4 NOISE

4.1 INTRODUCTION

4.1.1 This section evaluates the potential noise impacts associated with the construction and operation of the Project. 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 Process* (EIAO-TM) as well as the requirements set out under Clause 3.4.5 and Appendix C of the EIA Study Brief (No. ESB-338/2021) (hereinafter "the Study Brief").

4.2 LEGISLATIONS, STANDARDS AND GUIDELINES

Construction Phase

4.2.1 The principal legislation relating to the control of construction noise due to the Project is the EIAO. The EIAO-TM, issued under the EIAO, provides guidelines and noise criteria for evaluating noise impacts. The assessment criteria are defined in Annex 5 of the EIAO-TM with reference made to Annex 13 of the EIAO-TM for the guidelines of noise assessment.

4.2.2 The *Noise Control Ordinance* (NCO) also provides statutory controls on general construction works during restricted hours (i.e. between 1900 and 0700 hours or at any time on a general holiday (including Sunday)) and percussive piling. A number of Technical Memoranda have been issued under the NCO to stipulate control approaches and criteria with respect to construction activities:

- *Technical Memorandum on Noise from Construction Work other than Percussive Piling* (GW-TM);
- *Technical Memorandum on Noise from Construction Work in Designated Areas* (DA-TM)*;*
- *Technical Memorandum on Noise from Percussive Piling* (PP-TM)*.*

4.2.3 The GW-TM, which provides the guidelines for controlling the construction noise from the use of Powered Mechanical Equipment (PME) at the construction sites, details the procedures that should be adopted for the assessment of noise from construction work other than percussive piling, the issuing of Construction Noise Permits (CNP), and for determining whether or not any such CNP is being complied with.

4.2.4 In addition to the general controls on the use of PME during restricted hours, the use of Specified Powered Mechanical Equipment (SPME) and/or undertaking of Prescribed Construction Work (PCW) within designated areas are controlled under DA-TM. The DA-TM details the procedures for the assessment of the use of SPME and/or undertaking of PCW during restricted hours for issuing of CNP adopted by the Noise Control Authority.

4.2.5 Percussive piling is governed under the PP-TM. The PP-TM details procedures for the assessment of the use of percussive piling and CNP is required in order to carry out such work.

(a) General Construction Works during Non-Restricted Hours

4.2.6 Under the EIAO, potential noise impact arising from general construction works during non-restricted hours (i.e. 0700 to 1900 hours on any day not being a Sunday or public holiday) at noise sensitive uses that rely on opened windows for ventilation, should be assessed in accordance with the noise criteria specified in the EIAO-TM. The EIAO-TM noise standards are presented in **Table 4.1**.

Table 4.1 EIAO-TM Noise Standards for Daytime Construction Activities

Uses	Noise Standards ($L_{eq(30min)}$ dB(A))
	0700 to 1900 hours on any day not being a Sunday or general holiday
• All domestic premises; • Temporary housing accommodation; • Hostels; • Convalescent homes; and • Homes for the aged.	75
• Places of public worship; • Courts of law; and • Hospitals and medical clinics.	75
• Educational institutions (including kindergartens and nurseries)	70
	65 (During examinations)

Notes:
1. The above standards apply to uses which rely on opened windows for ventilation and are assessed at 1m from the external façade.
2. A Construction Noise Permit shall be required for carrying out relevant construction work during restricted hours under the Noise Control Ordinance. In case the applicant would like to evaluate whether carrying out relevant construction works during restricted hours under the Noise Control Ordinance is feasible or not in the context of programming construction works, reference should be made to relevant technical memoranda issued under the Noise Control Ordinance.

(b) General Construction Works during Restricted Hours

4.2.7 When assessing a CNP application for the use of PME during the restricted hours (i.e. between 1900 and 0700 hours or at any time on a general holiday (including Sunday)), the Noise Control Authority will compare the Acceptable Noise Levels (ANLs), as promulgated in GW-TM, and the Corrected Noise Levels (CNLs) (i.e. after accounting for factors such as barrier effects and reflections) associated with the proposed PME operations. The ANLs are related to the noise sensitivity of the area in question and different Area Sensitivity Ratings (ASRs) have been established to reflect the background characteristics of different areas. The appropriate ASR for the NSR is determined with reference to **Table 4.2**. The relevant BNLs are shown in **Table 4.3**.

Table 4.2 Area Sensitivity Ratings (ASRs)

Types of Area Containing NSR	Degree to which NSR is affected by Influencing Factor (IF)		
	Not Affected	**Indirectly Affected**	**Directly Affected**
Rural area, including Country Parks or village type developments	A	B	B
Low density residential area consisting of low-rise or isolated high-rise developments	A	B	C
Urban area	B	C	C
Area other than those above	B	B	C

Notes:
The following definitions apply:
(a) "Country Park" means an area that is designated as a country park pursuant to section 14 of the *Country Parks Ordinance*;
(b) "Directly affected" means that the NSR is at such a location that noise generated by the IF is readily noticeable at the NSR and is a dominant feature of the noise climate of the NSR;
(c) "Indirectly affected" means that the NSR is at such a location that noise generated by the IF, whilst noticeable at the NSR, is not a dominant feature of the noise climate of the NSR;
(d) "Not affected" means that the NSR is at such a location that noise generated by the IF is not noticeable at the NSR; and
(e) "Urban area" means an area of high density, diverse development including a mixture of such elements as industrial activities, major trade or commercial activities and residential premises.

Table 4.3 Basic Noise Levels of General Construction Works

Time Period	$L_{Aeq, 5min}$ (dB(A))		
	ASR 'A'	ASR 'B'	ASR 'C'
All days during the evening (1900 to 2300 hours), and general holidays (including Sundays) during the daytime and evening (0700 to 2300 hours)	60	65	70
All days during the night-time (2300 to 0700 hours)	45	50	55

4.2.8 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 under the DA-TM. Construction plant or equipment classified as SPME under the DA-TM includes hand-held breakers, bulldozers, concrete lorry mixer, dump trucks and poker vibrators. The PCW includes the erection or dismantling of formwork or scaffolding (PCW 001), loading, unloading or handling of rubble, wooden boards, steel bars, wood or scaffolding material (PCW 002) and hammering (PCW 003). The DA-TM provides the procedures for assessing the use of SPME during restricted hours and for determining whether a CNP would be issued. This Project falls within the Designated Area.

4.2.9 Apart from above, in view of some of the construction works will be in close vicinity to East Railway Line, relevant requirements stated in the technical circular for railway protection under *Technical Circular (Works) No. 1/2019* for *Railway Protection* issued by Development Bureau (DEVB TC(W) No. 1/2019) shall be followed. In general, the construction works in close vicinity to railway shall be carried out outside the peak railway traffic hours or during the non-traffic hours of the railway. Should the peak railway traffic hours or non-traffic hours of the railway fall within the restricted hours under NCO, CNP(s) shall be applied prior to commencement of construction and mitigation measure(s) required under the enforced CNP(s) shall be strictly implemented to minimise the noise impact.

(c) Percussive Piling

4.2.10 Under NCO and PP-TM, percussive piling is prohibited between 1900 and 0700 hours on any weekday not being a general holiday and at any time on Sunday or general holiday. A CNP is required for the carrying out of percussive piling between 0700 and 1900 hours on any day not being a general holiday. PP-TM sets out the requirements for working and determination of the permitted hours of operations for the CNP applications. The permitted hours of operations would be 3, 5 or 12 hours per day depending on the types of percussive piling and the predicted noise impact at NSRs. Should percussive piling be required under this Project, CNP(s) shall be applied prior to commencement of percussive piling and mitigation

measure(s) required under the enforced CNP(s) shall be strictly implemented to minimise the noise impact.

4.2.11 Despite any description or assessment made in this EIA Report on construction noise aspects, there is no guarantee that a CNP will be issued for the 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 TM 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 deciding whether to grant a CNP. Nothing in the EIA Report should bind the Noise Control Authority in making its decision. If a CNP is to be issued, the Noise Control Authority should include in the permit any condition it considers appropriate. Failure to comply with any such conditions will lead to cancellation of the CNP and prosecution under the NCO.

Operation Phase

4.2.12 The road traffic noise impact assessment shall be carried out in accordance to the criteria and guidelines as stated in Annexes 5 and 13 of the EIAO-TM.

4.2.13 The road traffic noise is presented in terms of noise levels exceeded for 10% of the one-hour period for the hour having the peak traffic flow [$L_{10(1\ hour)}$ dB(A)]. The noise standards of Road Traffic Noise for planning purpose as stipulated in Annex 5 of EIAO-TM are presented in **Table 4.4**.

Table 4.4 Noise Standards for Road Traffic Noise

Common Uses	Road Traffic Noise Peak Hour Traffic $L_{10(1\text{-}hour)}$ (dB(A))
• All domestic premises; • Temporary housing accommodation; • Hostels; • Convalescent homes; and • Homes for the aged.	70
• Educational institutions (including kindergartens and nurseries); • Places of public worship; and • Courts of law.	65
• Hospitals and medical clinics	55
Note: 1. The above standards, or equivalent, apply to uses which rely on opened windows for ventilation and are assessed at 1m from the external façade.	

4.3 DESCRIPTION OF ENVIRONMENT

4.3.1 The Project site is located in Sheung Shui area which is highly urbanised and developed. The proposed works areas are surrounded by residential buildings and schools. The noise climate in the vicinity of the Project site is dominated by road traffic noise from Fanling Highway, So Kwun Po Road (SKPR) and Pak Wo Road, and railway noise.

4.4 ASSESSMENT AREA AND NOISE SENSITIVE RECEIVERS

4.4.1 The assessment area for noise impact assessment is defined by a distance of 300m from the boundary of the Project site and any associated works as identified in the EIA Study, in accordance with Appendix C of the EIA Study Brief. Existing, committed and planned NSRs earmarked on the relevant Outline Zoning Plans (OZP), Development Permission Area Plans,

Outline Development Plans, Layout Plans and other relevant published land use plans, including plans and drawings published by the Lands Department and any land use and development applications approved by the Town Planning Board, in the vicinity of the Study have been identified.

4.4.2 The first layer of the NSRs has been selected as representative NSRs and included in the noise impact assessments as the NSRs located behind are located further away from the Project and/or are screened by existing structures. Representative NSRs for construction noise assessment are selected with direct views to the construction works sites, while those for road noise assessment are selected with direct views to the new road segments and/or existing road segments that will have increased traffic flow due to the Project.

4.4.3 All existing and planned NSRs identified are shown in **Figure 4.1**. Photographs of the existing representative NSRs are provided in **Appendix 4.1.2**.

