Attachment C

Revised Environmental Review (Textual Revisions)

Prepared for

Prepared by

Ramboll Hong Kong Limited

PLANNING APPLICATION FOR PROPOSED MIXED USE DEVELOPMENT AT HUNG SHUI KIU/HA TSUEN (AREA 32B)

ENVIRONMENTAL REVIEW REPORT

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Appendix 4.1 Railway Noise Result in HSK NDA P&E Study

1. INTRODUCTION

1.1 Background

1.1.1 The Application Site (Area 32B) is in the southern part of the Hung Shui Kiu / Ha Tsuen New Development Area (HSK/HT NDA). It is zoned as "Commercial (1)" ("C(1)") under the current Hung Shui Kiu / Ha Tsuen Outline Zoning Plan ("OZP") No. S/HSK/3 [or known as "Site 4-13b" under the Revised Recommended Outline Development Plan (RODP) of the 2016 HSK NDA Planning & Engineering Study (see **Appendix 1.1**)]. The Application Site is shown in **Figure 1.1**.

1.1.2 Ramboll Hong Kong Limited is commissioned by the Applicant / project proponent to prepare an Environmental Review (ER) for the Proposed Development from an environmental aspect. The Proposed Development scheme adopted in the assessment is provided by the project architect.

1.1.3 The ER includes the following major environmental issues;

i. Qualitative air quality impact on the proposed development

ii. Review of the traffic noise impact from the adjacent road networks on the proposed development; and

iii. Review of the railway noise impact on the Proposed Development.

1.1.4 The Proposed Development will have population intake after completion of infrastructure surrounding the Proposed Development. The existing potential fixed noise sources are expected to be demolished before population intake. The future planned fixed noise sources are expected to comply with Hong Kong Planning Standards and Guidelines (HKPSG) criteria which is 5 dB(A) below Acceptable Noise Levels (ANL) or prevailing background noise. Therefore, adverse fixed noise impact is not expected.

1.2 Proposed Development

1.2.1 The Application Site comprises of 2 sub-sites, namely Application Site 32B – Site A and Application Site 32B – Site B

1.2.2 The master layout plan of the Proposed Scheme is shown in **Appendix 1.2**. Details of Proposed Development are summarized in **Table 1.1** below.

Table 1.1 Development Parameters for Proposed Development in Application Site

Development Parameters		Application Site 32B – Site A	Application Site 32B – Site B
Site Area (m^2)		8,967	4,634
Building Height (mPD)		200	200
GFA (m^2)	Residential	58,144 [1]	0
	Clubhouse	2,325	0
	Office / Hotel / Hostel Development	0	65,845
	Commercial	5,221	0
Remark: [1] 58,144m^2 of residential GFA in Application Site 32B – Site A can provide 1,240 no. of residential units. [2] GFA for non-domestic areas do not require approval and are indicative only.			

1.2.3 It is anticipated the Proposed Development will be completed in 2033.

1.3 Key Environmental Issues and Study Approach

1.3.1 Key Environmental issues and concerns as identified for the Project include:

Air

1.3.2 The potential air quality impacts arising from the vehicular emissions of the nearby roads and chimney emissions (if any). The detail will be discussed at **Section 2**.

Traffic Noise

1.3.3 The identified key noise sources in the vicinity of the Application Site include the road traffic noise from nearby road network. Practical noise mitigation measures should be recommended where required in order to satisfy the requirement of the HKPSG. The detail will be discussed at **Section 3.**

Railway Noise

1.3.4 EIA report of Agreement No. CE 2/2011 (CE) Hung Shui Kiu New Development Area Planning and Engineering Study – Investigation (HSK NDA P&E Study) is reviewed. Practical noise mitigation measures should be recommended where required in order to satisfy the requirement of HKPSG and Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Site (IND-TM). The detail will be discussed at **Section 4**.

Fixed Noise

1.3.5 Potential fixed noise sources associated with the proposed Development includes mechanical ventilation and air conditioning (MVAC) system equipment. Other building services equipment, such as water pumps, lift machine etc., will be enclosed within the plant rooms. The planned fixed noise sources shall be designed to meet the HKPSG requirement. With the mitigation measures, it is expected there would be no insurmountable noise impact from fixed noise sources of proposed Development to nearby noise sensitive receivers.

Land Contamination

1.3.6 Land contamination assessment and the decontamination work (if needed) will be conducted by the developer and submitted to the EPD for endorsement prior to the commencement of any construction/ development works.

2. QUALITATIVE AIR QUALITY IMPACT ASSESSMENT

2.1 Introduction

2.1.1 This section examines the potential air quality impacts arising from all relevant emission sources in the vicinity of the Application Site.

2.2 Environmental Legislation and Guidelines

2.2.1 The following legislation and regulations provide the standards and guidelines for evaluation of air quality impacts and the type of works that are subject to air pollution control:

- Air Pollution Control Ordinance (APCO) (Cap. 311) and the Air Quality Objectives (AQO)
- Environmental Impact Assessment Ordinance (EIAO) (Cap. 499.S16), EIAO-TM, Annexes 4 and 12
- HKPSG

2.3 Impact of Industrial Emission

2.3.1 No existing or planned industrial chimneys have been identified within 200 m from the boundary of the Application Site after population intake of the Proposed Development, based on the best available information.

2.4 Impact of Vehicular Emission

2.4.1 The HKPSG has provided a set of guidelines to assess the potential air quality impacts generated from traffic. According to Table 3.1 in Chapter 9 of HKPSG, a number of horizontal buffer distance between kerb side of roads and sensitive uses is recommended for various types of road.

2.4.2 The Application Site will be bounded by planned road (Road L22) which is classified as local distributor, in accordance with the PEP Item No. 7787CL (Part) and 7829CL Hung Shui Kiu / Ha Tsuen New Development Area Advance Works Phase 3 and Stage 2 Works – Site Formation and Engineering Infrastructure issued by CEDD. According to the Table 3.1 of Chapter 9 of HKPSG, the recommended buffer distance from local distributor is >5m for active and passive recreational uses. The planned roads and its recommended buffer distance are shown in **Figure 2.1**.

2.4.3 In **Figure 2.1**, there is >5m buffer distance from local distributor to the residential development within Application Site 32B – Site A. For Application Site 32B – Site B, although part of the hotel development falls within the 5m buffer distance from the planned road (L22), the planned hotel relies on central ventilation and fresh air intake(s). It is confirmed that no air sensitive uses, including openable windows, fresh air intake of mechanical ventilation and recreational uses in the open area, would be located within the buffer zones.

2.4.4 As the Application Site is located within the HSK NDA, the above review is based on the current best available information, i.e. the roads networks within the 500m assessment areas from the proposed developments shown in the drawings from PWP Item Nos. 7787CL (Part) and 7829CL Hung Shui Kiu / Ha Tsuen New Development Area Advanced Works Phase 3 and Stage 2 Works – Site formation and Engineering Infrastructure.

2.5 Impact of emission source within Site

2.5.1 Within the Application Site, hotel and residential development are proposed. An above ground car park and commercial use in terms of retails will be provided to support the proposed development. As such, the potential air emission source would be the exhaust of the above ground car park and potential kitchen exhaust from the food and beverage areas, if any.

Above Ground Car Park

2.5.2 For the above ground car park proposed in the Application Site, its design and operation of the proposed carparks will comply with ProPECC PN 2/96 on Control of Air Pollution in Car Parks. There is no detailed layout of the carparks and its associated design at the moment, nevertheless, the future exhaust outlets will be located at the façade facing towards either the road D7 or the road L22, to avoid nuisance to any air-sensitive uses of the proposed development or other existing and planned ASRs.

Oily Fume & Cooking Odour

2.5.3 If there are any food and beverage (F&B) areas to be provided in the Proposed Development, appropriate Air Pollution Control Equipment such as exhaust hoods and grease trap will be provided and the air change rate for the F&B area will be designed according to the standard of kitchen as stipulated in Building Department's Practice Note for Authorized Persons (PNAP). Potential odour emissions will be minimised as far as practicable. The following considerations recommended in EPD's Control of Oil Fume and Cooking Odour from Restaurant and Food Business shall be taken into account in the detailed design when positioning the exhaust outlets:

- Locate the outlet at such a place where the ventilation is good and the emissions from them can be adequately dispersed without hindrance
- Provide sufficient separation distance from any sensitive receptor in the vicinity so that the emissions will not cause, or contribute to, an odour nuisance or other type of air pollution to the public
- Ensure the emissions from the exhaust system will be directed vertically upwards, unless it can be demonstrated by an environmental professional that other direction is more advantageous in preventing emissions from causing air pollution problems
- Ensure that emissions from the exhaust system will not be restricted nor deflected by, for example, the use of plates or caps

2.6 Impact of off-site planned PTI at Area 32A

2.6.1 According to the Outline Development Plan of HSK NDA, there is a planned PTI at the planned commercial site Area 4-13a, i.e. Planning Area 32A. Based on the best available information, there is no program of the construction and operation of the PTI, nor the design of the PTI. The shortest distance from the boundary of the Application Site to the boundary of the Area 4-13a is around 25m. Nevertheless, for the planned PTI which is constructed by other applicants, their design should take the surrounding air sensitive uses into account for the design of the openings and exhausts outlets, such that the potential nuisance to any air-sensitive uses in the surrounding areas to be minimized. According to the Explanatory Statement of the HSK Outline Zoning Plan (OZP) (S/HSK/3) for the Planning Area 32A, the future development of the site should be governed by Master Layout Plan (MLP) submission under lease. With the careful design of the future PTI by the owner of the Planning Area 32A, it is believed that the

operation of the future PTI should not pose any adverse impact nor nuisance to the surrounding air sensitive use, including the Application Site.

2.7 Impact of Future Industrial Use at Area 35

2.7.1 According to the HSK ODP, there is an industrial zone assigned at Planning Area 35 (two sub-zones are named as 3-50 and 3-51). The Planning Area 35 is about more than 250m west of the Application Site with the major highway Kong Sham Western Highway located in between.

2.7.2 Based on the current public available information, there is no specific use identified at this industrial use area or the operation information of future industrial use. The whole HSK NDA is still in a planning stage.

2.7.3 According to the notes of the industrial use in the OZP S/HSK/3, this industrial zone is intended primarily for general industrial uses to ensure an adequate supply of industrial floor space to meet demand from production-oriented industries. Information technology and telecommunications industries, office related to industrial uses, and selected uses akin to industrial production and would not compromise building and fire safety are also always permitted in this zone.

2.7.4 The separation from the planned industrial use and the Application Site is more than 250m with the major highway Kong Sham Western Highway and the planned commercial located in between. With this buffer separation, the potential nuisance from the planned industrial use to the Application Site should be minimized. Furthermore, the proposed use at the western boundary of the Application Site is Hotel, which is equipped with central ventilation system, i.e. not rely on openable windows for ventilation. The residential use is located behind the hotel use. With the further separation of the planned industrial use, the location of central ventilation building in between and the well planned use within the planned industrial zone, the future occupants at the residential portion of the Application Site is unlikely to be subject to any adverse air quality impact.

2.8 Conclusion for Operational Phase

2.8.1 As no openable windows, fresh air intakes and recreational uses in the open spaces fall within the 5m buffer distance from local distributor (L22), the proposed development will not be subject to adverse air quality impacts from vehicular emissions.

2.8.2 All existing and planned air pollutant and odour emission sources within the 500m assessment area have been identified based on the best available information. No adverse air quality impacts on the air-sensitive uses of the proposed development are anticipated.

2.9 Potential Impact Arising from Proposed Development – Construction Phase

2.9.1 During the construction phase of the Proposed Development, there may be potential air quality impacts upon the nearby air sensitive receivers (ASRs). The representative ASRs during construction phase among all Development Sites are identified and listed in Table 2.1 and their locations are shown in **Figure 2.2**.

Table 2.1 Distance of the ASRs from the Application Site Boundary

ASR IDs	Descriptions	Distance from the Application Site Boundary (m)
A1	Planned Commercial Use at Area 32A	~15
A2	Planned Commercial Use at Area 32C	~ 0
A3	Planned Residential Development at Area 34B	~58

Identification of Potential Emissions

2.9.2 Construction vehicles and machinery are a potential source of air pollutant emissions during the construction phase. Significant emissions are not anticipated from the criteria pollutants – NO_2, SO_2, and CO, etc. as only a limited number of diesel/ petroleum fuelled machinery would be operated at the Subject Site. Besides, the Subject Site is located at an area where supply of electricity is available. Therefore, the number of diesel/ petroleum fuelled machinery operated at the Subject Site shall be minimized as practically as possible with the use of electric construction machinery. Moreover, under the Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation, only approved or exempted non-road mobile machineries (including mobile generator, air compressor, crawler crane, bulldozer, etc.) with a proper label are allowed to be used in the construction site, which would meet the prescribed emission standards and requirement. According to the requirements stipulated in the Air Pollution Control (Fuel Restriction) Regulations and its amendment, using liquid fuel with a sulphur content of less than 0.001% by weight (such as Ultra Low Sulphur Diesel) for the equipment should be fulfilled to control the SO_2 and PM emissions. Travelling of the dump trucks is another potential source of air emission of construction. At this planning application stage, there is no detailed information on the construction program or amount of excavated material to be handled. However, it is anticipated that the volume of excavated materials to be handled would be about 13,601 m^3 where no basement carpark is proposed. The excavation is for just removal of top soil for foundation. The period of excavation is anticipated to be around 6 months. There is likely to be around 9 dump trucks per day (assuming each truck can carry 15 tonnes and there is around 270 working days per year) during the site formation stage of the Development Site. Watering the haul road and the site once per hour would be implemented to minimize the potential dust emission during the travelling of the dump trucks within the site. With reference to other similar scale projects, the number of on-site diesel/petroleum fuelled machinery (20-21 machineries) to be used for construction works is limited owing to the small size of the work site with an area of 13,601 m2. In addition, availability of electricity supply during construction of the project will be explored and such requirement will be specified in future contract. If available, contractor should maximise use of electric non-road mobile machinery (NRMMs) and with least reliance of diesel fuelled equipment (e.g. for electricity powered stationary equipment such as pump instead of using generator). Moreover, air quality impact due to construction shall be reviewed at the later stage.

2.9.3 Based on the best available information, the potential concurrent project within 500m of the Project Site boundary is the Proposed Development at 32C. The major

construction dust and gaseous emission would be from earthworks. It is recommended that the future Contractor of the proposed development to closely liaise with concurrent projects to avoid cumulative air quality nuisance on nearby ASRs due to construction by programme arrangement of major dust and gaseous emission activities. Proper mitigation measures including watering frequently and good site practice will be implemented to ensure that their construction activities would not cause adverse construction dust impact. Therefore, adverse cumulative air quality impact arising from construction activities of the concurrent project are not anticipated.

Mitigation Measures for Fugitive Dust and Air Quality Impact

2.9.4 Since paved roads are already existing within the Subject Site, it is expected that the construction dust to be generated by vehicle movement within the Subject Site are limited. Air pollutant emission mostly arises from construction activities and can be effectively suppressed by incorporating proper mitigation measures into work procedures through contractual clauses with reference to EPD's Recommended Pollution Control Clauses for Construction Contracts, where applicable, good site management, and close monitoring by the resident engineers. The contractor shall be required to follow the requirements of the Air Pollution Control (Construction Dust) Regulations for demolition and construction of the project. With the adoption of good practices, it is expected that emission of construction dust can be kept at an acceptable level. Mitigation measures including but not limited to the followings with respect to demolition, infrastructure construction of a building should be implemented as appropriate.

In the case of demolition works:

- The area at which demolition work takes place shall be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the demolition activities so as to maintain the entire surface wet;
- For any wall of the building to be demolished that abuts or fronts upon a street, service lane or other open area accessible to the public, impervious dust screens or sheeting shall be used to enclose the whole wall to a height of at least 1m higher than the highest level of the structure being demolished;
- Any dusty materials remaining after a stockpile is removed shall be wetted with water and cleared from the surface of roads or streets.

In the case of infrastructure construction works/ site formation/ excavation/ earthworks:

- Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting shall be provided to enclose the scaffolding from the ground floor level of the building;
- Any skip hoist for material transport shall be totally enclosed by impervious sheeting;
- Any relevant requirements set outs in Parts III and IV of Air Pollution Control (Construction Dust) Regulations shall be met;
- Vehicle washing facilities including a high pressure water jet shall be provided at every discernible or designated vehicle exit point;
- Where a site boundary adjoins a road, street, service lane or other area accessible to the public, hoarding of not less than 2.4 m high from ground

level shall be provided along the entire length of that portion of the site boundary except for a site entrance or exit;

- Locate all the dusty activities away from any nearby ASRs as far as practicable;
- Erect higher hoarding at the locations with ASRs in immediate proximity to the project site boundary;
- Avoid using exempted non-road mobile machineries;
- Consider connecting construction plant and equipment to mains electricity supply and avoid use of diesel generators and diesel-powered equipment as far as practicable.

The additional dust mitigation measures are described below:

Monitoring and Auditing

2.9.5 Regular site audit will be implemented to ensure that mitigation measures are in place.

General Site Management

2.9.6 Appropriate working methods should be devised and arranged to minimise air pollutant emissions and to ensure any installed control system and/or measures are operated and/or implemented in accordance with their design merits. No free falling of construction debris should be allowed, which should be let down by hoist or enclosed tunnel to the ground.

