4. Noise Impact Assessment

4.1 Introduction

This section presents an assessment of the potential noise impacts associated with the carrying out of the Project under three different Reprovisioning Options. As the Project involves mainly ground decontamination works, after which the remediated site will then be handed over to LandsD for redevelopment, the Project has no operation phase.

Recommendations for mitigation measures have been made, where necessary, to reduce the identified noise impacts to an acceptable level.

4.2 Environmental Legislation, Standards and Guidelines

4.2.1 Construction Noise

Control over the generation of construction noise in Hong Kong is governed by the Noise Control Ordinance (NCO) and the Environmental Impact Assessment Ordinance (EIAO) and their subsidiary requirements. Various Technical Memoranda (TMs) have been issued under the NCO and the EIAO to stipulate criteria and control approaches. These TMs prescribe the maximum permitted noise levels for the use of Powered Mechanical Equipment (PME) and certain construction activities and processes, according to the type of equipment or activity, the perceived noise climate of the area, and the working hours of equipment operation and usage. The TMs applicable to the control of noise from construction activities of proposed construction works are:

- TM on Environmental Impact Assessment Process (EIAO-TM)
- TM on Noise from Construction Work other than Percussive Piling (GW-TM)
- TM on Noise from Construction Work in Designated Areas (DA-TM)

4.2.1.1 General Construction Activities during Non-Restricted Hours

Noise impact arising from general construction activities other than percussive piling during the daytime period (07:00 – 19:00 hours of any day not being a Sunday or general holiday) are assessed against the noise standards tabulated in **Table 4.1** below.

Table 4.1: Noise Standards for Daytime Construction Activities

Noise sensitive Uses	0700 to 1900 hours on any day not being a Sunday or general holiday, $L_{eq\ (30min)}$, dB(A)
All domestic premises including temporary housing accommodation	75
Hotels and hostels	
Educational institutions including kindergarten, nurseries and all others when unaided voice communication is required	70 65 during examination

Source: EIAO-TM, Annex 5, Table 1B – Noise Standards for Daytime Construction Activities

Note: (i) The above noise standards apply to uses, which rely on opened windows for ventilation
(ii) The above standards shall be viewed as the maximum permissible noise levels assessed at 1m from the external facade
(iii) The above standards shall be met as far as possible. All practicable mitigation measures shall be exhausted and the residual impacts are minimised

4.2.1.2 General Construction Activities during Restricted Hours

Noise impacts arising from general construction activities (excluding percussive piling) conducted during the restricted hours (19:00-07:00 hours on any day and anytime on Sunday or general holiday) and percussive piling during anytime are governed by the NCO.

For undertaking general construction activities involving the use of PME within restricted hours, a Construction Noise Permit (CNP) is required from the Authority under the NCO. The noise criteria and the assessment procedures for issuing a CNP are specified in Technical Memorandum on Noise from Construction Work Other Than Percussive Piling (GW-TM) under the NCO.

The use of Specified PME (SPME) and/or the carrying out of Prescribed Construction Work (PCW) within a Designated Area (DA) under the NCO during the restricted hours are also prohibited without a CNP. The relevant technical details in Technical Memorandum on Noise from Construction Work in Designated Areas (DA-TM) under NCO can be referred.

Designated areas, in which the control of SPME and PCW will apply, are established through the Noise Control (Construction Work Designated Areas) Notice made under Section 8A (1) of the NCO. According to the Designated Area defined under the NCO, all part of the works area of this project will fall within these areas where construction works would be carried out.

Regardless of any description or assessment made in the EIA Report, in assessing a filed application for a CNP the Authority will be guided by the relevant Technical Memoranda. The Authority will consider all the factors affecting their decision taking into account contextual situations and conditions. Nothing in the EIA Report will pre-empt the Authority in making their decisions, and there is no guarantee that a CNP will be issued. If a CNP is to be issued, the Authority may include conditions as appropriate and such conditions are to be followed while the works covered by the CNP are being carried out. Failing to do so may lead to cancellation of the permit and prosecution action under the NCO.

According to the construction programme, the proposed decontamination works will be carried out during non-restricted hours. In case of any activities during restricted hours, it is the Contractor's responsibility to ensure compliance with the NCO and the relevant TMs. The Contractor will be required to submit CNP application to the Noise Control Authority and abide by any conditions stated in the CNP, should one be issued.

4.3 Study Area and Sensitive Receivers

4.3.1 Study Area

In accordance with Clause 3.4.4.2 of the EIA Study Brief, the Study Area is defined as within 300m of the site boundary of the Project for noise impact assessment. The Study Area has been identified and is shown in **Figure 4.1**.