4.4.4 The identified representative Noise Assessment Points (NAP) for construction and road traffic noise impact assessments are listed in **Appendix 4.1.1** and shown in **Figure 4.1**.

4.5 IDENTIFICATION OF ENVIRONMENTAL IMPACTS

Construction Phase

4.5.1 Potential source of noise impact during construction phase of the Project would be due to the use of PME from different construction activities. The construction of the Project will be carried out from 2025 to 2030 tentatively. Tentative construction programme of the Project is presented in **Appendix 4.2.1**. Lifting works of precast segment at So Kwun Po Link (SKPL) (Bridge Portion) across the East Rail Line are likely to be carried out within the Railway Protection Area of East Rail Line during restricted hours specified under NCO for the safety of rail line and/or closure for heavily trafficked roads nearby where applicable. In accordance with the DEVB TC(W) No. 1/2019, Works Departments shall liaise with Mass Transit Railway Corporation Limited (MTRCL) for any proposed works within the Railway Protection Area to minimise any potential/possible interference of the proposed works to railway operation. Works Departments shall consult MTRCL on various issues such as details of works proposals, protective measures, construction methods, monitoring mechanisms and maintenance requirements. Prior comments and agreement from MTRCL shall be obtained regarding the working hours for the proposed works to be carried out within railway premises as well as in the vicinity of the railway structures.

4.5.2 CNP(s) for proposed construction works to be carried out during restricted hours shall be applied prior to commencement of construction, and the required mitigation measure(s) outlined in the enforced CNP(s) shall be strictly implemented to minimise the noise impact. In addition, if percussive piling is required under this Project, CNP(s) shall be applied prior to commencement of percussive piling and mitigation measure(s) required under the enforced CNP(s) shall be strictly implemented to minimise the noise impact. Details of the proposed construction methods are described in **Section 2** of this EIA Report, with major construction activities listed in **Table 4.5**. The currently envisaged construction programme would not require percussive piling works.

Table 4.5 Construction Activities

Location/Task	Activity
All Works Areas	(i) Tree Felling & Site Clearance

Location/Task	Activity
Lift Shaft and Staircases (near San Wan Road)	(i) Predrilling (ii) UU Diversion (iii) Piling (iv) Excavation and Lateral Support (ELS) System (v) Pile Caps (vi) Superstructure (vii) Lift & E&M Installation (viii) Architectural Builders Works and Finishes (ABWF) Works (ix) Connection Works with Existing So Kwun Po Road
Skating Rink	(i) Reprovision of Skating Rink
Footpath & Cycle Track	(i) Site Clearance & Site Formation (ii) Construction of Footpath & Cycling Track
Box Culvert at North District Park, San Wan Road	<u>Box Culvert Section near North District Park</u> (i) ELS System (ii) Temporary Drainage Diversion & Reconstruction of Box Culvert <u>Box Culvert Section near San Wan Road</u> (i) ELS (ii) Temporary Drainage Diversion & Reconstruction of Box Culvert
At-grade Road Construction (Northern Portion)	<u>Retaining Wall Portion and Road Construction</u> (i) UU Diversion (ii) ELS System (iii) Construction of Retaining Wall (iv) Street Furniture, Road Surfacing & Road Marking <u>Subway Construction under SKPR and Road Re-construction at SKPR</u> (i) ELS System (ii) Predrilling for Subway Construction (iii) Piling for Subway Construction (Phase 1) (iv) Piling for Subway Construction (Phase 2) (v) Subway Construction (vi) Backfilling to Final Road Level of SKPR (vii) Street Furniture, Road Surfacing & Road Marking
So Kwun Po Link (SKPL) (Bridge Portion)	(i) Predrilling (ii) Piling (Phase 1) (iii) Piling (Phase 2) (iv) ELS System (v) Pile Caps (vi) Abutments & Piers (vii) Bridge Deck (viii) Street Furniture, Road Surfacing & Road Marking

Location/Task	Activity
At-grade Road Construction (Southern Portion)	*Slip Road between Fanling Highway and Pak Wo Road* Retaining Wall Portion (i) UU Diversion (ii) ELS System (iii) Construction of Retaining Wall (iv) Street Furniture, Road Surfacing & Road Marking Elevated Road Portion (Stage 1) (i) Predrilling (ii) Piling (iii) ELS System (iv) Pile Caps & Portals (v) Bridge Deck (vi) Street Furniture, Road Surfacing & Road Marking Elevated Road Portion (Stage 2) (i) Partial Demolition of Existing SKPR Bridge (ii) Predrilling (iii) Piling (iv) ELS System (v) Pile Caps & Portals (vi) Bridge Deck (vii) Street Furniture, Road Surfacing & Road Marking *So Kwun Po Link (SKPL) N/B* Retaining Wall Portion (i) UU Diversion (ii) ELS System (iii) Construction of Retaining Wall and Formation of Temp Road (iv) Backfilling to Final Road Level (v) Street Furniture, Road Surfacing & Road Marking Elevated Road Portion (i) Partial Demolition of Existing SKPR Bridge (ii) Predrilling (iii) Piling (iv) ELS System (v) Pile Caps (vi) Formation of Temp Road (vii) Abutment and Pier Construction (viii) Bridge Deck (ix) Street Furniture, Road Surfacing & Road Marking *SKPL S/B & Diverted So Kwun Po Road (SKPR) S/B* Retaining Wall Portion (i) UU Diversion (ii) ELS System (iii) Construction of Retaining Wall (iv) Street Furniture, Road Surfacing & Road Marking Elevated Road Portion (i) Predrilling (ii) Piling (iii) ELS System (iv) Pile Caps & Abutment (v) Bridge Deck (vi) Street Furniture, Road Surfacing & Road Marking

Location/Task	Activity
Subway A (Near Pak Wo Road)	(i) Predrilling (ii) ELS System (iii) Pile Caps, Lift Shaft, Staircase and Subway (iv) Subway (v) Lift and E&M Installation (vi) ABWF Works
Improvement Works at Pak Wo Road	(i) UU Diversion (ii) Road Improvement Works
Landscape and Establishment Works	(i) Landscape and Establishment Works
Note: 1. Should percussive piling be required under this Project, CNP(s) shall be applied prior to commencement of percussive piling and mitigation measure(s) required under the enforced CNP(s) shall be strictly implemented to minimise the noise impact.	

4.5.3 During the construction, some existing noise barriers on the existing roads will be required to be temporarily removed. These noise barriers will be re-provided. The indicative locations of the re-provision or temporary removal of the noise barriers are shown in **Appendix 4.5.2**.

4.5.4 As shown in **Appendix 4.5.2**, two small portions of existing noise barrier at So Kwun Po Road (a part of NB296 (approx. 20m) and NB292 (approx. 22m)) will be removed during the construction of the new So Kwun Po Link. Temporary 5.0m high noise barrier will be provided as noise mitigation measure. Therefore, adverse traffic noise impact during construction phase is not anticipated. Besides, after the construction of the new So Kwun Po Link, the removed portion will be re-provided.

4.5.5 Based on the construction activities presented in **Table 4.5**, piling works would be carried out. No percussive piling works will be anticipated for the Project. Alternative piling method has been considered and adopted in lieu of percussive piling method.

4.5.6 The extent and significance of construction noise impact will depend on the types and numbers of PMEs in operation. Construction works will be carried out during non-restricted hours as far as practicable. As mentioned in Section 4.5.1, the lifting works of precast segment at the So Kwun Po Link (SKPL) (Bridge Portion) across the East Rail Line may be required to be carried out during restricted hours for the safety of rail line and/or closure for heavily trafficked roads nearby where applicable. Noise impact of construction works outside restricted hours will be identified and evaluated in this EIA study. A CNP is required for the construction works during restricted hours. The conditions stipulated in the CNP and the mitigation measures should be implemented for the construction works conducted during the restricted hours.

4.5.7 The construction of the Project is anticipated to commence in 2025 Q3 and for completion by 2030 Q4. As mentioned in **Section 2.13**, potential concurrent projects have been identified in the vicinity of the Study Area during construction phase of the Project (refer to **Figure 2.4**):

- Housing Development in Ching Hiu Road;
- Housing Development in Fanling Area 17;
- Expansion of North District Hospital;
- Utilities Works and Junction Improvement Works for Partial Development of Fanling Golf Course Site; and
- Reclaimed Water Supply to Sheung Shui and Fanling.

4.5.8 The Expansion of North District Hospital and Housing Development in Fanling Area 17 are located at more than 300m away from the proposed Project (see **Figure 4.4**). In light of the large separation distance between these projects and the proposed Project, and that substantial screening are provided by nearby buildings, no cumulative construction noise is anticipated from these projects.

4.5.9 The Housing Development in Ching Hiu Road and the Utilities Works and Junction Improvement Works for Partial Development of Fanling Golf Course Site are located at more than 230m to the south-west of the proposed Project. The separation distance between these projects and the proposed Project are still considered as large, and that substantial screening are also provided by nearby buildings. Therefore, significant cumulative construction noise is also not expected.

4.5.10 The works of the Reclaimed Water Supply to Sheung Shui and Fanling are divided into different segments, of which the closest works areas of the water supply project to the proposed Project are along San Wan Road, Chi Cheong Road and Jockey Club Road. Based on the construction programme attached in the latest available monthly EM&A report of the Reclaimed Water Supply to Sheung Shui and Fanling (3/WSD/20) (i.e. Report No.21 - Aug 2023) during the preparation of this EIA Report, the works at San Wan Road and Jockey Club Road will be completed by end of August 2025 while the works at Chi Cheong Road will be completed by April 2025, whereas the construction works of the proposed Project commences in August 2025. Hence, the overlapping of the two projects only lasts for less than a month.

4.5.11 Furthermore, based on the results of the construction noise impact assessment under mitigated scenario of the proposed Project (refer to **Section 4.8** and **Appendix 4.11**), the predicted noise levels of NSRs nearby San Wan Road and Jockey Club Road (i.e. YPC, THMSS, KYDC, MKCPS, SSC, SKP, AMALS, SKHCYSS, TPE, LST, SSKPTT, and FW) in August 2025 are only 43 – 57 dB(A), which are over 10 dB(A) less than daytime construction noise criteria. Therefore, it is considered that the noise contribution to these NSRs by the proposed Project is insignificant and that adverse cumulative construction noise is not anticipated.

Operation Phase Road Traffic Noise

4.5.12 Road traffic noise from the road network within the Study Area, including both the “Project Roads” and the “Other Roads”, would be the major noise source during the operation phase. "Project Roads" refers to the “Proposed Road Link” that are completely new or are substantially altered by the Proposed Project. “Other Roads” refers to the “Existing Roads” which are unchanged or “Associated Road Modification Works” that are minor modified and the predicted overall noise level with the Project would not be greater than that without the Project at the design year by 1.0dB(A) or more. The extent of “Project Roads” and “Other Roads” is presented in **Figure 4.2**.