2.9.7 A high standard of housekeeping shall be maintained. Any piles of materials accumulated on or around the work areas shall be cleaned up regularly. Cleaning, repair and maintenance of all plant facilities within the work areas shall be carried out in a manner to minimize air emissions. Prior to cleaning, the materials should be handled properly to prevent fugitive dust emission. Any exposed earth shall be properly treated by compacting or hydro seeding, within 6 months after the last construction activity.

2.9.8 Frequent mist/ water spraying should be applied on dusty areas. The frequency of spraying will depend upon local conditions such as rainfall, temperature, wind speed and humidity. The amount of water spraying should be just enough to dampen the material without over-watering which could result in surface water runoff.

Material Stockpiling and Handling

2.9.9 The amount of stockpiling should be minimised where possible. Construction material or debris should be covered and stored inside enclosed areas. Other control measures such as enclosed or semi-enclosed windboard should be used, where applicable, to minimise dust emission. Regular watering is needed at areas such as storage piles, where there could be potential dust emission.

Dust Emissions from Site Traffic

2.9.10 Dust emission from construction traffic is generated predominantly from the travelling of dump trucks. Areas within the Subject Site where there are regular vehicle movements should have a hard surface. Speed controls at an upper limit of 10km/hr should be imposed and their movements should be confined to designated roadways within the Subject Site. All dusty vehicle loads should have side and tail boards covered by tarpaulin extending at least 300mm over the edges. Wheel-wash troughs and hoses should be provided at exit points of the Subject Site.

2.9.11 "Recommended Pollution Control Clauses for Construction Contracts" is available on the EPD website which set out the recommended air pollution control measures to be implemented by the contractor(s) during the construction stage of the Project.

2.9.12 With the adoption of good practices, it is expected that construction air quality impact can be minimized.

3. TRAFFIC NOISE IMPACT ASSESSMENT

3.1 Introduction

3.1.1 This section assesses the potential road traffic noise impacts on the noise sensitive uses of the Proposed Development. Practical mitigation measures are proposed to mitigate the potential noise impacts, where necessary.

3.2 Road Traffic Noise Impact Assessment

Assessment Criteria

3.2.1 Noise standards are recommended in Chapter 9, "Environment", of the HKPSG for planning against possible noise impact from road traffic, railway and aircrafts. According to the guidelines, the maximum allowed road traffic noise level, measured in terms of $L_{10(1\ hr.)}$, at noise sensitive facades of the Proposed Development is recommended to be 70 dB(A).

3.2.2 In the present scenario, the maximum noise levels due to traffic on the surrounding roads in terms of $L_{10(1\ hr)}$ should not exceed 70 dB(A) at the noise sensitive facades of the Proposed Development. This criterion applies to uses which rely on opened windows for ventilation.

Review of the Traffic Noise Impact

3.2.3 With reference to the EIA report of Agreement No. CE 2/2011 (CE) Hung Shui Kiu New Development Area Planning and Engineering Study – Investigation (HSK NDA P&E Study), although the traffic noise assessment of the Application Site is not conducted in the HSK NDA P&E Study, the traffic noise assessment of nearby sites, including Site 4-10 at Area 34B are conducted. Same as the Application Site, this 4-10 residential development is located at the same side of the Road D6. The traffic noise results of the nearby site is summarized in **Table 3.1** and attached in **Appendix 3.1**.

Table 3.1 Traffic noise results of the nearby sites

Site	Predicted Unmitigated Overall Noise Level, dB(A)	Compliance of Noise Criteria after Mitigation
4-10	61-68	Yes

3.2.4 The Application Site and Site 4-10 are both located west of the Road D6 with a longer buffer distance and smaller angle of view from Road D6, it can be predicted that the maximum noise levels due to traffic on the surrounding roads of the Application Site in terms of $L_{10(1\ hr)}$ would be similar to that in Site 4-10 (i.e., <70 dB(A)).

3.2.5 For the local road L22 which is a dead-end road, the Application Site is located at its end with the proposed hotel portion located next to the roundabout of the L22. The residential towers shown in the indicative master layout plan are located at the southeastern end of the Application Site. With sufficient buffer distance and limited angle of view to the roundabout of the L22, it is anticipated that there should not have any significant noise impact upon the residential tower.

3.2.6 For the existing Kong Sham Western Highway and the adjacent Road P1, it is about 210m northwest from the boundary of the Application Site, and about 270m to 280m northwest from the residential portion of the proposed development. The large buffer distance from the proposed residential towers to the two major roads would reduce the noise level by equal to or more than 13 dB(A) in accordance with the Calculation of

Road Traffic Noise (i.e. 10*log(270m/13.5m). Moreover, the planned public housing developments at Area 34A and 34B with tentative completion year of 2032 are located northwest of the Application Site. The building structure of future public housing development would provide shielding for the traffic noise from the Kong Sham Western Highway and the Road P1 for the proposed development so that the noise level experienced by the proposed residential towers would be further largely reduced, even if there is a delay on the construction of the hotel portion of the proposed development. With sufficient buffer distance and presence of building structure located in between, it is anticipated that the proposed development is unlikely to be subject to adverse traffic noise impact from the Kong Sham Western Highway and Road P1.

3.2.7 Nevertheless, detailed calculation on the traffic noise level of the Application Site shall be conducted in next stage to further ensure the traffic noise level would not exceed 70dB(A). In case of any exceedance, mitigation measures, such as acoustic window and balcony shall be applied. Under the current public information, such as EPD's Practice Note ProPECC PN 5/23, the noise reduction provided by the acoustic window and balcony can be up to 8 dB(A) which is considered to be adequate to mitigate the relevant exceedance, if any, at the Application Site.

3.3 Conclusion

3.3.1 It is expected that the maximum noise levels due to traffic on the surrounding roads in terms of L10(1 hr) would not exceed 70 dB(A) with sufficient buffer distance and present of building structure in between.

3.3.2 Nevertheless, the whole HSK NDA is still under planning and there is no detail layout of the proposed development, detailed calculation on the traffic noise level of the Application Site shall be conducted in next stage under the lease to further ensure the traffic noise level would not exceed 70dB(A). In case of any exceedance, mitigation measures, such as acoustic window and balcony shall be applied.

4. RAILWAY NOISE IMPACT ASSESSMENT

4.1 Introduction

4.1.1 This section assesses the potential railway noise impacts on the noise sensitive uses of the Proposed Development. Practical mitigation measures are proposed to mitigate the potential noise impacts, where necessary.

4.2 Railway Noise Impact Assessment

Assessment Criteria

4.2.1 Noise standards are recommended in Chapter 9, "Environment", of the HKPSG for planning against possible noise impact from road traffic, railway and aircrafts. According to the guidelines, an averaged noise level, measured in terms of $L_{eq\ (24\ hr)}$ is recommended to be 65dB(A) and the maximum noise levels due to rail traffic during the night time (2300 – 0700) in terms of L_{max} is recommended to be 85dB(A).

4.2.2 The EIAO-TM and IND-TM stipulate the appropriate ANL for rail noise. The ANLs are dependent on ASRs of the NSRs and are shown in Table 4.4.

Table 4.1 Acceptable Noise Levels for Railway Noise

Time Period	ANL on Different Area Sensitivity Rating for Rail Noise, (L_{eq}, 30min, dB(A))		
	ASR "A"	ASR "B"	ASR "C"
Day (0700 to 1900 hours)	60	65	70
Evening (1900 to 2300 hours)	60	65	70
Night (2300 to 0700 hours)	50	55	60

4.2.3 The study area within Hung Shui Kiu and Ha Tsuen OZP is a developed area, in particular the surrounding uses are zoned "C" for commercial development. According to Table 1 in the IND-TM, the type of area should be (iii) Urban Area. Moreover, from the HSK NDA EIA, there is no major road with the daily traffic flow more than 30,000 vehicles and there is no industrial zone located in between, i.e. there is no influence factor surrounding the Application Site. As such, ASR "B" would be adopted.

Assessment Methodology

4.2.4 With reference to the EIA report of Agreement No. CE 2/2011 (CE) Hung Shui Kiu New Development Area Planning and Engineering Study – Investigation (HSK NDA P&E Study), although the railway noise assessment of the Application Site is not conducted in the HSK NDA P&E Study, the railway noise assessment of nearby sites, including Sites 4-25c and 4-29, are conducted. The railway noise results of the nearby sites under unmitigated scenario are summarized in **Table 4.2** and shown in **Appendix 4.1**.

Table 4.2 Railway noise results of the nearby sites - Unmitigated

Site	NSR ID	Area Sensitivity Rating	Predicted Unmitigated Overall Noise Level, dB(A)			
			L_{eq}, 30min, dB(A)		L_{max}	$L_{eq(24\ hr)}$
			Day & Evening (0700 to 2300 hours)	Night (2300 to 0700 hours)		
4-25c	WR-P6a	B	39-52	38-51	40-57	37-52
	WR-P6b	B	39-52	37-51	39-57	37-52
	WR-P6c	B	38-51	37-49	37-55	37-51
4-29	WR-P7a	B	44-56	43-55	49-63	44-56
	WR-P7b	B	47-59	45-**57** *	50-64	47-59
	WR-P7c	B	45-57	44-**56** *	50-64	45-57

Remark:

* **Bold and underline** indicates exceedance of the related criteria.

4.2.5 As shown in **Table 4.2**, there are exceedance at NSR ID WR-P7b and WR-P7c within Site 4-29, hence, mitigation measures are proposed in the HSK NDA P&E Study. The proposed mitigation measures and the railway noise results of the nearby sites under mitigated scenario are summarized in **Table 4.3**.

Table 4.3 Railway noise results of the nearby sites - Mitigated

Site	NSR ID	Proposed Mitigation Measures	Predicted Unmitigated Overall Noise Level, dB(A)			
			$L_{eq(30min)}$, dB(A)		L_{max}	$L_{eq(24\ hr)}$
			Day & Evening (0700 to 2300 hours)	Night (2300 to 0700 hours)		
4-29	WR-P7b	Layout set back to 70m from Tuen Ma Line (TML)	45-57	44-55	48-61	45-57
	WR-P7c	Layout set back to 70m from Tuen Ma Line (TML)	44-56	43-54	48-61	44-56

4.2.6 As the shortest distance between the WRL and the Application Site (~ 131m) is farther than that between the WRL and the Site 4-29 (55m) as well as the recommended setback (70m) under the EIA, no exceedance on $L_{eq(30min)}$ (Day and Evening hours), L_{max} and $L_{eq(24\ hr)}$ is expected.

4.2.7 Detailed calculation on the railway noise level of the Application Site shall be conducted in next stage to further ensure the railway noise level would not exceed the acceptable noise level of $L_{eq(30min)}$ (Day, Evening and Night hours), L_{max} and $L_{eq(24\ hr)}$. In case of any

exceedance, mitigation measures, such as layout set back and acoustic fins or provision of acoustic window/balcony shall be applied.

4.3 Conclusion

4.3.1 It is expected that there is no exceedance on Leq(30min) (Day, Evening and Night hours), Lmax and Leq(24 hr).

4.3.2 Detailed calculation on the railway noise level of the Application Site shall be conducted in next stage to further ensure the railway noise level would not exceed the acceptable noise level of $L_{eq(30min)}$ (Day, Evening and Night hours), L_{max} and $L_{eq(24\ hr)}$. In case of any exceedance, mitigation measures, such as layout set back and acoustic fins or provision of acoustic window/balcony shall be applied.

5. TRANSIT NOISE IMPACT ASSESSMENT

5.1 Review of the Smart and Green Mass Transportation System (SGMTS)

5.1.1 The Smart and Green Mass Transit System (SGMTS) in Hung Shui Kiu/Ha Tsuen and Yuen Long South New Development Areas is about 16 kilometres in length, most of which are dedicated roads. The SGMTS will adopt a green road-based mode without the need for physical rail tracks, aiming to providing the public with convenient feeder services to travel to various area within the HSK NDA, in accordance with the SGMTS website (https://www.hskhtsgmts.hk/en/home/)

5.1.2 In the SGMTS website, the project is still under design, and detailed information or operation mode of the SGMTS is not available at this stage. Nevertheless, the SGMTS will adopt a green road-based mode, requiring no physical tracks and overhead electrical cable which flexibly adjusting its routing and service frequencies. The design of the SGMTS can also minimize environmental impact while saving construction time and costs. In addition, innovative paving materials will be considered for the road surface in accordance with the SGMTS website.

5.1.3 The SGMTS is still under the planning stage and there is no detailed information about its final design and operation. Nevertheless, it is expected that the operation of SGMTS should not induce insurmountable impact upon the proposed development. Dedicated roads are assigned for the SGMTS only that the number of vehicles travelling is expected not to be many. Also, electricity vehicles may be adopted that the engine noise would not as noisy as traditional vehicles. According to the SGMTS website, the system travelling close the Application Site is about 4.5 km long with seven proposed stations. The travelling speed of the SGMTS is expected not to be as fast as major roads. With a relatively low speed, the noise from the traveling should not be high.

5.1.4 A detailed assessment will be carried out at later stage to review the potential noise impact from the SGMTS to the proposed development when the information is available. Practical mitigation measures will be considered if any unacceptable impact is identified.

6. CONSTRUCTION NOISE IMPACT ASSESSMENT

6.1 Introduction

6.1.1 During the construction phase of the Proposed Development, major noise impacts would arise from piling works, operation of Powered Mechanical Equipment (PME), and construction-related traffic.

6.2 Construction Noise Criteria

6.2.1 Construction noise is controlled under the Noise Control Ordinance (NCO) which prohibits the use of powered mechanical equipment (PME) during the restricted hours (7 p.m. to 7 a.m. on normal weekdays and any time on a public holiday, including Sunday) without a valid Construction Noise Permit (CNP) from the Authority. The criteria and procedures for issuing such a permit are specified in the "Technical Memorandum on Noise from Construction Works Other than Percussive Piling" (TM1). While there is no planned construction works to be carried out during the restricted hours, TM1 should be followed in case there is any need to carry out works in such time period in future.

6.2.2 With effect from 1 November 1996, the use of specified powered mechanical equipment (SPME) for carrying out construction work other than percussive piling and/ or the carrying out of prescribed construction work (PCW) within a designated area are also brought under control. The relevant technical details are provided in the "Technical Memorandum on Noise from Construction Work in Designated Areas" (TM2).

6.2.3 Percussive pilling is controlled similarly by a construction noise permit system and described in the NCO and the "Technical Memorandum on Noise from Percussive Piling" (TM3) which restrict the number of hours during which piling can be conducted. Percussive piling is prohibited between 7 p.m. and 7 a.m. and on holidays (including Sundays). Percussive piling during the daytime (i.e. between 7 a.m. and 7 p.m. on any day not being a holiday) may be carried out in accordance with the permitted hours and other conditions under a valid construction noise permit.

6.2.4 For construction works other than percussive piling, although TM1 does not provide control over daytime construction activities, noise limits as shown in below are set out in the "Practice Note for Professional Persons Environmental Consultative Committee" (ProPECC) PN 1/24.

Table 5.1 Noise Limit for Daytime Construction Activities

NSR	0700 to 1900 Hours on Any Day Not Being a Sunday or General Holiday, Leq (30min), dB(A)
Dwelling	75
School	70 65 (During Examination)

Notes:

(i) The above 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 façade.

6.3 Recommended Mitigation Measures for Construction Noise

6.3.1 Noise mitigation measures should be introduced in the Proposed Development to alleviate potential noise impacts on nearby NSRs if any. The Contractor(s) will be required under the contract to ensure regular maintenance of all plant and equipment, and that noise generation at source would be minimized and practicable noise mitigation measures would be in use. The Contractor(s) will be required to adopt quiet type construction plants (e.g. EPD's quality powered mechanical equipment (QPME) inventory), wherever practicable. Similarly, quieter method other than percussive piling will be adopted as far as practicable for any piling works subject to ground investigation result (which usually dictates the piling method). Movable noise barriers will also be erected around noisy plants in order to minimize noise generation at source. With these measures in place noise generation due to construction activities would be minimized.

6.3.2 The following general noise mitigation measures could be considered:

- Application of properly designed silencers, mufflers, acoustically dampened panels and acoustic sheds or shields, etc.;
- Use of electric-powered equipment where applicable instead of diesel-powered or pneumatic-powered equipment;
- Erecting noise enclosures/ movable noise barriers around noisy plants;
- Only well-maintained plants should be operated on-site;
- Plants should be serviced regularly during the construction programme;
- Noisy activities can be scheduled to minimize exposure of nearby NSRs to high levels of construction noise. For example, noisy activities can be scheduled for midday or at times coinciding with periods of high background noise;
- Noisy equipment such as emergency generators shall always be sited as far away as possible from noise sensitive receivers;
- Location of noise emitting plants at maximum possible distances from sensitive receivers;
- Contractual clauses for construction works; and
- Schedule of noisy operations during non-restricted hours where possible.

6.3.3 The above-mentioned noise mitigation measures will be included in the contractual clauses for implementation by the contractor(s) during the construction stage. With these measures in place, construction noise due to the Proposed Development can be minimized, and no significant noise impact is anticipated.

6.3.4 Requirements in relevant pollution control ordinances/regulations and the guideline document "Recommended Pollution Control Clause for Construction Contracts" also are relevant for construction noise control.

