5340	R	70	65 - 74	N	Y
D2-6	R5341-5360	PRH	70	64 - 74	N	Y
D2-9	R5361-5380	PRH	70	48 - 73	N	Y
D2-12	R5381-5400	R	70	68 - 71	N	Y
D3-1a	R5401-5405	R	70	69 - 75	N	Y

NSR	AP	Use ^[1]	L _{10 (1 hr)} dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
D3-1b	R5406-5410	HOS	70	67 - 75	N	Y
D3-1c	R5411-5420	R	70	67 - 71	N	Y
D3-3	R5421-5440	R	70	66 - 71	N	Y
D3-4	R5441-5460	R	70	66 - 72	N	Y
D3-6	R5461-5480	R	70	58 - 73	N	Y
D3-7	R5481-5500	R	70	66 - 69	Y	N
D3-8	R5501-5520	PRH	70	45 - 73	N	Y
D3-11	R5521-5540	E	65	65 - 71	N	Y
D3-12	R5541-5560	E	65	65 - 69	N	Y
FN-50	R5801-5802	W	65	72 - 77	N	N
FN-51	R5821-5823	R	70	68 - 75	N	N
FN-52	R5832	R	70	74 - 75	N	N
FN-53	R5836	E	65	75	N	N
FN-54	R5841	I/C	55	73 - 77	N	N
FN-55	R5861-5862	E	65	71 - 73	N	N
FN-56	R5881-5883	W	65	64 - 75	N	N
FN-57	R5901-5902	R	70	65 - 74	N	N
FN-58	R5921	R	70	78 - 79	N	N
FN-59	R5961	R	70	71 - 78	N	N
FN-60	R6001-6002	R	70	74 - 77	N	Y
FN-61	R6041-6060	I/C	55	75 - 76	N	N
FN-62	R6061-6080	R	70	68 - 75	N	N
FN-63	R6081-6100	R	70	73 - 74	N	N
FN-64	R6101-6120	E	65	77 - 78	N	N
FN-65	R6121-6140	E	65	75 - 79	N	N
FN-66	R6141-6160	R	70	72 - 81	N	N
FN-67	R6161-6180	R	70	66 - 69	Y	N
FN-68	R6181-6200	R	70	70 - 76	N	N
FN-69	R6201-6220	E	65	73 - 77	N	N
FN-70	R6221-6240	R	70	68 - 79	N	N
FN-71	R6241-6260	E	65	71 - 82	N	N
FN-72	R6261-6280	R	70	71 - 76	N	N
FN-73	R6281-6300	E	65	70 - 73	N	N
FN-74	R6301-6320	E	65	73	N	N
FN-75	R6321-6340	R	70	72 - 78	N	N
FN-76	R6341-6360	E	65	76 - 78	N	N
FN-77	R6361-6380	R	70	72 - 81	N	N
R TH1	R TH1	R	70	68 - 71	N	Y
R TH2	R TH2	R	70	71 - 72	N	Y
R TH4	R TH4	R	70	71	N	Y
R TH5	R TH5	R	70	74	N	Y
R TH6	R TH6	R	70	74 - 75	N	Y
R KT1	R KT1	R	70	69 - 71	N	Y
R KT2	R KT2	R	70	76 - 77	N	Y
R KT3	R KT3	R	70	72	N	Y
R KLHSW	R KLHSW	R	70	79	N	Y
R SR7N	R SR7N	R	70	75	N	Y
R SR77	R SR77	R	70	81	N	Y
R FLNBP1	R FLNBP1	R	70	70	Y	N
R WHS1	R WHS1	R	70	78 - 82	N	Y

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
R NWP1	R NWP1	R	70	68 - 69	Y	N
R NWP2	R NWP2	R	70	70	Y	N
R SR8	R SR8	R	70	72	N	Y
R SR12	R SR12	R	70	68 - 70	Y	N

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when “With Project Overall Noise Level does not comply with the Noise Criteria” AND, either “With Project – Without Project Overall Noise Level > 1dB(A)” or “New Roads exceeds Noise Criteria” or “New Roads Contribution > 1 dB(A)”.
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

From **Table 4.25a**, some NSRs, for example San Fung Avenue (FNE-5), Hing Yan Tsuen, Sheung Shui Seventh Day Adventist Church (FNE-6), Tsui Lai Garden (FNE-8), Hung Kiu San Tsuen (FN-11), etc., would exceed the respective criteria. However, for these NSRs, the contribution due to the Project road is less than 1dB(A). Besides, the noise level from Project road is also within the respective noise criterion. For the remaining NSRs, for example Tai Tau Leng (FNE-1), Choi Yuen Estate (FNE-2), Buddhist Li Chong Yuet Ming Nursing Home for the Elderly, Mother of Christ Church, Tai Ping Estate (FNE-3), Village Houses near Hing Yan Tsuen (FNE-4), San Uk Tsuen (FN-3), future NSRs A1-8, A1-11, B1-7, etc. the direct mitigation measures are discussed in **Section 4.9.2.1**.

Table 4.25b – Road traffic noise sensitivity analysis for potential locations of social welfare facilities under unmitigated scenario at FLN in Year 2044

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
B2-7	R7001-7050	R	70	43-71	N	Y
B2-12	R7051-7100	R	70	44-68	Y	N
B3-3	R7101-7150	R	70	50-68	Y	N
C2-6	R7201-7250	R	70	66-72	N	Y
D2-9	R7451-7500	R, H	55-70	43-74	N	Y

Note:

- [1] R – residential; H – Home for the Aged;
- [2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.25b**, planned NSRs at B2-12 and B3-3 would comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, mitigation measures are required.

Table 4.25c – Road traffic noise sensitivity analysis for potential locations of kindergartens under unmitigated scenario at FLN in Year 2044

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
B2-7	R7501-7550	E	65	43-71	N	Y
B3-6	R7651-7700	E	65	55-66	N	Y
D3-1c	R7751-7800	E	65	55-72	N	Y
D3-6	R7801-7850	E	65	47-74	N	Y
D3-8	R7851-7900	E	65	42-73	N	Y
D3-4	R7901-7950	E	65	54-74	N	Y
D2-9	R7951-8000	E	65	43-74	N	Y

Note:

[1] E – educational;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.25c**, all planned NSRs would not comply with relevant noise criterion. Mitigation measures are required.

4.8.2.2 Assessment Results of Road Traffic Noise under Unmitigated Scenario at Year 2036, 2038 and 2043

According to **Section 4.6.2.1**, the road assessment year for the commissioning of the road improvement work is 2044 (i.e 15 years after all road commencement). However, the opening years for some primary distributor, district distributor and expressway will be earlier. Hence, their respective assessment years are also selected. The following additional years have been predicted:

- Road traffic noise assessment for KTN at Years 2036 and 2043 (15 years after completion of DP3 and DP4); and
- Road traffic noise assessment for FLN at Years 2038 (15 years after completion of Fanling Bypass Eastern Section)

Road hierarchy of KTN and FLN are shown in **Appendix 4.14**. Details of traffic data of “with project” and “without project” scenarios in respective years for KTN and FLN are given in **Appendix 4.15**. **Tables 4.26 - 4.28** summarises the noise level of the first layer of NSRS along the primary distributor, district distributor and expressway for KTN and FLN respectively.

Appendix 4.21 presents the predicted road traffic noise impacts on NSRs and identifies the locations where direct noise mitigation measures should be provided to the proposed road project in order to alleviate the adverse noise impacts at those affected NSRs.

KTN

Table 4.26a – Predicted road traffic noise level under unmitigated scenario at KTN in Year 2036 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
KTN-7	R1061-1080	H	55	74 - 75	N	Y
KTN-9	R1081-1100	R	70	57 - 69	Y	N
KTN-11	R1101-1120	R	70	65 - 82	N	Y
KTN-12	R1121-1140	R	70	75 - 76	N	Y
KTN-49	R1301-1320	R	70	69 - 70	Y	N
KTN-50	R1681-1682	R	70	78 - 79	N	Y
A1-2	R2500-2520	PRH	70	65 - 74	N	Y
A1-4	R2521-2540	R	70	66 - 72	N	Y
A1-5	R2541-2560	CDA	70	66 - 72	N	Y
A1-6	R2561-2580	R	70	69 - 72	N	Y
A1-8	R2581-2600	HOS	70	68 - 73	N	Y
A2-2	R2621-2640	PRH	70	64 - 76	N	Y
A2-4	R2641-2660	HOS	70	65 - 70	Y	N
A2-5	R2660-2680	R	70	64 - 68	Y	N
A2-7	R2681-2700	PRH	70	43 - 69	Y	N
A3-1	R3281-3300	E	65	70 - 71	N	Y
A3-2	R3301-3320	E	65	60 - 61	Y	N
A3-3	R2721-2740	PRH	70	58 - 72	N	Y
A3-4	R3381-3400	E	65	63 - 65	Y	N
A3-7	R2141	R	70	56	Y	N
B2-5	R3401-3420	E	65	68 - 71	N	Y
B2-6	R3421-3440	E	65	73 - 79	N	Y
B2-7	R3441-3460	E	65	67 - 68	N	Y
B2-10	R2761-2780	CDA	70	47 - 74	N	Y
E1-2	R2861-2880	E	65	65 - 68	N	Y
E1-3	R3701-3720	G	70	64 - 72	N	Y
E1-4	R3721-3740	E	65	62	Y	N
F1-3	R2841-2860	OU	70	54 - 68	Y	N

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when “With Project Overall Noise Level does not comply with the Noise Criteria” AND, either “With Project – Without Project Overall Noise Level > 1dB(A)” or “New Roads exceeds Noise Criteria” or “New Roads Contribution > 1 dB(A)”.
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

From **Table 4.26a**, NSRs at Lady Ho Tung Welfare Centre (KTN-7), Europa Garden Phase I (KTN-11), Scattered Village Houses West of Europa Garden Phase I (KTN-12), Scattered Village Houses along Kwu Tung Road (KTN-50), planned NSRs A1-2, A1-4, A1-5, A1-6, etc would

exceed the respective criteria. The direct mitigation measures (except KTN-7) are discussed in **Section 4.9.2.1**.

It was identified that the existing KTN-7 Lady Ho Tung Welfare Centre is now temporarily closed, with no known re-opening schedule. Hence, mitigation measures are not proposed for this NSR.

Table 4.26b – Road traffic noise sensitivity analysis for potential locations of social welfare facilities under unmitigated scenario at KTN in Year 2036

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6661-6700	H	55	40 - 77	N	Y
A1-6	R6831-6880	R	70	21 - 72	N	Y
A2-2	R6701-6750	R	70	28 - 76	N	Y
A2-5	R6581-6600	R	70	22 - 71	N	Y
A3-3	R6501-6600	R	70	30 - 72	N	Y
B2-8	R6781-6800	R	70	67 - 69	Y	N
B2-10	R6861-6900	R	70	66 - 80	N	Y

Note:

[1] R – residential; H – Home for the Aged;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.26b**, planned NSRs at B2-8 would comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion. Mitigation measures are required.

Table 4.26c – Road traffic noise sensitivity analysis for potential locations of kindergartens under unmitigated scenario at KTN in Year 2036

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6161-6200	E	65	40 - 77	N	Y
A1-4	R6261-6300	E	65	28 - 72	N	Y
A1-5	R6301-6330	E	65	17 - 71	N	Y
A1-6	R6331-6380	E	65	21 - 72	N	Y
A1-8	R6381-6400	E	65	26 - 72	N	Y
A2-2	R6201-6250	E	65	28 - 76	N	Y
A2-4	R6141-6160	E	65	24 - 71	N	Y
A2-7	R6101-6130	E	65	15 - 70	N	Y
A3-3	R6001-6100	E	65	30 - 72	N	Y

Note:

[1] E – educational;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.26c**, all planned NSRs would not comply with relevant noise criterion, mitigation measures are required.

Table 4.27a – Predicted road traffic noise level under unmitigated scenario at KTN in Year 2043 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
KTN-7	R1061-1080	H	55	74 - 75	N	Y
KTN-9	R1081-1100	R	70	56 - 69	Y	N
KTN-11	R1101-1120	R	70	65 - 83	N	Y
KTN-12	R1121-1140	R	70	76	N	Y
KTN-45	R1221-1240, R1501-1507	R	70	66 - 67	Y	N
KTN-46	R1241-1260	R	70	49 - 50	Y	N
KTN-49	R1301-1320	R	70	69 - 70	Y	N
KTN-50	R1681-1682	R	70	79	N	Y
KTN-P2	R1541-1560	R	70	76 - 81	N	Y
A1-2	R2500-2520	PRH	70	66 - 74	N	Y
A1-4	R2521-2540	R	70	66 - 72	N	Y
A1-5	R2541-2560	CDA	70	66 - 72	N	Y
A1-6	R2561-2580	R	70	70 - 72	N	Y
A1-8	R2581-2600	HOS	70	68 - 73	N	Y
A1-9	R2601-2620	R	70	65 - 74	N	Y
A2-2	R2621-2640	PRH	70	64 - 76	N	Y
A2-4	R2641-2660	HOS	70	66 - 70	Y	N
A2-5	R2660-2680	R	70	64 - 68	Y	N
A2-7	R2681-2700	PRH	70	43 - 69	Y	N
A2-9	R2701-2720	R	70	61 - 75	N	Y
A2-11	R3221-3240	E	65	67 - 70	N	Y
A2-12	R3241-3260	E	65	67 - 69	N	Y
A2-13	R3261-3280	E	65	70 - 72	N	Y
A3-1	R3281-3300	E	65	70 - 71	N	Y
A3-2	R3301-3320	E	65	60 - 61	Y	N
A3-3	R2721-2740	PRH	70	58 - 72	N	Y
A3-4	R3381-3400	E	65	63 - 65	Y	N
A3-6	R2741-2760	R	70	64 - 73	N	Y
A3-7	R2141	R	70	56	Y	N
B2-5	R3401-3420	E	65	68 - 71	N	Y
B2-6	R3421-3440	E	65	73 - 79	N	Y
B2-7	R3441-3460	E	65	67 - 68	N	Y
B2-10	R2761-2780	CDA	70	48 - 74	N	Y
D1-5	R3481-3500	R	70	68	Y	N
D1-7	R2781-2800	R	70	63 - 75	N	Y
D1-11	R2821-2840	R	70	61 - 73	N	Y
E1-2	R2861-2880	E	65	65 - 68	N	Y
E1-3	R3701-3720	G	70	64 - 72	N	Y
E1-4	R3721-3740	E	65	62	Y	N
F1-3	R2841-2860	OU	70	54 - 69	Y	N

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home

Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.

- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when “With Project Overall Noise Level does not comply with the Noise Criteria” AND, either “With Project – Without Project Overall Noise Level > 1dB(A)” or “New Roads exceeds Noise Criteria” or “New Roads Contribution > 1 dB(A)”.
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

From **Table 4.27a**, Lady Ho Tung Welfare Centre (KTN-7), Europa Garden Phase I (KTN-11), Scattered Village Houses West of Europa Garden Phase I (KTN-12), and Ma Tso Lung (KTN-45), Scattered Village Houses along Kwu Tung Road (KTN-50), KTS/267 Proposed House(KTN-P2), planned NSRs A1-2, A1-4, A1-5, A1-6, etc would exceed the respective criteria. The direct mitigation measures (except KTN-7) are discussed in **Section 4.9.2.1**.