4.6 ASSESSMENT METHODOLOGY

Construction Noise

4.6.1 The construction noise impact assessment will be undertaken in accordance with the procedures outlined in relevant TM issued under the NCO. The assessment methodology is summarised as follows:

- Locate representative NSRs that may be affected by the Project;
- Determine the PME used for corresponding activities, based on the agreed plant inventory provided by Project Engineer;

- Assign sound power levels (SWLs) to the PME proposed based on the GW-TM and list of SWLs of other commonly used PME [(1)];
- Calculate the correction factors based on the distance between the NSRs and the notional noise source position of the work sites;
- Apply corrections in the calculations, such as potential screening effects and acoustic reflection, if any; and
- Predict the construction noise levels at representative NSRs in the absence of any mitigation measures.

4.6.2 The construction programme and zoning arrangement of construction activities are presented in **Appendix 4.2.1** and **Appendix 4.2.2** respectively. The plant inventory (including type and quantity of the PME used as well as percentage on time utilization), which has been confirmed by the Project Engineer to be practical and suitable for the proposed works, is presented in **Appendix 4.3**. The sound power level (SWL) of plant in Table 3 of GW-TM or "Sound power levels of other commonly used PME" (Other PME) published by EPD have been referred to. The SWL of each construction activity has been calculated based on types and quantity of the plant, SWL of plant and percentage on-time utilization.

4.6.3 Where predicted noise level exceeds the noise criteria, appropriate noise mitigation measures, including quieter construction methods, quality PME and use of insulation fabric/moveable barrier/noise barriers, will be proposed and investigated. The mitigated scenario at different construction phases of the Project will be assessed, if applicable. The residual construction noise impact will be evaluated if the mitigated noise levels still exceed the relevant noise criteria upon exhaust of direct mitigation measures.

4.6.4 The potential concurrent projects in the vicinity of the Project have been reviewed and no cumulative construction noise impact is anticipated.

Operation Phase Road Traffic Noise

4.6.5 Road traffic noise prediction is carried out based on the traffic flows, following strictly the procedures stipulated in the "Calculation of Road Traffic Noise (CRTN)" (1988) published by Department of Transport, UK. Road traffic noise was presented in terms of noise levels exceeded for 10% of the one-hour period having the peak traffic flow (i.e. $L_{10\ (1hour)}$ dB(A)). A 2.5 dB(A) façade reflection and correction factors for effects due to gradient, distance, view angle, road surface, reflection and barriers were included in the assessment.

4.6.6 Traffic noise is predicted based on the maximum traffic flow within 15 years upon commencement of operation of the Project according to Appendix C of the EIA Study Brief and Section 5.1 in Annex 13 of the EIAO-TM.

4.6.7 All major road segments within 300m from the boundary of the Project site area and all relevant structures and features that could have noise screening or reflective effects will be taken into consideration in the traffic noise impact assessment. The characteristics of the road segments including the road width, surface type and traffic flow would be considered in the assessment. The surface type of the concerned road segments is confirmed with HyD and checked against actual site conditions.

4.6.8 As confirmed by the Traffic Consultant, the maximum traffic flow within 15 years (from Year 2030 to 2045) upon commencement of operation of the Project is adopted. As Year 2041 would be the peak traffic forecast year within 15 years upon the completion year with reference to the population data from "*Hong Kong Population Projections 2020-2069*" published by Census and Statistics Department (C&SD), assessment year in 2041 has been adopted for the traffic noise impact assessment to represent the worst-case scenario.

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(1) "Sound power levels of other commonly used PME" prepared by the Noise Control Authority

4.6.9 The traffic flow adopted for noise assessment has been endorsed by the related authority, i.e. Transport Department. The peak hour traffic flow of prevailing scenario in Year 2024 and "With Project" scenarios in Year 2041 are given in **Appendix 4.4.1** and the endorsement from Transport Department is given in **Appendix 4.4.2**.

4.6.10 The following scenarios are considered for traffic noise impact assessment in accordance with EIA Study Brief and the EIAO Guidance Note No. 12/2010 (GN 12/2010):

- Unmitigated scenario in Year 2041 (maximum traffic flow within 15 years upon commencement of operation of the Project);
- Mitigated scenario in Year 2041 (maximum traffic flow within 15 years upon commencement of operation of the Project); and
- Prevailing scenario in Year 2024 for indirect mitigation measures eligibility assessment.

4.6.11 With consideration of the scope of this Project, road sections were classified as "Project Roads" and "Other Roads" for the purpose of the road traffic noise assessment. The overall extent of "Project Roads" and "Other Roads" can be referred to **Figure 4.2**.

- "Project Roads", which in the context of this report, describes "Proposed Road Link" that are completely new or are substantially altered by the proposed project.
  - With consideration of the scope of this Project, the proposed So Kwun Po Link (SKPL) which comprises an at-grade road, an underpass, a single 2-lane flyover (main ramp) connecting San Wan Road to the north and Pak Wo Road to the south of So Kwun Po Interchange (SKPIC), and a single 1-lane flyover (side ramp) connecting San Wan Road on the north side of SKPL and Pak Wo Road on the south side of SKPIC are considered as "Project Roads" since these are completely new roads to be constructed by the Project.
  - The existing SKPR (North Bound), from Pak Wo Road to SKPIC and Fanling Highway, will be modified and shifted ~15m to the west with a new viaduct connected to SKPIC and Fanling Highway. Since the existing SKPR (North Bound) will be substantially altered by this Project with a new viaduct, this road section will also be considered as "Project Roads".
- "Other Roads", which are "Existing Roads" that are unchanged and "Associated Road Modification Works" that are minor modified and the predicted overall noise level with the Project would not be greater than that without the Project at the design year by 1.0dB(A) or more.
  - In this Project, "Associated Road Modification Works" include road improvement works So Kwun Po Slip Road (SKPSR) & Pak Wo Road, improvement of road auxiliaries, addition of a lay-by and / or minor adjustment of road alignment. The above-mentioned works are minor as there are no major change of nature of road, road alignment, road capacity, traffic flow pattern and the predicted overall noise level with the Project would not be greater than that without the Project at the design year by 1.0dB(A) or more.
  - All "Existing Roads" which are located within the assessment area and are unchanged by the Project are also considered as "Other Roads".

4.6.12 The existing extent of low noise road surfacing (LNRS) and noise mitigation measures provided within the Assessment Area have been considered in the assessment. Locations of existing noise barriers within the Assessment Area are shown in **Appendix 4.5.1**. The extent of LNRS on existing roads within the Assessment Area is shown in **Appendix 4.6**.

4.6.13 In accordance with the GN 12/2010, direct mitigation measures should be proposed for "Project roads" if adverse environmental impact is predicted. If the NSRs are affected by

noise from other existing roads, direct mitigation measures are required to reduce the noise from the "Project roads" to a level that it:

- is not higher than the noise standard; and
- has no significant contribution to the overall noise from other existing roads, if the cumulative noise level, i.e. noise from the road project under the subject Designated Project (DP) together with other existing roads, exceeds the standard.
    - There will not be a significant contribution to the cumulative traffic noise impact (i.e. summation of road traffic noise from the road project under consideration and the road traffic noise due to roads other than the concerned road project) if noise from the concerned road project would not cause the overall traffic noise level to increase by 1.0 dB(A) or more.

4.6.14 Indirect mitigation measures should be considered upon exhaust of direct mitigation measures to abate the residual impact from noise sources under the EIAO-TM and the GN 12/2010. The eligibility testing criteria for indirect mitigation measures are listed as follows:

- The predicted overall noise level from the Project roads, together with other traffic noise in the vicinity must be above a specified noise level (e.g. 70 dB(A) for domestic premises and 65 dB(A) for educational institutions. All are in $L_{10\ (1hour)}$);
- 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 Project roads were commenced; and
- The contribution to the increase in the predicted overall noise level from the Project roads must be at least 1.0 dB(A).

4.7 PREDICTION AND EVALUATION OF ENVIRONMENTAL IMPACTS

Construction Noise

4.7.1 Potential construction noise impacts of the Project during normal daytime working hours have been assessed at the representative NSRs according to the construction programme and construction plant inventory presented in **Appendix 4.2.1** and **Appendix 4.3** respectively. The unmitigated noise assessment results are summarized in **Table 4.6**. Details of the unmitigated construction noise assessment are presented in **Appendix 4.7.1** and **Appendix 4.7.2.**

Table 4.6 Summary of Construction Noise Assessment Results - Unmitigated

NAP ID	Description	Type of Use	Noise Criteria Leq (30 min), dB(A)	Predicted Unmitigated Maximum Construction Noise Level Leq (30 min), dB(A)
8RG1	8 Royal Green	Residential	75	75
8RG2	8 Royal Green	Residential	75	75
AMALS1	TWGHs Hong Kong and Kowloon Electrical Appliances Merchants Association Limited School	Educational Institution	70/65	**79**

NAP ID	Description	Type of Use	Noise Criteria Leq (30 min), dB(A)	Predicted Unmitigated Maximum Construction Noise Level
AMALS2	TWGHs Hong Kong and Kowloon Electrical Appliances Merchants Association Limited School	Educational Institution	70/65	**80**
CC	Camellia Court	Residential	75	73
CHEE1	Ching Ho Estate Extension (Flat 9 - Living & Dining Room)	Planned Residential	75	**82**
CHEE2	Ching Ho Estate Extension (Flat 9 - Bed Room)	Planned Residential	75	**81**
CP1	Cheerful Park Block 1	Residential	75	**80**
CP2	Cheerful Park Block 1	Residential	75	**80**
CP3	Cheerful Park Block 2	Residential	75	**82**
CP4	Cheerful Park Block 2	Residential	75	**82**
CP5	Cheerful Park Block 3	Residential	75	**79**
EG1	Eden Garden	Residential	75	**93**
EG2	Eden Garden	Residential	75	**94**
FW1	Fanling Wai	Residential	75	**76**
FW2	Fanling Wai	Residential	75	74
GG	Glamour Garden	Residential	75	**92**
GPV1	Green Park Villa	Residential	75	73
GPV2	Green Park Villa	Residential	75	75
KYDC1	TWGHs Kap Yan Directors' College	Educational Institution	70/65	**80**
KYDC2	TWGHs Kap Yan Directors' College	Educational Institution	70/65	**79**
KYDC3	TWGHs Kap Yan Directors' College	Educational Institution	70/65	**80**
LST	Ling Shan Tsuen	Residential	75	71
MKCPS1	TWGHs Ma Kam Chan Memorial Primary School	Educational Institution	70/65	**80**
MKCPS2	TWGHs Ma Kam Chan Memorial Primary School	Educational Institution	70/65	**80**
SG	Sunningdale Garden Block 2	Residential	75	73
SKHCYSS	S.K.H Chan Young Secondary School	Educational Institution	70/65	**76**
SKHWCPS	S.K.H. Wing Chun Primary School	Educational Institution	70/65	**86**
SKP1	So Kwun Po	Residential	75	**84**
SKP2	So Kwun Po	Residential	75	**83**
SKP3	So Kwun Po	Residential	75	**84**
SSC	Sheung Shui Centre Block 4	Residential	75	75