6.3.5 This section assesses the potential construction noise impacts on the noise sensitive uses of the Proposed Development. Practical mitigation measures are proposed to mitigate the potential noise impacts, where necessary.

7. CONCLUSION

7.1 Introduction

7.1.1 The key environmental issues associated with construction and operation phase of the Proposed Development are qualitatively reviewed in this report.

7.2 Air Quality

7.2.1 As no air-sensitive uses, including openable windows, fresh air intakes for mechanical ventilation, and recreational uses in open areas, will be located within the buffer zones for nearby roads as required under the HKPSG, and no existing or planned chimneys have been identified within 200m of the boundary of the Application Site, it is not anticipated that the proposed development will be subject to adverse air quality impacts arising from road traffic or industrial chimneys.

7.2.2 All existing and planned air pollutant and odour emission sources within the 500m assessment area have been identified based on the best available information. No adverse air quality impacts on the air-sensitive uses of the proposed development are anticipated.

7.3 Traffic Noise

7.3.1 It is expected that the maximum noise levels due to traffic on the surrounding roads in terms of L10(1 hr) would not exceed 70 dB(A) with the mitigation measures proposed in the HSK NDA P&E Study.

7.3.2 Detailed calculation on the traffic noise level of the Application Site shall be conducted in next stage to further ensure the traffic noise level would not exceed 70dB(A). In case of any exceedance, mitigation measures, such as acoustic window and balcony shall be applied with reference to the Practice Note ProPECC PN 5/23.

7.4 Railway Noise

7.4.1 It is expected that there is no exceedance on Leq(30min) (Day, Evening and Night hours), Lmax and Leq(24 hr).

7.4.2 Detailed calculation on the railway noise level of the Application Site shall be conducted in next stage to further ensure the railway noise level would not exceed the acceptable noise level of Leq(30min) (Day, Evening and Night hours), Lmax and Leq(24 hr). In case of any exceedance, mitigation measures, such as layout set back and acoustic fins shall be applied.

7.5 Transit Noise Impact Assessment

7.5.1 A detailed assessment will be carried out at later stage to review the potential noise impact from the SGMTS to the proposed development when the information is available. Practical mitigation measures will be considered if any unacceptable impact is identified.

7.6 Fixed Noise

7.6.1 The planned fixed noise sources shall be designed to meet the HKPSG requirement. With the mitigation measures, it is expected there would be no insurmountable noise impact from fixed noise sources of proposed Development to nearby noise sensitive receivers.

7.7 Construction Phase Impact

7.7.1 During construction, the project proponent would control noise, dust and site run-off nuisances to within established standard and guidelines through the implementation of relevant mitigation measures. In addition, the "Recommended Pollution Control Clauses for Construction Contracts", should also be implemented where necessary.

7.8 Further Study on Noise Impact

7.8.1 A detailed noise impact assessment (NIA) according to the actual building plan will be carried out at a later stage under the lease to confirm the location and extent of at-receiver mitigation measures, if it is required, to achieve full compliance with the road traffic noise, railway noise, fixed noise and transit noise criteria where applicable.

Figures

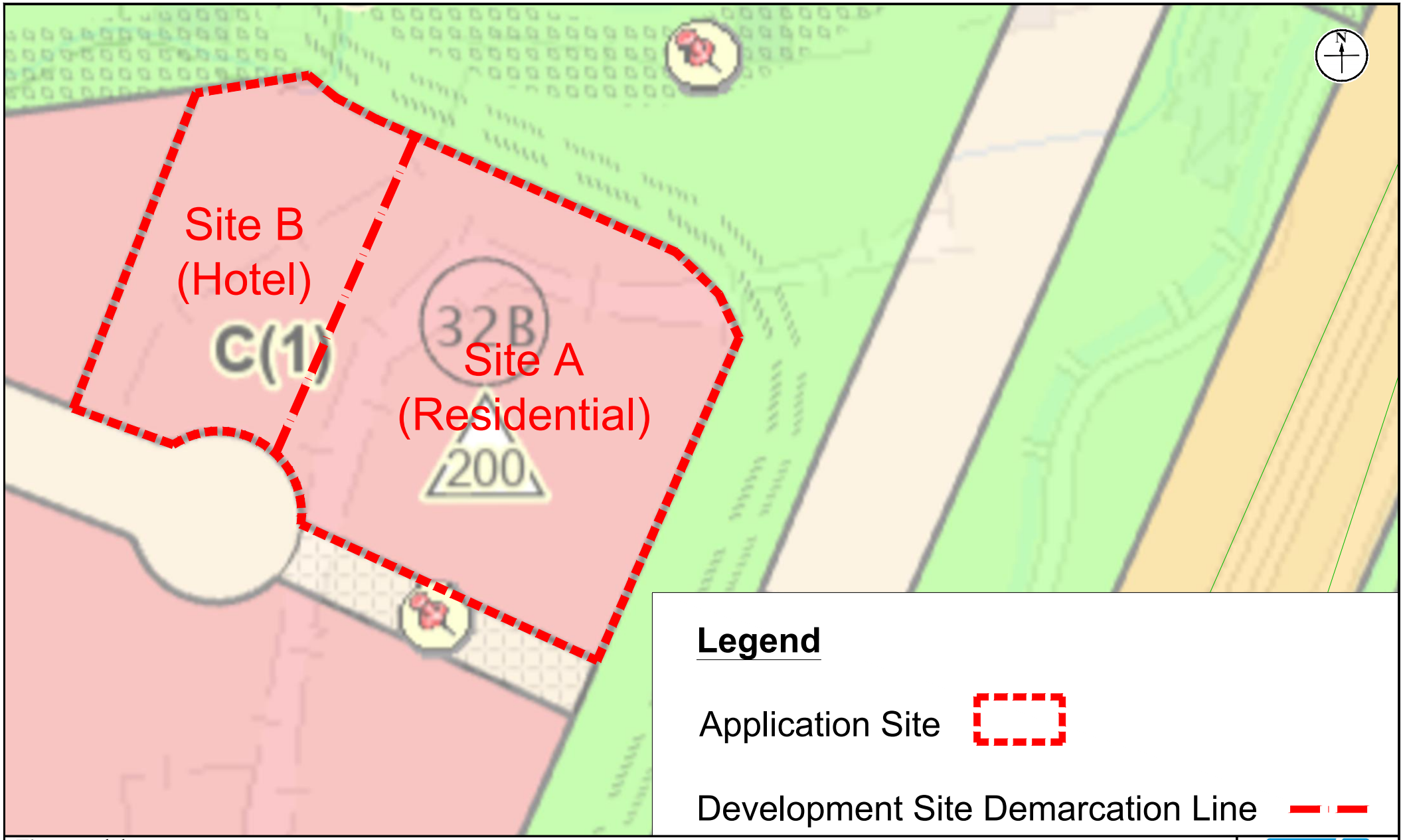


Figure: 1.1	RAMBOLL
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	Checked by: TC
Project: Planning Application for Proposed Mixed Use Development at Hung Shui Kiu/ Ha Tsuen (Areas 32B)	Rev.: 1.0
	Date: May 2026

Q:\Projects\SHKHSK32EI00\05 Assessments\Fig_EA Report_32B.dwg

Remark

No air-sensitive uses including openable windows, fresh air intakes and recreational uses in the open spaces are allowed within the buffer zone

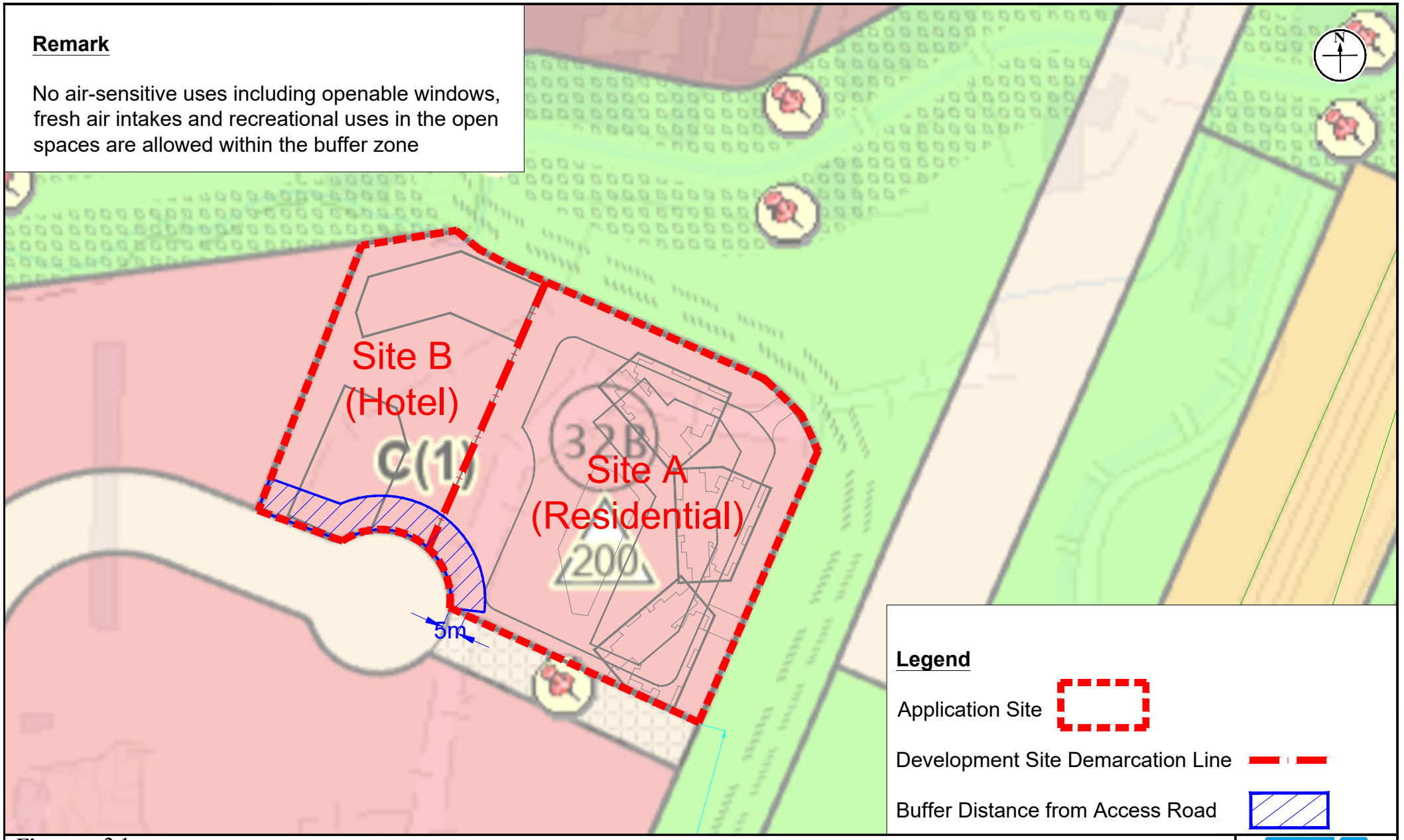


Figure: 2.1	RAMBOLL
Title: Buffer Distance for Planned Road L22	Drawn by: SC Checked by: TC
Project: Planning Application for Proposed Mixed Use Development at Hung Shui Kiu/ Ha Tsuen (32B)	Rev.: 1.0 Date: Dec 2024

Q:\Projects\SHKHSK32EI00\05 Assessments\Fig_EA Report_32B.dwg

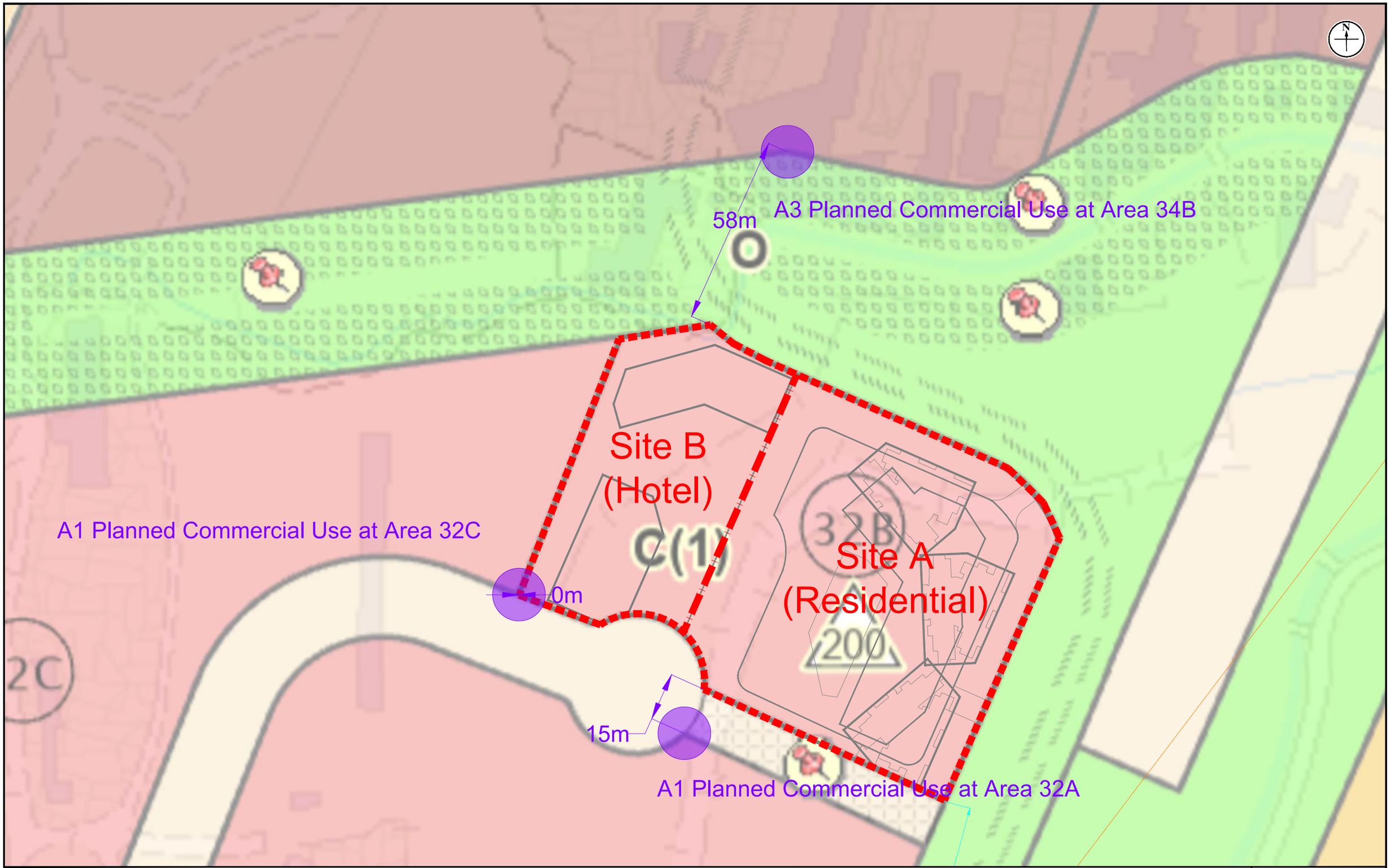
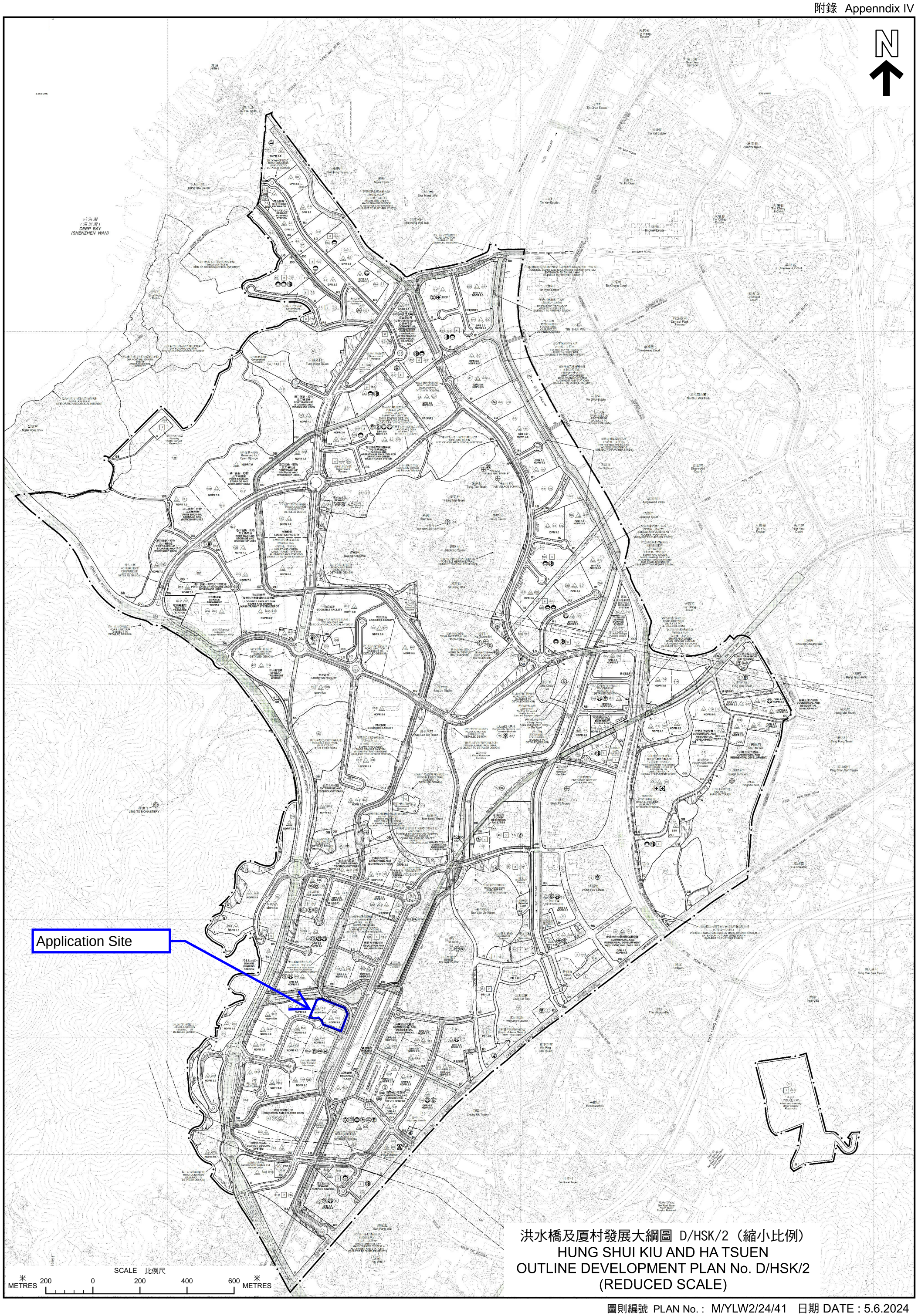