Table 4.27b - Road traffic noise sensitivity analysis for potential locations of social welfare facilities under unmitigated scenario at KTN in Year 2043

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6661-6700	H	55	41 - 77	N	Y
A1-6	R6831-6880	R	70	22 - 72	N	Y
A2-2	R6701-6750	R	70	29 - 76	N	Y
A2-5	R6581-6600	R	70	22 - 71	N	Y
A3-3	R6501-6600	R	70	30 - 72	N	Y
B2-8	R6781-6800	R	70	67 - 69	Y	N
B2-10	R6861-6900	R	70	66 - 80	N	Y

Note:

[1] R – residential; H – Home for the Aged;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.27b**, planned NSRs at B2-8 would comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, mitigation measures are required.

Table 4.27c – Road traffic noise sensitivity analysis for potential locations of kindergartens under unmitigated scenario at KTN in Year 2043

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6161-6200	E	65	41 - 77	N	Y
A1-4	R6261-6300	E	65	29 - 72	N	Y
A1-5	R6301-6330	E	65	17 - 72	N	Y
A1-6	R6331-6380	E	65	22 - 72	N	Y
A1-8	R6381-6400	E	65	26 - 72	N	Y
A2-2	R6201-6250	E	65	29 - 76	N	Y
A2-4	R6141-6160	E	65	24 - 71	N	Y
A2-7	R6101-6130	E	65	15 - 71	N	Y

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A3-3	R6001-6100	E	65	30 - 72	N	Y

Note:

[1] E – educational;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.27c**, all planned NSRs would not comply with relevant noise criterion, mitigation measures are required.

FLN

Table 4.28a – Predicted road traffic noise level under unmitigated scenario at FLN in Year 2038 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
FN-1	R4001-4020	R	70	61 - 64	Y	N
FN-2	R4021-4040	R	70	61 - 70	Y	N
FN-3	R4041-4060	R	70	66 - 74	N	Y
FN-4	R4061-4080	I/C	70	53 - 62	Y	N
FN-5	R4081-4100	R	70	58 - 62	Y	N
FN-6	R4101-4120	R	70	58 - 59	Y	N
FN-7	R4121-4140	R	70	56 - 62	Y	N
FN-8	R4141-4160	R	70	65 - 75	N	Y
FN-31	R4421-4440	R	70	53 - 72	N	N
FS-1	R4541-4560	R	70	63 - 77	N	Y
FS-4	R4561-4580	R	70	62 - 69	Y	N
FS-5	R4581-4600	R	70	57 - 64	Y	N
FS-6	R4601-4620	R	70	61 - 65	Y	N
FS-9	R4621-4640	E	65	59 - 61	Y	N
FS-10	R4641-4660	R	70	59 - 72	N	Y
FS-11	R4661-4680	R	70	65 - 69	Y	N
FS-12	R4681-4700	R	70	70 - 72	N	N
FS-13	R4701-4720	R	70	72	N	N
FS-14	R4721-4740	R	70	64 - 77	N	N
FS-15	R4741-4760	R	70	57 - 77	N	Y
FS-16	R4761-4780	R	70	71 - 76	N	Y
FS-17	R4781-4800	R	70	70 - 78	N	Y
C2-7	R5291-5295	E	65	66 - 68	N	Y
C2-9	R5296-5300	E	65	67 - 76	N	Y
D2-2	R5301-5320	HOS	70	66 - 75	N	Y
D2-4	R5321-5340	R	70	65 - 74	N	Y
D2-6	R5341-5360	PRH	70	63 - 74	N	Y
D2-9	R5361-5380	PRH	70	47 - 73	N	Y
D2-12	R5381-5400	R	70	67 - 71	N	Y

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
D3-1a	R5401-5405	R	70	69 - 75	N	Y
D3-1b	R5406-5410	HOS	70	67 - 75	N	Y
D3-1c	R5411-5420	R	70	67 - 71	N	Y
D3-3	R5421-5440	R	70	66 - 71	N	Y
D3-4	R5441-5460	R	70	66 - 72	N	Y
D3-6	R5461-5480	R	70	58 - 73	N	Y
D3-7	R5481-5500	R	70	66 - 69	Y	N
D3-12	R5541-5560	E	65	65 - 69	N	Y
FN-53	R5836	E	65	75	N	N
FN-75	R6321-6340	R	70	72 - 78	N	N
R TH1	R TH1	R	70	68 - 71	N	Y
R TH2	R TH2	R	70	71 - 72	N	Y
R TH4	R TH4	R	70	71	N	Y
R TH5	R TH5	R	70	74	N	Y
R TH6	R TH6	R	70	74	N	Y
R KT1	R KT1	R	70	69 - 71	N	Y
R KT2	R KT2	R	70	76	N	Y
R KT3	R KT3	R	70	72	N	Y
R KLHSW	R KLHSW	R	70	78	N	Y
R SR7N	R SR7N	R	70	75	N	Y
R SR77	R SR77	R	70	80 - 81	N	Y
R FLNBP1	R FLNBP1	R	70	70	Y	N
R WHS1	R WHS1	R	70	78 - 82	N	Y
R NWP1	R NWP1	R	70	68 - 69	Y	N
R NWP2	R NWP2	R	70	70	Y	N
R SR8	R SR8	R	70	72	N	Y
R SR12	R SR12	R	70	68 - 70	Y	N

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when “With Project Overall Noise Level does not comply with the Noise Criteria” AND, either “With Project – Without Project Overall Noise Level > 1dB(A)” or “New Roads exceeds Noise Criteria” or “New Roads Contribution > 1 dB(A)”.
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

From **Table 4.28a**, some NSRs, for example Tong Hang Tung Chuen (FS-13) and Dawning Views (FS-14), noise levels would exceed the respective criteria. However, for these NSRs, the contribution due to the Project road is less than 1dB(A). Besides, the noise level from Project road is also within the respective noise criterion. Therefore, mitigation measures are not required at these NSRs.

For the remaining NSRs, for example San Uk Tsuen (FN-3), Scattered Village Houses East of Ma Wat River and West of Wing Ning Wai (FS-1), Shung Him Tong Tsuen (FS-10), planned NSRs D2-2, D2-9, etc. the direct mitigation measures are discussed in **Section 4.9.2.1**.

Table 4.28b – Road traffic noise sensitivity analysis for potential locations of social welfare facilities under unmitigated scenario at FLN in Year 2038

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
B2-7	R7001-7050	R	70	43-71	N	Y
B2-12	R7051-7100	R	70	44-68	Y	N
B3-3	R7101-7150	R	70	50-68	Y	N
C2-6	R7201-7250	R	70	66-72	N	Y
D2-9	R7451-7500	R, H	55-70	43-74	N	Y

Note:

[1] R – residential; H – Home for the Aged;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.28b**, planned NSRs at B2-12 and B3-3 would comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, mitigation measures are required.

Table 4.28c – Road traffic noise sensitivity analysis for potential locations of kindergartens under unmitigated scenario at FLN in Year 2038

NSR	AP	Use ^[1]	L ₁₀ (1 hr), dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
B2-7	R7501-7550	E	65	43-71	N	Y
B3-6	R7651-7700	E	65	55-66	N	Y
D3-1c	R7751-7800	E	65	55-72	N	Y
D3-6	R7801-7850	E	65	47-74	N	Y
D3-4	R7901-7950	E	65	43-74	N	Y
D2-9	R7951-8000	E	65	43-71	N	Y

Note:

[1] E – educational;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.28c**, all planned NSRs would not comply with relevant noise criterion, mitigation measures are required.

4.8.2.3 Assessment Results of Shooting Noise Source under Unmitigated Scenario

Noise measurements were carried out on 18 May 2011 to establish the SWL during firing practices at Lo Wu Classification Range. The measurement results are summarized in **Tables 4.29** and **4.30**.

Table 4.29 – Noise measurement details (Shooting noise)

Noise Measurement Details	Lo Wu Classification Range	
	Lo Wu Rifle Range	Firing Range
Measurement period	1045 – 1330	1200 – 1300
Measurement positions	Near field ^[1] : 6m away from shooting location (1.5m above ground) Far-field ^[2] : 150m away from shooting location (4m above ground)	Near field ^[1] : 2m away from shooting location (1.5m above ground)
Measurement parameters	Continuous 1 second sound pressure level in 1/3 octave bands	
Weapon type	MP5, AR15, Glock, Sniper, Revolver	Shotgun

Note:

[1] To determine the SWL for single mode of each weapon.

[2] To check with the tonality characteristic of firing noise during 30-minutes.

Different firing modes of weapon including single and burst mode were measured. For weapon MP5 and AR15, they were measured in single and burst mode. However, for remaining weapons, they were measured in single mode only. Noise impact assessment will be based on single mode shooting of each weapon.

The SWL for single mode shooting of each weapon is determined by standard acoustic principle based on the separation distance between the measurement position and the shooting location. Near-field measurement location is selected for the determination of SWL for single mode of each weapon to capture the sound energy of the weapon. **Table 4.30** below summarises the average SPL of single mode of each weapon measured at the measurement location and the correspondence SWL for single mode shooting of each weapon. The details in determining the SWL for single mode shooting of each weapon is shown in **Appendix 4.22**.

Information provided by HKPF reveals that all weapons except revolver will be fired during typical training session in Lo Wu Classification Range. Moreover, there is no standard module of weapon used during the firing practice, i.e. there will be a mixed use of weapon during the firing practice. Hence, it is considered reasonable to average the SWL for single mode shooting of each weapon for assessment purpose.

Table 4.30 – Determination of SWL for single mode shooting of each weapon

Weapon	SWL for single mode shooting, dB(A)	Correction factor to a 30 mins period ^[1] , dB(A)	SWL (30 mins), dB(A)
Lo Wu Rifle Range KTN G1-1			
MP5	117.4	-32.6	84.9
AR 15	120.5	-32.6	88.0
Glock	120.6	-32.6	88.1
Sniper	116.7	-32.6	84.1
Revolver ^[2]	122.4	-32.6	89.9
Average			86.6
Firing Range KTN G1-2			

Weapon	SWL for single mode shooting, dB(A)	Correction factor to a 30 mins period ^[1] , dB(A)	SWL (30 mins), dB(A)
Shotgun	121.3	-32.6	88.7

Note:

[1] Based on acoustic principle, $-10 \times \log(1/1800s)$.

[2] Based on the information provided by HKPF during noise measurement, revolver will not be used as firing practice in Lo Wu Rifle Range; hence it would not be included in the average SWL of single mode of weapon.

HKPF provided the total number of shots during a training day at Lo Wu Rifle Range and Firing Range shown in **Table 4.31** below.

It is noted that there were a total of six training sessions during the training day in Lo Wu Rifle Range and each session lasted for about 15 minutes. There was a training session in the Firing Range on that day and this session lasted for about two hours.

As explained previously, averaging the number of shots for a 30 minutes period will be assumed for assessment purpose.

Table 4.31 – Number of shots during 30-minutes in Lo Wu Classification Range

Weapon	No. of shots
Lo Wu Rifle Range KTN G1-1	
MP5 + Glock	3384
AR 15	788
Sniper	5
Revolver	6
Total number of shots	4183
Average shots (15-minutes)	~700
Average shots (30-minutes)	~1400
Firing Range KTN G1-2	
Shotgun	187
Average shots (30-minutes)	~47

The relevant correspondence with HKPF for the request of number of shots is shown in **Appendix 4.23**.

Based on **Table 4.30**, average SWLs of 86.6 dB(A) and 88.7 dB(A) for Lo Wu Rifle Range and Firing Range respectively will be adopted to predict the SPL at the planned NSRs.

Tonality check has been carried out at far-field noise measurement location (i.e. 150m away from the shooting location) and there is no tonality characteristic on the firing noise. Hence, no correction is applied.

The predicted SPL at the representative planned NSRs due to Lo Wu Rifle Range and Firing Range is shown in **Tables 4.32** and **4.33** respectively. The cumulative impact of both practice sites is summarised in **Table 4.34**. Detailed calculation of shooting noise impacts is given in **Appendix 4.24**.

Table 4.32 – Predicted SPL at planned NSRs due to Lo Wu Rifle Range (KTN G1-1)

NSR	AP	L _{eq} (30 mins) dB(A)		Compliance [Y/N]	Exceedance, dB(A)
		Predicted SPL ^[2]	Criterion ^[3]		
A3-3	R2721	59	60	Y	-
A3-4 ^[1]	R9003	49	60	Y	-

D1-11 ^[1]	R2830	51	60	Y	-
D1-12 ^[1]	R9004	57	54	N	3
D1-13 ^[1]	R9005	59	54	N	5
E1-3	R9002	56	60	Y	-
E1-4	R3721	57	60	Y	-
F1-3	R2841	67	54	N	13
F1-3	R2843	71	54	N	17
F1-3	R9001	67	54	N	13
F1-4	R9000	67	54	N	13

Note:

- [1] As A3-4, D1-11, D1-12 and D1-13 are of low to medium rise buildings, no direct line of sight from the receivers to the Lo Wu Rifle Range due to the existing topography (Fung Kong Shan and Tai Shek Mo), hence, a -10dB(A) is applied.
- [2] Bold figures denotes exceedance of relevant noise criteria.
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for fixed noise.

Table 4.33 – Predicted SPL at planned NSRs due to Firing Range (KTN G1-2)

NSR	AP	L _{eq} (30 mins) dB(A)		Compliance [Y/N]	Exceedance, dB(A)
		Predicted SPL ^[2]	Criterion ^[3]		
A3-3	R2721	50	60	Y	-
A3-4 ^[1]	R9003	41	60	Y	-
D1-11 ^[1]	R2830	39	60	Y	-
D1-12	R9004	50	54	Y	-
D1-13	R9005	55	54	N	1
E1-3	R9002	48	60	Y	-
E1-4	R2721	49	60	Y	-
F1-3	R9001	63	54	N	9
F1-3	R2841	58	54	N	4
F1-3	R2843	56	54	N	2
F1-4	R9000	55	54	N	1

Note:

- [1] As A3-4 and D1-11 are medium rise buildings, no direct line of sight from the receivers to the Lo Wu Rifle Range due to the existing topography (Fung Kong Shan and Tai Shek Mo), hence, a -10dB(A) is applied.
- [2] Bold figures denotes exceedance of relevant noise criteria.
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for fixed noise.

Table 4.34 – Cumulative noise impacts from both practice sites (KTN G1-1 and KTN G1-2)

NSRs	AP	Predicted Noise Level, L _{eq} (30 mins) dB(A) ^[1]			Criterion, L _{eq} (30 mins) dB(A) ^[2]	Compliance [Y/N]	Exceedance, dB(A)
		Lo Wu Rifle Range	Firing Range	Cumulative Noise Impact			
A3-3	R2721	59	50	59	60	Y	-
A3-4	R9003	49	41	50	60	Y	-
D1-11	R2830	51	39	52	60	Y	-
D1-12	R9004	57	50	58	54	N	4
D1-13	R9005	59	55	60	54	N	6
E1-3	R9002	56	48	57	60	Y	-
E1-4	R3721	57	49	58	60	Y	-
F1-3	R2841	67	58	68	54	N	14
F1-3	R2843	71	56	72	54	N	18

NSRs	AP	Predicted Noise Level, L_{eq} (30 mins) dB(A) ^[1]			Criterion, L_{eq} (30 mins) dB(A) ^[2]	Compliance [Y/N]	Exceedance, dB(A)
		Lo Wu Rifle Range	Firing Range	Cumulative Noise Impact			
F1-3	R9001	67	63	68	54	N	14
F1-4	R9000	67	55	68	54	N	14

Note:

[1] Bold figures denotes exceedance of relevant noise criteria.

