3 NOISE IMPACT

3.1 Introduction

3.1.1 The study area for the potential noise impacts from the construction and operation of the Project is 300m from the proposed Roads D3A & D4A. After carrying out detailed desktop review and with reference to the development schedule in the approved Kai Tak Development (KTD) Schedule 3 Environmental Impact Assessment (EIA) Report, the first population intake of all sensitive land use within study area would be at Year 2021 which is after the completion of construction of the proposed Roads D3A & D4A (Year 2016). Therefore, no noise sensitive receiver (NSR) was identified within the study area during construction phase and hence no assessment was carried out for the potential construction noise impact from the Project. Since the project will not include any fixed noise sources, such as ventilation systems of enclosed road section, assessment for fixed noise source is therefore not necessary.

3.1.2 This section presents the traffic noise impact assessment for the operation phase of the Project. Existing and planned noise sensitive receivers in the vicinity of the study area are determined. Potential noise impacts associated with the Project have been identified together with any practicable mitigation measures.

3.2 Environmental Legislation, Policies, Plans, Standards and Criteria

3.2.1 The potential traffic noise impact from the Project was assessed in accordance with Annex 5 "Criteria for Evaluating Noise Impact" and Annex 13 "Guidelines for Noise Assessment" of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). Annex 5 of the EIAO-TM defines the criteria $L_{10\ (1\ hour)}$ for road traffic noise at various NSRs:

- 70dB(A) at the façades of residential dwellings, hotels, offices;
- 65dB(A) at the façades of schools, places of public worship, courts of law, places where unaided voice communication is required; and
- 55dB(A) at the façades of hospital or clinics.

3.2.2 For the purpose of the traffic noise assessment in this Report, the roads within 300m from the proposed project alignment are included in the assessment. All roads are described as one of the following:

- 'Non-Project' Road: includes Road D3 & Road D4.
- 'Project' Roads: includes all roads created and roads substantially altered by this Project.

3.2.3 The extent of "Project" and "Non-Project" Roads are shown in **Figure 3.1**.

3.2.4 The noise contribution from 'Project' roads should be less than 70 dB(A) at any dwellings (less than 65 dB(A) for educational institutions and places of public worship), so as to satisfy the relevant noise criteria, and there should not be any increase in traffic noise impact. In the case of an NSR where existing noise levels already exceeded the relevant criteria, any increase in noise level contributed by the 'Project' roads should be less than 1.0 dB(A).

3.3 Description of the Environment

3.3.1 The Project is located in the runway areas of the former Kai Tak Airport. The existing land uses in adjoining areas are commercial, industrial and recreational uses. Prince Edward Road East, Kwun Tong Bypass and other distributor networks are dominant noise sources in the hinterland area and are outside the study area of this assessment.

3.4 Noise Sensitive Receivers

3.4.1 In order to evaluate the operational noise impact from the Project, representative Noise Sensitive Receivers (NSRs) within the Study Area are identified for assessment. Only the first layer of NSRs has been identified for assessment because it would provide acoustic shielding to those receivers at further distance behind. As centrally air-conditioned buildings do not rely on opened windows for ventilation, the noise standard as stipulated in Table 1 Annex 5 of EIAO-TM would not be applicable, and hence these buildings are not selected for noise impact assessment. Since there is no committed site layouts for the planned noise sensitive land uses within Kai Tak Development, the representative site layouts are based on those shown in the "Revision of Runway Precinct Development – Runway Precinct Study Report" for the operation noise assessment. **Table 3.1** and **Figure 3.2** shows the representative NSRs selected for this noise impact assessment.

Table 3.1 Representative Noise Sensitive Receivers for Noise Impact Assessment

NSRs	Location	Planned Land Use	Max. Building Height, mPD
N1 – N4	Site 4A1	Residential	80
N5 – N8	Site 4A1	Residential	65
N9 – N10	Site 4A2	Commercial	45
N11 –N16	Site 4B1	Residential	55
N17 – N19	Site 4B2	Residential	55
N20 – N22	Site 4B3	Residential	65
N23 – N25	Site 4B4	Residential	55
N26 – N31	Site 4B5	Residential	45
N32	Site 4C1	Commercial	45
N33	Site 4C2	Commercial	55
N34	Site 4C3	Commercial	45
N35	Site 4C4	Commercial	45
N36 – N37	Site 4C5	Commercial	45