Figure:	2.2	RAMBOLL
Title:	Locations of ASRs during Construction Phase	Drawn by: SC
		Checked by: CC
Project:	Planning Application for Proposed Mixed Use Development at Hung Shui Kiu/ Ha Tsuen (32B)	Rev.: 1.0
		Date: Feb 2018

\\aphkfps3\Drive Q\Projects\SHKHSK32EI00\05 Assessments\Fig_EA Report_32B.dwg

Appendix 1.1 Revised Outline Development Plan (RODP) for Hung Shui Kiu and Ha Tsuen and Hung Shui Kiu and Ha Tsuen Outline Zoning Plan (No. S/HSK/3) (Southern Area)



洪水橋及厦村發展大綱圖 D/HSK/2（縮小比例）
HUNG SHUI KIU AND HA TSUEN
OUTLINE DEVELOPMENT PLAN No. D/HSK/2
(REDUCED SCALE)

圖則編號 PLAN No.： M/YLW2/24/41 日期 DATE : 5.6.2024

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

NOTE:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NO. 60222570/TR19A/FIGURE 2.2.

CUT LINE A-A

SEE DRAWING NO. 60222570/TR19A/FIGURE 2.2.1

N

816000 E

817000 E

833000 N

832000 N

Application Site

Yuen Tau Shan

Kau Lee Uk Tsuen

San Sang Tsuen

San Uk Tsuen

Sha Chau Lei

Shek Po Tsuen

Kiu Tau Wai

Hung Uk Tsuen

San Lee Uk Tsuen

Tin Sum Tsuen

Chung Uk Tsuen

Sun Fung Wai

Nai Wai

Tsing Chuen Wai

KONG SHAM WESTERN HIGHWAY

CASTLE PEAK ROAD

YUEN LONG HIGHWAY

COMMUNITY FARMING AND FARMERS' MARKETS

HUNG FUK ESTATE

HOSPITAL, SPECIALIST CLINIC/ POLYCLINIC

RETENTION FACILITIES

(COMMERCIAL & RESIDENTIAL DEVELOPMENT WITH LIGHT RAIL FACILITIES)

COMMERCIAL & RESIDENTIAL

OU (REGIONAL PLAZA WITH LEISURE, FOOD & BEVERAGES USES)

OU (RAILWAY STATION)

OU (VEHICLE DEPOT)

FWSR & FLWSR

Ser Res

Plot File by: ZENGFX
PATH: P:\PROJECTS\60222570\Drawing\REPORT\TR19A\TR19A_714.dgn

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PROJECT
項目

HUNG SHUI KIU NEW DEVELOPMENT AREA PLANNING AND ENGINEERING STUDY - INVESTIGATION

CLIENT
業主

CEDD
土木工程拓展署
Civil Engineering and Development Department

規劃署
Planning Department

CONSULTANT
工程顧問公司

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分判工程顧問公司

ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核對

STATUS
狀況

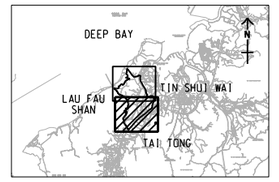
SCALE
比例

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DIMENSION UNIT
尺寸單位

METRES

KEY PLAN
索引圖 A3 1 : 500000



PROJECT NO.
項目編號

60222570

AGREEMENT NO.
協議編號

CE2/2011 (CE)

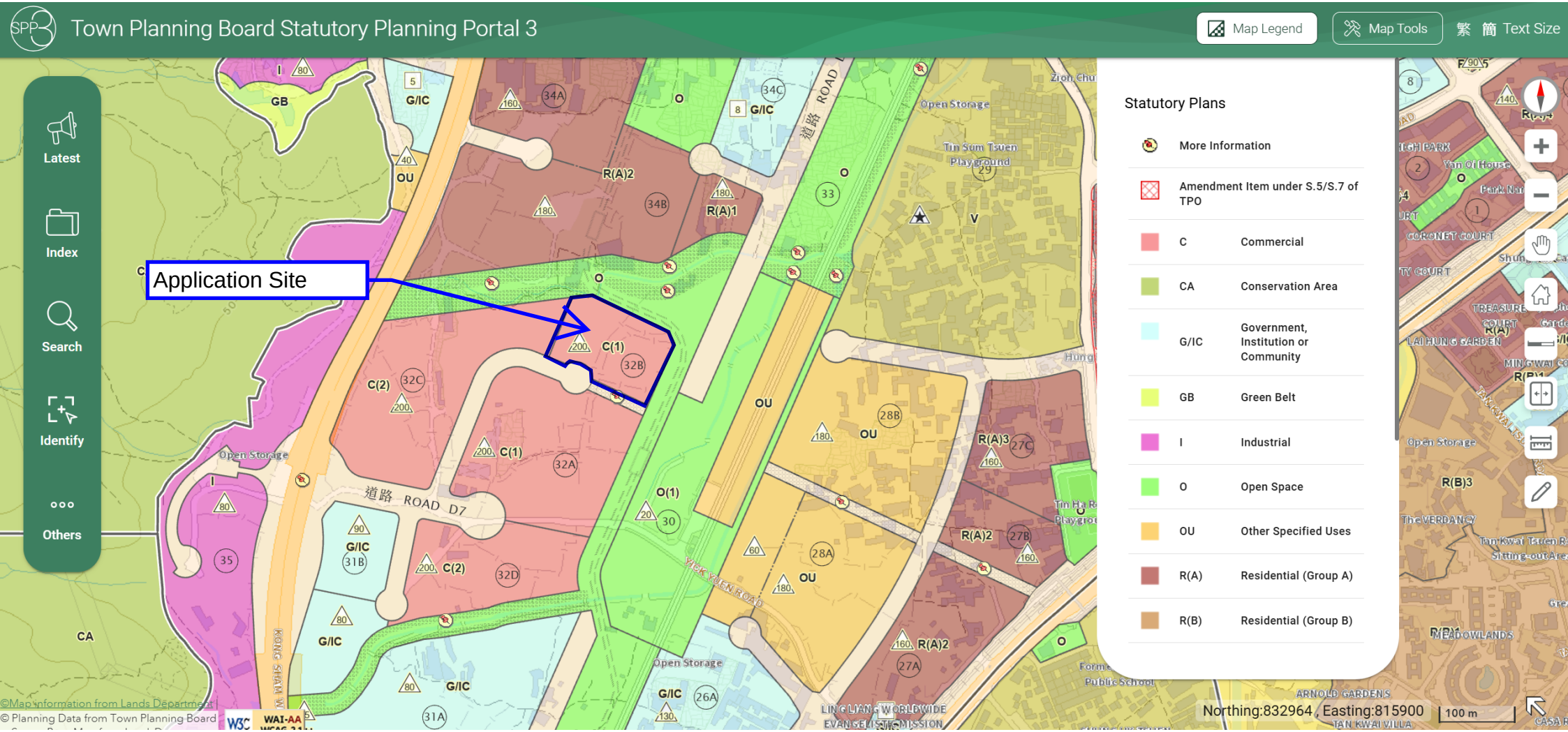
SHEET TITLE
圖紙名稱

REVISED RECOMMENDED OUTLINE DEVELOPMENT PLAN (RODP) (SOUTHERN AREA)

SHEET 2 OF 2

SHEET NUMBER
圖紙編號

60222570/TR19A/FIGURE 2.2.2


Town Planning Board Statutory Planning Portal 3
Map Legend
Map Tools
繁 簡 Text Size
Latest
Index
Search
Identify
Others
Application Site
Statutory Plans
More Information
Amendment Item under S.5/S.7 of TPO
C Commercial
CA Conservation Area
G/IC Government, Institution or Community
GB Green Belt
I Industrial
O Open Space
OU Other Specified Uses
R(A) Residential (Group A)
R(B) Residential (Group B)
道路 ROAD D7
YICK YUEN ROAD
Northing:832964 , Easting:815900
100 m
©Map information from Lands Department
© Planning Data from Town Planning Board
WAI-AA

Appendix 1.2 Master Layout Plan of the Proposed Development



Remarks

For Site B, the layout, uses and development parameters are for indicative purpose only. The proposed non-domestic development conforms to the Notes of the OZP, which commercial development with uses such as 'Office', 'Hotel', 'Shop and Services', 'Eating Place', 'Place of Entertainment', and etc. are always permitted under the OZP.

Title: Master Layout Plan		Checked	DH	Drawn MH
		Rev		Date Sept 2026
		Scale		Figure 3.1



Remarks

For Site B, the layout, uses and development parameters are for indicative purpose only. The proposed non-domestic development conforms to the Notes of the OZP, which commercial development with uses such as 'Office', 'Hotel', 'Shop and Services', 'Eating Place', 'Place of Entertainment', and etc. are always permitted under the OZP.

	Title: G/F Plan	Checked	DH	Drawn: MH
		Rev		Date: Sept 2026
		Scale		Figure: 3.2



Remarks

For Site B, the layout, uses and development parameters are for indicative purpose only. The proposed non-domestic development conforms to the Notes of the OZP, which commercial development with uses such as 'Office', 'Hotel', 'Shop and Services', 'Eating Place', 'Place of Entertainment', and etc. are always permitted under the OZP.

	Title				
	1/F Plan	Checked	DH	Drawn	MH
		Rev		Date	Sept 2026
		Scale		Figure	3.3



Remarks

For Site B, the layout, uses and development parameters are for indicative purpose only. The proposed non-domestic development conforms to the Notes of the OZP, which commercial development with uses such as 'Office', 'Hotel', 'Shop and Services', 'Eating Place', 'Place of Entertainment', and etc. are always permitted under the OZP.

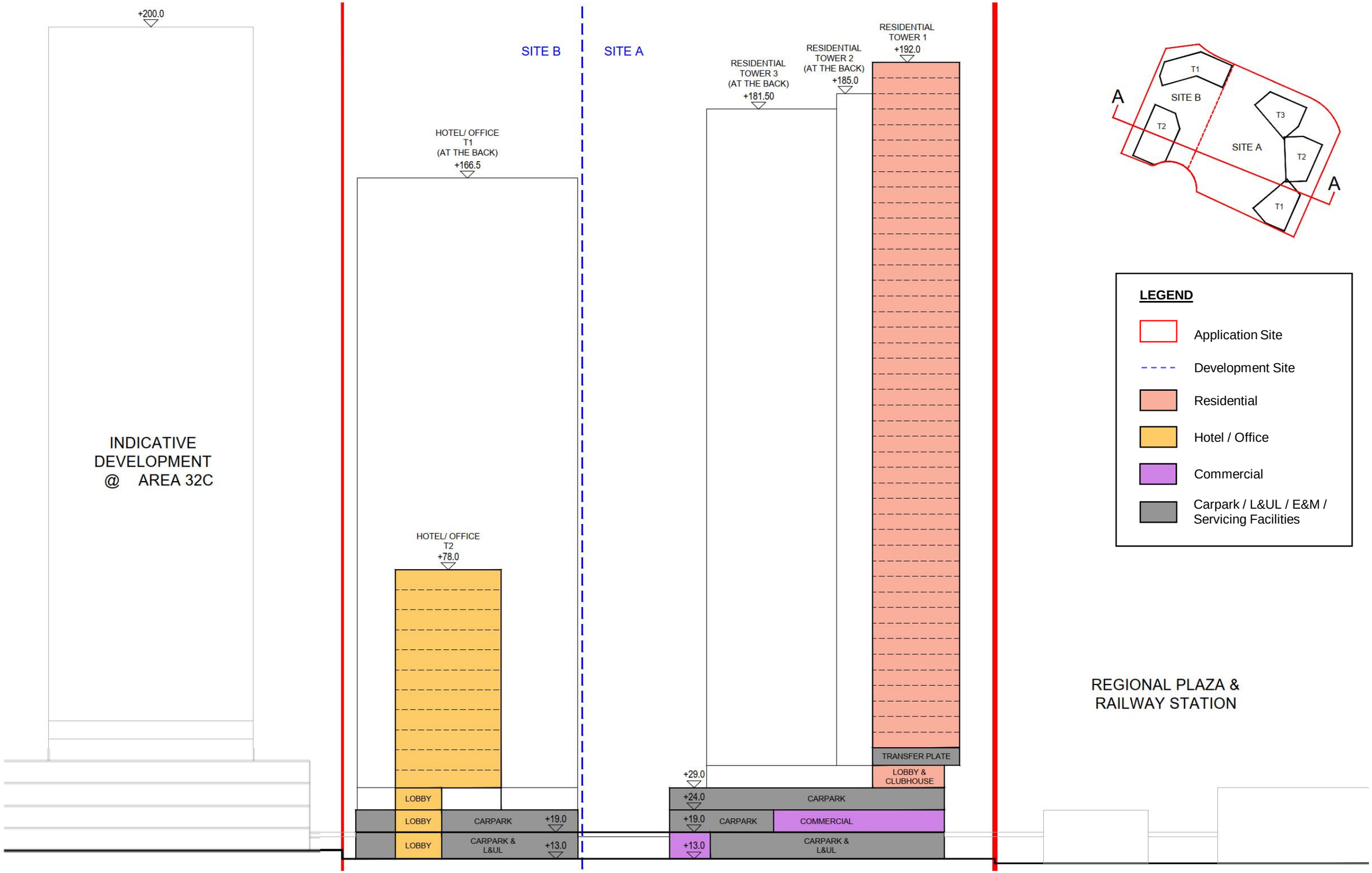
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		Rev		Date: Sept 2026
		Scale		Figure: 3.4



Remarks

For Site B, the layout, uses and development parameters are for indicative purpose only. The proposed non-domestic development conforms to the Notes of the OZP, which commercial development with uses such as 'Office', 'Hotel', 'Shop and Services', 'Eating Place', 'Place of Entertainment', and etc. are always permitted under the OZP.