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for fixed noise.

Based on **Table 4.34** above, the predicted cumulative noise impacts on KTN A3-3, KTN A3-4, KTN D1-11, KTN E1-3 and KTN E1-4 would comply with the respective criteria. However, due to the close separation distance, there are noise exceedances at KTN D1-12, KTN D1-13, KTN F1-3 and KTN F1-4. **Appendix 4.24a** shows the predicted noise levels at the NSRs at various floor levels.

4.8.2.4 Assessment Results of Lok Ma Chau Railway Tunnel Ventilation Shaft under Unmitigated Scenario

Noise measurements were conducted at the boundary of the ventilation shafts to evaluate its impacts on the planned NSRs. Details of measurements and analysis are shown in **Appendix 4.25** and summarised in **Table 4.35**. From **Table 4.35**, the noise impacts from ventilation shafts would comply with the night time noise criterion and therefore adverse noise impacts are therefore not anticipated. **Appendices 4.25a, 4.26a and 4.29a** show the predicted noise levels at the NSRs at various floor levels.

Table 4.35 – Predicted impacts on planned NSRs (Lok Ma Chau Railway Tunnel Ventilation Shaft)

NSR	AP	ASR	Leq (30 mins) dB(A)		Compliance
			Predicted Sound Pressure Level	Night-time Criterion ^[1]	
Lok Ma Chau Tunnel Ventilation Shaft (KTN A1-11 and KTN A1-12)					
KTN A1-5	R9013	B	49	50	Y
KTN A2-4	R9010	B	44	50	Y
KTN A2-7	R9011	B	44	50	Y
KTN A1-8	R9012	B	41	50	Y
Lok Ma Chau Tunnel Ventilation Shaft (KTN B1-5)					
KTN A1-2	R2504	B	30	50	Y
Lok Ma Chau Tunnel Ventilation Shaft (KTN D1-2)					
KTN D1-7	R2781	B	43	50	Y
KTN D1-7	R2782	B	39	50	Y
KTN D1-5	R3803	B	39	50	Y

Note:

[1] Only night-time criterion is assessed as the worst case scenario. Relevant environmental standards/ criteria: TM-EIAO noise standards for fixed noise.

4.8.2.5 Assessment Results of District Cooling System (DCS) under Unmitigated Scenario

KTN

The major noise source of DCS comes from the pump system enclosed within the building structure (Reference: EIA-157/2008 Kai Tak Development Engineering Study cum Design and Construction of Advance Works – Investigation, Design, and Construction).

The nearest existing NSR, KTN B1-3, and planned NSR, KTN A1-2 from DCS (KTN B1-7) are located at 8m and 140m respectively. Since there is no design information on the proposed DCS, analysis has been conducted to determine the maximum allowable SWL criteria based on the separation distance. Detailed calculation is shown in **Appendix 4.26**. Since the Lok Ma Chau Tunnel Ventilation Shaft (KTN B1-5) is located within 300m of the planned NSRs (KTN A1-2), the cumulative impact has been included. **Table 4.36** shows the maximum allowable SWL. **Appendix 4.26a** shows the predicted noise levels at the NSRs at various floor levels.

Table 4.36 – Summary of maximum allowable SWL for District Cooling System

Plant Item	Maximum Allowable SWL, dB(A)
District Cooling System (KTN B1-7)	75

Note:

- [1] Cumulative impacts from the operation of existing Lok Ma Chau Ventilation Shaft (KTN A1-2) are included.

A 3dB(A) façade correction and 3dB(A) tonality correction have been applied in noise analysis. With reference to “Tuen Mun Area 54 Sewage Pumping Station EIA-150/2008” and “Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 2 EIA-094/2004”, a noise reduction of 10dB(A) and 20dB(A) is possible with the application of silencer installation and special acoustic enclosure at various units.

The Contractor shall install acoustic silencers, noise barrier or acoustic enclosure as appropriate to ensure the specified maximum SWLs as shown in **Table 4.36** will not be exceeded. The future design and selection of the equipment shall also aim to reduce the effect of tonality at the NSRs.

4.8.2.6 Assessment Results of Sewage Treatment Works under Unmitigated Scenario

FLN

The major noise sources of sewage treatment plant are from the inlet pump of the influent pumping station, the air blowers of the blower house, and returned activated sludge (RAS) pump of the RAS pumping station (Reference: EIA-097/2004 Tai Po Sewage Treatment Works Stage V).

The nearest existing NSR (FLN A1-3) from Sewage Treatment Works Extension - Phase 2 (FLN A2-3) is located at about 85m. Since there is no design information on the proposed STW, analysis has been conducted to determine the maximum allowable SWL based on the separation distance. The existing Shek Wu Hui Sewage Treatment Works is located at 205m from the existing NSRs (FN-18). Hence, cumulative impacts have been included. **Table 4.37** shows the maximum allowable SWL. Detailed calculation is shown in **Appendix 4.27**.

Appendix 4.27a shows the predicted noise levels at the NSRs at various floor levels.

Table 4.37 - Summary of maximum allowable SWL for Sewage Treatment Plant Extension - Phase 2

Plant Item	Maximum Allowable SWL, dB(A)
Sewage Treatment Plant Extension - Phase 2 (FLN A2-3)	83

Note:

- [1] Cumulative impacts from the operation of existing Shek Wu Hui Sewage Treatment Works are included.

A 3 dB(A) façade correction and 3dB(A) tonality correction have been applied in noise analysis. With reference to “Tuen Mun Area 54 Sewage Pumping Station EIA-150/2008” and “Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 2 EIA-094/2004”, a noise reduction of 10dB(A) and 20dB(A) is possible with the application of silencer installation and special acoustic enclosure at various units.

The Contractor shall install acoustic silencers, noise barrier or acoustic enclosure as appropriate to ensure the specified maximum SWLs as shown in **Table 4.37** will not be exceeded. The future design and selection of the equipment shall also aim to reduce the effect of tonality at the NSRs.

4.8.2.7 Assessment Results of Sports Ground / Sports Complex under Unmitigated Scenario

Based on the preliminary assessment, adverse noise impacts of crowd noise and PA system noise from Sports Ground / Complex & Sports (KTN F1-1) Centre are not anticipated. The predicted noise levels at the nearest NSRs from the sports activity at the Sports Ground / Complex & Sports Centre are presented in **Table 4.38**. Detailed calculation is shown in **Appendix 4.28**. **Appendix 4.28a** shows the predicted noise levels at the NSRs at various floor levels.

Table 4.38 - Predicted Sound Pressure Level at NSRs (Sports Ground / Sports Complex)

NSR	AP	ASR	Shortest Distance from the Source (m)	L _{eq 30 mins} dB(A)		Compliance
				Predicted Sound Pressure Level	Daytime Criterion ^[1]	
KTN F1-3	R2848	B	160	56	54	N
KTN-45	R1501	B	140	54	54	Y
KTN H1-1	R9021	B	50	52	54	Y

Note:

- [1] Activity conducted during daytime only. Relevant environmental standards/ criteria: TM-EIAO noise standards for fixed noise.
[2] Cumulative impacts from the operation of existing Lo Wu Classification Range (KTN G1-1 and KTN G1-2) are included.

The predicted impacts of crowd noise and PA system noise will be within the noise criteria for the existing NSRs (KTN-45 and KTN H1-1). However, exceedance is predicted at the planned NSR KTN F1-3. Mitigation measures at KTN F1-3 are required. Since NSR KTN F1-3 is also affected by helicopter noise and shooting noise from Lo Wu Classification Range, noise barrier would not be proposed. Instead,

provision of acoustic insulation with air conditioning has been recommended. Upon commissioning of the Sports Ground / Complex & Sports Centre (KTN F1-1), the background noise level shall be measured at specific NSRs locations before each outdoor activity or event, and the respective maximum allowable daytime and night-time noise levels shall be determined and agreed with EPD on a case by case basis.

It is recommended that, upon any rehearsal and main event, the organiser should appoint an appropriate person to monitor the noise situation by sound level meter at the most affected noise sensitive receivers. That person should provide feedback to the organizer for immediate action, such as adjustment of the speaker output level, whenever necessary. Noise measurement should be conducted at least hourly during the event, of which the results should be recorded properly and submitted to the venue operator subsequently. The venue operator will provide the recorded measurements for reference to EPD when requested for any necessary follow up investigation.

In addition, it is also recommended to incorporate the following measures for the PA system and/or the sound amplification system, if used during the outdoor noise activities:

- To use a cluster of small power loudspeakers instead of a few large power loudspeakers;
- To use directional loudspeakers and orientate them to point towards the audience and away from the nearby NSRs; and
- To include a “Limiter” device in the system to set the upper bound of the output sound level.

With proper event management, the noise generated from the outdoor activities would be under control and adverse noise impact on the nearby NSRs would be minimised.

4.8.2.8 Assessment Results of Sewage Pumping Station / Pumping Station under Unmitigated Scenario

KTN

The major noise sources of SPS/PS are from the operation of pumps, mechanically racked screens, transformer and ventilation fan of deodourization unit. (Reference: EIA-150/2008 Tuen Mun Area 54 Sewage Pumping Station EIA).

The nearest existing NSR (KTN D1-9) and planned NSR (KTN D1-5, KTN D1-7) from SPS (KTN D1-3) are located at about 220m and 105m respectively while the nearest existing NSR (KTN-45) and planned NSR (KTN F1-3) from SPS (KTN F1-2) are located at about 35m and 150m respectively. Since there is no design information on the proposed SPS, analysis has been conducted to determine the maximum allowable SWL based on the separation distance. The existing Lok Ma Chau Tunnel Ventilation Shaft (KTN D1-2) is located at 180m from the existing NSRs (D1-9). Hence, cumulative impacts have been included. **Table 4.39** shows the maximum allowable SWL. Detailed calculation is shown in **Appendix 4.29**. **Appendix 4.29a** shows the predicted noise levels at the NSRs at various floor levels.

Table 4.39 - Summary of maximum allowable SWL for SPS (KTN)

Plant Item	Maximum Allowable SWL, dB(A)
Sewage Pumping Station (KTN D1-3)	89

Sewage Pumping Station (KTN F1-2)	76
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Note:

- [1] Cumulative impacts from the operation of existing Lok Ma Chau Ventilation Shaft (KTN D1-2) are included.

A 3dB(A) facade correction and 3dB(A) tonality correction have been applied in noise analysis. With reference to “Tuen Mun Area 54 Sewage Pumping Station EIA-150/2008” and “Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 2 EIA-094/2004”, a noise reduction of 10dB(A) and 20dB(A) is possible with the application of silencer installation and special acoustic enclosure at various units.

The Contractor shall install acoustic silencers, noise barrier or acoustic enclosure as appropriate to ensure the specified maximum SWLs as shown in **Table 4.39** will not be exceeded. The future design and selection of the equipment shall also aim to reduce the effect of tonality at the NSRs.

FLN

The nearest existing NSR FLN A1-3, FLN-A1-6, FN-8, FN-18 and FN-18 from SPS/PS (FLN A1-2, FLN A1-6, FLN B1-4, FLN B2-3 and FLN C2-3) are located at about 14m, 50m, 145m, 110m and 190m respectively. Since there is no design information on the proposed SPS/PS, analysis has been conducted to determine the maximum allowable SWL based on the separation distance. The proposed SPS/PS are located within 300m of the other existing / planned noise sources. Hence, their cumulative impacts have been included. **Table 4.40** shows the maximum allowable SWL. Detailed calculation is shown in **Appendix 4.29**. **Appendix 4.29a** shows the predicted noise levels at the NSRs at various floor levels.

Table 4.40 - Summary of maximum allowable SWL for SPS/PS (FLN)

Plant Item	Maximum Allowable SWL, dB(A)
Pumping Station (FLN A1-2)	67
Sewage Pumping Station (FLN A1-6)	86
Sewage Pumping Station (FLN B1-4)	88
Sewage Pumping Station (FLN B2-3)	93
Sewage Pumping Station (FLN C2-3)	98

Based on the preliminary assessment, it is recommended that the maximum SWLs for the SPS/PS FLN A1-2, FLN-A1-6, FLN B1-4, FLN B2-3 and FLN C2-3 located at FLN should be controlled to be not more than 67, 86, 88, 93 and 98 dB(A) respectively in order to ensure no exceedance at the nearby sensitive receivers. Similar to SPS in KTN, appropriate mitigation measures discussed in **Section 4.8.2.8** shall be adopted.

4.8.2.9 Assessment Results of Helicopter Noise under Unmitigated Scenario

As discussed in **Section 4.6.4**, helicopter could land anywhere within the site of Lo Wu Classification Range HLS (Blocks 1 to 4 as in **Figure 4.8**) provided that it is safe for landing. As discuss with GFS and HKPF, in order to ensure a safe operation of helicopter in future and taking into account the NENT NDA, the landing area would be restricted to the middle portions of the HLS (Blocks 2 and 3 as marked in **Figure 4.8**).

Without Lateral Movements – Idling

The L_{max} for helicopter Super Puma AS332 L2 and EC155 B1 during idling are 82.0 dB(A) and 80.0 dB(A) respectively, at a reference distance of 150m. **Table 4.41** summarises the calculated L_{max} at the identified NSRs during idling mode. Details of the calculation are provided in **Appendix 4.30**.

Table 4.41 - Helicopter noise impact during idling

NSR	AP	Criteria L_{max} , dB(A)	Separation Distance ^[1] , m	L_{max} during Idling, dB(A) ^[2]	
				Super Puma AS332 L2	EC155 B1
A3-3	R2721	85	545	74	72
A3-4	R9003	85	515	74	72
D1-11	R2830	85	475	75	73
D1-12	R9004	85	250	81	79
D1-13	R9005	85	150	85	83
E1-3	R9002	85	760	71	69
E1-4	R3721	85	690	72	70
F1-3	R2841	85	125	87	85
F1-3	R2843	85	85	90	88
F1-3	R9001	85	115	87	85
F1-4	R9000	85	170	84	82

Notes:

- [1] Nearest separation distance is measured from the boundary of Blocks 2 and 3.
[2] Bold value indicates exceedance of the criteria L_{max} 85 dB(A) (domestic premises).
Relevant environmental standards/ criteria: TM-EIAO noise standards for helicopter noise.

When a helicopter of AS332 L2 / EC155 B1 is in idling mode, the predicted L_{max} is in the range of 71 to 90 dB(A) / 69 to 88 dB(A) respectively. Adverse helicopter noise impacts are therefore anticipated during idling mode.

Without Lateral Movements – Hovering/ Lift-off

The L_{max} for helicopter Super Puma AS332 L2 and EC155 B1 in hovering/lift-off mode are 90.6 dB(A) and 87.7dB(A) respectively, at a reference distance of 150m. **Table 4.42** summarises the calculated L_{max} at the identified NSRs during hovering/lift-off mode. Details of the calculation are provided in **Appendix 4.30**.

Table 4.42 - Helicopter noise impact during hovering/lift-off

NSR	AP	Criteria L_{max} , dB(A)	Separation Distance, m ^[1]	L_{max} during hovering/lift-off, dB(A) ^[2]	
				Super Puma AS332 L2	EC155 B1
A3-3	R2721	85	545	82	80
A3-4	R9003	85	515	83	80
D1-11	R2830	85	475	84	81
D1-12	R9004	85	250	89	86
D1-13	R9005	85	150	94	91
E1-3	R9002	85	760	80	77
E1-4	R3721	85	690	80	77
F1-3	R2841	85	125	95	92
F1-3	R2843	85	85	99	96
F1-3	R9001	85	115	96	93
F1-4	R9000	85	170	93	90

Notes:

- [1] Nearest separation distance is measured from the boundary of Blocks 2 and 3.