NAP ID	Description	Type of Use	Noise Criteria Leq (30 min), dB(A)	Predicted Unmitigated Maximum Construction Noise Level
SSDSQ1	Sheung Shui Disciplined Services Quarters Block B	Residential	75	**80**
SSDSQ2	Sheung Shui Disciplined Services Quarters Block B	Residential	75	**79**
SSGSS1	Sheung Shui Government Secondary School	Educational Institution	70/65	**81**
SSGSS2	Sheung Shui Government Secondary School	Educational Institution	70/65	**80**
SSGSS3	Sheung Shui Government Secondary School	Educational Institution	70/65	**81**
SSKPTT	Sam Shing Kung Pak Tai Temple	Place of Public Worship	70	69
SSTC	Sheung Shui Town Centre New York Court	Residential	75	**76**
THMSS	Hong Kong Taoist Association Tang Hin Memorial Secondary School	Educational Institution	70/65	**77**
TKPSS1	Tin Ka Ping Secondary School	Educational Institution	70/65	**77**
TKPSS2	Tin Ka Ping Secondary School	Educational Institution	70/65	**73**
TPE	Tin Ping Estate Block 5 Tin Mei House	Residential	75	71
ViG1	Vienna Garden Block 1	Residential	75	**97**
ViG2	Vienna Garden Block 1	Residential	75	**99**
ViG3	Vienna Garden Block 1	Residential	75	**92**
ViG4	Vienna Garden Block 1	Residential	75	**93**
ViG5	Vienna Garden Block 2	Residential	75	**92**
YPC	Yuk Po Court Seung Wu House	Residential	75	71

Notes:
1. Bold and underlined values denote exceedance over the corresponding noise criteria.
2. Noise criteria of 75 dB(A) for all domestic premises (including temporary housing accommodation), hotels and hostels, 70 dB(A) for educational institutions and places for public worship, whereas 65 dB(A) for examination period.

4.7.2 The predicted noise levels are in the range of 69 dB(A) to 99 dB(A). Predicted noise levels at some of the representative NSRs exceed the corresponding construction noise criteria. Based on this, direct mitigation measures are required to mitigate the potential noise impact on the affected NSRs during construction phase.

4.7.3 The total number of dwellings, classrooms and other noise sensitive receivers that will be exposed to noise impact exceeding the criteria set in Annex 5 in the EIAO-TM were evaluated and it is estimated that a total of about 2,922 dwellings and 596 classrooms will be exposed to construction noise impact under unmitigated scenario.

Operation Phase Road Traffic Noise

4.7.4 Road traffic noise prediction has been carried out at representative NSRs. The affected NSRs requiring direct noise mitigation measures are summarized in **Table 4.7** with details presented in **Appendix 4.8**.

Table 4.7 Summary of affected NSRs requiring Direct Noise Mitigation Measures

NSR	Description	NAP	Assessment Point Elevation (mPD)	Type of Use	Noise Criteria, $L_{10(1\text{-hr})}$, dB(A)	AM Period							PM Period						
						Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Direct Mitigation measures required	Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Direct Mitigation measures required
						Overall	Project Roads	Other Roads					Overall	Project Roads	Other Roads				
AMALS	TWGHs Hong Kong and Kowloon Electrical Appliances Merchants Association Limited School	AMALS1_1	12.5	Educational Institution	65	**66**	59	65	1.2	No	Yes	Yes	**66**	60	65	1.1	No	Yes	Yes
		AMALS1_2	15.8			**68**	62	**67**	1.2	No	Yes	Yes	**69**	62	**67**	1.1	No	Yes	Yes
		AMALS1_3	19.1			**70**	63	**68**	1.1	No	Yes	Yes	**70**	63	**69**	1.1	No	Yes	Yes
		AMALS1_4	22.4			**70**	64	**69**	1.1	No	Yes	Yes	**71**	64	**70**	1.1	No	Yes	Yes
		AMALS1_5	25.7			**71**	65	**70**	1.1	No	Yes	Yes	**71**	65	**70**	1.1	No	Yes	Yes
		AMALS1_6	29.0			**71**	65	**70**	1.2	No	Yes	Yes	**72**	65	**71**	1.1	No	Yes	Yes
		AMALS1_7	32.3			**72**	65	**71**	1.1	No	Yes	Yes	**72**	**66**	**71**	1.1	Yes	Yes	Yes
		AMALS2_3	19.1			**69**	62	**68**	1.0	No	Yes	Yes	**69**	63	**68**	1.0	No	Yes	Yes
		AMALS2_4	22.4			**71**	65	**70**	1.1	No	Yes	Yes	**71**	65	**70**	1.1	No	Yes	Yes
		AMALS2_5	25.7			**72**	65	**71**	1.1	No	Yes	Yes	**72**	65	**71**	1.1	No	Yes	Yes
		AMALS2_6	29.0			**72**	65	**71**	1.1	No	Yes	Yes	**72**	**66**	**71**	1.1	Yes	Yes	Yes
		AMALS2_7	32.3			**72**	**66**	**71**	1.1	Yes	Yes	Yes	**72**	**66**	**71**	1.1	Yes	Yes	Yes
SSDSQ	Sheung Shui Disciplined Services Quarters Block B	SSDSQ1_4	25.4	Residential	70	**71**	65	69	1.3	No	Yes	Yes	70	64	69	1.1	No	No	No
		SSDSQ1_5	28.2			**71**	65	70	1.3	No	Yes	Yes	**71**	65	70	1.1	No	Yes	Yes
		SSDSQ1_6	31.0			**72**	66	**71**	1.4	No	Yes	Yes	**72**	66	**71**	1.2	No	Yes	Yes
		SSDSQ1_7	33.8			**72**	67	**71**	1.5	No	Yes	Yes	**72**	66	**71**	1.3	No	Yes	Yes
		SSDSQ1_8	36.6			**73**	67	**71**	1.4	No	Yes	Yes	**73**	67	**71**	1.3	No	Yes	Yes
		SSDSQ1_9	39.4			**73**	68	**72**	1.5	No	Yes	Yes	**73**	67	**72**	1.3	No	Yes	Yes
		SSDSQ1_10	42.2			**73**	68	**72**	1.5	No	Yes	Yes	**73**	67	**72**	1.3	No	Yes	Yes
		SSDSQ1_11	45.0			**74**	68	**72**	1.4	No	Yes	Yes	**73**	68	**72**	1.3	No	Yes	Yes
		SSDSQ1_12	47.8			**74**	68	**72**	1.5	No	Yes	Yes	**74**	68	**72**	1.3	No	Yes	Yes
		SSDSQ1_13	50.6			**74**	68	**72**	1.5	No	Yes	Yes	**74**	68	**72**	1.2	No	Yes	Yes
		SSDSQ1_14	53.4			**74**	68	**72**	1.4	No	Yes	Yes	**74**	68	**72**	1.3	No	Yes	Yes
		SSDSQ1_15	56.2			**74**	68	**73**	1.4	No	Yes	Yes	**74**	68	**73**	1.3	No	Yes	Yes
		SSDSQ1_16	59.0			**74**	68	**73**	1.5	No	Yes	Yes	**74**	68	**73**	1.3	No	Yes	Yes
		SSDSQ1_17	61.8			**74**	68	**73**	1.4	No	Yes	Yes	**74**	68	**73**	1.3	No	Yes	Yes
		SSDSQ1_18	64.6			**74**	68	**73**	1.4	No	Yes	Yes	**74**	68	**73**	1.3	No	Yes	Yes
		SSDSQ1_19	67.4			**74**	68	**73**	1.4	No	Yes	Yes	**74**	68	**73**	1.2	No	Yes	Yes
		SSDSQ1_20	70.2			**74**	68	**73**	1.3	No	Yes	Yes	**74**	68	**73**	1.2	No	Yes	Yes
		SSDSQ1_21	73.0			**74**	68	**73**	1.4	No	Yes	Yes	**74**	68	**73**	1.2	No	Yes	Yes
		SSDSQ1_22	75.8			**74**	68	**73**	1.3	No	Yes	Yes	**74**	68	**73**	1.1	No	Yes	Yes
		SSDSQ1_23	78.6			**74**	68	**73**	1.2	No	Yes	Yes	**74**	68	**73**	1.2	No	Yes	Yes
		SSDSQ1_24	81.4			**74**	68	**73**	1.2	No	Yes	Yes	**74**	68	**73**	1.1	No	Yes	Yes
		SSDSQ1_25	84.2			**74**	68	**73**	1.3	No	Yes	Yes	**74**	68	**73**	1.1	No	Yes	Yes

NSR	Description	NAP	Assessment Point Elevation (mPD)	Type of Use	Noise Criteria, $L_{10(1\text{-}hr)}$, dB(A)	AM Period							PM Period						
						Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Direct Mitigation measures required	Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Direct Mitigation measures required
						Overall	Project Roads	Other Roads					Overall	Project Roads	Other Roads				
SSGSS	Sheung Shui Government Secondary School	SSGSS1_2	15.9	Educational Institution	65	**67**	63	64	2.3	No	Yes	Yes	**67**	62	65	1.9	No	Yes	Yes
		SSGSS1_3	19.4			**68**	64	**66**	2.2	No	Yes	Yes	**68**	63	**66**	1.9	No	Yes	Yes
		SSGSS1_4	22.9			**69**	65	**66**	2.4	No	Yes	Yes	**69**	64	**67**	2.0	No	Yes	Yes
		SSGSS1_5	26.4			**70**	**66**	**67**	2.6	Yes	Yes	Yes	**69**	65	**67**	2.1	No	Yes	Yes
		SSGSS1_6	29.9			**70**	**67**	**67**	2.7	Yes	Yes	Yes	**70**	**66**	**68**	2.3	Yes	Yes	Yes
		SSGSS1_7	33.4			**71**	**67**	**68**	2.7	Yes	Yes	Yes	**70**	**67**	**68**	2.3	Yes	Yes	Yes
		SSGSS2_3	19.4			**67**	63	64	2.8	No	Yes	Yes	**66**	63	64	2.6	No	Yes	Yes
		SSGSS2_4	22.9			**68**	65	65	2.9	No	Yes	Yes	**67**	64	65	2.7	No	Yes	Yes
		SSGSS2_5	26.4			**69**	**66**	**66**	2.7	Yes	Yes	Yes	**69**	65	**66**	2.4	No	Yes	Yes
		SSGSS2_6	29.9			**70**	**67**	**68**	2.5	Yes	Yes	Yes	**70**	**66**	**67**	2.4	Yes	Yes	Yes
		SSGSS2_7	33.4			**71**	**67**	**68**	2.5	Yes	Yes	Yes	**70**	**66**	**68**	2.3	Yes	Yes	Yes
		SSGSS3_7	33.4			**72**	65	**71**	1.0	No	Yes	Yes	**72**	65	**72**	0.8	No	Yes	No
SKHWCPS	S.K.H. Wing Chun Primary School	SKHWCPS_6	29.7	Educational Institution	65	**74**	**66**	**73**	0.8	Yes	Yes	Yes	**74**	65	**73**	0.6	No	Yes	No
		SKHWCPS_7	33.2			**75**	**67**	**74**	0.7	Yes	Yes	Yes	**75**	**66**	**74**	0.6	Yes	Yes	Yes