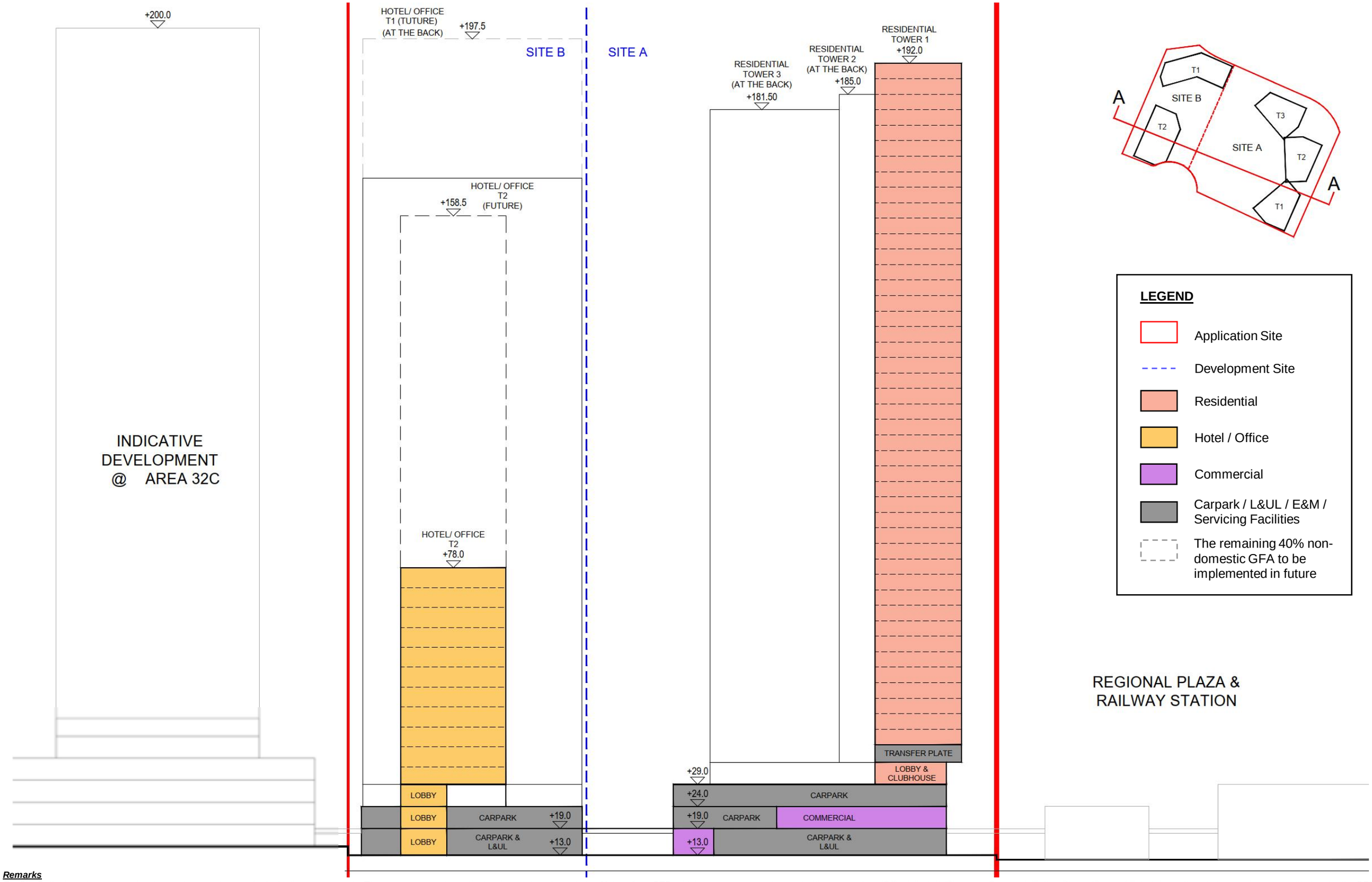
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		Rev		Date: Sept 2026
		Scale		Figure: 3.5



Remarks

For Site B, the layout, uses and development parameters are for indicative purpose only. The proposed non-domestic development conforms to the Notes of the OZP, which commercial development with uses such as 'Office', 'Hotel', 'Shop and Services', 'Eating Place', 'Place of Entertainment', and etc. are always permitted under the OZP.

	Title: Section Plan (Phase 1)	Checked	DH	Drawn MH
		Rev		Date Sept 2026
		Scale		Figure 3.6



Remarks

For Site B, the layout, uses and development parameters are for indicative purpose only. The proposed non-domestic development conforms to the Notes of the OZP, which commercial development with uses such as 'Office', 'Hotel', 'Shop and Services', 'Eating Place', 'Place of Entertainment', and etc. are always permitted under the OZP.

	Title: Section Plan (Future Scenario)	Checked	DH	Drawn MH
		Rev		Date Sept 2026
		Scale		Figure 3.7

Appendix 3.1 Traffic Noise Result in HSK NDA P&E Study

NOTE:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NO. 60222570/TR19A/FIGURE 2.2.

CUT LINE A-A

SEE DRAWING NO. 60222570/TR19A/FIGURE 2.2.1

Reference Site

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: ZENGFX
PATH: P:\PROJECTS\60222570\Drawing\REPORT\TR19A\TR19A_714.dgn

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PROJECT 項目

HUNG SHUI KIU NEW DEVELOPMENT AREA PLANNING AND ENGINEERING STUDY - INVESTIGATION

CLIENT 業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

規劃署 Planning Department

CONSULTANT 工程顧問公司

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SUB-CONSULTANTS 分判工程顧問公司

ISSUE/REVISION 修訂

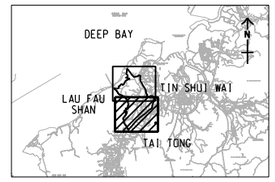
I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核實

STATUS 階段

SCALE 比例: A3 1 : 10000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖 A3 1 : 500000



PROJECT NO. 項目編號: 60222570

AGREEMENT NO. 協議編號: CE2/2011 (CE)

SHEET TITLE 圖紙名稱

REVISED RECOMMENDED OUTLINE DEVELOPMENT PLAN (RODP) (SOUTHERN AREA)

SHEET 2 OF 2

SHEET NUMBER 圖紙編號

60222570/TR19A/FIGURE 2.2.2

4.7 Traffic Noise Impact Assessment

Assessment Approach and Methodology

4.7.1 Road traffic noise impact is predicted using the methodology provided in the UK Department of Transport Calculation of Road Traffic Noise (CRTN) 1988. The computer model RoadNoise 2000 which complies with the CRTN is used for the prediction. The noise levels are presented in terms of noise levels exceeded for 10% of the one-hour period during the peak traffic flow, i.e. $L_{10(1hour)}$ dB(A).

4.7.2 Traffic noise is predicted based on the worst-case year traffic forecast within 15 years upon commencement of operation of the proposed roadwork according to Clause 3.4.5.2(vi)(a) of the EIA Study Brief. Based on the latest project programme, the proposed road network is expected to be in operation in operation in Year 2033. The assessment year for road traffic noise is taken as Year 2048 which is the maximum traffic projection within 15 years after full operation of the proposed roadwork. The peak traffic flow with the Project in Year 2048 is shown in **Appendix 4.7.1**. Transport Department (TD) has no comment on the traffic forecast adopted in this EIA study.

4.7.3 The following scenarios are studied in the assessment:

- Unmitigated scenario in Year 2048;
- Mitigated scenario in Year 2048; and
- Prevailing scenario in Year 2018 for indirect technical remedies eligibility assessment.

4.7.4 For the purpose of the traffic noise assessment in the EIA study, the roads within 300 m from the proposed Project boundary are included in the assessment. Road-plots of the traffic noise model with the extent of Project roads are depicted in **Appendix 4.7.2**. The friction course on Hung Tin Road (excluding slip roads) and Yuen Long Highway, existing noise barriers at Tin Ha Road, Hung Tin Road (in the vicinity of Hung Fuk Estate), Hung Chi Road, Hung Shui Kiu Tin Sum Road and all traffic noise mitigation measures and friction course as stated in the approved EIA Report of “Deep Bay Link” (EIA-078/2002) have been taken into account in the assessment. In this study, the planned Tuen Mun Western Bypass (TMWB) which is located next to planned Site 4-4 is also considered in the assessment with the assumption of the semi-enclosures on its slip-roads under unmitigated and mitigated scenarios.

4.7.5 The traffic speeds adopted for the roads in the noise models are summarised as follows and the traffic speed adopted for each road is presented in **Appendix 4.7.2**:

(a) KSWH and Yuen Long Highway: 80 km per hour;

(b) Tin Ying Road (for prevailing scenario only), Hung Tin Road and certain sections of Castle Peak Road: 70 km per hour; and

(c) Concerned roads other than those listed in (a) and (b) above: 50 km per hour.

4.7.6 Direct mitigation measures would be proposed in all situations where the predicted traffic noise level exceeds the criteria set in Table 1A of Annex 5 to the EIAO-TM by 1 dB(A) or more.

4.7.7 If any façades of NSRs are still exposed to predicted noise levels exceeding the relevant noise criteria after the implementation of all direct mitigation measures, provision of indirect technical remedies in the form of acoustic insulation and air conditioning should be considered under the EIAO-TM and EIAO Guidance Note No. 12/2010. The eligibility for indirect technical remedies would be tested against the following three criteria:

- The predicted overall noise level from the Project roads, together with other traffic noise in the vicinity must be above a specified noise level (for example, 70 dB(A) for domestic premises and 65 dB(A) for educational institutions. All 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).

Prediction and Evaluation of Environmental Impacts

4.7.8 The Revised RODP has incorporated environmentally friendly designs to avoid and/or reduce traffic noise impact to sensitive receivers. These designs include deletion of Tin Ying Road, provision of depressed roads with or without decking-over, allocation of non-sensitive uses at the noisy roads, traffic controls for heavy goods vehicles which centralising the cargo truck travelling along KSWH, Planned Road P1 and D1 would also be implemented to reduce the road traffic noise impact at those NSRs within the Project area. In addition, provision of EFTS would potentially reduce the road-based traffic volume, thereby reducing the potential traffic noise impact arising from the Project. In the Stage 2 Community Engagement which consulted the public on the PODP and facilitated formulation of the RODP, there were comments expressing concerns over the noise impact brought by Castle Peak Road. Taking into account the public concern, low noise road surfacing (LNRS) would be implemented, subject to design review, on the road section of Castle Peak Road in the vicinity of Project area. Different materials for LNRS are being reviewed and tested by the Government for application in Hong Kong. Environmental review will be conducted in due course to study how the use of new road surfacing material could help reduce traffic noise impacts.

4.7.9 Road traffic noise assessment has been conducted for the representative NSRs in the worst-case year 2048. The predicted traffic noise levels at the representative NSRs under the unmitigated scenario are presented in **Table 4.24** to **Table 4.26**. Whereas **Appendix 4.7.3** shows the details of the noise assessment results of the each assessment points of the NSRs at different assessment levels under unmitigated scenario.

Table 4.24 Summary of Unmitigated Road Traffic Noise Assessment Results (Existing NSRs outside the Project Area)

NSR ID	Description	Existing / Planned Use	NAP ID	Criteria, dB(A)	Predicted Unmitigated Overall Noise Level, dB(A)	Compliance of Noise Criteria
E1-OA	Tin Wah Estate	Existing Residential	E1-OA_R01	70	66-67	Yes
E1-OB_R	Tin Shing Court	Existing Residential	E1-OB_R01	70	67-68	Yes
E1-OB_E0	Q.E.S. Old Students' Association Branch Primary School	Existing Educational	E1-OB_E01 to E1-OB_E02	65	56-74	No
E1-OB_E1	YLPMSAA Tang Siu Tong Secondary School	Existing Educational	E1-OB_E11 to E1-OB_E12	65	61-74	No
E1-OB_E2	Lions Clubs International Ho Tak Sum Primary School	Existing Educational	E1-OB_E21	65	57-69	No
E2-OA	Village House at Lau Fau Shan	Existing Village	E2-OA_R01	70	66-67	Yes
E2-OB	San Hing Tsuen	Existing Village	E2-OB_R01 to E2-OB_R03	70	71-72	No
E2-OC	Sha Kong Wai	Existing Village	E2-OC_R01 to E2-OC_R04	70	71-76	No
E2-OD	Tin Yan Estate	Existing Residential	E2-OD_R01	70	66-67	Yes
E4-OA	Tsing Cheun Wai	Existing Village	E4-OA_R01 to E4-OA_R04	70	71-73	No
E4-OB	Nai Wai	Existing Village	E4-OB_R01	70	77	No
E4-OC	Sun Fung Wai	Existing Village	E4-OC_R01 to E4-OC_R03	70	72-80	No
E4-OD	Chung Uk Tsuen	Existing Village	E4-OD_R01 to E4-OD_R04	70	74-78	No
E5-OA	Tong Fong Tsuen	Existing Village	E5-OA-R01 & E5-OA-R02	70	67-79	No
E5-OB	Hang Mei Tsuen	Existing Village	E5-OB-R01	70	75	No
E5-OC	Tai Tao Tsuen	Existing Village	E5-OC-R01	70	71	No
E5-OD	Uptown	Existing Residential	E5-OD_R01	70	71-76	No
E5-OE	Shung Tak Catholic English College	Existing Educational	E5-OE_E01	65	73-74	No
E5-OF	Treasure Court	Existing Residential	E5-OF_R01	70	73	No
E5-OG	Lai Hung Garden	Existing Residential	E5-OG_R01	70	74	No
E5-OH	Bauhinia Garden	Existing Residential	E5-OH_R01	70	74-75	No

Note: Full names of the abbreviations of uses should be referred to the List of Abbreviations.

Table 4.25 Summary of Unmitigated Road Traffic Noise Assessment Results (Existing NSRs within the Project Area)

NSR ID	Description	Use	NAP ID	Criteria, dB(A)	Predicted Unmitigated Overall Noise Level, dB(A)	Compliance of Noise Criteria
E1-IA	Tseung Kong Wai	Existing Village	E1-IA_R01	70	76	No
E1-IB	Hong Mei Tsuen	Existing Village	E1-IB_R01	70	54-55	Yes
E1-IC	Tung Tau Tsuen	Existing Village	E1-IC_R01 to E1-IC_R03	70	64-69	Yes
E1-ID	Lo Uk Tsuen	Existing Village	E1-ID_R01	70	59	Yes
E1-IE	Sik Kong Wai	Existing Village	E1-IE_R01	70	69-70	Yes
E1-IF	Ha Tsuen Shi	Existing Village	E1-IF_R01 to E1-IF_R02	70	64-76	No
E1-IG	San Uk Tsuen	Existing Village	E1-IG_R01 to E1-IG_R03	70	65-69	Yes
E1-IH	Sha Chau Lei	Existing Village	E1-IH_R01 to E1-IH_R02	70	66-70	Yes
E1-IJ	San Sang Tsuen	Existing Village	E1-IJ_R01 to E1-IJ_R05	70	68-73	No
E1-IK	Shek Po Tsuen	Existing Village	E1-IK_R01 to E1-IK_R03	70	64-73	No
E2-IA	Fung Kong Tsuen	Existing Village	E2-IA_R01 to E2-IA_R02	70	72-76	No
E4-IA	Tin Sum Tsuen	Existing Village	E4-IA_R01 to E4-IA_R03	70	72-73	No
E4-IB	Tsing Chuen Wai	Existing Village	E4-IB_R01	70	69-72	No
E5-IA	Kiu Tau Wai	Existing Village	E5-IA_R01	70	64-69	Yes
E5-IB_R	Hung Uk Tsuen	Existing Village	E5-IB_R01 to E5-IB_R02	70	63-74	No
E5-IB_C	Chinese Mission Seminary	Existing Church	E5-IB_C01	65	73-74	No
E5-IC	San Lee Uk Tsuen	Existing Village	E5-IC_R01	70	73	No
E1-26	Existing Homes for the Elderly (Yeung Chun Pui and Ching Chung)	IC	E1-26_H01 to E1-26_H02	70	59-63	Yes
E4-30	Ling Liang Worldwide Evangelistic Mission Hung Shui Kiu Ling Liang Church	IC	E4-30_C01	65	72	No
E5-23	Sheffield Villas	R3	E5-23_R01 to E5-23_R12	70	64-66	Yes
E5-25	Hung Fuk Estate	RSc	E5-25_R01 to E5-25_R41	70	59-73	No
E5-31	Existing Residential Development	R2	E5-31_R01 to E5-31_R22	70	61-73	No
E5-35	Bellevue Court	R4	E5-35_R01	70	64-73	No
E5-39	Existing Residential Development	R3	E5-39_R01 to E5-39_R05	70	68-77	No
E5-44	The Church of Jesus Christ of Latter-Day Saints (Hung Shui Kiu)	R3	E5-44_C01 to E5-44_C02	65	68-71	No

NSR ID	Description	Use	NAP ID	Criteria, dB(A)	Predicted Unmitigated Overall Noise Level, dB(A)	Compliance of Noise Criteria
O5-06	Committed Subsidised Sales Flat	R2(SSF)c	O5-06_R01 to O5-06_R24	70	59-75	No
O5-33	Committed Residential Development	R2	O5-33_R01 to O5-33_R31	70	72-73	No

Note: Full names of the abbreviations of uses should be referred to the List of Abbreviations.

4.7.10 Referring to **Table 4.24** and **Table 4.25**, the predicted noise levels at the representative existing NSRs outside and within the Project area would be in the range of 56 to 79 dB(A) and 54 to 77 dB(A), respectively. Most of representative existing NSRs would expose to the noise levels exceeding the relevant noise criteria. Mitigation measures are required to alleviate the potential adverse traffic noise impact.