- [2] Bold value indicates exceedance of the L_{max} 85 dB(A) (domestic premises). Relevant environmental standards/ criteria: TM-EIAO noise standards for helicopter noise.

When a AS332 L2 / EC155 B1 helicopter is in hovering/lift-off mode, the predicted L_{max} is in the range of 80 to 99 dB(A) / 77 to 96 dB(A) respectively. Adverse helicopter noise impacts are therefore anticipated during hovering/lift-off mode.

With Lateral Movements – Approach/ Take-off

The approach and departure path range of Lo Wu Classification Range HLS is shown in **Figure 4.11**. The L_{max} for helicopter Super Puma AS332 L2 and EC155 B1 is 87.7 dB(A) and 84.9 dB(A) respectively during approach mode; and 86.7 dB(A) and 83.9 dB(A) respectively during take-off mode. As the measured L_{max} is larger during approach mode, the worst case scenario for the approach mode is presented in **Table 4.43** at the identified NSRs. According to GFS Helipad Specification Guidelines, the helicopter approach and departure trajectory is an 8% slope within 245m from the edge of the helipad and there should be nothing underneath the path. Beyond 245m, the slope can be increased to 12.5%. The distance between the flight path and the sensitive receivers measured is shown in **Appendix 4.30**. The details of calculation are provided in **Appendix 4.30**.

Table 4.43 - Helicopter noise impact during approach mode

NSR	AP	Criteria L_{max} , dB(A)	Separation Distance, m ^[1]	L_{max} during Approach mode, dB(A) ^[2]	
				Super Puma AS332 L2	EC155 B1
A3-3	R2721	85	420	80	77
A3-4	R9003	85	460	79	76
D1-11	R2830	85	320	82	79
D1-12	R9004	85	75	95	92
D1-13	R9005	85	110	92	89
E1-3	R9002	85	365	81	78
E1-4	R3721	85	340	82	79
F1-3	R2841	85	125	115	112
F1-3	R2843	85	85	115	112
F1-3	R9001	85	115	118	115
F1-4	R9000	85	170	106	104

Notes:

- [1] Nearest separation distance is measured from the highest level to flight path underneath the helicopter flight path for F1-3 and F1-4); nearest horizontal distance is adopted for D1-11, D1-12, D1-13, A3-3, A3-4, E1-3 and E1-4.
- [2] Bold value indicates exceedance of the L_{max} 85 dB(A) (domestic premises). Relevant environmental standards/ criteria: TM-EIAO noise standards for helicopter noise.

When a AS332 L2 / EC155 B1 helicopter is in approach mode, the predicted L_{max} is in the range of 79 to 118 dB(A) / 78 to 115 dB(A) respectively. Adverse helicopter noise impacts are therefore anticipated during approach mode.

With Lateral Movements – Flyover

The L_{max} for AS332 L2 / EC155 B1 helicopter during flyover is 85.7 and 82.9 dB(A) respectively. In accordance with the Civil Aviation Ordinance, CAP 448C, Air Navigation (Hong Kong) Order 1995, Schedule 14, Section II. 5 Low Flying, except with the permission in writing of the Chief

Executive and in accordance with any conditions specified a helicopter should not fly over a congested area of a city, town or settlement below a height of 1,500 feet (about 455m) above the highest fixed object within 2,000 feet (about 610m) of the helicopter.

Table 4.44 summarises the calculated L_{max} at the identified NSRs. Details of the calculation are provided in **Appendix 4.30**.

Table 4.44 - Helicopter noise impact during flyover mode

NSR	AP	Criteria L_{max} , dB(A)	Separation Distance (m)	L_{max} during Flyover mode, dB(A) ^[1]	
				Super Puma AS332 L2	EC155 B1
A3-3	R2721	85	455	79	76
A3-4	R9003	85	455	79	76
D1-11	R2830	85	455	79	76
D1-12	R9004	85	455	79	76
D1-13	R9005	85	455	79	76
E1-3	R9002	85	455	79	76
E1-4	R3721	85	455	79	76
F1-3	R2841	85	455	79	76
F1-3	R2843	85	455	79	76
F1-3	R9001	85	455	79	76
F1-4	R9000	85	455	79	76

Notes:

[1] Relevant environmental standards/ criteria: TM-EIAO noise standards for helicopter noise.

When a AS332 L2 / EC155 B1 helicopter is in flyover mode, the predicted L_{max} is 79 / 76 dB(A) respectively. Adverse helicopter noise impacts are therefore not anticipated during flyover mode.

4.9 Mitigation Measures

4.9.1 Construction Phase

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

- Good site practices to limit noise emissions at the source;
- Use of quiet plant and working methods;
- Use of site hoarding as noise barrier to screen noise at ground level of NSRs;
- Use of temporary noise barriers, enclosure and acoustic mat to screen noise from relatively static PMEs;
- Scheduling of construction works outside school examination periods in critical area; and
- Alternative use of plant items within one worksite, wherever practicable.

The above mitigation measures would need to be implemented in all work sites as good practices. Detailed descriptions of these mitigation measures are given in the following sections.

4.9.1.1 Good Site Management Practices

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

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

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

4.9.1.2 Use of Site Hoarding

Purpose built temporary noise barriers (approx 2.4m high) located on the site boundaries between noisy construction activities and NSRs could generally reduce noise levels at low-level zone of NSRs through partial screening. It would be possible for the Contractor to provide these in the form of site hoardings to achieve this attenuation effect, provided that they have no openings or gaps and have a superficial surface density of at least 14kg/m^2 . Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period. For conservative assessments, however, the site hoarding has not been taken into consideration in the construction noise assessments.

4.9.1.3 Use of Movable Noise Barrier, Acoustic Mat & Full Enclosure for Relatively Fixed Plant Source

Movable temporary noise barriers that can be located close to noisy plant and be moved concurrently with the plant along a worksite can be very effective for screening noise from NSRs. A typical design which has been used locally is a wooden framed barrier with a small-cantilevered upper portion of superficial density no less than 14kg/m^2 on a skid footing with 25mm thick internal sound absorptive lining. This measure is particularly effective for low level zone of NSRs. A cantilevered top cover would be required to achieve screening benefits at upper floors of NSRs.

Movable barriers will be used for some PME (e.g. pipe pile rigs, auger). It is anticipated that suitably designed barriers could achieve at least 5dB(A) for movable plant and 10dB(A) for stationary plant.

The use of standard enclosure and acoustic mat has been considered in this assessment to shelter relatively fixed plant including rock drill, air compressor concrete pump and generator. These standard enclosures can provide about 15dB(A) noise reduction. For electric saw, movable noise barriers of 5dB(A) attenuation have been assumed. For rock drill, acoustic mat of 10dB(A) attenuation have also been assumed in the assessment.

A summary of the barrier, standard enclosure and acoustic mat adopted for various PME's and indicative drawing for barrier, standard enclosure and acoustic mat are shown in **Appendix 4.31**, and the associated noise reduction is given in **Appendix 4.4** and summarised in **Table 4.45** below:

Table 4.45 - Summary of barrier and standard enclosure adopted for PME's

PME	Enclosure / Barriers	Attenuation, dB(A)
Air Compressor	Enclosure	-15dB(A)
Asphalt Paver	Movable Barrier	-5dB(A)
Bulldozer	Movable Barrier	-5dB(A)
Hand Held Breaker	Movable Barrier	-10dB(A)
Concrete Mixer Truck	Movable Barrier	-5dB(A)
Concrete Pump	Enclosure	-15dB(A)
Crane Mobile	Movable Barrier	-5dB(A)
Compactor, vibratory	Movable Barrier	-10dB(A)
Dump Truck with Grab	Movable Barrier	-5dB(A)
Backhoe/Mini Backhoe	Movable Barrier	-5dB(A)
Excavator/Loader, Wheeled/Tracked	Movable Barrier	-5dB(A)
Generator	Enclosure	-15dB(A)
Grout Mixer	Enclosure	-15dB(A)
Grout Pump	Movable Barrier	-5dB(A)
Hoist	Movable Barrier	-5dB(A)
Lorry, Crane/Grab	Movable Barrier	-5dB(A)
Piling, Vibrating Hammer	Movable Barrier	-5dB(A)
Vibratory Poker	Movable Barrier	-10dB(A)
Rock Drill	Acoustic Mat	-10dB(A)
Roller	Movable Barrier	-5dB(A)
Saw, circular, wood	Movable Barrier	-5dB(A)
Saw, Chain, Hand-held	Movable Barrier	-5dB(A)
Vertical band drain installation rig	Movable Barrier	-5dB(A)

4.9.1.4 Use of "Quiet" Plant and Working Methods

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

The use of quiet plant associated with the construction works is made reference to the PME listed in the TM or the QPME/ other commonly used PME listed in EPD web pages as far as possible which includes the SWLs for specific quiet PME. CNP applications which contain sufficient details of any particularly quiet items of PME or any special noise control measures which the CNP applicant proposes to employ on the site may be given special consideration by the Noise Control Authority. It should be noted that EPD may apply the noise levels specified in the TM-GW and TM-DA when processing a CNP application for evening or night time works.

4.9.1.5 Assessment Results of Construction Noise under Mitigated Scenario

With the adoption of the above mitigation measures, **Appendix 4.32** present the mitigated construction impacts at NSRs for KTN and FLN. **Appendix 4.33** present the noise contribution on a monthly basis during the construction period. The predicted construction noise impacts at the NSRs under mitigated scenario are summarized in **Table 4.46** below.

Table 4.46 - Predicted construction noise impact at NSRs under mitigated scenario

NSR	AP	Uses ^[1]	L _{eq} (30 mins) dB(A)			Duration of Exceedence Months ^[6]
			Noise Criteria ^[2]	Mitigated Noise Level ^[3]	Exceedence	
KTN						
KTN-2	R1024	R	75	70	0	0
KTN-9	R3013	R	75	75	0	0
	R3014	R	75	75	0	0
	R3015	R	75	75	0	0
KTN-11	R1103	R	75	69	0	0
	R1105	R	75	73	0	0
KTN-12	R1122 ^[5]	R	75	70	0	0
KTN-20	R3000	R	75	75	0	0
	R3001	R	75	56	0	0
	R8113	R	75	68	0	0
KTN-33	R8101	R	75	71	0	0
KTN-45	R3002 ^[5]	R	75	71	0	0
KTN-46	R8100 ^[5]	R	75	73	0	0
KTN-48	R1282	R	75	65	0	0
KTN-49	R1141	R	75	70	0	0
	R1301	R	75	62	0	0
KTN-50	R1321 ^[5]	R	75	66	0	0
	R1322	R	75	67	0	0
A1-2	R8010	PRH	75	71	0	0
A1-5	R8005	CDA	75	75	0	0
	R8006	CDA	75	72	0	0
	R8007	CDA	75	71	0	0
A1-6	R8112	R	75	63	0	0
A2-2	R8000	PRH	75	69	0	0
	R8001	PRH	75	73	0	0
	R8002	PRH	75	72	0	0
	R8003	PRH	75	74	0	0
	R8004	PRH	75	74	0	0
A2-4	R3028	R	75	70	0	0
	R3029	R	75	69	0	0

NSR	AP	Uses ^[1]	Leq (30 mins) dB(A)			Duration of Exceedence Months ^[6]
			Noise Criteria ^[2]	Mitigated Noise Level ^[3]	Exceedence	
A3-1	R3020	E	70(65)	66	0(1)	0(2)
A3-2	R3021	E	70(65)	58	0(0)	0(0)
A3-3	R3022	R	75	67	0	0
A3-7	R2141	R	75	75	0	0
	R3008	R	75	73	0	0
B1-3	R8110	R	75	71	0	0
B1-9	R8104	R	75	74	0	0
B2-10	R8105	CDA	75	70	0	0
	R8111	E	70(65)	70	0(5)	0(5)
B2-7	R8008	E	70(65)	65	0(0)	0(0)
	R8009	E	70(65)	66	0(1)	0(4)
	R8107	R	75	66	0	0
C1-4	R2102	R	75	67	0	0
	R2103	R	75	70	0	0
	R3012	R	75	65	0	0
D1-7	R8106	R	75	66	0	0
D1-9	R2042 ^[5]	R	75	69	0	0
	R2046	R	75	69	0	0
	R3009	R	75	60	0	0
	R3010 ^[5]	R	75	75	0	0
	R8201	R	75	66	0	0
	R8202	R	75	74	0	0
	R8203	R	75	76	1	4
	R8204	R	75	72	0	0
	R8205	R	75	77	2	3
	R8206	R	75	69	0	0
	R8207	R	75	73	0	0
	R8208	R	75	59	0	0
G1-3	R3006	R	75	75	0	0
	R3007	R	75	70	0	0
H1-1	R1412	R	75	75	0	0
	R1421	R	75	75	0	0
	R8108	R	75	73	0	0
KTN-P2	R1541	R	75	75	0	0
	R1544	R	75	75	0	0
FLN						
FN-2	R4023	R	75	71	0	0
FN-3	R4046	R	75	72	0	0
FN-5	R4082	R	75	71	0	0
FN-7	R4123	R	75	68	0	0
FN-8	R4153	R	75	67	0	0
FN-10	R4161	R	75	64	0	0
	R4162	R	75	65	0	0
	R8504	R	75	67	0	0
	R8505	R	75	67	0	0
	R8506	R	75	71	0	0
FN-11	R4181	R	75	75	0	0
FN-12	R8502	R	75	70	0	0
FN-18	R4242	R	75	75	0	0
FN-18	R8016	R	75	66	0	0
FN-22	R4316	R	75	69	0	0

NSR	AP	Uses ^[1]	Leq (30 mins) dB(A)			Duration of Exceedence Months ^[6]
			Noise Criteria ^[2]	Mitigated Noise Level ^[3]	Exceedence	
FN-23	R4321	R	75	75	0	0
FN-26	R4343	R	75	72	0	0
	R4346	R	75	71	0	0
FN-29	R4389	R	75	71	0	0
FN-30	R4401	R	75	72	0	0
FN-31	R4421	R	75	75	0	0
	R4426	R	75	75	0	0
FN-38	R8017	E	70(65)	64	0(0)	0(0)
FN-40	R4506	R	75	74	0	0
	R4507	R	75	73	0	0
FN-64	R8019	R	75	68	0	0
FN-83	R8503	R	75	61	0	0
FNE-1	R1363	R	75	69	0	0
	R1367	R	75	73	0	0
FNE-2	R1382	R	75	73	0	0
FNE-10	R8500	R	75	68	0	0
FS-4	R4562	R	75	70	0	0
FS-6	R4602	R	75	65	0	0
FS-9	R4622	E	70(65)	65	0(0)	0(0)
	R8521	R	75	64	0	0
FS-10	R8522	R	75	73	0	0
FS-11	R8509	R	75	74	0	0
FS-12	R8020	R	75	64	0	0
FS-13	R8510	R	75	68	0	0
	R8511	R	75	75	0	0
	R8512	R	75	66	0	0
FS-14	R4722	R	75	60	0	0
FS-15	R8513	R	75	71	0	0
FS-16	R8018	R	75	64	0	0
FS-17	R8514	R	75	74	0	0
	R8515	R	75	75	0	0
A1-2	R8508	R	75	77	2	24
A1-4	R8507	W	75	65	0	0
A1-8	R4962	E	70(65)	61	0(0)	0(0)
A1-11	R4981	E	70(65)	65	0(0)	0(0)
B3-3	R8700	PRH	75	60	0	0
D2-4	R8701	R	75	65	0	0
	R8702	R	75	63	0	0
D2-6	R8703	PRH	75	61	0	0
D2-9	R8600	PRH	75	61	0	0
	R8601	PRH	75	67	0	0
	R8704	PRH	75	74	0	0
D3-4	R8021	R	75	77	2	18
	R8022	R	75	73	0	0
D3-5	R8705	R	75	72	0	0
D3-7	R8023	R	75	75	0	0
	R8520	R	75	77	2	18
D3-8	R8519	PRH	75	74	0	0
D3-11	R8602	E	70(65)	67	0(2)	0(2)
	R8603	E	70(65)	67	0(2)	0(2)

Notes:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] Values in parentheses indicate the noise criterion during examination period of educational institution. Relevant environmental standards/ criteria: TM-EIAO noise standards for construction noise.
- [3] Bolded values mean exceedance of the noise criteria.
- [4] Values in parentheses indicate the exceedance during examination period of educational institution.
- [5] Cumulative impacts arisen from Lok Ma Chau Loop development and cycle tracks construction have been included.
- [6] In general practice, examination period should only last for 2 weeks with 4 examinations per year, i.e. about 2 months. For assessment purpose, examination period of 3 months per year would be assumed as worst case scenario.