4.3.2 Description of the Environment

The Project will be situated next to Victoria Road and Cadogan Street, Kennedy Town, adjacent to Victoria Harbour, with a site area of about 32,000 m^2.

4.3.3 Noise Sensitive Receivers (NSRs)

NSRs have been identified in accordance with Annex 13 of the EIAO-TM. The NSRs have included existing, planned / committed noise sensitive developments and relevant uses earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans, Layout Plans and other relevant published land use plans, including plans and drawings published by Lands Department.

For the purpose of noise assessment, the first layer of residential premises located close to the site boundary have been selected as assessment points/ identified representative NSRs within the Study Area for prediction of the noise impact levels.

According to the Outline Zoning Plans (S/H1/19 – Kennedy Town & Mount Davis), the Study Area mainly comprises zoning of Other Specified Uses and Residential. Existing NSRs in the residential zones located close to the site boundary have been identified and selected as representative NSRs. Three planned NSRs are identified within the Study Area.

Descriptions of selected representative existing NSRs are tabulated in **Table 4.2**. The locations of representative noise sensitive receivers are shown in the **Figure 4.1**. Photos of existing noise sensitive receivers are shown in **Figure 4.2**.

Table 4.2: Representative Noise Sensitive Receivers Identified for the Assessment

No.	NSR ID	Description	Use	Existing/ Planned	No. of Storeys (Sensitive use only)
1	KT-N1	Cheong Kat Mansion	Residential	Existing	25
2	KT-N2	The Merton (Block 2)	Residential	Existing	45
3	KT-N3	Centenary Mansion	Residential	Existing	27
4	KT-N4	Cayman Rise	Residential	Existing	31
5	KT-N5	Bayanihan Kennedy Town Centre	Philippine Overseas Worker Training School	Existing	6
6	KT-N6	Kennedy Town Jockey Club Clinic	Medical Clinics	Existing	3
7	KT-N7	SKH Lui Ming Choi Memorial Primary School	Educational	Existing	7
8	KT-N8	No. 60 Victoria Road	Residential	Existing	29
9	KT-N9	No.37A Cadogan Street	Residential	Planned	44
10	KT-N10*	Development within Kennedy Town CDA site	Residential (under planning, assumed use subject to review)	Planned	--
11	KT-N11*	Development within Kennedy Town CDA site	Residential (under planning, assumed use subject to review)	Planned	--

Remarks: (*) NSR is not included in Reprovisioning Options B & C since the development will commence only after completion of Project period of such reprovisioning options.

4.4 Assessment Methodology

4.4.1 Construction Noise

4.4.1.1 Airborne Noise

Assessment approach to the noise impact is in line with the Guidance Note titled "*Preparation of Construction Noise Impact Assessment under the Environmental Impact Assessment Ordinance*" (GN-9/2010).

In addition, the assessment of construction noise impact is based on standard acoustic principles, and the guidelines given in GW-TM issued under the NCO where appropriate. Where no sound power level (SWL) can be found in the relevant TM, reference has been made to BS 5228 Part 1:2009[1] or noise emission levels measured for PME used in previous projects in Hong Kong. The general approach is summarised below:

- Formulate a typical construction schedule / programme;
- Identify a typical project-specific equipment inventory for each work stage together with the number of equipment;
- Obtained from GW-TM, the SWL for each PME assumed in the equipment inventory;
- Select representative NSRs for the construction noise impact assessment;
- Calculate the unmitigated Predicted Noise Level (PNL) and correct it for facade reflection to obtain the Corrected Noise Level (CNL) at the representative NSRs;
- If necessary, re-select typical project-specific silenced equipment and calculate the mitigated noise impact;
- Compare the mitigated CNL with the noise standards to determine acceptability and the need for further mitigation.

The calculation methodology is estimated with the following standard formula (1):

$$SPL = SWL - DC + FC \qquad (1)$$

where

SPL: Sound Pressure Level in dB(A)

SWL: Sound Power Level in dB(A)

DC: Distance Attenuation in dB(A) = 20 log D + 8 [where D is the distance between NSR and noise source in m]

FC: Facade Correction in dB(A) = +3 dB(A)

4.4.1.2 Ground-borne Noise

Excavation and backfilling are involved in the proposed Project. No tunnelling works would be involved underground. Hence potential ground-borne noise impact to existing NSRs and planned/committed noise sensitive developments is not anticipated. In view of this situation, ground-borne noise impacts arising from the proposed Project works to the planned NSRs are not anticipated.

[1] British Standard BS 5228-1: 2009 "*Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise*"

4.5 Identification of Potential Noise Impact

4.5.1 Reprovisioning Options

With reference to **Chapter 2**, there are 3 Reprovisioning Options, namely Option A, Option B, and Option C, that are being considered for the Project. The construction noise impact assessment has been conducted under these three Reprovisioning Options.