Table 4.26 Summary of Unmitigated Road Traffic Noise Assessment Results (Planned NSRs within the Project Area)

NSR ID	Use	Description	NAP ID	Criteria, dB(A)	Predicted Unmitigated Overall Noise Level, dB(A)	Compliance of Noise Criteria
P1-02	R2(SSF)c	Site 1-02	P1-02_R01 to P1-02_R31	70	57-75	No
P1-03	E	Site 1-03	P1-03_E01 to P1-03_E11	65	53-64	Yes
P1-04	R2c	Site 1-04	P1-04_R01	70	47-60	Yes
P1-05	R2c	Site 1-05	P1-05_R01 to P1-05_R11	70	57-67	Yes
P1-06	R2c	Site 1-06	P1-06_R01 to P1-06_R11	70	64-70	Yes
P1-08	R2c	Site 1-08	P1-08_R01 to P1-08_R22	70	66-74	No
P1-09	R2c	Site 1-09	P1-09_R01 to P1-09_R12	70	68-75	No
P1-12	R2	Site 1-12	P1-12_R01	70	68-73	No
P1-15	E	Site 1-15	P1-15_E01 to P1-15_E05	65	65-73	No
P1-17	R2	Site 1-17	P1-17_R01	70	57-63	Yes
P1-18	E	Site 1-18	P1-18_E01 to P1-18_E03	65	57-68	No
P1-19	R2	Site 1-19	P1-19_R01 to P1-19_R21	70	69-76	No
P1-21	R2c	Site 1-21	P1-21_R01 to P1-21_R21	70	54-69	Yes
P1-22	E	Site 1-22	P1-22_E01 to P1-22_E11	65	63-79	No
P2-02	R3	Site 2-02	P2-02_R01 to P2-02_R32	70	61-67	Yes
P2-03	R3	Site 2-03	P2-03_R01 to P2-03_R21	70	52-65	Yes
P2-07	R3	Site 2-07	P2-07_R01 to P2-07_R21	70	62-66	Yes
P2-09	E	Site 2-09	P2-09_E01 to P2-09_E02	65	57-66	No

NSR ID	Use	Description	NAP ID	Criteria, dB(A)	Predicted Unmitigated Overall Noise Level, dB(A)	Compliance of Noise Criteria
P2-10	R3	Site 2-10	P2-10_R01 to P2-10_R31	70	62-70	Yes
P2-11	R3c	Site 2-11	P2-11_R01 to P2-11_R31	70	66-74	No
P2-14	R3	Site 2-14	P2-14_R01 to P2-14_R12	70	62-68	Yes
P2-15	E	Site 2-15	P2-15_R01	70	62-64	Yes
P2-16	E	Site 2-16	P2-16_E01 to P2-16_R15	65	63-69	No
P2-18	RR4	Site 2-18	P2-18_R01 to P2-18_R05	70	69-71	No
P2-19	RR4	Site 2-19	P2-19_R01	70	66-67	Yes
P2-24	E	Site 2-24	P2-24_E01 to P2-24_E11	65	59-70	Yes
P2-25	G	Site 2-25	P2-25_H01	70	69-71	No
P2-26	E	Site 2-26	P2-26_E01 to P2-26_E11	65	63-70	No
P2-28	E	Site 2-28	P2-28_E01 to P2-28_E02	65	60-68	No
P2-30	RSc	Site 2-30	P2-30_R01 to P2-30_R21	70	48-70	Yes
P2-31	R2(SSF)c	Site 2-31	P2-31_R01 to P2-31_R21	70	61-68	Yes
P4-01	G	Site 4-01	P4-01_R01 to P4-01_R13	70	64-75	No
P4-03	R2(SSF)c	Site 4-03	P4-03_R01 to P4-03_R11	70	61-76	No
P4-04	RSc	Site 4-04	P4-04_R01 to P4-04_R24	70	56-71	No
P4-05	RSc	Site 4-05	P4-05_R01 to P4-05_R14	70	65-72	No
P4-06	R2(SSF)c	Site 4-06	P4-06_R01 to P4-06_R12	70	66-74	No
P4-08	E	Site 4-08	P4-08_E01 to P4-08_E11	65	61-65	Yes
P4-09	R1c	Site 4-09	P4-09_E06	70	62-68	Yes
P4-17	OU	Site 4-17	P4-17_E01 to P4-17_E06	65	57-73	No
P4-20	RR4	Site 4-20	P4-20_R01 to P4-20_R04	70	64-72	No
P4-22	RSc	Site 4-22	P4-22_R01 to P4-22_R42	70	52-71	No
P4-24	R2(SSF)c	Site 4-24	P4-24_R01 to P4-24_R46	70	66-75	No
P4-25a	OU(C&R)	Site 4-25a	P4-25a_R01	70	65-69	Yes
P4-25b	OU(C&R)	Site 4-25b	P4-25b_R01 to P4-25b_R11	70	61-71	No
P4-25c	OU(C&R)	Site 4-25c	P4-25c_R01 to P4-25c_R11	70	52-60	Yes
P4-26	R1c	Site 4-26	P4-26_R01 to P4-26_R21	70	64-71	No

NSR ID	Use	Description	NAP ID	Criteria, dB(A)	Predicted Unmitigated Overall Noise Level, dB(A)	Compliance of Noise Criteria
P4-28	RSc	Site 4-28	P4-28_R01 to P4-28_R44	70	54-73	No
P4-29	OU(C&R)	Site 4-29	P4-29_R01 to P4-29_R31	70	50-71	No
P4-32	G	Site 4-32	P4-32_R01 to P4-32_R14	70	63-73	No
P4-33	E	Site 4-33	P4-33_E01 to P4-33_E03	65	67-75	No
P4-36	E	Site 4-36	P4-36_E02 to P4-36_R01	65	66-70	No
P5-07a	OU(C&R)	Site 5-07a	P5-07a_R01 – P5-07a_R21	70	55-71	No
P5-07b	OU(C&R)	Site 5-07b	P5-07b_R01 to P5-07b_R21	70	60-73	No
P5-08	OU(C&R)	Site 5-08	P5-08_R01 to P5-08_R11	70	69-73	No
P5-09	OU(C&R)	Site 5-09	P5-09_R01 to P5-09_R31	70	60-71	No
P5-14	E	Site 5-14	P5-14_E01 to P5-14_E11	65	67-74	No
P5-16	R2(SSF)c	Site 5-16	P5-16_R01 to P5-16_R11	70	58-79	No
P5-17	RSc	Site 5-17	P5-17_E04 to P5-17_R12	65	54-75	No
P5-21	E	Site 5-21	P5-21_E01 to P5-21_E02	65	61-66	No
P5-22	Site 5-22	R3	P5-22_R01 to P5-22_R03	70	65-77	No
P5-24	R2(SSF)c	Site 5-24	P5-24_R01 to P5-24_R23	70	43-68	Yes
P5-26	R2(SSF)	Site 5-26	P5-26_R01 to P5-26_R04	70	63-74	No
P5-28	G	Site 5-28	P5-28_H01 to P5-32_R01 to P5-32_R82	70	64-72	No
P5-32	OU(C&R)	Site 5-32	P5-32_R01 to P5-32_R82	70	62-80	No
P5-34	E	Site 5-34	P5-34_E01 to P5-34_E11	65	60-73	No
P5-37	E	Site 5-37	P5-37_E01 to P5-37_E02	65	70-74	No

Note: Full names of the abbreviations of uses should be referred to the List of Abbreviations.

4.7.11 For the planned NSRs within the Project area (see **Table 4.26**), the predicted road traffic noise levels would be in the range of 43 to 80 dB(A). Despite the environmentally friendly designs are considered in the Revised RODP, results indicate that most planned residential and educational NSRs would still exceed the noise criteria by up to 10 dB(A) and 14 dB(A) respectively. Hence, direct mitigation measures for these affected NSRs are required. For those non-compliance planned educational institutes, mitigation measures as discussed in **Section 4.7.15** are considered under the Class Assessment Document following ETWB Technical Circular (Works) No. 13/2003.

4.7.12 The total number of dwellings, classrooms and other NSRs that will be exposed to noise impact exceeding the criteria set in Annex 5 in the EIAO-TM have been calculated. It is estimated that a total of 786 of existing dwellings, 4352 planned dwellings, 120 existing classrooms, 445 planned classroom, 2 existing churches, 1 existing and 3 planned buildings of home for the elderly would be exposed to traffic noise impact under unmitigated scenario.

Direct Mitigation Measures

4.7.13 High volume of traffic flows of some major roads within or surrounding the Project, namely KSWH, Yuen Long Highway, Ping Ha Road, Tin Wah Road, Hung Tin Road, Castle Peak Road, Planned Road P1 and Planned Road D1, is expected in Year 2048. With the implementation of environmentally friendly designs in the Revised RODP, the noise barriers on KSWH according to its approved EIA Report and the LNRS on Castle Peak Road, exceedance of the noise criteria at some existing and planned NSRs are still predicted in the unmitigated scenario. Noise mitigation measures would therefore be required to alleviate the potential road traffic noise impact.

4.7.14 Noise mitigation measures in terms of: (i) vertical barriers and cantilever noise barriers on the Project roads; (ii)LNRS on Project roads; and (iii) alternative residential development layout (for Sites 5-8, 5-26 and 5-32) are proposed to alleviate adverse traffic noise impact on the affected NSRs. The details of proposed LNRS and noise barriers are summarised in below **Table 4.27** and **Table 4.28** with total length of mitigation measures rounded off to the nearest 10 m. The locations of the vertical barriers, cantilever noise barriers and extent of LNRS are shown in **Figures 4.7.1 – Figure 4.7.16**. The alternative residential development layouts are presented in **Figure 4.7.17 – Figure 4.7.27**. Different materials for LNRS are being reviewed and tested by the Government for application in Hong Kong. Environmental reviews will be conducted at the later design stage to review the proposed noise mitigation measures taking into account the latest design standard at that time for the application of the LNRS materials.

Table 4.27 Locations of Proposed Low Noise Road Surfacing

ID	Road	Length, m
LNS1	Not used	-
LNS2	Tin Wah Road	350
LNS3	Proposed Roundabout at Junction J2	210
LNS4	Proposed Road D1	500
LNS5	Proposed Road near Site2-26	280
LNS6	Proposed Road D1	400
LNS7	Proposed Road D1	640
LNS8	Proposed Road D1 (Depressed Section)	120
LNS9	Proposed Road L1	670
LNS10	Proposed Road P1	560
LNS11	Proposed Road L5	440
LNS12	Proposed Road D2	280
LNS13	Proposed Road D2 (Depressed Section)	180
LNS14	Proposed Road D2	1260
LNS15	Proposed Road L3	390
LNS16	Proposed Road D2	370
LNS17	Proposed Roundabout at Junction J8	190
LNS18	Ping Ha Road	110
LNS19	Not used	-

ID	Road	Length, m
LNS20	Kiu Fat Street	280
LNS22	Proposed Road near Site 5-13	730
LNS23	Hung Chi Road / Proposed Road L5	340
LNS24	Not used	-
LNS25	Note used	-
LNS26	Not used	-
LNS27	Proposed Road near Site 4-24	140
LNS28	Not used	-
LNS29	Proposed Road L2	670
LNS30	Proposed Road near Site 4-29	270
LNS31	Not used	-
LNS32	Proposed Road P1	790
LNS33	Proposed Road P1	380
LNS34	Proposed Road P1	610
LNS35	Proposed Road D8	480
LNS36	Proposed Road near Site 4-33	210

Table 4.28 List of Proposed Traffic Noise Mitigation Measures

Noise Barrier ID	Location	Barrier Type	Height, mAG	Length, m
CB1	Proposed Road D2	Cantilever	6+4.2 m at 45 degree	50
CB2	Not Used	-	-	-
CB3a	Proposed Road P1	Cantilever	5.5+2.5 m at 45 degree	80
CB3b	Proposed Road P1	Cantilever	5.5+2.5 m at 45 degree	130
CB4	Not Used	-	-	-
CB5	Proposed Road D2, near Site 1-22	Cantilever	6+4.2 m at 45 degree	130
VB2	Tin Wah Road / Lau Fau Shan Road	Vertical	5	140
VB3	Proposed Road D1	Vertical	3	120
VB4	Proposed Road D2	Vertical	5	140
VB5	Proposed Road D1	Vertical	5	90
VB6	Proposed Road D1	Vertical	5	150
VB7	Proposed Road D3	Vertical	4	60
VB8	Proposed Road D3	Vertical	4	50
VB9	Proposed Road D3	Vertical	4	50
VB10	Proposed Road D2	Vertical	4	180
VB11	Not used	-	-	-
VB12	Proposed Road D2	Vertical	6	110
VB13	Not used	-	-	-
VB14	Not used	-	-	-
VB15	Proposed Road D2	Vertical	5	30
VB16	Proposed Road D2	Vertical	5	60
VB17	Proposed Road D2	Vertical	5	20

Noise Barrier ID	Location	Barrier Type	Height, mAG	Length, m
VB17	Proposed Road D2	Vertical	5	20
VB18	Proposed Road D2	Vertical	4	60
VB19	Not used	-	-	-
VB20	Proposed Road L3	Vertical	7	110
VB21	Proposed Road D2/ Ping Ha Road	Vertical	7	50
VB22	Not used	-	-	-
VB23	Proposed Road D2/ Ping Ha Road	Vertical	7	130
VB24	Ping Ha Road	Vertical	7	160
VB25	Not used	-	-	-
VB26	Proposed Road L1	Vertical	5	70
VB27	Not used	-	-	-
VB28	Hung Tin Road	Vertical	5	90
VB29	Hung Tin Road	Vertical	7	80
VB30	Not used	-	-	-
VB31	Hung Tin Road	Vertical	7	60
VB32	Not used	-	-	-
VB33	Not used	-	-	-
VB34	Not used	Vertical	7	30
VB35	Proposed Road D5	Vertical	5	80
VB36	Proposed Road D5	Vertical	5	70
VB37	Proposed Road D5	Vertical	3	70
VB38	Proposed Road D5	Vertical	3	80
VB39	Proposed Road P1	Vertical	3	100
VB40	Proposed Road P1	Vertical	3	130
VB41	Proposed Road D2	Vertical	5	130
VB42	Not used	-	-	-

4.7.15 Regarding the noise exceedance on the planned education institutes at Sites 1-18, 1-22, 2-16, 4-33, 4-36 and 5-34, alternative layouts and 3 m high boundary wall (for Site 2-9, 4-33, 4-36 and 5-34 only) are also considered under the Class Assessment Document following ETWB Technical Circular (Works) No. 13/2003. The details of the proposed boundary wall are presented in **Table 4.29** and the alternative layouts are presented in **Figure 4.7.17 – Figure 4.7.27**.

Table 4.29 Details of Proposed Boundary Wall for Planned Education Institutes

Boundary Wall ID	Location	Barrier Type	Height, mAG	Length, m
VB1	Boundary Wall at Site 2-9	Vertical	3	65
VB43	Boundary wall at Site 4-36	Vertical	3	60
VB44	Boundary wall at Site 4-36	Vertical	3	120
VB45	Boundary wall at Site 4-33	Vertical	3	200
VB46	Boundary wall at Site 5-34	Vertical	3	150
VB47	Boundary wall at Site 5-34	Vertical	3	160

4.7.16 With the implementation of the above recommended noise mitigation measures, the noise levels at some of the representative NSRs would comply with the traffic noise criteria. However, exceedance of the traffic noise criteria would still be predicted at some of the representative existing NSRs due to existing roads and some planned NSRs due to existing roads including KSWH and planned local roads.

4.7.17 The predicted mitigated traffic noise levels at the representative existing NSRs outside and within the Project area, and the major noise source causing exceedance on the affected existing NSRs are presented in below **Table 4.30** and **Table 4.31**. **Table 4.32** summarises the predicted mitigated traffic noise levels at the planned representative NSRs.

Table 4.30 Summary of Mitigated Road Traffic Noise Assessment Results (Existing NSRs outside the Project area)

NSR ID	Description	Existing / Planned Use	NAP ID	Criteria, dB(A)	Predicted Mitigated Overall Noise Level, dB(A)	Major Noise Source causing Exceedance
E1-OA	Tin Wah Estate	Existing Residential	E1-OA_R01	70	65-67	-
E1-OB	Tin Shing Court	Existing Residential	E1-IB_R01	70	62-66	-
E1-OB_E0	Q.E.S. Old Students' Association Branch Primary School	Existing Educational	E1-OB_E01 to E1-OB_E02	65	56-74	Ping Ha Road (East of Hung Tin Road)
E1-OB_E1	YLPMSAA Tang Siu Tong Secondary School	Existing Educational	E1-OB_E11 to E1-OB_E12	65	61-74	Ping Ha Road (East of Hung Tin Road). Hung Tin Road
E1-OB_E2	Lions Clubs International Ho Tak Sum Primary School	Existing Educational	E1-OB_E21	65	54-65	-
E2-OA	Village House at Lau Fau Shan	Existing Village	E2-OA_R01	70	66-67	-
E2-OB	San Hing Tsuen	Existing Village	E2-OB_R01 to E2-OB_R03	70	71-72	Lau Fau Shan Road
E2-OC	Sha Kong Wai	Existing Village	E2-OC_R01 to E2-OC_R04	70	64-70	-
E2-OD	Tin Yan Estate	Existing Residential	E2-OD_R01	70	66-67	-
E4-OA	Tsing Cheun Wai	Existing Village	E4-OA_R01 to E4-OA_R04	70	68-70	-
E4-OB	Nai Wai	Existing Village	E4-OB_R01	70	76-77	Castle Peak Road
E4-OC	Sun Fung Wai	Existing Village	E4-OC_R01 to E4-OC_R03	70	72-78	Castle Peak Road
E4-OD	Chung Uk Tsuen	Existing Village	E4-OD_R01 to E4-OD_R04	70	74-78	Castle Peak Road

NSR ID	Description	Existing / Planned Use	NAP ID	Criteria, dB(A)	Predicted Mitigated Overall Noise Level, dB(A)	Major Noise Source causing Exceedance
E5-OA	Tong Fong Tsuen	Existing Village	E5-OA-R01 & E5-OA-R02	70	66-79	Ping Ha Road (East of Hung Tin Road)
E5-OB	Hang Mei Tsuen	Existing Village	E5-OB-R01	70	75	Ping Ha Road (East of Hung Tin Road)
E5-OC	Tai Tao Tsuen	Existing Village	E5-OC-R01	70	71	Castle Peak Road, Hung Tin Road
E5-OD	Uptown	Existing Residential	E5-OD_R01	70	72-76	Castle Peak Road, Hung Tin Road
E5-OE	Shung Tak Catholic English College	Existing Educational	E5-OE_E01	65	73-74	Castle Peak Road, Hung Tin Road
E5-OF	Treasure Court	Existing Residential	E5-OF_R01	70	73	Castle Peak Road
E5-OG	Lai Hung Garden	Existing Residential	E5-OG_R01	70	74	Castle Peak Road
E5-OH	Bauhinia Garden	Existing Residential	E5-OH_R01	70	74-75	Castle Peak Road