4.9.1.6 Residual Noise Impacts

Even with all practicable construction noise mitigation measures, such as the use of quiet PME, temporary movable noise barrier, enclosure, acoustic mat and rearrangement of works group have been considered and exhausted, residual construction noise impacts are still expected at some NSRs.

Table 4.47 indicates that the maximum residual construction noise exceedances and the associated duration despite of the implementation of all practicable noise mitigation measures.

Table 4.47 - Residual noise impact at noise sensitive receivers

NSR	AP	Uses ^[1]	L _{eq} (30 mins) dB(A)		Duration of Exceedance, (Month) ^[4]
			Noise Criteria ^[2]	Exceedance	
KTN					
A3-1	R3020	E ^[3]	70(65)	0(1)	0(2)
B2-7	R8009	E ^[3]	70(65)	0(1)	0(4)
B2-10	R8111	E ^[3]	70(65)	0(5)	0(5)
D1-9	R8203	R	75	1	4
	R8205	R	75	2	3
FLN					
A1-2	R8508	R	75	2	24
D3-4	R8021	R	75	2	18
D3-7	R8520	R	75	2	18
D3-11	R8602	E ^[3]	70(65)	0(2)	0(2)
	R8603	E ^[3]	70(65)	0(2)	0(2)

Notes:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] Values in parentheses indicate the noise criterion during examination period of educational institution. Relevant environmental standards/ criteria: TM-EIAO noise standards for construction noise.
- [3] In general practice, examination period should only last for 2 weeks. By scheduling the construction works to avoid the examination period, the residual impact should be minimized.
- [4] In general practice, examination period should only last for 2 weeks with 4 examinations per year, i.e. about 2 months. For assessment purpose, examination period of 3 months per year would be assumed as worst case scenario.

It can be seen from **Table 4.47** that for residential premises, the residual impacts exceeding the construction noise criteria are in the range of 1 – 2 dB(A) and the duration of exceedences ranges from 3 – 24 months. For educational institutions, the residual impacts exceeding the construction noise criteria is in the range of 1 – 5 dB(A) for examination periods and the duration of exceedences ranges from 2 – 5 months.

4.9.1.7 Consideration of Further Mitigation Measures

It can be seen from **Section 4.9.1.6** that some of the noise sensitive receivers would be subject to residual construction noise impacts. The feasibility of refining the construction methodologies and further noise mitigation measures have therefore been further considered as discussed in the following sections.

The number of noisy PME used has been reviewed as practicable for the construction programme, the dominate noise source would be bulldozer, rock drill, concrete lorry mixer and vertical band drain installation rig, mitigation measures including use of quiet plant, temporary movable noise barrier and enclosure have already been applied on these construction activities. The use of the rock drill and vertical band drain installation rig is subject to the geographical profile of that particular area during detail design stage. The contractor should further verify the necessity for adopting noisy PME to reduce the construction impacts to the nearby NSRs. To further minimise the impact for schools, it is proposed the Contractor should closely liaise with the school to avoid noisy construction works during examination period.

4.9.2 Operational Phase

4.9.2.1 Assessment Results of Road Traffic Noise under Mitigated Scenario at Year 2044

At a meeting between Civil Engineering and Development Department (CEDD), Highways Department (HyD) and Environmental Protection Department (EPD) held on 28 March 2011, it was agreed to explore other means of noise mitigation measures such as barrier and enclosure instead of applying low noise surfacing. Application of low noise surfacing would only be proposed as the last resort. A ten metres setback distance from the junction stop line shall also be allowed if low noise surfacing is proposed. Record of the corresponding meeting minute is given in **Appendix 4.34** for reference.

The following mitigation measures have been considered:

- 3m barrier (Absorptive);
- 4m barrier (Absorptive);
- 5m barrier (Absorptive);
- 7m barrier (Absorptive);
- 5m vertical barrier with 3m cantilevered arm at 45° (Absorptive);
- 7m vertical barrier with 3m cantilevered arm at 45° (Absorptive);
- Low noise surfacing;
- Semi-enclosure; and
- Full enclosure

The locations, configuration and engineering practicability of proposed mitigation measures have been confirmed with the project proponent. For full enclosure near the roundabout, the pedestrian walkway is required to be covered. This requirement has already been taken into account in the assessment. In addition to the proposed mitigation measures, applications of low noise surfacing have been further discussed with Highways Department. The proposed noise barrier on existing road and overlapping with PWP items will be arranged such as programme, responsible party, work packaging in detailed design stage.

In addition, as there are full and semi-enclosures recommended for mitigating road traffic noise, the noise generated would reverberate within the structure. For the proposed full and semi-enclosures, absorptive panels would be installed as far as possible along the entire length except at locations such as daylight panels and for safety reason.

Figure 4.9 shows the proposed mitigation measures and their corresponding locations. Mitigation measures in the form of low noise surfacing, 3m barrier, 4m barrier, 5m barrier, 5m vertical barrier with 3m cantilevered arm at 45°, 7m vertical barrier with 3m cantilevered arm at 45°, semi-enclosure and full enclosure are proposed on the concerned roads. Typical section of full enclosure is shown in **Appendix 4.35** for illustration purposes.

KTN

Table 4.48a presents the mitigated noise impacts on NSRs. **Appendix 4.36a** summarises the mitigated traffic noise levels of the affected NSRs.

Table 4.48a - Predicted road traffic noise level under mitigated scenario at KTN in Year 2044 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion [3]	Predicted Noise Level		
KTN-1	R1001-1020	W, E, R	65 - 70	57 - 63	Y	N
KTN-2	R1021-1040	E, R	65 - 70	58 - 65	Y	N
KTN-4	R1041-1060	R	70	65 - 66	Y	N
KTN-7	R1061-1080	H	55	64 - 66	N	Y
KTN-9	R1081-1100	R	70	56 - 69	Y	N
KTN-11	R1101-1120	R	70	59 - 72	N	N
KTN-12	R1121-1140	R	70	70	Y	N
KTN-20	R1161-1180	R	70	24 - 26	Y	N
KTN-32	R1181-1200	R	70	59 - 70	Y	N
KTN-33	R1201-1220	R	70	61 - 62	Y	N
KTN-45	R1221-1240, R1501-1507	R	70	66 - 67	Y	N
KTN-46	R1241-1260	R	70	49 - 50	Y	N
KTN-48	R1281-1300	R	70	57 - 70	Y	N
KTN-49	R1301-1320	R	70	67 - 68	Y	N
KTN-50	R1681-1682	R	70	71 - 73	N	N
KTN-P2	R1541-1560	R	70	59 - 68	Y	N
KTN-P6	R1521-1540	R	70	63 - 71	N	N
A1-2	R2500-2520	PRH	70	62 - 70	Y	N

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion [3]	Predicted Noise Level		
A1-4	R2521-2540	R	70	62 - 70	Y	N
A1-5	R2541-2560	CDA	70	65 - 70	Y	N
A1-6	R2561-2580	R	70	67 - 70	Y	N
A1-8	R2581-2600	HOS	70	65 - 70	Y	N
A1-9	R2601-2620	R	70	61 - 70	Y	N
A2-2	R2621-2640	PRH	70	54 - 70	Y	N
A2-4	R2641-2660	HOS	70	66 - 70	Y	N
A2-5	R2660-2680	R	70	63 - 68	Y	N
A2-7	R2681-2700	PRH	70	43 - 69	Y	N
A2-9	R2701-2720	R	70	51 - 68	Y	N
A2-11	R3221-3240	E	65	62 - 65	Y	N
A2-12	R3241-3260	E	65	63 - 65	Y	N
A2-13	R3261-3280	E	65	49 - 64	Y	N
A3-1	R3281-3300	E	65	65	Y	N
A3-2	R3301-3320	E	65	59 - 61	Y	N
A3-3	R2721-2740	PRH	70	58 - 70	Y	N
A3-4	R3381-3400	E	65	63 - 65	Y	N
A3-6	R2741-2760	R	70	62 - 70	Y	N
A3-7	R2141	R	70	56	Y	N
B2-5	R3401-3420	E	65	56 - 65	Y	N
B2-6	R3421-3440	E	65	52 - 65	Y	N
B2-7	R3441-3460	E	65	63 - 65	Y	N
B2-10	R2761-2780	CDA	70	47 - 69	Y	N
C1-3	R2021-2040	CDA	70	65 - 70	Y	N
C1-4	R2001, R2101-2120	R	70	55 - 67	Y	N
D1-5	R3481-3500	R	70	68	Y	N
D1-7	R2781-2800	R	70	58 - 70	Y	N
D1-9	R2040-2060	R	70	57 - 68	Y	N
D1-11	R2821-2840	R	70	61 - 70	Y	N
E1-2	R2861-2880	E	65	57 - 64	Y	N
E1-3	R3701-3720	G	70	63 - 69	Y	N
E1-4	R3721-3740	E	65	62	Y	N
F1-3	R2841-2860	OU	70	54 - 69	Y	N
E1-8	R1507	R	70	60	Y	N
H1-1	R1503-1506, R1508	R	70	66 - 69	Y	N

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when "With Project Overall Noise Level does not comply with the Noise Criteria" AND, either "With Project - Without Project Overall Noise Level > 1dB(A)" or "New Roads exceeds Noise Criteria" or "New Roads Contribution > 1 dB(A)".
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The mitigated traffic noise levels at most existing and planned NSRs will comply with the relevant noise criteria except at existing NSR Europa Garden Phase 1 (KTN-11), the scattered village houses along Kwu Tung Road (KTN-50), and Village near Chau Tau Tsuen (KTN-P6), where exceedances are caused by the existing roads. The exceedances at KTN-11, KTN-50 and KTN-P6 are caused by the existing roads only and the contribution due to the Project road is less than 1dB(A). Besides, the noise level from Project road is also within the respective noise criterion. Hence, further direct noise mitigation measures are not required according to EPD's Guidance Note 12/2010.

As discussed in **Section 4.8.2.1**, the existing Lady Ho Tung Welfare Centre (KTN-7) is temporarily closed.

Table 4.48b – Road traffic noise sensitivity analysis for potential locations of social welfare facilities under mitigated scenario at KTN in Year 2044

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6661-6700	H	55	38 - 74	N	Y
A1-6	R6831-6880	R	70	16 - 71	N	Y
A2-2	R6701-6750	R	70	29 - 68	Y	N
A2-5	R6581-6600	R	70	22 - 71	N	Y
A3-3	R6501-6600	R	70	30 - 72	N	Y
B2-8	R6781-6800	R	70	44 - 67	Y	N
B2-10	R6861-6900	R	70	52 - 69	Y	N

Note:

[1] R – residential; H – Home for the Aged;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.48b**, all planned NSRs would not comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, non-sensitive use at that particular façade or acoustic insulation should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable. **Figure 4.11a** shows the façade which can rely on open window for ventilation without exceeding the traffic noise criteria.

Table 4.48c – Road traffic noise sensitivity analysis for potential locations of kindergartens under mitigated scenario at KTN in Year 204

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6161-6200	E	65	38 - 74	N	Y
A1-4	R6261-6300	E	65	29 - 71	N	Y
A1-5	R6301-6330	E	65	14 - 71	N	Y
A1-6	R6331-6380	E	65	16 - 71	N	Y
A1-8	R6381-6400	E	65	25 - 72	N	Y

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion [2]	Predicted Noise Level		
A2-2	R6201-6250	E	65	29 - 68	N	Y
A2-4	R6141-6160	E	65	24 - 71	N	Y
A2-7	R6101-6130	E	65	15 - 70	N	Y
A3-3	R6001-6100	E	65	30 - 72	N	Y

Note:

[1] E – educational;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.48c**, all planned NSRs would not comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, non-sensitive use at that particular façade or acoustic insulation should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable. **Figure 4.12a** shows the façade which can rely on open window for ventilation without exceeding the traffic noise criteria.

FLN

Table 4.49a presents the mitigated noise impacts on NSRs. **Appendix 4.36b** summarises the mitigated traffic noise levels of the affected NSRs.

Table 4.49a - Predicted road traffic noise level under mitigated scenario at FLN in Year 2044 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion [3]	Predicted Noise Level		
FNE-1	R1361-1380	R	70	60-75	N	N
FNE-2	R1381-1400	R	70	59-82	N	N
FNE-3	R1401-1420	I/C, W	55-70	68-79	N	Y
FNE-4	R1421-1440	R	70	66-72	N	N
FN-3	R4041-4060	R	70	65-74	N	N
FN-8	R4141-4160	R	70	58-68	Y	N
FN-12	R4201-4220	R, W	65-70	55-65	Y	N
FN-26	R4341-4360	R	70	64-73	N	Y
FN-27	R4361-4380	R	70	67-69	Y	N
FN-29	R4381-4400	R	70	66-72	N	N
FN-31	R4421-4440	R	70	52-71	N	N
FS-1	R4541-4560	R	70	57-70	Y	N
FS-10	R4641-4660	R	70	59-70	Y	N
FS-15	R4741-4760	R	70	52-76	N	N
FS-16	R4761-4780	R	70	68-75	N	N
FS-17	R4781-4800	R	70	66-70	Y	N
A1-8	R4961-4980	G	65	65	Y	N
A1-11	R4981-5000	G	65	62-65	Y	N
B1-7	R5001-5020	R	70	38-70	Y	N
B3-4	R5181-5200	E	65	60-62	Y	N
C2-7	R5291-5294	E	65	58-65	Y	N

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion [3]	Predicted Noise Level		
C2-9	R5295-5300	E	65	58-72	N	Y
D2-2	R5301-5320	HOS	70	66-70	Y	N
D2-4	R5321-5340	R	70	64-70	Y	N
D2-6	R5341-5360	PRH	70	63-70	Y	N
D2-9	R5361-5380	PRH	70	47-70	Y	N
D2-12	R5381-5400	R	70	64-70	Y	N
D3-1a	R5401-5405	R	70	67-70	Y	N
D3-1b	R5406-5410	HOS	70	67-70	Y	N
D3-1c	R5411-5420	R	70	66-70	Y	N
D3-3	R5421-5440	R	70	64-68	Y	N
D3-4	R5441-5460	R	70	63-70	Y	N
D3-6	R5461-5480	R	70	57-70	Y	N
D3-8	R5501-5520	PRH	70	44-70	Y	N
D3-11	R5521-5540	E	65	53-65	Y	N
D3-12	R5541-5560	E	65	57-65	Y	N
FN-60	R6001-6002	R	70	65-69	Y	N
R TH1	R TH1	R	70	67-69	Y	N
R TH2	R TH2	R	70	68	Y	N
R TH4	R TH4	R	70	67	Y	N
R TH5	R TH5	R	70	68	Y	N
R TH6	R TH6	R	70	69-70	Y	N
R KT1	R KT1	R	70	67-68	Y	N
R KT2	R KT2	R	70	66-67	Y	N
R KT3	R KT3	R	70	70	Y	N
R KLHSW	R KLHSW	R	70	64-65	Y	N
R SR7N	R SR7N	R	70	74	N	N
R SR77	R SR77	R	70	65-68	Y	N
R WHS1	R WHS1	R	70	68-70	Y	N
R SR8	R SR8	R	70	68	Y	N

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when "With Project Overall Noise Level does not comply with the Noise Criteria" AND, either "With Project - Without Project Overall Noise Level > 1dB(A)" or "New Roads exceeds Noise Criteria" or "New Roads Contribution > 1 dB(A)".
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The mitigated traffic noise levels at most existing and planned NSRs will comply with the relevant noise criteria except at some NSRs, for example Tai Tau Leng (FNE-1), Choi Yuen Estate (FNE-2) and Village Houses near Hing Yan Tsuen (FNE-4), where exceedances are caused by the existing roads. However, the contribution due to the Project road is less than 1dB(A). Besides, the noise level from Project road is also within the respective noise criterion. Therefore, mitigation measures are not required at these NSRs.