4.5.2 Noise Impact

The potential source of noise impact during the carrying out of the Project would be the use of PME for various activities, including excavation and decontamination processes, removal of spoil and backfilling in the Project site. PME likely to be used include breaker, excavator, lorry, air compressor, and generator etc.

Under normal conditions, activities for the Project would be carried out during non-restricted hours (0700 – 1900 hours) on normal working dates. In the case of any activities that have to be carried out during restricted hours, it is the Contractor's responsibility to ensure compliance with the NCO as well as the relevant TMs. The Contractor will be required to submit an application for the CNP and abide by the conditions set out by the Noise Control Authority. For carrying out of any general activities involving the use of any PME within restricted hours, a Construction Noise Permit (CNP) is required from the Authority under the NCO. The noise criteria and the assessment procedures for issuing a CNP are specified in GW-TM under the NCO.

4.5.3 Cumulative Noise Impact

Alternative ground decontamination works at the proposed Kennedy Town CDA site are expected to commence in 2015. Based on the latest available information, the following planned concurrent and interfacing projects have been identified for the Project, as shown in **Figure 2.4**.

- Residential Development at the Ka Wai Man Road & Ex-Mount Davis Cottage Area
- Reprovisioning of Kennedy Town Saltwater Pumping Station
- Development within the Kennedy Town CDA site (for Reprovisioning Option A only)

Where construction programmes are known, cumulative assessment has been conducted. However, the Reprovisioning of Kennedy Town Saltwater Pumping Station project is generally in early development and there is currently no information available regarding the construction programme and plant to be used in this project. This project is therefore not assessed in this EIA and would need to be included in studies conducted by the project proponent.

The construction noise impact associated with two potential developments at the Ka Wai Man Road & Ex-Mount Davis Cottage Area and within the Kennedy Town CDA site has been assessed in construction noise impact assessment. Residential Development at the Ka Wai Man Road and Ex-Mount Davis Cottage Area is currently underway and is assumed to have population intake starting from 2021. Potential development within the Kennedy Town CDA site is conservatively assumed to be a concurrent project throughout the Years 2024 to 2028 for Stage 2 of Reprovisioning Option A.

4.6 Prediction and Evaluation of Noise Impact

The type and quantity of Powered Mechanical Equipment (PME) likely to be used for this Project and their Sound Power Levels (SWLs) are shown in **Appendix 4.1**.

4.6.1 Reprovisioning Option A

The predicted noise levels of Reprovisioning Option A are presented in **Table 4.3**. Details of the construction noise impact at the representative NSRs are shown in **Appendix 4.2**.

Table 4.3: Unmitigated Construction Airborne Noise Impact of Reprovisioning Option A

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Mitigation Measure Required?
KT-N1	Residential	59-**85**	75	Yes	Yes
KT-N2	Residential	58-**85**	75	Yes	Yes
KT-N3	Residential	60-**84**	75	Yes	Yes
KT-N4	Residential	64-**82**	75	Yes	Yes
KT-N5	Philippine Overseas Worker Training School	58-**80**	70	Yes	Yes
KT-N6	Medical Clinics	62-**85**	75*	Yes	Yes
KT-N7	Educational	62-**81**	70/65	Yes	Yes
KT-N8	Residential	55-**77**	75	Yes	Yes
KT-N9	Residential	58-**82**	75	Yes	Yes
KT-N10	Residential (under planning, assumed use subject to review)	67-**85**	75	Yes	Yes
KT-N11	Residential (under planning, assumed use subject to review)	66-**85**	75	Yes	Yes

Remarks: (*) Construction noise criteria 75 dB(A) for medical clinics are referred to approved Kai Tak Development EIA report (Register No.: AEIAR-130/2009) NSR N12 – Sir Robert Black Health Centre.

Bold figure denotes exceedance of relevant noise criteria.

4.6.2 Reprovisioning Option B

The predicted noise levels of Reprovisioning Option B are presented in **Table 4.4**. Details of the construction noise impact at the representative NSRs are shown in **Appendix 4.3**.

Table 4.4: Unmitigated Construction Airborne Noise Impact of Reprovisioning Option B

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Mitigation Measure Required?
KT-N1	Residential	59-**86**	75	Yes	Yes
KT-N2	Residential	58-**86**	75	Yes	Yes
KT-N3	Residential	60-**82**	75	Yes	Yes
KT-N4	Residential	67-**82**	75	Yes	Yes
KT-N5	Philippine Overseas	63-**80**	70	Yes	Yes

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Mitigation Measure Required?
	Worker Training School				
KT-N6	Medical Clinics	72-**85**	75*	Yes	Yes
KT-N7	Educational	68-**81**	70/65	Yes	Yes
KT-N8	Residential	60-**77**	75	Yes	Yes
KT-N9	Residential	58-**81**	75	Yes	Yes

Remarks: (*) Construction noise criteria 75 dB(A) for medical clinics are referred to approved Kai Tak Development EIA report (Register No.: AEIAR-130/2009) NSR N12 – Sir Robert Black Health Centre.