Table 4.31 Summary of Mitigated Road Traffic Noise Assessment Results (Existing NSRs within the Project area)

NSR ID	Description	Use	NAP ID	Criteria	Predicted Overall Noise Level, dB(A)	Major Noise Source causing Exceedance
E1-IA	Tseung Kong Wai	Existing Village	E1-IA_R01	70	69-70	-
E1-IB	Hong Mei Tsuen	Existing Village	E1-IB_R01	70	54-55	-
E1-IC	Tung Tau Tsuen	Existing Village	E1-IC_R01 to E1-IC_R03	70	61-67	-
E1-ID	Lo Uk Tsuen	Existing Village	E1-ID_R01	70	56	-
E1-IE	Sik Kong Wai	Existing Village	E1-IE_R01	70	66-68	-
E1-IF	Ha Tsuen Shi	Existing Village	E1-IF_R01 to E1-IF_R02	70	62-67	-
E1-IG	San Uk Tsuen	Existing Village	E1-IG_R01 to E1-IG_R03	70	61-66	-
E1-IH	Sha Chau Lei	Existing Village	E1-IH_R01 to E1-IH_R02	70	66-70	-
E1-IJ	San Sang Tsuen	Existing Village	E1-IJ_R01 to E1-IJ_R05	70	68-73	Tin Ha Road
E1-IK	Shek Po Tsuen	Existing Village	E1-IK_R01 to E1-IK_R03	70	64-72	Hung Tin Road, Hung Chi Road
E2-IA	Fung Kong Tsuen	Existing Village	E2-IA_R01 to E2-IA_R02	70	67-68	-
E4-IA	Tin Sum Tsuen	Existing Village	E4-IA_R01 to E4-IA_R03	70	72-73	Tin Ha Road

NSR ID	Description	Use	NAP ID	Criteria	Predicted Overall Noise Level, dB(A)	Major Noise Source causing Exceedance
E4-IB	Tsing Chuen Wai	Existing Village	E4-IB_R01	70	67-70	-
E5-IA	Kiu Tau Wai	Existing Village	E5-IA_R01	70	61-66	-
E5-IB_R	Hung Uk Tsuen	Existing Village	E5-IB_R01 to E5-IB_R02	70	61-69	-
E5-IB_C	Chinese Mission Seminary	Existing Church	E5-IB_C01	65	73-74	Castle Peak Road
E5-IC	San Lee Uk Tsuen	Existing Village	E5-IC_R01	70	73	Tin Ha Road
E1-26	Existing Homes for the Elderly (Yeung Chun Pui and Ching Chung)	Homes for the Elderly	E1-26_H01 to E1-26_H02	70	58-60	-
E4-30	Ling Liang Worldwide Evangelistic Mission Hung Shui Kiu Ling Liang Church	Place of Worship	E4-30_C01	65	72	Castle Peak Road
E5-23	Sheffield Villas	Residential	E5-23_R01 to E5-23_R12	70	64-66	-
E5-25	Hung Fuk Estate	Residential	E5-25_R01 to E5-25_R41	70	61-74	Hung Tin Road, Hung Chi Road
E5-31	Existing Residential Development	Residential	E5-31_R01 to E5-31_R22	70	64-73	Castle Peak Road
E5-35	Bellevue Court	Residential	E5-35_R01	70	67-71	Castle Peak Road
E5-39	Existing Residential Development	Residential	E5-39_R01 to E5-39_R05	70	59-75	Castle Peak Road
E5-44	The Church of Jesus Christ of Latter-Day Saints (Hung Shui Kiu)	Residential	E5-44_C01 to E5-44_C02	65	72-73	Castle Peak Road, Tin Ha Road
O5-06	Committed Subsidised Sales Flat	Residential	O5-06_R01 to O5-06_R24	70	58-72	Ping Ha Road (East of Hung Tin Road)
O5-33	Committed Residential Development	Residential	O5-33_R01 to O5-33_R31	70	68-77	Hung Shui Kiu Tin Sum Road

Table 4.32 Summary of Mitigated Road Traffic Noise Assessment Results (Planned NSRs within the Project area)

NSR ID	Use	Description	NAP ID	Criteria	Mitigated Overall Noise Level, dB(A)	Require Additional Mitigation Measures
P1-02	Residential	Site 1-02	P1-02_R01 to P1-02_R31	70	54-72	Yes
P1-03	Educational	Site 1-03	P1-03_E01 to P1-03_E11	65	51-62	No
P1-04	Residential	Site 1-04	P1-04_R01	70	44-58	No
P1-05	Residential	Site 1-05	P1-05_R01 to P1-05_R11	70	56-66	No
P1-06	Residential	Site 1-06	P1-06_R01 to P1-06_R11	70	64-70	No
P1-08	Residential	Site 1-08	P1-08_R01 to P1-08_R22	70	63-70	No

NSR ID	Use	Description	NAP ID	Criteria	Mitigated Overall Noise Level, dB(A)	Require Additional Mitigation Measures
P1-09	Residential	Site 1-09	P1-09_R01 to P1-09_R12	70	58-69	No
P1-12	Residential	Site 1-12	P1-12_R01	70	66-70	No
P1-15	Educational	Site 1-15	P1-15_E01 to P1-15_E05	65	60-66	Yes
P1-17	Residential	Site 1-17	P1-17_R01	70	54-60	No
P1-18	Educational	Site 1-18	P1-18_E01 to P1-18_E03	65	53-65	No
P1-19	Residential	Site 1-19	P1-19_R01 to P1-19_R21	70	60-70	No
P1-21	Residential	Site 1-21	P1-21_R01 to P1-21_R21	70	52-67	No
P1-22	Educational	Site 1-22	P1-22_E01 to P1-22_E11	65	49-69	Yes
P2-02	Residential	Site 2-02	P2-02_R01 to P2-02_R32	70	61-67	No
P2-03	Residential	Site 2-03	P2-03_R01 to P2-03_R21	70	52-65	No
P2-07	Residential	Site 2-07	P2-07_R01 to P2-07_R21	70	62-66	No
P2-09	Educational	Site 2-09	P2-09_E01 to P2-09_E02	65	58-65	No
P2-10	Residential	Site 2-10	P2-10_R01 to P2-10_R31	70	61-69	No
P2-11	Residential	Site 2-11	P2-11_R01 to P2-11_R31	70	65-70	No
P2-14	Residential	Site 2-14	P2-14_R01 to P2-14_R12	70	62-67	No
P2-15	Educational	Site 2-15	P2-15_R01	70	62-64	No
P2-16	Educational	Site 2-16	P2-16_E01 to P2-16_R15	65	60-63	No
P2-18	Residential	Site 2-18	P2-18_R01 to P2-18_R05	70	68-70	No
P2-19	Residential	Site 2-19	P2-19_R01	70	65-67	No
P2-24	Educational	Site 2-24	P2-24_E01 to P2-24_E11	65	54-65	No
P2-25	Residential Home for the Elderly	Site 2-25	P2-25_H01	70	67-69	No
P2-26	Educational	Site 2-26	P2-26_E01 to P2-26_E11	65	59-66	Yes
P2-28	Educational	Site 2-28	P2-28_E01 to P2-28_E02	65	55-63	No
P2-30	Residential	Site 2-30	P2-30_R01 to P2-30_R21	70	47-70	No
P2-31	Residential	Site 2-31	P2-31_R01 to P2-31_R21	70	60-67	No
P4-01	Staff Quarters	Site 4-01	P4-01_R01 to P4-01_R13	70	62-72	Yes
P4-03	Residential	Site 4-03	P4-03_R01 to P4-03_R11	70	58-70	No
P4-04	Residential	Site 4-04	P4-04_R01 to P4-04_R24	70	54-70	No

NSR ID	Use	Description	NAP ID	Criteria	Mitigated Overall Noise Level, dB(A)	Require Additional Mitigation Measures
P4-05	Residential	Site 4-05	P4-05_R01 to P4-05_R14	70	56-72	Yes
P4-06	Residential	Site 4-06	P4-06_R01 to P4-06_R12	70	61-70	No
P4-08	Educational	Site 4-08	P4-08_E01 to P4-08_E11	65	61-64	No
P4-10	Residential	Site 4-10	P4-10_R01	70	61-68	No
P4-20	Residential	Site 4-20	P4-20_R01 to P4-20_R04	70	62-70	No
P4-22	Residential	Site 4-22	P4-22_R01 to P4-22_R42	70	52-70	No
P4-24	Residential	Site 4-24	P4-24_R01 to P4-24_R46	70	63-75	Yes
P4-25a	Other Use (Commercial and Residential)	Site 4-25a	P4-25a_R01	70	63-67	No
P4-25b	Other Use (Commercial and Residential)	Site 4-25b	P4-25b_R01 to P4-25b_R11	70	60-69	No
P4-25c	Other Use (Commercial and Residential)	Site 4-25c	P4-25c_R01 to P4-25c_R11	70	52-60	No
P4-26	Residential	Site 4-26	P4-26_R01 to P4-26_R21	70	61-71	Yes
P4-28	Residential	Site 4-28	P4-28_R01 to P4-28_R44	70	54-71	Yes
P4-29	Other Use (Commercial and Residential)	Site 4-29	P4-29_R01 to P4-29_R31	70	50-69	No
P4-32	Staff Quarters	Site 4-32	P4-32_R01 to P4-32_R14	70	61-70	No
P4-33	Educational	Site 4-33	P4-33_E01 to P4-33_E03	65	59-73	Yes
P4-36	Educational	Site 4-36	P4-36_E02 to P4-36_R01	65	58-65	No
P5-07a	Other Use (Commercial and Residential)	Site 5-07a	P5-07a_R01 - P5-07a_R21	70	53-68	No
P5-07b	Other Use (Commercial and Residential)	Site 5-07b	P5-07b_R01 to P5-07b_R21	70	57-73	Yes
P5-08	Other Use (Commercial and Residential)	Site 5-08	P5-08_R01 to P5-08_R11	70	66-70	No
P5-09	Other Use (Commercial and Residential)	Site 5-09	P5-09_R01 to P5-09_R31	70	57-69	No
P5-14	Educational	Site 5-14	P5-14_E01 to P5-14_E11	65	66-72	Yes
P5-16	Residential	Site 5-16	P5-16_R01 to P5-16_R11	70	55-74	Yes
P5-17	Residential	Site 5-17	P5-17_E04 to P5-17_R12	65	53-73	Yes

NSR ID	Use	Description	NAP ID	Criteria	Mitigated Overall Noise Level, dB(A)	Require Additional Mitigation Measures
P5-21	Educational	Site 5-21	P5-21_E01 to P5-21_E02	65	61-66	Yes
O5-22	Committed Residential Development (Site 5-22)	Residential	O5-22_R01 to O5-22_R03	70	65-77	Yes
P5-24	Residential	Site 5-24	P5-24_R01 to P5-24_R23	70	43-68	No
P5-26	Residential	Site 5-26	P5-26_R01 to P5-26_R04	70	56-70	No
P5-28	Residential Home for the Elderly	Site 5-28	P5-28_H01	70	64-72	Yes
P5-32	Other Use (Commercial and Residential)	Site 5-32	P5-32_R01 to P5-32_R82	70	63-77	Yes
P5-34	Educational	Site 5-34	P5-34_E01 to P5-34_E11	65	48-71	Yes
P5-37	Educational	Site 5-37	P5-37_E01 to P5-37_E02	65	70-74	Yes

4.7.18 As shown in **Table 4.30** and **Table 4.31,** the exceedance at the representative existing NSRs would be due to Ping Ha Road (East of Hung Tin Road), Lau Fau Shan Road, Castle Peak Road, Tin Ha Road, Hung Tin Road, Hung Chi Road and Hung Shui Kiu Tin Sam Road. A review is conducted to determine whether the traffic noise impact on these existing roads due to the Project would be considered significant. Findings as presented in **Appendix 4.7.6** indicate that significant traffic noise impact from the Project would only be predicted on Hung Chi Road and Hung Shui Kiu Tin Sam Road. Implementation of mitigation measures on these existing roads under this Project are proposed to alleviate the traffic noise impact as described in **Sections 4.7.19** to **4.7.21**.

Hung Chi Road

4.7.19 The facades of Hung Fuk Estate (E1-IK_R02 and EI-IK_R03) and Shek Po Tsuen (E5-25_R01) facing Hung Chi Road would be exposed to the traffic noise level exceeding the noise criterion of 70 dB(A) though existing 2 m high noise barrier at the Shek Po Tsuen side and 5 m high noise barrier in the vicinity of Hung Fuk Estate have been in place. To alleviate the adverse traffic noise impact on these facades, LNRS on the concerned road sections is proposed and the results indicate that the above affected facades would comply with the noise criterion of 70 dB(A). Different materials for LNRS are being reviewed and tested by the Government for application in Hong Kong. Environmental reviews will be conducted at the later design stage to review the proposed noise mitigation measures taking into account the latest design standard at that time for the application of the LNRS materials.

Hung Shui Kiu Tin Sam Road (East Section)

4.7.20 The planned NSRs at Sites 5-28, 5-32 and 5-33 facing Hung Shui Kiu Tin Sam Road (East Section) would be exposed to traffic noise levels exceeding 70 dB(A) though existing 3 m high noise barrier in the vicinity of Site 5-28 has been in place. Provision of noise barrier along the concerned road section are studied. It is noted that a number of existing run-ins will be required for Site 5-32, which will break off the alignment of the noise barrier. In addition, the existing space of planting strips allowing installation of noise barriers are limited. Provision of noise barrier for Sites 5-32 and 5-33 is not feasible. LNRS on the concerned road sections is proposed to alleviate the traffic noise

impact and the results indicate that the affected facades at Site 5-28 would comply with the noise criterion of 70 dB(A). Different materials for LNRS are being reviewed and tested by the Government for application in Hong Kong. Environmental reviews will be conducted at the later design stage to review the proposed noise mitigation measures taking into account the latest design standard at that time for the application of the LNRS materials.

Hung Shui Kiu Tin Sam Road (South of San Lee Uk Tsuen)

4.7.21 The planned residential NSRs at Site 5-33 and educational institute at Site 5-37 facing Hung Shui Kiu Tin Sam Road (South of San Lee Uk Tsuen) would be exposed to traffic noise levels exceeding 70dB(A) and 65 dB(A) respectively. Mitigation measure on this road section is studied. Due to the existing bus stops, the existing space of planting strips allowing installation of noise barriers are limited. Provision of noise barrier is not feasible. LNRS on the concerned road sections is proposed to alleviate the traffic noise impact. Different materials for LNRS are being reviewed and tested by the Government for application in Hong Kong. Environmental reviews will be conducted at the later design stage to review the proposed noise mitigation measures taking into account the latest design standard at that time for the application of the LNRS materials.

Castle Peak Road

4.7.22 With the enhancement of the existing noise environment with LNRS described in **Section 4.7.8,** the Project would reduce the noise emissions at Castle Peak Road.

4.7.23 It is noted that a retrofitting programme for Castle Peak Road (Hung Shui Kiu) has also been studied by EPD and an approximately 106 m long 5 m high vertical barrier along westbound of Castle Peak Road (Hung Shui Kiu Section) near Parkview Garden (with absorptive panels) would be implemented. However, for other sections of Castle Peak road (Hung Shui Kiu), there are following site constraints that provision of noise barriers/enclosures are not feasible or ineffectiveness.

4.7.24 Space Availability: The central reserve at Castle Peak Road (Hung Shui Kiu) is less than 2 m in width. Therefore, space is not adequate for horizontal clearance at both sides of the carriageways. In addition, there is not enough space to widen the width of the central reserve as there are bus stop and existing subway on the westbound of the carriageway of Castle Peak Road (Hung Shui Kiu Section) and Light Railway Transit (LRT) on the opposite side of the carriageway. This has imposed constraints for erection of noise enclosure and barrier.

4.7.25 Existing Structure: For the section fronting Treasure Court, there is an existing subway across Castle Peak Road and a ramp structure on both sides of the carriageway. The amenity area between the carriageway and the existing ramp structure is less than 2 m width. If the noise barriers are proposed, its foundations and columns would conflict with the existing subway structure.

4.7.26 Road Safety: A few existing bus bay located along Castle Peak Road. It could be another constraint since sightline of passengers and the bus drivers at bus bay would be much degraded after erection of a barrier structure so that the barrier should be set back from the carriageway. However, it would reduce the effectiveness of noise barrier.

4.7.27 Pedestrian/Vehicle Access: There are also many pedestrian access/vehicle access along Castle Peak Road. This imposed a constraint on the extent of the noise barrier and the short length of barriers (e.g. less than 30 m) is considered not acoustically effective in noise reduction due to the diffracted noise at the two ends of the noise barrier.

4.7.28 For the remaining roads including Ping Ha Road, Lau Fau Shan Road, Tin Ha Road and Hung Tin Road, as reviewed, the Project would not change the nature and the alignment of these roads, and would not induce significant change in the traffic capacity, traffic composition and traffic pattern of these roads. Therefore, the noise impact on these existing roads due to the Project is considered insignificant and should therefore be addressed under the policy endorsed by the Executive Council in November 2000 to address the noise impacts from existing roads if necessary and feasible. The engineering solutions under the policy include retrofitting of barriers and enclosures; and providing LNRS. The feasibility of the installation of noise barriers/enclosures on the concerned existing roads is studied and the outcome is summarised in the following paragraphs.