To further attenuate the noise impact along Po Shek Wu Road, the retrofitting noise mitigation measures were revised and replaced. Instead, semi noise enclosure and full enclosure have been proposed on part of the Po Shek Wu Road under this study.

Noise exceedances are still predicted at planned educational institution NSRs in FLN C2-9. Provision of acoustic insulation with air conditioning is recommended to these planned receivers (East and south facades between 4/F to 8/F). Otherwise, a large extent of semi-enclosure would be required even over the junction which is lengthy. In addition, to avoid the sight line over the junction, the span length would be even greater according to Transport Planning and Design Manual. This increase in span would require sizeable structural elements which cause visual impact and safety problem. Therefore, the use of semi-enclosure is not recommended.

Noise exceedances at these NSRs are caused by the traffic noise contribution from existing roads, i.e. Fanling Highway (e.g. FNE-3) and Ma Sik Road (e.g. FN-26). Further noise mitigation measures on these roads are considered further in **Section 4.9.2.3** such that sufficient protection would be provided to those NSRs.

Table 4.49b – Road traffic noise sensitivity analysis for potential locations of social welfare facilities under mitigated scenario at FLN in Year 2044

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
B2-7	R7001-7050	R	70	43-71	N	Y
B2-12	R7051-7100	R	70	44-68	Y	N
B3-3	R7101-7150	R	70	50-68	Y	N
C2-6	R7201-7250	R	70	64-71	N	Y
D2-9	R7451-7500	R, H	55-70	41-71	N	Y

Note:

[1] R – residential; H – Home for the Aged;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.49b**, planned NSRs at B2-12 and B3-3 would comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, non-sensitive use at that particular façade or provision of acoustic insulation with air conditioning should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable. **Figure 4.11b** shows the facade which can rely on open window for ventilation without compromising the noise criteria.

Table 4.49c – Road traffic noise sensitivity analysis for potential locations of kindergartens under mitigated scenario at FLN in Year 2044

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
B2-7	R7501-7550	E	65	43-71	N	Y
B3-6	R7651-7700	E	65	54-66	N	Y
D3-1c	R7751-7800	E	65	47-71	N	Y

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion [2]	Predicted Noise Level		
D3-6	R7801-7850	E	65	42-73	N	Y
D3-8	R7851-7900	E	65	41-72	N	Y
D3-4	R7901-7950	E	65	52-72	N	Y
D2-9	R7951-8000	E	65	41-71	N	Y

Note:

[1] E – educational;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.49c**, all planned NSRs would not comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, non-sensitive use at that particular façade or provision of acoustic insulation with air conditioning should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable. **Figure 4.12b** shows the facade which can rely on open window for ventilation without exceeding the noise criteria.

4.9.2.2 Assessment Results of Road Traffic Noise under Mitigated Scenario at Year 2036, 2038 and 2043

According to **Section 4.6.2.1**, the road assessment year for the commissioning of the road improvement year is 2044 (i.e 15 years after all road commencement). However, the road opening for some primary distributor, district distributor and expressway will be earlier. Hence, their respective assessment years are also being selected. The following additional years have been predicted:

- Road traffic noise assessment for KTN at Years 2036 and 2043; and
- Road traffic noise assessment for FLN at Year 2038

Tables 4.50 to 4.52 summarises the noise level of the first layer of NSRs along the primary distributor, district distributor and expressway for KTN and FLN respectively.

Appendix 4.37 presents the road traffic noise impacts on NSRs and identifies the locations where direct noise mitigation measures should be provided on the proposed road project in order to alleviate the adverse noise impacts. **Figure 4.9** shows the proposed mitigation measures and their corresponding locations.

KTN

Table 4.50a - Predicted road traffic noise level under mitigated scenario at KTN in Year 2036 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
KTN-7	R1061-1080	H	55	64 - 66	N	Y
KTN-9	R1081-1100	R	70	56 - 67	Y	N
KTN-11	R1101-1120	R	70	58 - 72	N	N
KTN-12	R1121-1140	R	70	70	Y	N
KTN-49	R1301-1320	R	70	67	Y	N
KTN-50	R1681-1682	R	70	73	N	N
A1-2	R2500-2520	PRH	70	62 - 70	Y	N
A1-4	R2521-2540	R	70	62 - 70	Y	N
A1-5	R2541-2560	CDA	70	64 - 70	Y	N
A1-6	R2561-2580	R	70	67 - 70	Y	N
A1-8	R2581-2600	HOS	70	65 - 70	Y	N
A2-2	R2621-2640	PRH	70	53 - 70	Y	N
A2-4	R2641-2660	HOS	70	65 - 70	Y	N
A2-5	R2660-2680	R	70	63 - 68	Y	N
A2-7	R2681-2700	PRH	70	43 - 68	Y	N
A3-1	R3281-3300	E	65	65	Y	N
A3-2	R3301-3320	E	65	59 - 61	Y	N
A3-3	R2721-2740	PRH	70	58 - 70	Y	N
A3-4	R3381-3400	E	65	63 - 65	Y	N
A3-7	R2141	R	70	56	Y	N
B2-5	R3401-3420	E	65	56 - 65	Y	N
B2-6	R3421-3440	E	65	52 - 65	Y	N
B2-7	R3441-3460	E	65	63 - 65	Y	N
B2-10	R2761-2780	CDA	70	46 - 69	Y	N
E1-2	R2861-2880	E	65	57 - 64	Y	N
E1-3	R3701-3720	G	70	63 - 69	Y	N
E1-4	R3721-3740	E	65	62	Y	N
F1-3	R2841-2860	OU	70	54 - 68	Y	N

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when "With Project Overall Noise Level does not comply with the Noise Criteria" AND, either "With Project - Without Project Overall Noise Level > 1dB(A)" or "New Roads exceeds Noise Criteria" or "New Roads Contribution > 1 dB(A)".
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The mitigated traffic noise levels at most existing and planned NSRs will comply with the relevant noise criteria except at existing NSR Europa garden Phase 1 (KTN-11) the scattered village houses along Kwu Tung Road (KTN-50) where exceedances are caused by the existing roads. The exceedances at KTN-11 and KTN-50 are caused by the existing roads only and the contribution due to the Project road is less than

1dB(A). Besides, the noise level from Project road is also within the respective noise criterion. Hence, further direct noise mitigation measures are not required according to EPD's Guidance Note 12/2010.

As discussed in **Section 4.8.2.1**, the existing Lady Ho Tung Welfare Centre (KTN-7) is temporarily closed.

Table 4.50b – Road traffic noise sensitivity analysis for potential locations of social welfare facilities under mitigated scenario at KTN in Year 2036

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6661-6700	H	55	38 - 74	N	Y
A1-6	R6831-6880	R	70	15 - 71	N	Y
A2-2	R6701-6750	R	70	28 - 68	Y	N
A2-5	R6581-6600	R	70	22 - 71	N	Y
A3-3	R6501-6600	R	70	30 - 71	N	Y
B2-8	R6781-6800	R	70	44 - 67	Y	N
B2-10	R6861-6900	R	70	52 - 68	Y	N

Note:

[1] R – residential; H – Home for the Aged;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.50b**, all planned NSRs would not comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, non-sensitive use at that particular façade or acoustic insulation should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable. **Figure 4.11a** shows the façade which can rely on open window for ventilation without exceeding the traffic noise criteria.

Table 4.50c – Road traffic noise sensitivity analysis for potential locations of kindergartens under mitigated scenario at KTN in Year 2036

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6161-6200	E	65	38 - 74	N	Y
A1-4	R6261-6300	E	65	28 - 71	N	Y
A1-5	R6301-6330	E	65	14 - 71	N	Y
A1-6	R6331-6380	E	65	15 - 71	N	Y
A1-8	R6381-6400	E	65	25 - 72	N	Y
A2-2	R6201-6250	E	65	28 - 68	N	Y
A2-4	R6141-6160	E	65	24 - 71	N	Y
A2-7	R6101-6130	E	65	15 - 70	N	Y
A3-3	R6001-6100	E	65	30 - 71	N	Y

Note:

[1] E – educational;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.50c**, all planned NSRs would not comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, non-sensitive use at that particular façade or acoustic insulation should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable. **Figure 4.12a** shows the façade which can rely on open window for ventilation without exceeding the traffic noise criteria.

Table 4.51a - Predicted road traffic noise level under mitigated scenario at KTN in Year 2043 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
KTN-7	R1061-1080	H	55	64 - 66	N	Y
KTN-9	R1081-1100	R	70	56 - 69	Y	N
KTN-11	R1101-1120	R	70	59 - 72	N	N
KTN-12	R1121-1140	R	70	70	Y	N
KTN-45	R1221-1240, R1501-1507	R	70	66 - 67	Y	N
KTN-46	R1241-1260	R	70	49 - 50	Y	N
KTN-49	R1301-1320	R	70	67	Y	N
KTN-50	R1681-1682	R	70	73	N	N
KTN-P2	R1541-1560	R	70	60 - 68	Y	N
A1-2	R2500-2520	PRH	70	62 - 70	Y	N
A1-4	R2521-2540	R	70	62 - 70	Y	N
A1-5	R2541-2560	CDA	70	64 - 70	Y	N
A1-6	R2561-2580	R	70	67 - 70	Y	N
A1-8	R2581-2600	HOS	70	65 - 70	Y	N
A1-9	R2601-2620	R	70	61 - 70	Y	N
A2-2	R2621-2640	PRH	70	54 - 70	Y	N
A2-4	R2641-2660	HOS	70	66 - 70	Y	N
A2-5	R2660-2680	R	70	63 - 68	Y	N
A2-7	R2681-2700	PRH	70	43 - 69	Y	N
A2-9	R2701-2720	R	70	51 - 68	Y	N
A2-11	R3221-3240	E	65	61 - 65	Y	N
A2-12	R3241-3260	E	65	63 - 65	Y	N
A2-13	R3261-3280	E	65	48 - 64	Y	N
A3-1	R3281-3300	E	65	65	Y	N
A3-2	R3301-3320	E	65	59 - 61	Y	N
A3-3	R2721-2740	PRH	70	58 - 70	Y	N
A3-4	R3381-3400	E	65	63 - 65	Y	N
A3-6	R2741-2760	R	70	61 - 70	Y	N
A3-7	R2141	R	70	56	Y	N
B2-5	R3401-3420	E	65	56 - 65	Y	N
B2-6	R3421-3440	E	65	52 - 65	Y	N

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion [3]	Predicted Noise Level		
B2-7	R3441-3460	E	65	63 - 65	Y	N
B2-10	R2761-2780	CDA	70	46 - 69	Y	N
D1-5	R3481-3500	R	70	68	Y	N
D1-7	R2781-2800	R	70	58 - 70	Y	N
D1-11	R2821-2840	R	70	61 - 70	Y	N
E1-2	R2861-2880	E	65	57 - 64	Y	N
E1-3	R3701-3720	G	70	63 - 69	Y	N
E1-4	R3721-3740	E	65	62	Y	N
F1-3	R2841-2860	OU	70	54 - 69	Y	N

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when "With Project Overall Noise Level does not comply with the Noise Criteria" AND, either "With Project - Without Project Overall Noise Level > 1dB(A)" or "New Roads exceeds Noise Criteria" or "New Roads Contribution > 1 dB(A)".
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The mitigated traffic noise levels at most existing and planned NSRs will comply with the relevant noise criteria except at existing NSR Europa garden Phase 1 (KTN-11) and the scattered village houses along Kwu Tung Road (KTN-50) where exceedances at KTN-11 are caused by the existing roads only and the contribution due to the Project road is less than 1dB(A). Besides, the noise level from Project road is also within the respective noise criterion. Hence, further direct noise mitigation measures are not required according to EPD's Guidance Note 12/2010.

As discussed in **Section 4.8.2.1**, the existing Lady Ho Tung Welfare Centre (KTN-7) is temporarily closed.

Table 4.51b – Road traffic noise sensitivity analysis for potential locations of social welfare facilities under mitigated scenario at KTN in Year 2043

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion [2]	Predicted Noise Level		
A1-2	R6661-6700	H	55	38 - 74	N	Y
A1-6	R6831-6880	R	70	15 - 71	N	Y
A2-2	R6701-6750	R	70	29 - 68	Y	N
A2-5	R6581-6600	R	70	22 - 71	N	Y
A3-3	R6501-6600	R	70	30 - 71	N	Y
B2-8	R6781-6800	R	70	44 - 67	Y	N
B2-10	R6861-6900	R	70	52 - 69	Y	N

Note:

- [1] R – residential; H – Home for the Aged;
- [2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.51b**, all planned NSRs would not comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, non-sensitive use at that particular façade or acoustic insulation should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable. **Figure 4.11a** shows the façade which can rely on open window for ventilation without exceeding the traffic noise criteria.

Table 4.51c – Road traffic noise sensitivity analysis for potential locations of kindergartens under mitigated scenario at KTN in Year 2043

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
A1-2	R6161-6200	E	65	38 - 74	N	Y
A1-4	R6261-6300	E	65	28 - 71	N	Y
A1-5	R6301-6330	E	65	14 - 71	N	Y
A1-6	R6331-6380	E	65	15 - 71	N	Y
A1-8	R6381-6400	E	65	25 - 72	N	Y
A2-2	R6201-6250	E	65	29 - 68	N	Y
A2-4	R6141-6160	E	65	24 - 71	N	Y
A2-7	R6101-6130	E	65	15 - 70	N	Y
A3-3	R6001-6100	E	65	30 - 71	N	Y

Note:

[1] E – educational;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.51c**, all planned NSRs would not comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, non-sensitive use at that particular façade or acoustic insulation should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable. **Figure 4.11a** shows the façade which can rely on open window for ventilation without exceeding the traffic noise criteria.