Bold figure denotes exceedance of relevant noise criteria.

4.6.3 Reprovisioning Option C

The predicted noise levels of Reprovisioning Option C are presented in **Table 4.5**. Details of the construction noise impact at the representative NSRs are shown in **Appendix 4.4**.

Table 4.5: Unmitigated Construction Airborne Noise Impact of Reprovisioning Option C

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Mitigation Measure Required?
KT-N1	Residential	65-**85**	75	Yes	Yes
KT-N2	Residential	64-**84**	75	Yes	Yes
KT-N3	Residential	66-**84**	75	Yes	Yes
KT-N4	Residential	72-**83**	75	Yes	Yes
KT-N5	Philippine Overseas Worker Training School	71-**81**	70	Yes	Yes
KT-N6	Medical Clinics	**76-85**	75*	Yes	Yes
KT-N7	Educational	72-**82**	70/65	Yes	Yes
KT-N8	Residential	67-**78**	75	Yes	Yes
KT-N9	Residential	64-**82**	75	Yes	Yes

Remarks: (*) Construction noise criteria 75 dB(A) for medical clinics are referred to approved Kai Tak Development EIA report (Register No.: AEIAR-130/2009) NSR N12 – Sir Robert Black Health Centre.

Bold figure denotes exceedance of relevant noise criteria.

The prediction results indicate that the noise impact of unmitigated construction activities from this Project would cause exceedance of the relevant daytime construction noise criteria. Mitigation measures are therefore required for these NSRs in order to alleviate the noise impacts generated during the carrying out of the Project.

4.7 Mitigation of Adverse Noise Impact

Mitigation measures for construction activities are detailed below. The following forms of mitigation measures are recommended and should be incorporated into the Contract Specifications:

- good site practice to limit noise emissions at source;
- selection of quieter plant;

- use of movable noise barrier;
- use of noise insulating fabric; and
- scheduling of construction works outside school examination periods.

While it is recognised that the Contractor may develop a different package of mitigation measures to meet the required noise standards, the following suite of practical and implementable measures demonstrate an approach that would be feasible to reduce noise to acceptable levels.

Good Site Practice

Good site practice and noise management can significantly reduce the impact of site activities on nearby NSRs. The following package of measures should be followed while carrying out of the Project:

- only well-maintained plant to be operated on-site and plant should be serviced regularly during the works;
- machines and plant that may be in intermittent use to be shut down between work periods or should be throttled down to a minimum;
- plant known to emit noise strongly in one direction, should, where possible, be orientated to direct noise away from the NSRs;
- mobile plant should be sited as far away from NSRs as possible; and,
- material stockpiles and other structures to be effectively utilised, where practicable, to screen noise from on-site construction activities.

Selection of Quieter Plant

The Contractor may be able to obtain particular models of plant that are quieter than the standards given in the GW-TM. This is one of the most effective measures and is increasingly practicable because of the availability of quiet equipment.

Quiet plant is defined as Quality Powered Mechanical Equipment (QPME) whose actual SWL is less than the value specified in GW-TM for the same piece of equipment. Examples of SWLs for specific silenced PME taken from EPD's QPME Inventory, BS 5228 Part 1:2009[2] and "*Sound Power Levels of Other Commonly Used PME*" are presented in **Table 4.6**. It should be noted that various types of silenced equipment can be found in Hong Kong.

Table 4.6: Quieter PME Recommended for Adoption during the Carrying out of the Project

PME	Power Rating/ Size, Weight	Reference	SWL, dB(A)
Crane, mobile	213kW	EPD-01516	101
Dump truck	50 tonne	BS 5228 Table D9-39	103
Excavator, wheeled/tracked	112.5kW	EPD-01230	99
Lorry	20 tonne	BS 5228 Table D9-19	102

[2] British Standard BS 5228-1: 2009 "*Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise*"

PME	Power Rating/ Size, Weight	Reference	SWL, dB(A)
Roller, vibratory	23kW	EPD-00591	105
Poker, vibratory, handheld (electric)	--	EPD document "Sound Power Levels of Other Commonly Used PME"	102

Whilst quieter PME are listed, the Contractor may be able to obtain particular models of plant that are quieter than the PMEs given in GW-TM.