NSR	Description	NAP	Assessment Point Elevation (mPD)	Type of Use	Noise Criteria, $L_{10(1\text{-hr})}$, dB(A)	AM Period							PM Period						
						Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Direct Mitigation measures required	Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Direct Mitigation measures required
						Overall	Project Roads	Other Roads					Overall	Project Roads	Other Roads				
ViG	Vienna Garden Block 1	ViG1_1	15.5	Residential	70	**74**	**71**	**71**	2.7	Yes	Yes	Yes	**74**	70	**72**	2.0	No	Yes	Yes
		ViG1_2	18.3			**76**	**72**	**73**	2.8	Yes	Yes	Yes	**76**	**72**	**74**	2.0	Yes	Yes	Yes
		ViG1_3	21.1			**76**	**73**	**73**	2.8	Yes	Yes	Yes	**76**	**72**	**74**	2.2	Yes	Yes	Yes
		ViG1_4	23.9			**76**	**73**	**73**	2.9	Yes	Yes	Yes	**76**	**73**	**74**	2.3	Yes	Yes	Yes
		ViG1_5	26.7			**76**	**73**	**73**	2.9	Yes	Yes	Yes	**76**	**73**	**74**	2.3	Yes	Yes	Yes
		ViG1_6	29.5			**76**	**73**	**73**	2.8	Yes	Yes	Yes	**76**	**73**	**74**	2.4	Yes	Yes	Yes
		ViG1_7	32.3			**76**	**73**	**73**	2.9	Yes	Yes	Yes	**76**	**73**	**74**	2.4	Yes	Yes	Yes
		ViG1_8	35.1			**76**	**73**	**73**	2.9	Yes	Yes	Yes	**76**	**73**	**74**	2.4	Yes	Yes	Yes
		ViG1_9	37.9			**76**	**73**	**73**	2.8	Yes	Yes	Yes	**76**	**72**	**74**	2.4	Yes	Yes	Yes
		ViG1_10	40.7			**76**	**73**	**73**	2.9	Yes	Yes	Yes	**76**	**72**	**74**	2.4	Yes	Yes	Yes
		ViG1_11	43.5			**76**	**73**	**73**	2.9	Yes	Yes	Yes	**76**	**72**	**74**	2.4	Yes	Yes	Yes
		ViG1_12	46.3			**76**	**73**	**73**	2.9	Yes	Yes	Yes	**76**	**72**	**73**	2.4	Yes	Yes	Yes
		ViG2_1	15.5			**76**	**72**	**74**	2.2	Yes	Yes	Yes	**77**	**71**	**75**	1.6	Yes	Yes	Yes
		ViG2_2	18.3			**77**	**73**	**75**	2.2	Yes	Yes	Yes	**77**	**73**	**76**	1.7	Yes	Yes	Yes
		ViG2_3	21.1			**77**	**74**	**75**	2.2	Yes	Yes	Yes	**78**	**73**	**76**	1.8	Yes	Yes	Yes
		ViG2_4	23.9			**77**	**74**	**75**	2.3	Yes	Yes	Yes	**78**	**73**	**76**	1.8	Yes	Yes	Yes
		ViG2_5	26.7			**77**	**74**	**75**	2.3	Yes	Yes	Yes	**78**	**73**	**76**	1.9	Yes	Yes	Yes
		ViG2_6	29.5			**77**	**74**	**75**	2.3	Yes	Yes	Yes	**77**	**73**	**76**	1.9	Yes	Yes	Yes
		ViG2_7	32.3			**77**	**73**	**75**	2.4	Yes	Yes	Yes	**77**	**73**	**75**	2.0	Yes	Yes	Yes
		ViG2_8	35.1			**77**	**73**	**75**	2.4	Yes	Yes	Yes	**77**	**73**	**75**	1.9	Yes	Yes	Yes
		ViG2_9	37.9			**77**	**73**	**75**	2.4	Yes	Yes	Yes	**77**	**73**	**75**	2.0	Yes	Yes	Yes
		ViG2_10	40.7			**77**	**73**	**74**	2.3	Yes	Yes	Yes	**77**	**73**	**75**	2.0	Yes	Yes	Yes
		ViG2_11	43.5			**77**	**73**	**74**	2.4	Yes	Yes	Yes	**77**	**72**	**75**	2.0	Yes	Yes	Yes
		ViG2_12	46.3			**77**	**73**	**74**	2.4	Yes	Yes	Yes	**77**	**72**	**75**	2.0	Yes	Yes	Yes
		ViG3_6	29.5			**75**	68	**74**	1.0	No	Yes	Yes	**75**	68	**74**	0.8	No	Yes	No
		ViG3_7	32.3			**75**	68	**74**	1.0	No	Yes	Yes	**75**	67	**74**	0.8	No	Yes	No
		ViG3_8	35.1			**75**	68	**74**	1.0	No	Yes	Yes	**75**	67	**74**	0.9	No	Yes	No
		ViG3_9	37.9			**74**	68	**73**	1.0	No	Yes	Yes	**75**	67	**74**	0.9	No	Yes	No
		ViG3_10	40.7			**74**	68	**73**	1.0	No	Yes	Yes	**74**	67	**73**	0.9	No	Yes	No
		ViG3_11	43.5			**74**	67	**73**	1.0	No	Yes	Yes	**74**	67	**73**	0.9	No	Yes	No
		ViG3_12	46.3			**74**	67	**73**	1.0	No	Yes	Yes	**74**	67	**73**	0.9	No	Yes	No

Notes:

[1] Bold and underlined values denote exceedance over the corresponding noise criteria.

[2] Detail of Road Traffic Noise Assessment for un-mitigated scenario shall refer to **Appendix 4.8**.

4.8 MITIGATION OF ENVIRONMENTAL IMPACTS

Construction Noise

4.8.1 In view of the predicted noise exceedances during the construction of the Project, feasibility and practicability of direct noise mitigation measures are elaborated as follows:

Quieter Construction Method / Quality Powered Mechanical Equipment (QPME)

4.8.2 The use of quiet PME is considered to be a practicable means to mitigate the construction noise impact. Quiet PME is defined as a PME having actual SWL lower than the value specified in the GW-TM. The total SWL of all plant items to be used on-site at each works area will be specified so that flexibility is allowed for the Contractor to select plant items to suit the construction needs. The Contractor shall select plant items with total SWL equal to or lower than the total SWL specified in the plant inventory in **Appendix 4.10** in order to meet the relevant noise criteria.

4.8.3 The Contractor shall consider quieter construction methods or technologies to reduce the noise at its source if they are technically feasible and applicable for the proposed construction works. The Project Engineer has confirmed that the below mentioned quieter construction method / QPME are technically feasible and applicable:

- Concrete mixer (electric) has been adopted as a mitigation measure to replace concrete lorry mixer.
- Self-compacting concrete has been adopted such that poker is not required.
- For piling works, “Press-in” method is more preferable than the use of traditional piling methods due to lesser noise and vibration impact generated. According to the EPD web page, the noise emission of “Press-in” method is 69 dB(A) at 7 m from the silent piler, which is more than 20 dB(A) quieter than the vibratory hammer. “Press-in” method has been adopted for ELS installations.
- High level of noise impact would be encountered for sites which involve demolition works. In view of this, hydraulic crusher (SWL=94dB(A)), which is a quieter alternative to the conventional pneumatic breaker (SWL=122dB(A)), has been proposed for the partial demolition of existing SKPR bridge. The operation principle of pneumatic breaker is by percussive striking actions of its chisels, so that much more noise would be generated as compared with hydraulic crusher.
- For the works at worksites 9f(ii), 10d and 10e, i.e. in close proximity to Vienna Garden, dump truck will be shared with other worksites 9g(ii), 8(vi), 9e(iv), 9e(v) & 9f(i), i.e. dump truck will not be used at worksites 9f(ii), 10d and 10e. Material delivery or disposal will be transported manually between worksites 9f(ii), 10d and 10e and other worksites 9g(ii), 8(vi), 9e(iv), 9e(v) & 9f(i). In addition, concrete pump, stationary/lorry mounted will not be used at worksites 10d(ii) and 10e(i). concrete will be transported manually from worksite 8(vii).

4.8.4 Sound power levels of different quieter equipment are listed in **Table 4.8**, wherein the brands and models are only presented as examples. Other quieter equipment / construction methods not adopted in the assessment shall be considered during the design, tendering and implementation stage of the construction works as appropriate.

Table 4.8 SWL of QPME adopted for Construction Noise Mitigation

QPME / Quiet PME	QPME Reference Number	Brand	Model Number	SWL, dB(A)
Air Compressor	EPD-07503	AIRMAN	PDS55S-5C1	92
Hand-held Percussive Breaker	EPD-12844	Hilti	TE 1000-AVR	99
Excavator, wheeled/tracked	EPD-13134	YANMAR	VIO17-1	91
Asphalt Paver	EPD-01226R	VOLVO	ABG5770	104
Generator	EPD-08951	DENYO	DCA-25USI3	80
Crane, mobile	EPD-05797	Maeda	CC985S-1	91
Roller, vibratory	EPD-09720	SAKAI	SW502S-1	94

Adoption of Temporary Noise Barriers, Enclosures and Noise Insulating Fabric

4.8.5 The use of noise barriers will be an effective means to mitigate the noise impact arising from the construction works in the works area, particularly for low-rise NSRs. Temporary Noise Barriers of appropriate height with skid footing should be used and located within a few metres of stationary plant and mobile plant such that the line-of-sight to the NSR is blocked by the barriers. The length of the barrier should be at least five times greater than its height. A cantilevered top cover would be required for the noise barriers to achieve screening benefits on the upper floors of NSRs. With reference to *A Practical Guide for the Reduction of Noise from Construction Works*, the noise barrier material should have a superficial surface density of at least 14 kg/m^2, without openings or gaps. It is anticipated that suitably designed noise barriers/enclosures could achieve at least 5 to 10 dB(A) reduction for movable and stationary plants, respectively. Enclosure is proposed to be used for small-size stationary PMEs including generator and air compressor. In accordance with GN 9/2010, about 15dB(A) noise reduction could be achieved by enclosures depending on the design. Detailed design of the proposed noise enclosure should be carried out by the contractor to achieve the minimum noise reduction requirement of 10 dB(A).