FLN

Table 4.52a - Predicted road traffic noise level under mitigated scenario at FLN in Year 2038 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
FN-3	R4041-4060	R	70	65-73	N	N
FN-8	R4141-4160	R	70	58-68	Y	N
FS-1	R4541-4560	R	70	57-70	Y	N
FS-10	R4641-4660	R	70	59-70	Y	N
FS-15	R4741-4760	R	70	52-76	N	N
FS-16	R4761-4780	R	70	68-75	N	N
FS-17	R4781-4800	R	70	66-70	Y	N
C2-7	R5291-5294	E	65	57-65	Y	N
C2-9	R5295-5300	E	65	58-72	N	Y
D2-2	R5301-5320	HOS	70	66-70	Y	N
D2-4	R5321-5340	R	70	64-70	Y	N
D2-6	R5341-5360	PRH	70	63-70	Y	N
D2-9	R5361-5380	PRH	70	47-70	Y	N
D2-12	R5381-5400	R	70	63-70	Y	N
D3-1a	R5401-5405	R	70	67-70	Y	N
D3-1b	R5406-5410	HOS	70	66-70	Y	N
D3-1c	R5411-5420	R	70	66-70	Y	N
D3-3	R5421-5440	R	70	64-68	Y	N
D3-4	R5441-5460	R	70	63-70	Y	N
D3-6	R5461-5480	R	70	57-70	Y	N
D3-12	R5541-5560	E	65	57-65	Y	N
R TH1	R TH1	R	70	66-69	Y	N
R TH2	R TH2	R	70	67-68	Y	N
R TH4	R TH4	R	70	67	Y	N
R TH5	R TH5	R	70	67-68	Y	N
R TH6	R TH6	R	70	69-70	Y	N
R KT1	R KT1	R	70	67-68	Y	N
R KT2	R KT2	R	70	66-67	Y	N
R KT3	R KT3	R	70	70	Y	N
R KLHSW	R KLHSW	R	70	64-65	Y	N
R SR7N	R SR7N	R	70	73-74	N	N
R SR77	R SR77	R	70	66-69	Y	N
R WHS1	R WHS1	R	70	68-70	Y	N
R SR8	R SR8	R	70	67-68	Y	N

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when "With Project Overall Noise Level does not comply with the Noise Criteria" AND, either "With Project - Without Project Overall Noise Level > 1dB(A)" or "New Roads exceeds Noise Criteria" or "New Roads Contribution > 1 dB(A)".
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The mitigated traffic noise levels at most existing and planned NSRs will comply with the relevant noise criteria except at some NSRs, for example San Uk Tsuen (FN-3), Regalia Villa (FS-15) and Scattered Village

Houses along MTRC and Fanling Highway (FS-16), where exceedances are caused by the existing roads. However, the contribution due to the Project road is less than 1dB(A). Besides, the noise level from Project road is also within the respective noise criterion. Therefore, mitigation measures are not required at these NSRs.

Noise exceedances are predicted in planned NSRs in C2-9. Provision of acoustic insulation with air conditioning is recommended to these planned receivers and these planned receivers do not rely on opened windows for ventilation.

Table 4.52b – Road traffic noise sensitivity analysis for potential locations of social welfare facilities under mitigated scenario at FLN in Year 2038

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
B2-7	R7001-7050	R	70	43-71	N	Y
B2-12	R7051-7100	R	70	44-68	Y	N
B3-3	R7101-7150	R	70	50-68	Y	N
C2-6	R7201-7250	R	70	66-71	N	Y
D2-9	R7451-7500	R, H	55-70	41-71	N	Y

Note:

[1] R – residential; H – Home for the Aged;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.52b**, planned NSRs at B2-12 and B3-3 would comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, non-sensitive use at that particular façade or provision of acoustic insulation with air conditioning should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable. **Figure 4.11b** shows the facade which can rely on open window for ventilation without exceeding the noise criteria.

Table 4.52c – Road traffic noise sensitivity analysis for potential locations of kindergartens under mitigated scenario at FLN in Year 2038

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N]
			Criterion ^[2]	Predicted Noise Level		
B2-7	R7501-7550	E	65	43-71	N	Y
B3-6	R7651-7700	E	65	53-66	N	Y
D3-1c	R7751-7800	E	65	47-71	N	Y
D3-6	R7801-7850	E	65	42-73	N	Y
D3-4	R7901-7950	E	65	41-71	N	Y
D2-9	R7951-8000	E	65	43-71	N	Y

Note:

[1] E – educational;

[2] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

The exact locations for the proposed welfare facilities, home for the elderly and kindergarten are not yet confirmed. Hence, a sensitivity test on the possible locations has been conducted. From **Table 4.52c**, all planned NSRs would not comply with relevant noise criterion. However, for some of the NSRs with road traffic noise levels exceeding the relevant noise criterion, non-sensitive use at that particular façade or provision of acoustic insulation with air conditioning should be adopted. In addition, during the design of the social welfare facilities and kindergarten, noise sensitive uses should be located to avoid exceedance as far as practicable. **Figure 4.12b** shows the facade which can rely on open window for ventilation without exceeding the noise criteria.

4.9.2.3 Consideration of Further Mitigation Measures on Existing Roads at Year 2044

To reduce the direct impact caused by existing roads, further noise mitigation measures of the following type have been considered:

- 5m barrier (Absorptive)

From **Table 4.49**, further consideration of mitigation measures on existing roads have been considered for FLN at Year 2044. **Figure 4.10b** shows the proposed mitigation measures and their corresponding locations on existing roads. **Table 4.53** shows a summary of mitigated noise impacts on NSRs. **Appendix 4.38** summarizes the mitigated traffic noise levels of the affected NSRs.

FLN

Table 4.53 - Predicted road traffic noise level under further mitigated scenario at FLN in Year 2044 (At Residential Premises, Primary School and Secondary School)

NSR	AP	Use ^[1]	L ₁₀ (1 hr) dB(A)		Compliance [Y/N]	Mitigation Measures Required [Y/N] ^[2]
			Criterion ^[3]	Predicted Noise Level		
FNE-3	R1401-1420	I/C, W	55 - 70	68 - 79	N	Y
FN-26	R4341-4360	R	70	59 - 69	Y	N

Note:

- [1] R – residential; E – educational; G – government; IC – Institution and Community; CDA – Comprehensive Development Areas; PRH – Public Rental Housing; HOS – Home Ownership Scheme; Ht – Hotel; H – Clinic/ Home for the Aged; W – Place of Worship, Gr – Government (Recreation); OU – Other Specified Uses.
- [2] For existing and planned NSRs outside and within the non-development area of NDA, direct mitigation measures are required when "With Project Overall Noise Level does not comply with the Noise Criteria" AND, either "With Project - Without Project Overall Noise Level > 1dB(A)" or "New Roads exceeds Noise Criteria" or "New Roads Contribution > 1 dB(A)".
- [3] Relevant environmental standards/ criteria: TM-EIAO noise standards for road traffic noise.

NSR FNE-3 is an elderly centre and has a noise exceedance predicted at the assessment point R1403. Site investigation further revealed that NSR FNE-3 does not have noise sensitive façade on the affected side as windows are fixed and central air conditioning is provided inside the elderly centre.

Noise barrier along Ma Sik Road is recommended to protect Good View New Village (FN-26).

To study the noise performance of the project, traffic noise levels at the residential premises, educational institutions and worship which have a

direct line of sight to the Project have been predicted. The numbers of dwellings, classrooms, worship that would benefit from and be protected by the provision of noise mitigation measures have been calculated. The definition of “exposed”, “benefited” and “protected” noise sensitive uses are defined as follow:

- Exposed – Noise sensitive elements with unmitigated noise level greater than relevant noise criteria;
- Benefited – Exposed noise sensitive elements with a noise reduction of 1.0 dB(A) or greater in overall noise level with the noise mitigation measures in place; and
- Protected – Exposed noise sensitive elements with an overall noise level not greater than relevant noise criteria with the noise mitigation measures in place

The number of dwellings that would benefit from and be protected by the provision of noise mitigation measures will be identified for existing residential premises and planned noise sensitive uses. The estimated results for existing and planned noise sensitive uses are presented in **Table 4.53a** below. **Appendix 4.39** shows the details breakdown.

Table 4.53a: Summary of protected and benefitted land uses

NSE ^[1]	Total No. of NSE	Unmitigated Scenario	Mitigated Scenario		
		No. of Exposed NSE	No. of Exposed NSE	Protected NSE	Benefitted NSE
KTN – Existing NSE					
Dwellings	1143	629	43	586	629
Classrooms	31	31	0	31	31
KTN – Planned NSE					
Dwellings	39699	11985	0	11985	11561
Classroom ^[2]	528	378	0	378	378
FLN – Existing NSE					
Dwellings	20222	14339	12744	1595	1523
Classrooms	402	438	438	0	0
Worship	18	14	10	4	4
FLN - Planned NSE					
Dwellings	27249	4752	0	4752	4678
Classroom ^[2]	456	248	30	218	246

Notes:

[1] NSE – Noise sensitive element

[2] As the layout details showing classrooms is not presently available, six classrooms will be assumed for each floor

4.9.2.4 Consideration of Indirect Mitigation Measures on Existing Roads

According to Section 6.2, Annex 13 of the TM-EIAO, it states that upon exhaust of direct mitigation measures, indirect mitigation measures in form of window insulation and air-conditioning is often the “last resort” in an attempt to ameliorate the residual impact.

There is an increase in the overall noise level compared with the prevailing noise level, and further direct mitigation measures have been

investigated, as discussed in **Section 4.9.2.3**. There are residual impacts after the application of these measures and therefore further mitigation measures are recommended. As all the direct mitigation measures have been exhausted, the eligibility of the affected premises for indirect technical remedies has been determined with reference to the following three criteria:

- the predicted overall noise level must be above a specified noise level (e.g. 70 dB(A) for domestic premises and 65 dB(A) for education institutions, all in $L_{10,1hr}$);
- the predicted overall noise level is at least 1.0 dB(A) more than the prevailing traffic noise level, i.e. the total traffic noise level existing before the works to construct the road were commenced; and
- the contribution to the increase in the predicted overall noise level from the road project must be at least 1.0dB(A).

The premises are eligible for ITR only if all the three criteria are met. Since none of the receivers (shown in **Tables 4.48 - 4.53**) has met all three criteria, ITR is not required.

4.9.2.5 Assessment Results of Shooting Noise under Mitigated Scenario

Based on **Table 4.34** above, residual impacts are predicted at KTN D1-12, KTN D1-13, KTN F1-3 and KTN F1-4. Provision of acoustic insulation with air conditioning is recommended to these planned receivers.

4.9.2.6 Assessment Results of Helicopter Noise under Mitigated Scenario

The assessment has identified noise exceedance from helicopter Super Puma AS332 L2 and EC155 B1 during idling (without lateral movements), hovering/lift-off (without lateral movements) and approach/take-off (with lateral movements) modes at the airfield KTN D1-12, KTN D1-13, KTN F1-3 and KTN F1-4.

As advised by Government Flying Service (GFS), training would be provided at the HLS and the helicopter operation would take less than one and a half hours. Residual impacts would be significant and hence mitigation measures are required. Mitigation measures are required to meet the noise standard of 85 dB(A) L_{max} (domestic premises) for helicopter noise stipulated in TM-EIAO. Since KTN D1-12, KTN D1-13, KTN F1-3 and KTN F1-4 are for potential activity centre and research and development in support of Lok Ma Chau Loop Development and are within the flight path of helicopter, single aspect design is not recommended. Nevertheless, provision of acoustic insulation with air conditioning are recommended to the KTN D1-12, KTN D1-13, KTN F1-3 and KTN F1-4.

4.10 Assessment of Side Effects and Constraints

The adopted mitigation measures have been designed to balance between feasibility and effectiveness. The scheme has avoided blockage to the entrance way of the existing and planned premises. The induced impacts from noise barrier will be separately discussed in Air Quality, Ecology and LVIA chapters.

4.11 Evaluation of Constraints on Planned Noise Sensitive Developments/ Landuses

The development of KTN and FLN should follow the building layout, setback distance, noise tolerant buildings, etc according to the Revised RODP as shown in **Appendix 4.19b**. In addition, provision of acoustic insulation with air conditioning is recommended to the reserve for supporting Lok Ma Chau Loop Development KTN F1-3, potential eco-tourism education centre, holiday camping or other recreational uses KTN F1-4, potential activity centre KTN D1-12, KTN D1-13 and educational institutions FLN C2-9 (East and south facades between 4/F to 8/F) as these planned receivers do not rely on opened windows for ventilation.

4.12 Summary of Environmental Mitigation Measures

A summary of noise mitigation measures during construction and operational phases for DPs is shown in **Table 4.54** below.

Table 4.54 – Summary of noise mitigation measures

DP	Phases	Mitigation Measures ^[1]
KTN		
San Tin Highway and Fanling Highway Kwu Tung Section Widening (between San Tin Interchange and Po Shek Wu Interchange) (Major Improvement) (DP1)	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Road Traffic)	<ul style="list-style-type: none"> • Provision of noise barrier before operation of the proposed project (Figure 4.9a); - KTN-NB42: Approx. 545m long, 3m high NB; - KTN-NB43: Approx. 525m long, 3m high NB; - KTN-NB44: Approx. 255m long, 5m high NB; - KTN-NB45: Approx. 340m long, 5m high NB; - KTN-NB46: Approx. 380m long, 5m high NB; - KTN-NB47: Approx. 445m long, 3m high NB; - KTN-NB49: Approx. 375m long, 5m high NB; - KTN-NB50: Approx. 360m long CNB; - KTN-NB51: Approx. 325m long CNB; - KTN-NB53: Approx. 60m long CNB; - KTN-NB54: Approx. 125m long, 5m high NB; - KTN-NB56: Approx. 160m long CNB; - KTN-NB57: Approx. 535m long, 5m high NB; - KTN-NB58: Approx. 675m long CNB; - KTN-NB59: Approx. 115m long CNB; - KTN-NB60: Approx. 840m long CNB; - KTN-NB61: Approx. 1105m long CNB; - KTN-NB62: Approx. 575m long CNB; - KTN-NB64: Approx. 670m long CNB; - KTN-NB66: Approx. 340m long CNB; - KTN-NB67: Approx. 330m long CNB; - KTN-NB68: Approx. 210m long CNB; - KTN-NB77: Approx. 320m Long, 3m high NB; - KTN-SE10: Approx. 125m long SE with opening to south direction; - KTN-FE04: Approx. 195m long FE; - KTN-FE05: Approx. 165m long FE