Use of Movable Noise Barriers

Movable noise barriers can be very effective in screening noise from particular items of plant when implementing the Project. Noise barriers located along the active works area close to the noise generating component of a PME could produce at least 10 dB(A) screening for stationary plant and 5 dB(A) for mobile plant provided the direct line of sight between the PME and the NSRs is blocked. A schematic configuration of a single movable noise barrier for PME is shown in **Figure 4.3**.

Use of Noise Insulating Fabric

Noise insulating fabric can also be adopted for certain PME (e.g. pilling machine etc.). The Fabric should be lapped such that there are no openings or gaps on the joints. According to the approved Tsim Sha Tsui Station Northern Subway EIA Report (Register No.: AEIAR-127/2008), a noise reduction of 10 dB(A) can be achieved for the PME lapped with the noise insulating fabric.

The noise screening benefit for each item of plant considered in this assessment is listed in **Table 4.7**.

Table 4.7: Noise Mitigation Measures for Certain PME during the Carrying out of the Project

PME	Mitigation Measures Proposed	Noise Reduction dB(A)
Piling, vibrating hammer	Noise insulating fabric	10
Piling, large diameter bored, grab and chisel	Noise insulating fabric	10
Piling, large diameter bored, oscillator	Noise insulating fabric	10
Piling, large diameter bored, reverse circulation drill	Noise insulating fabric	10
Piling, earth auger, auger	Noise insulating fabric	10
Piling rig	Noise insulating fabric	10
Drill rig, rotary type (diesel)	Noise insulating fabric	10
Air compressor	Movable noise barrier	10
Generator	Movable noise barrier	10
Breaker, mini-robot mounted	Movable noise barrier	10
Saw, circular, wool	Movable noise barrier	10
Welding plant	Movable noise barrier	10
Cutter, circular, steel	Movable noise barrier	10
Water pump	Movable noise barrier	10
Ventilation fan	Movable noise barrier	10
Bar bender and cutter	Movable noise barrier	10
Concrete pump, stationary/ lorry mounted	Movable noise barrier	5

PME	Mitigation Measures Proposed	Noise Reduction dB(A)
Excavator	Movable noise barrier	5
Mobile crane	Movable noise barrier	5
Roller, vibratory	Movable noise barrier	5
Poker, vibratory, hand-held	Movable noise barrier	5

These noise barriers should be free of gaps and made of materials having a surface mass density in excess of 10 kg/m^2. To improve the effectiveness of noise reduction, non-flammable absorptive lining can be adhered on the inner surface of the noise barriers. The barrier can be in the form of vertical or bend top barrier with an effective height to block the line of sight to NSRs.

Scheduling of Construction Works outside School Examination Periods

The daytime construction noise criterion during school examination period is 65 dB(A), which is lower than the normal daytime school criterion of 70 dB(A). During the carrying out of the Project, the contractor should liaise with the educational institution (NSR KT-N7) to obtain the examination schedule and avoid the noisy construction activities during school examination periods. A Construction Noise Mitigation Measures Plan for educational institution (i.e. NSR KT-N7) will be provided to address the potential noise exceedance during examination period.

Mitigated Construction Noise Impacts of Reprovisioning Option A

The effect of the use of quieter plant, movable barriers and noise insulating fabric has been investigated for the practicable construction activities. The predicted results of Reprovisioning Option A are presented in **Table 4.8**. Mitigated Construction Plant Inventory and details of the mitigated construction noise impact are shown in **Appendix 4.5** and **Appendix4.6** respectively.

Table 4.8: Mitigated Construction Airborne Noise Impact of Reprovisioning Option A

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Residual Noise Impact?
KT-N1	Residential	49-73	75	No	No
KT-N2	Residential	48-73	75	No	No
KT-N3	Residential	50-73	75	No	No
KT-N4	Residential	54-70	75	No	No
KT-N5	Philippine Overseas Worker Training School	48-68	70	No	No
KT-N6	Medical Clinics	52-73	75*	No	No
KT-N7	Educational	52-**69**	70 / 65	Yes	Yes^
KT-N8	Residential	45-65	75	No	No
KT-N9	Residential	48-70	75	No	No
KT-N10	Residential (under planning, assumed use subject to review)	57-73	75	No	No
KT-N11	Residential (under planning, assumed use subject to review)	56-73	75	No	No

Remarks: (*) Construction noise criteria 75 dB(A) for medical clinics are referred to approved Kai Tak Development EIA report (Register No.: AEIAR-130/2009) NSR N12 – Sir Robert Black Health Centre.
(^) Residual impact is only expected during examination period (typical examination period in January, March, June and October) of educational institution.
Bold figure denotes exceedance of relevant noise criteria.