4.8.6 Due to the close proximity of worksite 10a/10d/10e to Vienna Garden, temporary noise barrier of at least 5m high with sound absorptive material is proposed to be installed along the boundary facing Vienna Garden during work Item 2 (tree felling and site clearance) at worksite 10a and operation of mobile crane at worksite 10d(ii). This noise barrier is also proposed to be installed next to drill rig during work Item 10a for predrilling of subway. Reference has been made to the *Noise Mitigation Plan for Tsueng Kwan O – Lam Tin Tunnel – Road P2 and Associated Works* for 11.7 dB(A) noise reduction with the use of temporary noise barrier (SilentUp). Detailed design of the proposed 5m temporary noise barrier should be carried out by the contractor to achieve the minimum noise reduction requirement of 11.7 dB(A).

4.8.7 The use of noise insulating fabric is proposed to be adopted for certain PME such as drill rig and piling, large diameter bored, reverse circulation drill. The fabric should be lapped such that there would be no opening or gaps on the joints. With reference to MTRC Contract C4420 Tsim Sha Tsui Modification Noise Assessment Report for Variation of Environmental Permit (July 2003) and the technical data from the manufacturer, a noise reduction of over 10 dB(A) could be achieved with the use of the Fabric. As a conservative approach, a noise reduction of 10 dB(A) for the PME lapped with the fabric was assumed in this assessment.

4.8.8 The Project Engineer has confirmed that the use of quieter construction method / QPME and

adoption of temporary noise barriers, enclosures and noise insulating fabric proposed in **Appendix 4.10** are practicable to be implemented on-site. Schematic configuration of the typical noise barrier and enclosure is presented in **Appendix 4.9**.

Good Site Practices

4.8.9 It is also recommended to implement good site practices as far as practicable so as to further reduce the noise impact at NSRs. The following good site practices should be followed during the construction phase.

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

Other Direct Mitigation Measures

4.8.10 Apart from the aforementioned mitigation measures, other direct mitigation measures including non-explosive chemical expansion agent and bursting system for demolition have been evaluated. As mentioned in **Table 4.5**, partial demolition of the existing SKPR Bridge (i.e., item 9c (i) and 9e (i)) will be required. In view of the scale of demolition works and reinforcement steel structures are expected within the substructure of SKPR Bridge, non-explosive chemical expansion agent and bursting system are considered not technically feasible and applicable.

4.8.11 With the implementation of feasible noise mitigation measures, including good construction site practices, use of quieter construction method / QPME, use of movable noise barriers, enclosures and noise insulating fabric (as shown in **Appendix 4.10**), the mitigated noise levels at the representative NSRs were predicted. Summary of predicted mitigated noise levels and detailed calculations are presented in **Appendix 4.11.1** and **Appendix 4.11.2** respectively. A summary of the predicted cumulative noise levels at the representative floor of representative NSRs is presented in **Table 4.9**. The predicted cumulative noise levels of the Project are in the range of 53 dB(A) to 75 dB(A).

Table 4.9 Summary of Cumulative Construction Noise Assessment Results - Mitigated

NAP ID	Description	Type of Use	Noise Criteria Leq (30 min), dB(A)	Predicted Mitigated Maximum Construction Noise Level Leq (30 min), dB(A)
8RG1	8 Royal Green	Residential	75	57
8RG2	8 Royal Green	Residential	75	57
AMALS1	TWGHs Hong Kong and Kowloon Electrical Appliances Merchants Association Limited School	Educational Institution	70/65	62

NAP ID	Description	Type of Use	Noise Criteria Leq (30 min), dB(A)	Predicted Mitigated Maximum Construction Noise Level Leq (30 min), dB(A)
AMALS2	TWGHs Hong Kong and Kowloon Electrical Appliances Merchants Association Limited School	Educational Institution	70/65	63
CC	Camellia Court	Residential	75	54
CHEE1	Ching Ho Estate Extension (Flat 9 - Living & Dining Room)	Planned Residential	75	63
CHEE2	Ching Ho Estate Extension (Flat 9 - Bed Room)	Planned Residential	75	63
CP1	Cheerful Park Block 1	Residential	75	63
CP2	Cheerful Park Block 1	Residential	75	63
CP3	Cheerful Park Block 2	Residential	75	62
CP4	Cheerful Park Block 2	Residential	75	62
CP5	Cheerful Park Block 3	Residential	75	60
EG1	Eden Garden	Residential	75	72
EG2	Eden Garden	Residential	75	72
FW1	Fanling Wai	Residential	75	60
FW2	Fanling Wai	Residential	75	57
GG	Glamour Garden	Residential	75	70
GPV1	Green Park Villa	Residential	75	56
GPV2	Green Park Villa	Residential	75	58
KYDC1	TWGHs Kap Yan Directors' College	Educational Institution	70/65	62
KYDC2	TWGHs Kap Yan Directors' College	Educational Institution	70/65	61
KYDC3	TWGHs Kap Yan Directors' College	Educational Institution	70/65	62
LST	Ling Shan Tsuen	Residential	75	54
MKCPS1	TWGHs Ma Kam Chan Memorial Primary School	Educational Institution	70/65	62
MKCPS2	TWGHs Ma Kam Chan Memorial Primary School	Educational Institution	70/65	62
SG	Sunningdale Garden Block 2	Residential	75	56
SKHCYSS	S.K.H Chan Young Secondary School	Educational Institution	70/65	59
SKHWCPS	S.K.H. Wing Chun Primary School	Educational Institution	70/65	**70**
SKP1	So Kwun Po	Residential	75	66
SKP2	So Kwun Po	Residential	75	65
SKP3	So Kwun Po	Residential	75	66

NAP ID	Description	Type of Use	Noise Criteria Leq (30 min), dB(A)	Predicted Mitigated Maximum Construction Noise Level Leq (30 min), dB(A)
SSC	Sheung Shui Centre Block 4	Residential	75	57
SSDSQ1	Sheung Shui Disciplined Services Quarters Block B	Residential	75	63
SSDSQ2	Sheung Shui Disciplined Services Quarters Block B	Residential	75	62
SSGSS1	Sheung Shui Government Secondary School	Educational Institution	70/65	64
SSGSS2	Sheung Shui Government Secondary School	Educational Institution	70/65	64
SSGSS3	Sheung Shui Government Secondary School	Educational Institution	70/65	63
SSKPTT	Sam Shing Kung Pak Tai Temple	Place of Public Worship	70	53
SSTC	Sheung Shui Town Centre New York Court	Residential	75	59
THMSS	Hong Kong Taoist Association Tang Hin Memorial Secondary School	Educational Institution	70/65	59
TKPSS1	Tin Ka Ping Secondary School	Educational Institution	70/65	58
TKPSS2	Tin Ka Ping Secondary School	Educational Institution	70/65	55
TPE	Tin Ping Estate Block 5 Tin Mei House	Residential	75	55
ViG1	Vienna Garden Block 1	Residential	75	74
ViG2	Vienna Garden Block 1	Residential	75	75
ViG3	Vienna Garden Block 1	Residential	75	70
ViG4	Vienna Garden Block 1	Residential	75	72
ViG5	Vienna Garden Block 2	Residential	75	71
YPC	Yuk Po Court Seung Wu House	Residential	75	53

Notes:
1. Bold and underlined values denote exceedance over the corresponding noise criteria.
2. Noise criteria of 75 dB(A) for all domestic premises (including temporary housing accommodation), hotels and hostels, 70 dB(A) for educational institution and places for public worship, whereas 65 dB(A) for examination period.

Re-scheduling and Restricting Hours of Operation of Noisy Tasks

4.8.12 With the use of practical noise mitigation measures, noise levels arising from the Project at all the identified NSRs comply with the EIAO-TM construction noise criteria, except during examination period of S.K.H. Wing Chun Primary School (SKHWCPS), where up to 5 dB(A) noise exceedance is expected to occur if works are to be conducted during the examination period. There will be no exceedance during non-examination period. Due to the close proximity to the works sites, it is not feasible to adopt minimum separation distance. As precautionary measures, terms will be specified in the contractual documents requiring the Contractor to liaise with the school's management for the schedule of construction works, to avoid carrying out noisy construction activities during examination period. With the assumption of typical examination periods occurring in the months May, June, November and December, noise exceedance at the abovementioned NSRs would be predicted in 9 months, including May, June, November and December from June 2026 to December 2029, with

maximum exceedance of 5 dB(A). It is recommended that particularly noisy construction activities in work Item 8 for construction of So Kwun Po Link (SKPL) (Bridge Portion) (during "Predriling", "Piling", construction of "Pile Cap" and "Abutment & Piers", construction of "Street Furniture, Road Surfacing & Road Marking") should be scheduled to avoid examination periods of this NSR as far as practicable. With the particularly noisy construction activities not to be carried out during the examination periods, the mitigated construction noise impact would comply with the noise criterion of 65 dB(A).

4.8.13 With the implementation of the aforementioned mitigation measures, no adverse construction noise impact is anticipated at the NSRs due to the Project.

Operation Phase Road Traffic Noise

4.8.14 With reference to Annex 13 of the EIAO-TM, where the predicted noise impacts exceed the applicable noise criteria, direct mitigation measures shall be considered and evaluated. With the implementation of all the proposed direct noise mitigation measures, the noise contributions from Project roads to the overall noise levels at all NSRs would be less than 1.0 dB(A) if the cumulative noise level exceeds the standard, and the predicted noise levels due to Project roads at all NRSs would comply with the relevant noise criteria. Adverse road traffic noise impact from the "Project Roads" on existing and planned NSRs is not anticipated.

4.8.15 Direct noise mitigation measures would be provided as far as practicable until the mitigated overall noise levels comply with the relevant standards, or the mitigated noise levels from the Project roads do not exceed the relevant standards and do not contribute to the overall noise levels by 1.0 dB(A) or more. Direct noise mitigation measures, including LNRS, and vertical and cantilever noise barriers are proposed to mitigate adverse traffic noise impact on the affected NSRs.