DP	Phases	Mitigation Measures ⁽¹⁾
Castle Peak Road Diversion (Major Improvement) (DP2)	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Road Traffic)	<ul style="list-style-type: none"> • Provision of noise barrier before operation of the proposed project (Figure 4.9a); - KTN-NB52: Approx. 75m long CNB; - KTN-NB55: Approx. 145m long CNB; - KTN-NB-63 Approx. 380m long CNB; - KTN-SE-09: Approx. 85m long SE with opening to south direction
KTN NDA Road P1 and P2 (New Road) and associated new Kwu Tung Interchange (New Road) and Pak Shek Au Interchange Improvement (Major Improvement) (DP 3)	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Road Traffic)	<ul style="list-style-type: none"> • Provision of noise barrier before operation of the proposed project (Figure 4.9a); - KTN-NB11: Approx. 60m long CNB; - KTN-NB12: Approx. 240m long CNB; - KTN-NB13: Approx. 60m long CNB; - KTN-NB14: Approx. 45m long, 3m high NB; - KTN-NB27: Approx. 100m long CNB; - KTN-NB28: Approx. 115m long CNB; - KTN-NB29: Approx. 40m long, 3m high NB; - KTN-NB30: Approx. 60m long, 5m high NB; - KTN-NB31: Approx. 45m long, 3m high NB; - KTN-NB39: Approx. 65m long, 7m vertical barrier with 3m cantilevered arm at 45°; - KTN-NB40: Approx. 55m long CNB; - KTN-NB48: Approx. 160m long, 5m high ANB; - KTN-NB71: Approx. 50m long, 7m vertical barrier with 3m cantilevered arm at 45°; - KTN-NB80: Approx. 25m long CNB; - KTN-NB81: Approx. 20m long CNB; - KTN-SE06: Approx. 20m long SE with opening to north-eastern direction; - KTN-SE08: Approx. 105m long SE with opening to north-eastern direction; - KTN-FE01: Approx. 105m long FE; - KTN-FE03: Approx. 115m long FE
KTN NDA Road D1 to D5 (New Road) (DP 4)	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Road Traffic)	<ul style="list-style-type: none"> • Provision of noise barrier before operation of the proposed project (Figure 4.9a); - KTN-NB04: Approx. 35m long, 3m high NB; - KTN-NB05: Approx. 40m long, 3m high NB; - KTN-NB06: Approx. 65m long CNB;

DP	Phases	Mitigation Measures ⁽¹⁾
		<ul style="list-style-type: none"> - KTN-NB07: Approx. 65m long CNB; - KTN-NB08: Approx. 105m long CNB; - KTN-NB09: Approx. 60m long, 3m high NB; - KTN-NB10: Approx. 90m long, 3m high NB; - KTN-NB19: Approx. 30m long, 3m high NB; - KTN-NB20: Approx. 70m long, 5m high NB; - KTN-NB23: Approx. 80m long, 5m high NB; - KTN-NB24: Approx. 95m long, 7m vertical barrier with 3m cantilevered arm at 45°; - KTN-NB25: Approx. 30m long CNB; - KTN-NB35: Approx. 40m long CNB; - KTN-NB37: Approx. 80m long CNB; - KTN-NB38: Approx. 100m long, 3m high NB; - KTN-NB69: Approx. 120m long, 5m high NB; - KTN-NB70: Approx. 30m long, 7m vertical barrier with 3m cantilevered arm at 45°; - KTN-NB73: Approx. 75m long CNB; - KTN-NB75: Approx. 45m long, 3m high NB; - KTN-NB76: Approx. 40m long, 3m high NB; - KTN-NB82: Approx. 45m long, 3m high NB; - KTN-SE03: Approx. 75m long SE with opening to north-western direction; - KTN-SE05: Approx. 80m long SE with opening to south direction; - KTN-SE07: Approx. 95m long SE with opening to south-eastern direction; - KTN-FE02: Approx. 130m long FE
Construction of new Sewage Pumping Stations (SPS) in KTN NDA (DP5)	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Fixed Plant)	<ul style="list-style-type: none"> • Provision of noise mitigation measures including silencers, acoustic louvers and acoustic enclosure if necessary; • The maximum allowable sound power level KTN D1-3 and KTN F1-2 shall not exceed 89 and 76 dB(A) respectively
Utilization of treated sewage effluent from Shek Wu Hui Sewage Treatment Works (SWHSTW) (DP7)	Construction	<ul style="list-style-type: none"> • No mitigation measures are required
	Operation	<ul style="list-style-type: none"> • No mitigation measures are required
Non-DPs		
KTN	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Road Traffic)	<ul style="list-style-type: none"> • Provision of noise barrier before operation of the proposed project (Figure 4.9a); - KTN-NB02: Approx. 25m long, 5m high NB; - KTN-NB15: Approx. 65m long, 3m high NB; - KTN-NB16: Approx. 55m long, 3m high NB; - KTN-NB17: Approx. 55m long, 3m high NB;

DP	Phases	Mitigation Measures ⁽¹⁾
		<ul style="list-style-type: none"> - KTN-NB18: Approx. 60m long, 5m high NB; - KTN-NB21: Approx. 60m long, 5m high NB; - KTN-NB22: Approx. 35m long, 5m high NB; - KTN-NB26: Approx. 45m long, 7m vertical barrier with 3m cantilevered arm at 45°; - KTN-NB32: Approx. 20m long CNB ; - KTN-NB33: Approx. 85m long CNB ; - KTN-NB34: Approx. 70m long CNB ; - KTN-NB36: Approx. 45m long, 5m high NB; - KTN-NB41: Approx. 50m long, 5m high NB; - KTN-NB72: Approx. 115m long, 3m high NB; - KTN-SE04: Approx. 100m long SE with opening to south-western direction; • Building layout, setback distance, noise tolerant building according to Revised RODP (Appendix 4.19b).
	Operation (Fixed Plant)	<p><u>District Cooling System</u></p> <ul style="list-style-type: none"> • Provision of noise mitigation measures including silencers, acoustic louvers and acoustic enclosure if necessary; • The maximum allowable sound power level (DCS KTN B1-7) shall not exceed 75 dB(A); <p><u>KTN F1-3, KTN F1-4, KTN D1-12, KTN D1-13</u></p> <ul style="list-style-type: none"> • Provision of acoustic insulation with air conditioning has to be allowed to KTN F1-3, KTN F1-4, KTN D1-12, KTN D1-13; <p><u>Sports Ground / Sports Complex</u></p> <ul style="list-style-type: none"> • Provision of cluster of small power loudspeaker if necessary; • Provision of directional loudspeaker and orientate to point towards the audience if necessary; • Provision of “Limiter” device in the system to set the upper bound of the output sound level if necessary
FLN		
Utilization of treated sewage effluent from Shek Wu Hui Sewage Treatment Works (SWHSTW) (DP7)	Construction	<ul style="list-style-type: none"> • No mitigation measures are required
	Operation	<ul style="list-style-type: none"> • No mitigation measures are required
Po Shek Wu Interchange Improvement (Major Improvement) (DP 8)	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Road Traffic)	<ul style="list-style-type: none"> • Provision of noise barrier before operation of the proposed project (Figure 4.9b); - FLN-NB01: Approx. 95m long, 5m high NB; - FLN-NB02: Approx. 70m long, 3m high NB; - FLN-NB03: Approx. 115m long CNB; - FLN-FE01: Approx. 150m long FE; - FLN-SE01: Approx. 325m long SE with opening to west direction; - FLN-SE02: Approx. 450m long SE with opening to west direction
Fanling Bypass Western Section	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant;

DP	Phases	Mitigation Measures ⁽¹⁾
(New Road) (DP 9)		<ul style="list-style-type: none"> - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Road Traffic)	<ul style="list-style-type: none"> • Provision of noise barrier before operation of the proposed project (Figure 4.9b); - FLN-NB11: Approx. 45m long, 3m high NB; - FLN-NB12: Approx. 160m long, 5m high NB; - FLN-NB13: Approx. 205m long, 5m high NB
Fanling Bypass Eastern Section (New Road) (DP10)	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Road Traffic)	<ul style="list-style-type: none"> • Provision of noise barrier before operation of the proposed project (Figure 4.9b); - FLN-NB21: Approx. 345m long, 3m high NB; - FLN-NB22: Approx. 150m long, 5m high NB; - FLN-NB23: Approx. 165m long CNB; - FLN-NB24: Approx. 310m long CNB; - FLN-NB25: Approx. 130m long CNB; - FLN-NB26: Approx. 50m long, 5m high NB; - FLN-NB27: Approx. 45m long, 5m high NB; - FLN-NB28: Approx. 160m long, 5m high NB; - FLN-NB29: Approx. 130m long CNB; - FLN-NB30: Approx. 280m long CNB
Shek Wu Hui Sewage Treatment Works – Phase 2 Further Expansion at FLN NDA (DP 11)	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Fixed Plant)	<ul style="list-style-type: none"> • Provision of noise mitigation measures including silencers, acoustic louvers and acoustic enclosure if necessary; • The maximum allowable sound power level shall not exceed 83 dB(A)
Reprovision of Temporary Wholesale market in FLN NDA (DP 12)	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Fixed Plant)	<ul style="list-style-type: none"> • Mitigation measures are not required;
New Sewage pumping stations (SPS) in FLN NDA (DP13)	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Fixed Plant)	<ul style="list-style-type: none"> • Provision of noise mitigation measures including silencers, acoustic louvers and acoustic enclosure if necessary; • The maximum allowable sound power level for FLN A1-6,

DP	Phases	Mitigation Measures ⁽¹⁾
		FLN B1-4, FLN B2-3 and FLN C2-3 shall not exceed 86, 88, 93 and 98 dB(A) respectively
Non-DPs		
FLN	Construction	<ul style="list-style-type: none"> • Use of movable barrier, enclosure, acoustic mat and quiet plant; - Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining
	Operation (Road Traffic)	<ul style="list-style-type: none"> • Provision of noise barrier/ low noise surfacing before operation of the proposed project (Figure 4.9b, Figure 4.10b); - FLN-NB41: Approx. 95m long, 5m high NB; - FLN-NB42: Approx. 75m long CNB; - FLN-NB44: Approx. 290m long CNB; - FLN-NB45: Approx. 180m long CNB; - FLN-NB48: Approx. 100m long CNB; - FLN-NB49: Approx. 55m long CNB; - FLN-NB50: Approx. 70m long CNB; - FLN-NB51: Approx. 55m long CNB; - FLN-NB52: Approx. 55m long, 5m high NB; - FLN-NB53: Approx. 50m long, 3m high NB; - FLN-NB54: Approx. 50m long, 3m high NB; - FLN-NB55: Approx. 70m long, 3m high NB; - FLN-NB56: Approx. 75m long, 3m high NB; - FLN-NB58: Approx. 40m long, 5m high NB; - FLN-NB59: Approx. 65m long, 5m high NB; - FLN-NB60: Approx. 70m long, 3m high NB; - FLN-NB61: Approx. 70m long CNB; - FLN-NB62: Approx. 50m long CNB; - FLN-NB63: Approx. 270m long CNB; - FLN-NB65: Approx. 65m long, 5m high NB; - FLN-NB66: Approx. 85m long CNB; - FLN-NB67: Approx. 15m long, 5m high NB; - FLN-NB68: Approx. 105m long, 5m high NB; - FLN-NB69: Approx. 390m long, 5m high NB; - FLN-NB70: Approx. 285m long, 5m high NB; - FLN-NB71: Approx. 120m long, 5m high NB; - FLN-NB72: Approx. 145m long CNB; - FLN-NB73: Approx. 55m long, 4m high NB; - FLN-NB74: Approx. 260m long, 7m high NB; - FLN-NB75: Approx. 35m long, 3m high NB; - FLN-NB76: Approx. 115m long CNB; - FLN-NB77: Approx. 130m long, 5m high NB; - FLN-NB78: Approx. 45m long CNB; - FLN-NB79: Approx. 45m long, 5m high NB; - FLN-NB91: Approx. 110m long, 3m high NB; - FLN-NB92: Approx. 50m long CNB; - FLN-NB93: Approx. 65m long CNB; - FLN-NB94: Approx. 35m long CNB; - FLN-NB95: Approx. 60m long CNB; - FLN-NB96: Approx. 70m long CNB; - FLN-NB97: Approx. 80m long, 5m high NB; - FLN-LNS91: Approx. 100m long LNS; - FLN-LNS92: Approx. 115m long LNS;

DP	Phases	Mitigation Measures ^[1]
		<ul style="list-style-type: none"> - FLN-LNS93: Approx. 270m long LNS; - FLN-LNS94: Approx. 225m long LNS; - FLN-LNS95: Approx. 700m long LNS; - FLN-LNS96: Approx. 180m long LNS; - FLN-LNS97: Approx. 75m long LNS; - FLN-LNS98: Approx. 260m long LNS • Provision of acoustic insulation with air conditioning has been allowed to the east and south facades (4/F to 8/F) of educational institutions (FLN C2-9). • Building layout, setback distance, noise tolerant building according to Revised RODP (Appendix 4.19b).
	Operation (Fixed Plant)	<u>Pumping Station</u> <ul style="list-style-type: none"> • Provision of noise mitigation measures including silencers, acoustic louvers and acoustic enclosure if necessary; • The maximum allowable sound power level for FLN A1-2 shall not exceed 67

Note:

- [1] NB – Noise barrier; CNB – 5m vertical noise barrier with cantilevered arm at 45°; SE – Semi-enclosure, FE – Full enclosure. All the proposed noise barriers are absorptive in terms of acoustic characteristic.

4.13 Residual Environmental Impacts

Construction noise impact at most noise sensitive receivers arising from the Project can be properly mitigated by implementing the proposed noise control measures such as barrier, acoustic mat, full enclosure and quiet plant. However, there will be some receivers still exceeding the respective noise criteria. The noise level will exceed the noise criterion of 75 dB(A) by 1 – 2 dB(A) for about 3 – 24 months at residential premises. For the educational institutions, there will be no exceedance of the noise criterion of 70 dB(A) during normal period and exceedance of the noise criterion of 65 dB(A) during examination period of 1 – 5 dB(A) for about 2 – 5 months. Given the transient nature of the residual impact, the residual impact is considered as acceptable.

During the operational phase, the impact arising from the Project can be properly mitigated by implementing the proposed noise control measures such as barrier, enclosure and silencer. Residual 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.

4.14 Conclusion

Construction noise associated with the use of Powered Mechanical Equipment (PME) has been conducted. With the implementation of practical mitigation measures including good site management practices, use of site hoarding, use of movable noise barrier, acoustic mat and full enclosure, use of “quiet” plant and working method, construction noise impacts at most of the neighbouring noise sensitive uses would be controlled to acceptable levels. However, for some educational institutions, residual impacts during examination period are anticipated even after implementing all practicable mitigation measures. To further minimise the impact, it is recommended that the contractor should closely liaise with the educational institutions to avoid noisy construction works during examination period and the Contractor should investigate the

necessity in using noisy PME such as bulldozer, rock drill, vertical band drain installation rig, breaker and concrete lorry mixer.

Operational noise impacts associated with helicopter noise, industrial noise, fixed noise sources and road traffic noise have also been investigated. Fixed noise source sound power level limits are specified for district cooling system (DCS), sewage treatment works (STW) extension - Phase 2, sewage pumping station (SPS) and pumping station (PS) with necessary noise control measures to comply with statutory criteria. Provision of acoustic insulation with air conditioning is recommended to the landuse "OU", "G" and "Gr" (KTN D1-12, KTN D1-13, KTN F1-3 and KTN F1-4) which is affected by helicopter noise and shooting noise near Lo Wu Classification Range. Operational road traffic noise impact on the sensitive uses outside NDA area and existing sensitive uses within NDA area will be mitigated by provision of vertical noise barriers, vertical noise barriers with cantilevered arm, low noise surfacing, semi-enclosures / full enclosures to within their respective noise criteria and where exceedances are predicted, those contribution due to the project road is less than 1 dB(A) and within the respective noise criteria. Hence, road traffic noise impact from the project road is insignificant. Similar mitigation measures have been recommended for the planned noise sensitive uses within NDA area to comply with the statutory criteria. In addition, provision of acoustic insulation with air conditioning has been recommended for educational institutions (FLN C2-9, east and south facades between 4/F to 8/F).