With the incorporation of quieter plants, the use of movable barriers and noise insulating fabric, the results indicated that the mitigated noise impact associated with the construction of the Project would comply with the daytime construction noise criterion at most of the representative NSRs. Residual construction noise impact was predicted at one educational NSR during examination periods, namely "KT-N7". During the examination periods, the predicted exceedance for this NSR is 1-4 dB(A).

Mitigated Construction Noise Impacts of Reprovisioning Option B

The predicted results of Reprovisioning Option B are presented in **Table 4.9**. Mitigated Construction Plant Inventory and details of the mitigated construction noise impact are shown in **Appendix 4.5** and **Appendix 4.7** respectively.

Table 4.9: Mitigated Construction Airborne Noise Impact of Reprovisioning Option B

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Residual Noise Impact?
KT-N1	Residential	49-73	75	No	No
KT-N2	Residential	48-73	75	No	No
KT-N3	Residential	50-70	75	No	No
KT-N4	Residential	57-70	75	No	No
KT-N5	Philippine Overseas Worker Training School	53-68	70	No	No
KT-N6	Medical Clinics	62-72	75*	No	No
KT-N7	Educational	58-**69**	70 / 65	Yes	Yes^
KT-N8	Residential	50-65	75	No	No
KT-N9	Residential	48-69	75	No	No

Remarks: (*) Construction noise criteria 75 dB(A) for medical clinics are referred to approved Kai Tak Development EIA report (Register No.: AEIAR-130/2009) NSR N12 – Sir Robert Black Health Centre.
(^) Residual impact is only expected during examination period (typical examination period in January, March, June and October) of educational institution.
Bold figure denotes exceedance of relevant noise criteria.

With the incorporation of quieter plants, the use of movable barriers and noise insulating fabric, the results indicated that the mitigated noise impact associated with the construction of the Project would comply with the daytime construction noise criterion at most of the representative NSRs. Residual construction noise impact was predicted at one educational NSR during examination periods, namely "KT-N7". During the examination periods, the predicted exceedance for this NSR is 1-4 dB(A).

Mitigated Construction Noise Impacts for Reprovisioning Option C

The predicted results of Reprovisioning Option C are presented in **Table 4.10**. Mitigated Construction Plant Inventory and details of the mitigated construction noise impact are shown in **Appendix 4.5** and **Appendix 4.8** respectively.

Table 4.10: Mitigated Construction Airborne Noise Impact of Reprovisioning Option C

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Residual Noise Impact?
KT-N1	Residential	53-73	75	No	No
KT-N2	Residential	53-72	75	No	No
KT-N3	Residential	54-72	75	No	No
KT-N4	Residential	60-71	75	No	No
KT-N5	Philippine Overseas Worker Training School	61-69	70	No	No
KT-N6	Medical Clinics	65-73	75*	No	No
KT-N7	Educational	61-**70**	70 / 65	Yes	Yes^
KT-N8	Residential	57-68	75	No	No
KT-N9	Residential	53-70	75	No	No

Remarks: (*) Construction noise criteria 75 dB(A) for medical clinics are referred to approved Kai Tak Development EIA report (Register No.: AEIAR-130/2009) NSR N12 – Sir Robert Black Health Centre.

(^) Residual impact is only expected during examination period (typical examination period in January, March, June and October) of educational institution.

Bold figure denotes exceedance of relevant noise criteria.

With the incorporation of quieter plants, the use of movable barriers and noise insulating fabric, the results indicated that the mitigated noise impact associated with the construction of the Project would comply with the daytime construction noise criterion at most of the representative NSRs. Residual construction noise impact was predicted at one educational NSR during examination periods, namely “KT-N7”. During the examination periods, the predicted exceedance for this NSR is 1-5 dB(A).

4.8 Cumulative Impacts

4.8.1 Reprovisioning Option A

The overall cumulative construction noise levels from Reprovisioning Option A and the concurrent projects are presented in **Table 4.11**. The predicted noise levels have included the cumulative impacts from other potentially concurrent projects. Details of the cumulative mitigated construction noise impact of Reprovisioning Option A are shown in **Appendix 4.6**.

Table 4.11: Cumulative Construction Airborne Noise Impact of Reprovisioning Option A

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Residual Noise Impact?
KT-N1	Residential	54-73	75	No	No
KT-N2	Residential	53-73	75	No	No
KT-N3	Residential	56-73	75	No	No

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Residual Noise Impact?
KT-N4	Residential	62-71	75	No	No
KT-N5	Philippine Overseas Worker Training School	65-69	70	No	No
KT-N6	Medical Clinics	64-75	75*	No	No
KT-N7	Educational	63-**69**	70 / 65	Yes	Yes^
KT-N8	Residential	60-70	75	No	No
KT-N9	Residential	54-71	75	No	No
KT-N10	Residential (under planning, assumed use subject to review)	71-75	75	No	No
KT-N11	Residential (under planning, assumed use subject to review)	70-75	75	No	No

Remarks: (*) Construction noise criteria 75 dB(A) for medical clinics are referred to approved Kai Tak Development EIA report (Register No.: AEIAR-130/2009) NSR N12 – Sir Robert Black Health Centre.