4.8.16 LNRS and noise barriers proposed for the Project are summarized in **Table 4.10**. The locations of the noise barriers and the extent of LNRS are shown in **Figure 4.3**. Preliminary design of the proposed mitigation measures is presented in **Appendix 4.12**. All the proposed barriers shall be designed and constructed to comply with the "Guidelines on Design of Noise Barriers" which is published by the Environmental Protection Department and Highways Department.

Table 4.10 Proposed Noise Mitigation Measures

Proposed Noise Mitigation Measures	NMM ID	Location	Approximate Length, m (rounded off to the nearest 10m)
LNRS	SKPL-LNRS1	SKPL	330
	SKPL-LNRS2		350
Cantilever Barrier (5m high with 2.5m at 45-degree cantilever)	SKPL-7.5mVCB1		80
Cantilever Barrier (5m high with 2.5m at 45-degree cantilever)	SKPL-7.5mVCB2		170
3m Vertical Barrier	SKPL-3mVB1		100
3m Vertical Barrier	SKPL-3mVB2		80

Proposed Noise Mitigation Measures	NMM ID	Location	Approximate Length, m (rounded off to the nearest 10m)
5m Vertical Barrier	SKPL-5mVB1		90
LNRS	SKPRNB-LNRS1	SKPR (North Bound)	110
3m Vertical Barrier	SKPRNB-3mVB1		100
5m Vertical Barrier	SKPRNB-5mVB1		50

Note:
1. Noise barriers with absorptive panels will be adopted to meet the requirements given in "Guidelines on Design of Noise Barriers".

4.8.17 With the implementation of the recommended noise mitigation measures, predicted noise levels at some of the representative NSRs would comply with the traffic noise criteria. However, exceedance of the traffic noise would still be predicted at some of the representative NSRs due to existing roads. The predicted noise levels at the affected NSRs with the proposed noise mitigation measures are summarized in **Table 4.11**, with details presented in **Appendix 4.13**.

Table 4.11 Summary of affected NSRs after Direct Noise Mitigation Measures

NSR	Description	NAP	Assessment Point Elevation (mPD)	Type of Use	Noise Criteria, $L_{10(1\text{-hr})}$, dB(A)	AM Period							PM Period						
						Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Further Mitigation Measures required	Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Further Mitigation Measures required
						Overall	Project Roads	Other Roads					Overall	Project Roads	Other Roads				
AMALS	TWGHs Hong Kong and Kowloon Electrical Appliances Merchants Association Limited School	AMALS1_1	12.5	Educational Institution	65	65	58	65	0.8	No	No	No	**66**	58	65	0.8	No	Yes	No
		AMALS1_2	15.8			**68**	60	**67**	0.8	No	Yes	No	**68**	61	**67**	0.8	No	Yes	No
		AMALS1_3	19.1			**69**	61	**68**	0.8	No	Yes	No	**69**	62	**69**	0.7	No	Yes	No
		AMALS1_4	22.4			**70**	62	**69**	0.8	No	Yes	No	**70**	63	**70**	0.8	No	Yes	No
		AMALS1_5	25.7			**71**	63	**70**	0.8	No	Yes	No	**71**	63	**70**	0.8	No	Yes	No
		AMALS1_6	29.0			**71**	64	**70**	0.9	No	Yes	No	**71**	64	**71**	0.9	No	Yes	No
		AMALS1_7	32.3			**71**	64	**71**	0.8	No	Yes	No	**72**	64	**71**	0.8	No	Yes	No
		AMALS2_3	19.1			**69**	61	**68**	0.8	No	Yes	No	**69**	61	**68**	0.8	No	Yes	No
		AMALS2_4	22.4			**71**	63	**70**	0.8	No	Yes	No	**71**	64	**70**	0.8	No	Yes	No
		AMALS2_5	25.7			**71**	64	**71**	0.8	No	Yes	No	**72**	64	**71**	0.9	No	Yes	No
		AMALS2_6	29.0			**72**	64	**71**	0.8	No	Yes	No	**72**	65	**71**	0.9	No	Yes	No
		AMALS2_7	32.3			**72**	65	**71**	0.9	No	Yes	No	**72**	65	**71**	0.9	No	Yes	No
SSDSQ	Sheung Shui Disciplined Services Quarters Block B	SSDSQ1_4	25.4	Residential	70	68	57	67	0.4	No	No	No	68	56	67	0.3	No	No	No
		SSDSQ1_5	28.2			69	57	69	0.3	No	No	No	69	57	69	0.3	No	No	No
		SSDSQ1_6	31.0			70	58	70	0.3	No	No	No	70	58	70	0.3	No	No	No
		SSDSQ1_7	33.8			**71**	59	70	0.3	No	Yes	No	**71**	59	70	0.4	No	Yes	No
		SSDSQ1_8	36.6			**71**	60	**71**	0.3	No	Yes	No	**71**	60	**71**	0.3	No	Yes	No
		SSDSQ1_9	39.4			**72**	61	**71**	0.4	No	Yes	No	**72**	60	**71**	0.4	No	Yes	No
		SSDSQ1_10	42.2			**72**	61	**72**	0.3	No	Yes	No	**72**	61	**72**	0.3	No	Yes	No
		SSDSQ1_11	45.0			**72**	61	**72**	0.3	No	Yes	No	**72**	61	**72**	0.3	No	Yes	No
		SSDSQ1_12	47.8			**72**	61	**72**	0.4	No	Yes	No	**72**	61	**72**	0.4	No	Yes	No
		SSDSQ1_13	50.6			**73**	62	**72**	0.4	No	Yes	No	**73**	62	**72**	0.4	No	Yes	No
		SSDSQ1_14	53.4			**73**	62	**72**	0.3	No	Yes	No	**73**	62	**72**	0.3	No	Yes	No
		SSDSQ1_15	56.2			**73**	62	**72**	0.4	No	Yes	No	**73**	62	**72**	0.3	No	Yes	No
		SSDSQ1_16	59.0			**73**	62	**72**	0.4	No	Yes	No	**73**	62	**72**	0.4	No	Yes	No
		SSDSQ1_17	61.8			**73**	63	**73**	0.4	No	Yes	No	**73**	63	**73**	0.4	No	Yes	No
		SSDSQ1_18	64.6			**73**	63	**73**	0.5	No	Yes	No	**73**	63	**73**	0.4	No	Yes	No
		SSDSQ1_19	67.4			**73**	63	**73**	0.4	No	Yes	No	**73**	63	**73**	0.5	No	Yes	No
		SSDSQ1_20	70.2			**73**	63	**73**	0.4	No	Yes	No	**73**	63	**73**	0.5	No	Yes	No
		SSDSQ1_21	73.0			**73**	64	**73**	0.5	No	Yes	No	**73**	63	**73**	0.4	No	Yes	No
		SSDSQ1_22	75.8			**73**	64	**73**	0.5	No	Yes	No	**73**	63	**73**	0.5	No	Yes	No
		SSDSQ1_23	78.6			**73**	64	**73**	0.6	No	Yes	No	**73**	64	**73**	0.5	No	Yes	No
		SSDSQ1_24	81.4			**73**	64	**73**	0.5	No	Yes	No	**73**	64	**73**	0.5	No	Yes	No
		SSDSQ1_25	84.2			**74**	64	**73**	0.6	No	Yes	No	**73**	64	**73**	0.5	No	Yes	No

NSR	Description	NAP	Assessment Point Elevation (mPD)	Type of Use	Noise Criteria, $L_{10(1\text{-}hr)}$, dB(A)	AM Period							PM Period						
						Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Further Mitigation Measures required	Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Further Mitigation Measures required
						Overall	Project Roads	Other Roads					Overall	Project Roads	Other Roads				
SSGSS	Sheung Shui Government Secondary School	SSGSS1_2	15.9	Educational Institution	65	64	55	64	0.6	No	No	No	64	54	64	0.4	No	No	No
		SSGSS1_3	19.4			65	57	65	0.6	No	No	No	65	56	65	0.5	No	No	No
		SSGSS1_4	22.9			**66**	57	**66**	0.6	No	Yes	No	**66**	57	**66**	0.5	No	Yes	No
		SSGSS1_5	26.4			**67**	58	**66**	0.7	No	Yes	No	**67**	57	**67**	0.5	No	Yes	No
		SSGSS1_6	29.9			**68**	59	**67**	0.7	No	Yes	No	**68**	58	**67**	0.5	No	Yes	No
		SSGSS1_7	33.4			**68**	60	**67**	0.7	No	Yes	No	**68**	59	**67**	0.6	No	Yes	No
		SSGSS2_3	19.4			62	53	62	0.6	No	No	No	62	53	61	0.6	No	No	No
		SSGSS2_4	22.9			63	54	63	0.5	No	No	No	63	54	63	0.6	No	No	No
		SSGSS2_5	26.4			65	55	65	0.5	No	No	No	65	55	65	0.5	No	No	No
		SSGSS2_6	29.9			**66**	56	**66**	0.4	No	Yes	No	**66**	56	**66**	0.4	No	Yes	No
		SSGSS2_7	33.4			**67**	57	**67**	0.5	No	Yes	No	**67**	57	**67**	0.4	No	Yes	No
		SSGSS3_7	33.4			**71**	59	**71**	0.2	No	Yes	No	**72**	58	**71**	0.2	No	Yes	No
SKHWCPS	S.K.H. Wing Chun Primary School	SKHWCPS_6	29.7	Educational Institution	65	**73**	62	**73**	0.4	No	Yes	No	**73**	61	**73**	0.3	No	Yes	No
		SKHWCPS_7	33.2			**74**	63	**74**	0.3	No	Yes	No	**75**	63	**74**	0.3	No	Yes	No