3.5 Assessment Methodology

3.5.1 Traffic noise was predicted using the methodology provided in the UK Department of Transport Calculation of Road Traffic Noise (CRTN) 1988. The assessment was based on projected peak hour flows for the worst year within 15 years after opening of the road. Road traffic noise levels are presented in terms of noise levels exceeded for 10% of the one-hour period during the peak traffic flow, i.e. $L_{10,1hr}$ dB(A). The projected 2031 morning peak hour traffic flows and vehicle compositions are attached in **Appendix 3.1**. The methodology to produce the traffic data for this EIA study has been agreed by the Transport Department (TD). The agreement from TD for the methodology and traffic data adopted in this EIA is attached in **Appendix 4.2**. The roads with traffic flow below 50 veh/hr were not considered in this assessment.

3.5.2 Only roads within 300m (perpendicular distance) from each NSR were considered in the assessment for that NSR. Traffic speeds for all roads within the study area adopted in the noise model is 50kph.

3.5.3 The road network, proposed building layout, and all features that could have noise screening or reflective effects were digitised in the road traffic noise model. The roads were divided into segments, each of which was assigned a road layout number. A road layout defined the road width, opposing traffic lane separation, road surface type and traffic mix, flow and road design speed. Hard ground as defined in CRTN was assumed throughout the study area. Noise levels were calculated at each receiver point at various elevations.

3.6 Identification of Environmental Impacts

3.6.1 Operation phase impacts will arise from the road traffic noise. The proposed road network in the study area comprises of district distributors and local distributors, potential impact by road traffic noise would affect the planned NSRs within the study area.

3.7 Prediction and Evaluation of Environmental Impacts

3.7.1 Traffic noise levels have been predicted at representative noise assessment points. **Appendix 3.2** gives the breakdown of the noise contributions from the Project roads and non-Project roads at all representative planned NSRs. Sample input and output file for 10 representative assessment points and road-plots of traffic noise model are shown in **Appendix 3.3**.

3.7.2 Without the noise mitigation measures in place, the predicted noise levels at the identified NSRs would range from 68 to 79 dB(A) $L_{10\ (1\text{-hour})}$. The following paragraphs discuss the potential noise impacts at difference area of NSRs under this study.

3.7.3 Site 4A1 & Site 4B1 to 4B5: The predicted noise levels at residential sites exceeded the noise criterion of 70 dB(A). The predicted traffic noise impacts are summarized in **Table 3.2**. It is identified that the 'Project' road noise contribution to the overall noise level would be more than 1.0 dB(A). The major noise source is from the Project that contributed significant traffic noise impact to these NSRs. Hence, direct mitigation measures on 'Project' road (Roads D3A & D4A) are required to reduce the traffic noise impact.

3.7.4 Commercial sites with noise sensitive uses: The predicted traffic noise impacts for other planned NSRs N9 – N10 (Site 4A2) & N32 – N37 (Sites 4C1, 4C2, 4C3, 4C4 and 4C5) are summarized in **Table 3.2**. The noise exceedances are caused by 'Project' roads. With reference to the Outline Zoning Plan No. S/K22/4, these sites will be developed in form of hotel belt. As agreed by Lands Department, the layout of the affected NSRs could be designed to avoid the noise sensitive uses facing the major traffic noise sources or providing the noise sensitive uses with window insulation and air conditioning which should be incorporated into the land lease conditions.

Table 3.2 Summary of Traffic Noise Impact

NSR	Location	Planned Land Use	Major Noise Sources	Noise Level Above criterion of 70 dB(A)
N1 – N4	Site 4A1	Residential	Road D3A & D4A	✓
N5 – N8	Site 4A1	Residential	Road D3A & D4A	✓
N9 – N10	Site 4A2	Commercial	Road D3A	✓
N11 –N16	Site 4B1	Residential	Road D3A & D4A	✓
N17 – N19	Site 4B2	Residential	Road D3A & D4A	✓
N20 – N22	Site 4B3	Residential	Road D3A & D4A	✓
N23 – N25	Site 4B4	Residential	Road D3A & D4A	✓
N26 – N31	Site 4B5	Residential	Road D3A & D4A	✓
N32	Site 4C1	Commercial	Road D3A	✓
N33	Site 4C2	Commercial	Road D3A	✓
N34	Site 4C3	Commercial	Road D3A	✓
N35	Site 4C4	Commercial	Road D3A	✓
N36 – N37	Site 4C5	Commercial	Road D3A	✓

3.8 Mitigation of Environmental Impacts

3.8.1 Mitigation measures would be proposed for 'Project' roads if there would be adverse environmental impact. If the NSRs are affected by noise from non-Project roads, 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 non-Project roads if the cumulative noise level (i.e. noise from the Project roads together with non-Project roads) exceeds the noise standard.