(^) Residual impact is only expected during examination period (typical examination period in January, March, June and October) of educational institution.

Bold figure denotes exceedance of relevant noise criteria.

Based on the results shown in the table above, residual cumulative construction noise impact was predicted at one educational NSR, namely “KT-N7” during examination period. The predicted exceedance for this NSR is 1-4 dB(A). All practicable mitigation measures including movable barrier, insulating fabric and quiet plants have been proposed and exhausted to minimise the noise impact. In addition, it is noted that noise insulation works have been installed at this school and therefore significant noise impact would not be anticipated.

4.8.2 Reprovisioning Option B

The overall cumulative construction noise levels from Reprovisioning Option B and the concurrent projects are presented in **Table 4.12**. Details of the cumulative mitigated construction noise impact of Reprovisioning Option B are shown in **Appendix 4.7**.

Table 4.12: Cumulative Construction Airborne Noise Impact of Reprovisioning Option B

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Residual Noise Impact?
KT-N1	Residential	54-73	75	No	No
KT-N2	Residential	53-73	75	No	No
KT-N3	Residential	56-70	75	No	No
KT-N4	Residential	62-70	75	No	No
KT-N5	Philippine Overseas Worker Training School	65-69	70	No	No
KT-N6	Medical Clinics	64-72	75*	No	No
KT-N7	Educational	63-**69**	70 / 65	Yes	Yes^
KT-N8	Residential	67-70	75	No	No
KT-N9	Residential	54-69	75	No	No

Remarks: (*) Construction noise criteria 75 dB(A) for medical clinics are referred to approved Kai Tak Development EIA report (Register No.: AEIAR-130/2009) NSR N12 – Sir Robert Black Health Centre.
(^) Residual impact is only expected during examination period (typical examination period in January, March, June and October) of educational institution.
Bold figure denotes exceedance of relevant noise criteria.

Based on the results shown in the table above, residual cumulative construction noise impact was predicted at one educational NSR, namely "KT-N7" during examination period. The predicted exceedance for this NSR is 1-4 dB(A). All practicable mitigation measures including movable barrier, insulating fabric and quiet plants have been proposed and exhausted to minimise the noise impact. In addition, it is noted that noise insulation works have been installed at this school and therefore significant noise impact would not be anticipated.

4.8.3 Reprovisioning Option C

The overall cumulative construction noise levels from Reprovisioning Option C and the concurrent projects are presented in **Table 4.13**. Details of the cumulative mitigated construction noise impact of Reprovisioning Option C are shown in **Appendix 4.8**.

Table 4.13: Cumulative Construction Airborne Noise Impact of Reprovisioning Option C

NSR ID	Use	Predicted Noise Level dB(A)	Noise Criteria dB(A)	Exceedance of Noise Criteria?	Residual Noise Impact?
KT-N1	Residential	57-73	75	No	No
KT-N2	Residential	55-72	75	No	No
KT-N3	Residential	58-72	75	No	No
KT-N4	Residential	64-71	75	No	No
KT-N5	Philippine Overseas Worker Training School	66-70	70	No	No
KT-N6	Medical Clinics	66-74	75*	No	No
KT-N7	Educational	65-**70**	70 / 65	Yes	Yes^
KT-N8	Residential	67-70	75	No	No
KT-N9	Residential	56-70	75	No	No

Remarks: (*) Construction noise criteria 75 dB(A) for medical clinics are referred to approved Kai Tak Development EIA report (Register No.: AEIAR-130/2009) NSR N12 – Sir Robert Black Health Centre.
(^) Residual impact is only expected during examination period (typical examination period in January, March, June and October) of educational institution.
Bold figure denotes exceedance of relevant noise criteria.

Based on the results shown in the table above, residual cumulative construction noise impact was predicted at one educational NSR, namely "KT-N7" during examination period. The predicted exceedance for this NSR is 1-5 dB(A). All practicable mitigation measures including movable barrier, insulating fabric and quiet plants have been proposed and exhausted to minimise the noise impact. In addition, it is noted that noise insulation works have been installed at the school. Therefore, significant noise impact would not be anticipated.