NSR	Description	NAP	Assessment Point Elevation (mPD)	Type of Use	Noise Criteria, $L_{10(1\text{-hr})}$, dB(A)	AM Period							PM Period						
						Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Further Mitigation Measures required	Predicted Noise Level in 2041			Project Roads Contribution	Project Roads Exceed	Overall Exceed	Further Mitigation Measures required
						Overall	Project Roads	Other Roads					Overall	Project Roads	Other Roads				
ViG	Vienna Garden Block 1	ViG1_1	15.5	Residential	70	65	56	65	0.5	No	No	No	65	55	65	0.4	No	No	No
		ViG1_2	18.3			67	57	66	0.5	No	No	No	67	57	67	0.4	No	No	No
		ViG1_3	21.1			69	59	68	0.5	No	No	No	69	59	69	0.5	No	No	No
		ViG1_4	23.9			70	63	69	0.8	No	No	No	70	62	70	0.7	No	No	No
		ViG1_5	26.7			**71**	64	70	0.9	No	Yes	No	**71**	64	**71**	0.8	No	Yes	No
		ViG1_6	29.5			**72**	64	**71**	0.8	No	Yes	No	**73**	64	**72**	0.6	No	Yes	No
		ViG1_7	32.3			**73**	65	**72**	0.7	No	Yes	No	**73**	64	**73**	0.6	No	Yes	No
		ViG1_8	35.1			**73**	65	**72**	0.7	No	Yes	No	**74**	64	**73**	0.6	No	Yes	No
		ViG1_9	37.9			**73**	65	**72**	0.7	No	Yes	No	**74**	65	**73**	0.5	No	Yes	No
		ViG1_10	40.7			**73**	66	**72**	0.8	No	Yes	No	**74**	65	**73**	0.7	No	Yes	No
		ViG1_11	43.5			**73**	66	**72**	0.9	No	Yes	No	**74**	66	**73**	0.7	No	Yes	No
		ViG1_12	46.3			**73**	66	**72**	0.9	No	Yes	No	**74**	66	**73**	0.7	No	Yes	No
		ViG2_1	15.5			**70**	59	**70**	0.4	No	No	No	**70**	57	**70**	0.2	No	No	No
		ViG2_2	18.3			**71**	60	**71**	0.3	No	Yes	No	**71**	59	**71**	0.2	No	Yes	No
		ViG2_3	21.1			**72**	62	**72**	0.4	No	Yes	No	**72**	61	**72**	0.3	No	Yes	No
		ViG2_4	23.9			**73**	65	**73**	0.7	No	Yes	No	**73**	64	**73**	0.6	No	Yes	No
		ViG2_5	26.7			**74**	65	**73**	0.7	No	Yes	No	**74**	65	**74**	0.5	No	Yes	No
		ViG2_6	29.5			**75**	66	**74**	0.6	No	Yes	No	**75**	65	**75**	0.5	No	Yes	No
		ViG2_7	32.3			**75**	66	**74**	0.6	No	Yes	No	**75**	66	**75**	0.5	No	Yes	No
		ViG2_8	35.1			**75**	66	**74**	0.7	No	Yes	No	**75**	66	**75**	0.6	No	Yes	No
		ViG2_9	37.9			**75**	67	**74**	0.7	No	Yes	No	**75**	66	**75**	0.5	No	Yes	No
		ViG2_10	40.7			**75**	67	**74**	0.8	No	Yes	No	**75**	66	**75**	0.6	No	Yes	No
		ViG2_11	43.5			**75**	67	**74**	0.8	No	Yes	No	**75**	66	**74**	0.6	No	Yes	No
		ViG2_12	46.3			**75**	67	**74**	0.8	No	Yes	No	**75**	67	**74**	0.7	No	Yes	No
		ViG3_6	29.5			**74**	65	**74**	0.5	No	Yes	No	**74**	64	**74**	0.4	No	Yes	No
		ViG3_7	32.3			**74**	64	**74**	0.4	No	Yes	No	**74**	64	**74**	0.4	No	Yes	No
		ViG3_8	35.1			**74**	64	**74**	0.5	No	Yes	No	**74**	64	**74**	0.4	No	Yes	No
		ViG3_9	37.9			**74**	64	**73**	0.5	No	Yes	No	**74**	64	**74**	0.5	No	Yes	No
		ViG3_10	40.7			**74**	64	**73**	0.6	No	Yes	No	**74**	64	**73**	0.5	No	Yes	No
		ViG3_11	43.5			**74**	64	**73**	0.5	No	Yes	No	**74**	64	**73**	0.5	No	Yes	No
		ViG3_12	46.3			**73**	64	**73**	0.5	No	Yes	No	**73**	63	**73**	0.5	No	Yes	No

Notes:

[1] Bold and underlined values denote exceedance over the corresponding noise criteria.

[2] Detail of Road Traffic Noise Assessment for mitigated scenario shall refer to **Appendix 4.13**.

4.8.18 In accordance with the requirements given in Clause 3.4.1(b) of Appendix C of the EIA Study Brief, the estimated total number of NSRs that will be benefited and protected are summarized in **Table 4.12**.

Table 4.12 Estimated number of NSRs benefited and protected under Mitigated Scenario

Description	No. of Residential Dwellings	No. of Classrooms	No. of Other NSRs (Place of Public Worship, Accommodation / Hostel, Clinic / Home for the aged)	Total
Benefited	284	82	0	366
Protected	159	40	0	199

Notes:
1. Number of residential dwellings, classroom and other NSRs are estimated based on site observation and review of building layout.
2. Exposed – Noise Sensitive uses with unmitigated noise level greater than the relevant noise criteria.
3. Benefited – Exposed noise sensitive uses with a noise reduction of 1.0 dB(A) or greater in overall noise level with the noise mitigation measures in place.
4. Protected – Exposed noise sensitive uses with an overall noise level not greater than relevant noise criteria with the noise mitigation measures in place.

4.8.19 In accordance with the requirements given in Clause 3.3.2(c) and Clause 3.4.1(b) of Appendix C of the EIA Study Brief, the estimated total number of dwellings, classrooms and other noise sensitive receivers that will be exposed to noise impact exceeding the respective criteria are presented in **Table 4.9**.

Table 4.13 Estimated number of NSRs exposed to Exceedance

Scenario	Estimated Number Exposed to Exceedance			
	No. of Residential Dwellings	No. of Classrooms	No. of Other NSRs (Place of Public Worship, Accommodation / Hostel, Clinic / Home for the aged)	Total
Prevailing in 2024	2,960	449	1	3,410
Unmitigated in 2041	3,119	489	1	3,609
Mitigated in 2041	2,960	449	1	3,410

Notes:
1. Number of residential dwellings, classroom and other NSRs are estimated based on site observation and review of building layout.
2. Exposed – Noise sensitive uses with unmitigated noise level greater than relevant noise criteria.

4.8.20 Prior to the commencement of the Project, it is estimated that 3,410 NSRs have already been subject to traffic noise impact due to the existing roads. The proposed project without any noise mitigation measures will slightly increase the number of other NSRs along the Project to be exposed to the excessive traffic noise by 199, i.e. 3,609 NSRs exposed to exceedance. Upon exhausting all practicable direct noise mitigation measures, it is estimated that the number of dwellings, classroom and other NSRs exposed to exceedance will be 3,410. These NSRs exposed to exceedance are due to the traffic noise from other existing roads.

4.9 EVALUATION OF RESIDUAL IMPACTS

Construction Noise

4.9.1 The predicted mitigated construction noise levels at all NSRs would comply with the relevant noise standards stipulated in EIAO-TM with the implementation of the mitigation measures as mentioned in Section 4.8 except that the predicted construction noise levels at S.K.H. Wing Chun Primary School (SKHWCPS) would exceed the noise criterion of 65 dB(A) during examination period.

4.9.2 Scheduling of noisy construction works outside school examination period would reduce the overall construction noise impacts at S.K.H. Wing Chun Primary School (SKHWCPS) and ensure compliance with the construction noise criterion. The Contractor shall liaise with the school representative(s) to obtain the examination schedule in order to avoid noisy construction activities during school examination period and to schedule the construction activities in the vicinity of the school during summer recess as much as possible. A construction noise management plan should be prepared during the design / tendering and implementation stage of the construction works, to verify the inventory of noise sources, update the construction noise impact assessment if necessary, assess the effectiveness and practicality of all identified measures and update the proposed noise mitigation measures as necessary.

4.9.3 With the implementation of the proposed mitigation measures and scheduling works mentioned in Section 4.9.2, the predicted noise levels at the representative NSRs during construction phase would comply with the construction noise criteria. No residual noise impact is expected.

Operation Phase Road Traffic Noise

4.9.4 Results of the eligibility assessment for indirect technical remedies is presented in **Appendix 4.14**. Due to high prevailing noise levels and/or dominant noise contribution from existing roads, none of the NSRs are eligible for consideration for indirect technical remedies under the EIAO-TM.

4.10 ENVIRONMENTAL MONITORING AND AUDIT

Construction Phase

4.10.1 Based on the results of construction noise impact assessment given in **Appendices 4.7.1** and **4.7.2**, noise exceedances at some of the representative NSRs are predicted during construction of the Project under unmitigated scenario. Noise monitoring is therefore recommended to be carried out during construction phase. A construction noise management plan should be prepared during the design / tendering and implementation stage of the construction works, to verify the inventory of noise sources, update the construction noise impact assessment if necessary, assess the effectiveness and practicality of all identified measures and update the proposed noise mitigation measures as necessary. Regular environmental site audit is recommended to be carried out during construction phase to ensure proper implementation of mitigation measures and good site practices. Details of the EM&A programme are provided in a stand-alone EM&A Manual.

Operation Phase

4.10.2 Based on the results of the road traffic noise impact assessment for the mitigated scenario given in **Appendix 4.13**, there is no adverse traffic noise impact anticipated from the Project contribution with the implementation of the proposed mitigation measures. To verify the effectiveness of the proposed noise mitigation measures, road traffic noise levels should be monitored at representative NSRs during the first year after completion of road works. Details

of the EM&A programme are provided in a stand-alone EM&A Manual.

4.11 CONCLUSION

Construction Phase

4.11.1 Construction noise impact assessment has been conducted for the representative NSRs identified within the Assessment Area. Assessment results indicated that the mitigated noise levels at all NSRs would comply with the noise criteria set out in the EIAO-TM with the implementation of the proposed noise mitigation measures, including use of Quieter Construction Methods, QPME, provision of temporary movable noise barriers / enclosures and noise insulating fabric and proper scheduling of works.

4.11.2 A construction noise management plan should be prepared during the design / tendering and implementation stage of the construction works, to verify the inventory of noise sources, update the construction noise impact assessment if necessary, assess the effectiveness and practicality of all identified measures and update the proposed noise mitigation measures as necessary. Noise monitoring has been recommended to be carried out during construction phase. Regular environmental site audit has also been recommended to be carried out during construction phase to ensure proper implementation of mitigation measures and good site practices.

Operation Phase

4.11.3 Road traffic noise impact assessment has been conducted for the representative NSRs identified within the Assessment Area. Assessment results indicate that the predicted road traffic noise levels at some of the representative NSRs would exceed the noise criteria under unmitigated scenario.

4.11.4 With the implementation of noise mitigation measures including LNRS and noise barriers along some Project roads, the contributions from the Project roads to the overall noise levels at all NSRs would all be less than 1.0 dB(A) and all the predicted noise levels of the Project roads would comply with the noise criteria. While the overall predicted noise levels at some of the NSRs would still exceed the relevant noise criteria, the exceedances are mainly contributed by the other Existing roads. Therefore, it is concluded that no adverse road traffic noise impact arising from the Project is anticipated.