3.8.2 As discussed above, mitigation measures on some 'Project' roads would be required to mitigate the noise impact at Site 4A1 and Site 4B1 to 4B5. The proposed mitigation measures are shown in **Figure 3.3**. It should be noted that the exact length and heights of the mitigation measures as shown in **Figure 3.3** would be subject to minor refinement during the detailed design stage. The proposed mitigation measures are also summarised below with the total length of the mitigation measures rounded off to the nearest 10m:

- Provision of a landscaped deck along Roads D3A & D4A;
- Provision of about 1090 m length of vertical noise barrier (connected to the deck) at Roads D3A & D4A;
- Provision of about 60 m length of overhang vertical noise barrier (connected to the deck, approximately 2m in height) at Road D4A;
- Provision of staircases with noise barriers next to Sites 4A1 and 4B1; and
- Non-noise sensitive use areas within Sites 4A1 and 4B1 (agreed by Planning Department and Lands Department).

3.8.3 Taking into account the visual quality, all the proposed vertical noise barriers connected to the deck would be installed with transparent panels. With the implementation of the above noise mitigation measures, the predicted overall noise levels at these NSRs would comply with the noise criterion. Detailed mitigated results are presented in **Appendix 3.4** and the details are discussed in below.

3.8.4 N4 & N15 – N31: With the proposed direct noise mitigation measures shown in **Figure 3.3** in place, the predicted overall noise levels at these receivers would comply with the noise criterion of 70 dB(A).

3.8.5 N1-N3, N5-N8 & N11-N14: In addition to the proposed direct mitigation measures, non-noise sensitive use areas at Sites 4A1 and 4B1 are proposed as mitigation measures for traffic noise impact. The locations of the areas of non-noise sensitive use are shown in **Figure 3.3a**. Agreement from Lands Department on this mitigation measure (**Appendix 3.6**) has been obtained. With these proposed mitigation measures in place, the predicted overall noise levels at these receivers would comply with the noise criterion of 70 dB(A).

3.8.6 Commercial sites with noise sensitive uses: The predicted noise levels at planned NSRs N9 – N10 (Site 4A2) & N32 – N37 (Sites 4C1, 4C2, 4C3, 4C4 and 4C5) exceeded the noise criterion of 70 dB(A). The noise contribution is from 'Project' roads. The layout of the affected NSRs could be designed to avoid the noise sensitive uses facing the major traffic noise sources or providing the noise sensitive uses with window insulation and air conditioning which should be incorporated into the land lease conditions. Agreement from Lands Department on this mitigation measure has been obtained (**Appendix 3.6**). Adverse traffic noise impacts at these NSRs are not expected.

3.9 Residual of Environmental Impacts

3.9.1 With the proposed noise mitigation measures in place, the 'Project' road noise contributions to the overall noise levels at all representative NSRs would be less than 1.0 dB(A) and the 'New' road noise levels would all be below the relevant noise criteria. No adverse noise impacts arising from the 'Project' roads would be predicted at any of the representative NSRs. Prevailing scenario for indirect technical remedies eligibility assessment is thus not necessary. The effectiveness of mitigation measures, in terms of the number of residential dwellings that will either be protected or benefited (by at least 1 dB(A)), has been shown in **Appendix 3.5**.

3.10 Environmental Monitoring and Audit

3.10.1 No environmental monitoring and audit during the operation phase is considered necessary.

3.11 Conclusion

3.11.1 The potential road traffic noise impacts have been assessed based on the worst case traffic flows in 2031. Without any noise mitigation measures in place, the predicted noise levels at the NSRs would range from 68 to 79 dB(A). Practicable traffic noise mitigation measures are therefore formulated for the planned residential NSRs with predicted noise levels exceeding the traffic noise criteria. With the proposed noise mitigation measures, the predicted overall noise levels at these NSRs would comply with the noise criterion.

3.11.2 For those planned sites of commercial with noise sensitive uses, their layout should be designed to avoid the noise sensitive uses facing the major traffic noise sources or providing the noise sensitive uses with window insulation and air conditioning and these requirements should be spelt out in the land lease conditions.