4.9 Residual Impact

4.9.1 Reprovisioning Option A

Residual noise impact was predicted at one educational NSR, namely "KT-N7" during examination periods. According to school calendar in website of SKH Lui Ming Choi Memorial Primary School[3], January, March, June and October are examination periods. The examination period is only last for 1 week in each month. The predicted exceedance for NSR KT-N7 during examination periods is 1-4 dB(A) for a duration of 44 weeks within the 13 years construction period. All practicable mitigation measures including movable barrier, insulating fabric and quiet plants have been proposed and exhausted to minimise the noise impact. In addition, it is noted that noise insulation works have been installed at this school and therefore significant noise impact would not be anticipated.

4.9.2 Reprovisioning Option B

Residual noise impact was predicted at one educational NSR, namely "KT-N7" during examination periods. The predicted exceedance for NSR KT-N7 during examination periods is 1-4 dB(A) for a duration of 19 weeks within the 7 years construction period. All practicable mitigation measures including movable barrier, insulating fabric and quiet plants have been proposed and exhausted to minimise the noise impact. In addition, it is noted that noise insulation works have been installed at this school and therefore significant noise impact would not be anticipated.

4.9.3 Reprovisioning Option C

Residual noise impact was predicted at one educational NSR, namely "KT-N7" during examination periods. The predicted exceedance for NSR KT-N7 during examination period is 1-5 dB(A) for a duration of 13 weeks within the 4.5 years construction period. All practicable mitigation measures including movable barrier, insulating fabric and quiet plants have been proposed and exhausted to minimise the noise impact. In addition, it is noted that noise insulation works have been installed at the school. Therefore, significant noise impact would not be anticipated.

4.9.4 Summary of Residual Impact

The daytime construction noise criterion is 65 dB(A) during school examination periods, which is lower than the normal daytime school criterion of 70 dB(A). In this regard, scheduling of works outside school examination period to less intrusive periods would help reduce the overall noise impacts at the NSR. The examination period of the NSR should only last for 1 week. By scheduling the works to avoid the examination period, the adverse residual impact should be minimised. The Contractor shall liaise with the school representative(s) to obtain the examination schedule and avoid noisy activities during school examination period.

The residual impacts are evaluated in accordance with Section 4.4.3 of the TM-EIAO as shown in **Table 4.14** below:

[3] http://www.skhlmcmps.edu.hk/main.htm

Table 4.14: Evaluation of Residual Noise Impacts during Construction Phase

Criteria	Assessment
Effects on public health and health of biota or risk of life	The extent of noise nuisance would be unlikely to induce public health concern
Magnitude of the adverse environmental impacts	The predicted exceedance of construction noise for NSR KT-N7 is 1-5 dB(A) during examination period. All practicable measures have been proposed and exhausted to minimise the noise impact. In addition, it is noted that noise insulation works have been installed at this school.
Geographic extent of the adverse environmental impact	The geographic extent of the adverse impact from noise is anticipated to be limited to NSR KT-N7 during examination period.
Duration and frequency of the adverse environmental impacts	The predicted exceedance durations of construction noise for NSR KT-N7 are 44 / 19 / 13 weeks for Reprovisioning Options A / B / C, respectively during examination period. All practicable measures have been proposed and exhausted to minimise the noise impact.
Likely size of the community or the environmental that may be affected by the adverse impacts	NSR KT-N7 would be temporarily affected by residual construction noise during examination period.
Degree to which the adverse environmental impacts are reversible or irreversible	Not Applicable in noise section.
Ecological context	Not Applicable in noise section
Degree of disruption to sites of cultural heritage	Not Applicable in noise section
International and regional importance	The impacts are localized and not of international and regional importance
Likelihood and degree of uncertainty of adverse environmental impact	The impacts predicted are based upon worst case assumptions and as such, would not occur to the extent predicted on all occasions.

Based on the above, all practicable measures have been proposed and exhausted to minimise the noise impact..

4.10 Environmental Monitoring and Audit

Given residual airborne noise impact is predicted during the carrying out of the Project, to ensure that the nearby NSRs will not be subjected to unacceptable noise impact, an Environmental Monitoring and Audit (EM&A) programme is recommended. Details on the noise monitoring requirements, methodology and action plans would be described in the separated EM&A Manual.

4.11 Conclusion

The noise impact assessment has been made based on the best available information, taking into account other expected concurrent projects. Having exhausted practicable mitigation measures in the form of quiet plant, movable noise barrier and insulting fabric, the construction noise levels at most of the representative NSRs are predicted to comply with the noise standards stipulated in the EIAO-TM. Residual construction noise impact was predicted at one representative NSR of educational use. However, this NSR has already been implemented with noise insulation works and therefore significant noise impact is not anticipated during the carrying out of the Project. Notwithstanding this, it is recommended that particularly noisy activities should be scheduled to avoid examination periods of the educational NSR as far as practicable.