Ping Ha Road

4.7.29 With the existing 5 m high vertical barrier at Ping Ha Road in the vicinity of YLPMSAA Tang Siu Tong Secondary School and Q.E.S. Old Students' Association Branch Primary School, the predicted noise levels at these two schools would still exceed the noise criterion of 65 dB(A). Upgrading the existing noise barrier to cantilever noise barriers is not feasible as the existing foundation cannot allow extra loading.

Lau Fau Shan Road

4.7.30 Construction of noise barriers along Lau Fau Shan Road is considered not feasible as there is no sufficient space on footpath outside private land and there are a number of entrance accesses.

Tin Ha Road

4.7.31 Vertical noise barriers have been proposed at private land under “Hung Shui Kiu Development, Stage 2 – Widening of Tin Ha Road and Tan Kwai Tsuen Road”. However, no barrier is proposed in the final layout due to address public objections on land resumption for noise barrier. Therefore, it is not feasible to install noise barrier. Resurfacing with LNRS materials may be considered to be implemented where practicable by the Government.

Hung Tin Road

4.7.32 The existing Hung Tin Road outside the Shek Po Tsuen is constructed with retaining structures between the local roads and Hung Tin Road, therefore, there will be no space for installing noise barrier next to Hung Tin Road. In addition, construction of noise barriers along local road of Shek Po Tsuen is also considered not feasible as there is no sufficient space on footpath outside private land.

4.7.33 Except the above existing roads, exceedance at some planned NSRs would be due to KSWH (the section in the vicinity of Site 4-1 and Site 4-5) and some planned local roads. However, this section of the existing KSWH may not have sufficient structural capacity for installing more extensive noise barriers. Construction of a large extent of noise barrier along local roads is not feasible due to insufficient space. Therefore, additional mitigation measures including blank façade/acoustic windows would be considered for these planned residential NSRs. Provision of air conditioning and noise insulated windows for planned educational institutes under Class Assessment Document is proposed to alleviate the adverse traffic noise impact. With these mitigation measures in place, the noise levels at these affected planned NSRs would be within the respective noise criteria. Details of the additional mitigation measures proposed at the affected NSRs are summarised in **Table 4.33** below and its locations are shown in **Figures 4.7.17 – Figure 4.7.27**.

Table 4.33 Proposed Additional Mitigation Measures at Planned Sites

Site Ref. No.	Use	Proposed Additional Mitigation Measures	Applied to	Figure Reference
1-2	Residential	Acoustic Windows	1 - 17/F	Figure 4.7.19
1-15	Educational	Blank Façade	1 edge of 1 building	Figure 4.7.21
1-22	Educational	Noise Insulated Windows and Air Conditioning	1 school	Figure 4.7.21
2-26	Educational	Blank Façade	1 edge of 1 building	Figure 4.7.20
4-1	Staff Quarters	Acoustic Windows	1 - 25/F	Figure 4.7.25
		Blank Façade	1 edge of 2 buildings	
4-5	Residential	Acoustic Windows	20 - 42/F	Figure 4.7.25
4-24	Residential	Acoustic Windows	1 - 20/F	Figure 4.7.26
4-26	Residential	Acoustic Windows	3 - 11/F	Figure 4.7.26
4-28	Residential	Acoustic Windows	1 - 2/F	Figure 4.7.26
4-33	Educational	Noise Insulated Windows and Air Conditioning	1 school	Figure 4.7.27
5-7b	Residential/ Commercial	Acoustic Windows	1 – 9/F	Figure 4.7.22
5-14	Educational	Noise Insulated Windows and Air Conditioning	2 schools	Figure 4.7.23
5-16	Residential	Acoustic Windows	3 – 22/F	Figure 4.7.21
5-17	Residential	Acoustic Windows	4 – 29/F	Figure 4.7.22
5-21	Educational	Noise Insulated Windows and Air Conditioning	1 school	Figure 4.7.23
5-22	Residential	Acoustic Balcony	1 - 21/F	Figure 4.7.24
5-28	Residential Home for the Elderly	Noise Insulated Windows and Air Conditioning[(a)]	1 Residential Home for the Elderly	Figure 4.7.24
5-32	Residential/ Commercial	Acoustic Windows	1 - 28/F	Figure 4.7.24
		Acoustic Balcony	1 – 9/F	
5-34	Educational	Blank Façade	1 edge of 1 building	Figure 4.7.24
		Noise Insulated Windows and Air Conditioning	1 school	
5-37	Educational	Noise Insulated Windows and Air Conditioning	1 school	Figure 4.7.24

Note:
(a) For Site 5-28, the need of additional mitigation measures would subject to whether the LNRS can apply on Hung Shui Kiu Tin Sam Road (East Section).

4.7.34 **Appendix 4.7.4** summarises the predicted traffic noise levels at various NSRs under mitigated scenario. It has been demonstrated that the noise impact can be mitigated to an acceptable level by employing a package of mitigation measures including: (i) noise barriers at some road sections of Project roads; (ii) application of LNRS on some Project road sections; (iii) alternative building layout and special building layout design such as blank façade design and provision of acoustic windows/acoustic balcony for planned residential NSRs; and (iv) boundary wall and provision of noise insulated windows and air conditioning for some educational institutes under Class Assessment Document. However, there is scope for adoption of alternative noise mitigation measures, for example, by means of alternative layout and design of individual developments at detailed design stage. Noise impact assessment at the planned residential sites is proposed to be conducted by future developers at the detailed design stage to study whether the future development layout would avoid exposing excessive traffic noise

levels so as to minimise the scale/extent of the proposed noise mitigation measures such as noise barriers and special building layout design. The requirement of noise impact assessment would be included in the lease condition or planning briefs of the residential sites.

4.7.35 With the implementation of mitigation measures, the total number of dwellings, classrooms and other noise sensitive element that will be benefited and protected has been calculated. It is estimated that a total of about 786 existing dwellings, 4352 planned dwellings, 120 existing classrooms, 455 planned classrooms and 1 existing and 3 planned buildings of home for the elderly would be benefited. A total of about 189 existing dwellings, 4352 planned dwellings, 30 existing classrooms, 455 planned classrooms and 1 existing and 3 planned buildings of home for the elderly would be protected.

Indirect Mitigation Measures for Existing NSRs

4.7.36 Review of the further mitigation measures have been conducted in consideration of the constraints and project nature. It is considered that all practicable direct mitigation measures, including: i) noise barriers at some road sections of Project roads; ii) application of LNRS on some Project Road sections; and iii) alternative building layout and special building design including blank façade design and provision of acoustic windows/acoustic balcony for planned residential NSRs and provision of noise insulated windows and air conditioning for planned educational institutes have been exhausted and no adverse residual impact is anticipated.

4.7.37 **Appendix 4.7.5** presents the eligibility test against the above three testing criteria stated in **Section 4.7.7** for indirect technical noise mitigation measures. All representative NSRs do not fall within the above three testing criteria, indirect mitigation measure is therefore not required under this Project.

Evaluation of Residual Environmental Impacts

4.7.38 The traffic noise impact from the Project can be properly mitigated by implementing the proposed noise control measures such as noise barriers on Project roads, LNRS and special building design on the planned developments. Residual road traffic noise impact is not anticipated.

Appendix 5.1 Railway Noise Result in HSK NDA P&E Study

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

NOTE:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NO. 60222570/TR19A/FIGURE 2.2.

CUT LINE A-A

SEE DRAWING NO. 60222570/TR19A/FIGURE 2.2.1

N

816000 E

817000 E

833000 N

832000 N

Reference Site

Yuen Tau Shan

San Uk Tsuen

Sha Chau Lei

Kau Lee Uk Tsuen

San Sang Tsuen

Shek Po Tsuen

San Lee Uk Tsuen

Tin Sum Tsuen

Hung Uk Tsuen

Kiu Tau Wai

Chung Uk Tsuen

Sun Fung Wai

Nai Wai

Tsing Chuen Wai

KONG SHAM WESTERN HIGHWAY

CASTLE PEAK ROAD

YUEN LONG HIGHWAY

COMMUNITY FARMING AND FARMERS' MARKETS

RETENTION FACILITIES

HUNG FUK ESTATE

HOSPITAL, SPECIALIST CLINIC/ POLYCLINIC

(COMMERCIAL & RESIDENTIAL DEVELOPMENT WITH LIGHT RAIL FACILITIES)

COMMERCIAL & RESIDENTIAL

COMMERCIAL & RESIDENTIAL (PODIUM)

OU (REGIONAL PLAZA WITH LEISURE, FOOD AND BEVERAGES USES)

OU (RAILWAY STATION)

OU (RCP)

OU (SPS)

OU (ESS)

OU (E+TP)

OU (LF)

PTI

G (VEHICLE DEPOT)

FWSR & FLWSR

Ser Res

DEEP BAY

TIN SHUI WAI

LAU FAU SHAN

TAI TONG

AECOM

PROJECT
項目

HUNG SHUI KIU NEW DEVELOPMENT AREA PLANNING AND ENGINEERING STUDY - INVESTIGATION

CLIENT
業主

CEDD
土木工程拓展署
Civil Engineering and Development Department

規劃署
Planning Department

CONSULTANT
工程顧問公司

AECOM Asia Company Ltd.
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SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核實

STATUS
狀況

SCALE
比例

A3 1 : 10000

DIMENSION UNIT
尺寸單位

METRES

KEY PLAN
索引圖

A3 1 : 500000

PROJECT NO.
項目編號

60222570

AGREEMENT NO.
協議編號

CE2/2011 (CE)

SHEET TITLE
圖紙名稱

REVISED RECOMMENDED OUTLINE DEVELOPMENT PLAN (RODP) (SOUTHERN AREA)

SHEET 2 OF 2

SHEET NUMBER
圖紙編號

60222570/TR19A/FIGURE 2.2.2

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Plot File by: ZENGFX
PATH: P:\PROJECTS\60222570\Drawing\REPORT\TR19A\TR19A_714.dgn

4.8 Rail Noise Assessment

Assessment Approach and Methodology

Train Noise Source Term for Rail Noise Assessment

4.8.1 The key noise impact from the railway would be the train induced airborne noise at viaduct and at grade section of WRL and LRT respectively across the Project area. Three noise sources have been identified from train operation are listed below:

- Rolling noise from train wheel and rail interaction;
- Noise from air conditioning unit on top of the each train cars; and
- Structure re-radiated noise from the viaduct structure during train passing.

4.8.2 The WRL viaduct structure including the multi plenum system and the above noise source propagation path are further illustrated with diagram in **Appendix 4.8.1**.

WRL Source Terms Reference Review

4.8.3 The rail noise source terms of WRL were referred from the "West Rail Operation Noise Assessment Report" prepared by MTR Corporation Limited in July 2015. The report aims to assess the noise impact of WRL due to the change from 7 cars to 8 cars in accordance with the Environmental Permit (FEP-24/004/1998/J). Noise measurement has been conducted to obtain the in-situ noise source terms for trains running on typical viaduct sections with the installation of multi plenum system. The air conditioning units on top of the WRL train and the structure re-radiated noise from the viaduct were also measured during the study. All three train noise source terms are considered as the latest information and adopted in the WRL noise assessment for this Project.

LRT Source Terms Reference Review

4.8.4 The source term of LRT was adopted from the previous EIA Report No. EIA-027/1999 entitled "Light Rail Transit (LRT) works for Tin Shui Wai Reserve Zone and Grade Separation of the LRT with Pui To Road and Tsing Lun Road in Tuen Mun" under a EIA Study Brief No: ESB-027/1999. The Sound Exposure Level (SEL) of the LRT was evaluated from the Lmax referenced from the previous EIA report. Air conditioning noise and re-radiated noise are considered insignificant contribution compared with the rolling noise of a LRT in this Project.

Rail Noise Assessment Procedures

4.8.5 The rail noise assessment was carried out to assess the worst case scenario under normal, abnormal, transient and emergency operation. The rail noise from the noise source to the NSRs will be corrected by distance, angle of view, barrier, speed, frequency, façade etc. The railway track was divided into segments and the respective noise level of each segment was calculated. The assessment procedure is listed in **Table 4.34** summarised the steps and assumption of the rail noise calculation. Major assessment parameters are including train frequency and speed are provided by MTRC and summarised in **Table 4.35**.

Table 4.34 Rail Noise Assessment Procedures

Description	Assumptions / Remarks	Ref.
Locate the NAPs which would most likely be affected by air-borne noise from the rail operation	The first layer of existing/planned NSRs located in the vicinity of WRL and LRT, have been selected as representative NAPs for rail noise prediction and evaluation	Section 4.4
Identify the train noise sources origination	The rolling noise source is located from the gap between the train and the walkway on the viaduct. Part of the train wheel rail interaction noise had been absorbed by a multi-plenum system and the effect of the system has been included in the source measurement in previous study A/C noise located on the roof of each car and source level was measured in previous study Structural re-radiated noise generated from the vibration of the viaduct during event was measured in previous study	**Appendix 4.8.1**
Identify the train frequency and make appropriate frequency correction	+10 log10 (N) where N = Train frequency per 30 min per Direction	A
Identify the train speed for correction	+20 log10 (V/Vref) where V = Train speed, Vref = Reference train speed	A
Identify the distance from the NSR to the train and make distance correction	-10 log10 (d'/dref) where d' = Slant distance from track to NSR and dref = Reference distance	A

Description	Assumptions / Remarks	Ref.
Identify the train type and the source term of the train	Relevant noise level referred to previous study	B & C
Identify the angle of view and make appropriate angle of view correction	+10 log10 ($\pi\theta/180 - \cos 2\alpha \sin\theta$) -5 where θ= Angle of View and α= Acute angle between a line drawn through the NSR, parallel to the track, and the line bisecting the angle of view, θ	A
Incorporate Façade Correction	+2.5 dB(A)	A
Incorporate Track Wear Correction	+3 dB(A)	A
Incorporate Joint/Turnout Correction	With conservative assumption, +7.0dB(A) for a representative 20 m segment	A
Incorporate Barrier Correction	Shadow Zone: -21dB(A) for δ > 2.5 m where δ is the Path Difference in metre -7.75 log10 (5.2 + 203 δ) dB(A) for 0≤ δ <2.5 m Illuminated Zone: 0dB(A) for δ > 0.4 m 0.88 + 2.14 log10 (10-3 + δ) dB(A) for 0≤ δ <0.4 m	Chart 6(a) of A
Calculate the overall noise level from all rail segments including rolling noise, A/C noise and structural re-radiated noise	Standard acoustic principal	-
Calculate the Lmax	SEL = Lmax + 10log(L/V) +10.5 – 10log[(4D/(4D2+1)) + 2tan-1(1/(2D))]	Equation 15.21 of D
Calculate the Leq, 24hr	Standard acoustic principal	-
Model validation	On site measurement was carried out to record the in-situ noise level and compared against the modelled results.	**Appendix 4.8.2**

Reference:
A - Calculation of Railway Noise (1995).
B - "West Rail Operation Noise Assessment Report" prepared by MTR Corporation Limited in July 2015.
C - "Light Rail Transit (LRT) works for Tin Shui Wai Reserve Zone and Grade Separation of the LRT with Pui To Road and Tsing Lun Road in Tuen Mun" under a EIA Study Brief No: ESB-027/1999.
D - Transportation Noise Reference Book.

Table 4.35 Rail Noise Assessment Input Summary

Parameters	WRL	LRT
Train Type and No. of Car	SP1900, 9 cars total 225 m in accordance with the VEP-45/2001	LRV, 2 cars of total 40 m as conservative scenario
Rolling Noise	SEL Northbound = 81.4 dB(A) [a] SEL Southbound = 80.7 dB(A) [a] (8 cars running 130kph at 25 m)	Lmax = 65 dB(A) [b] (2 cars running 50kph at 25 m)
Air Conditioning Noise	Lmax at Viaduct = 48.8 dB(A) [a] Lmax at Station = 54.8 dB(A) [a] (8 cars at 25 m)	Not applicable as insignificant contribution
Structure Re-radiated Noise	$L_{eq\ 30mins}$ = 40.6 dB(A) Viaduct [a]	Not applicable as LRT in HSK is at grade
Train Frequency per 30 min per Direction	14 number during peak daytime; 10 number during peak night-time	Between Nai Wai LRT Station to HSK LRT Station: Southbound: 20 number during peak daytime; 13 number during peak night-time Northbound: 20 number during peak daytime; 24 number during peak night-time From Tin Shui Wai LRT Station to Hang Mei Tsuen LRT Station: Southbound: 14 number during peak daytime; 13 number during peak night-time Northbound: 14 number during peak daytime; 18 number during peak night-time
Train Frequency per 24hrs both directions	680 trains	Between Nai Wai LRT Station to HSK LRT Station: 917 trains From Tin Shui Wai LRT Station to Hang Mei Tsuen LRT Station: 717 trains
Train Speed	Refer to speed profile in Appendix 2.1 in [a] • Station speed, 50 kph • Approach and leaving Station, 80 kph • Other viaduct section, 100 kph	LRT speed was measured on site. • Section near planned NSR, 60 kph • Section approaching and leaving junctions and stations, 40 kph • Section near NAP LR-E1, 50 kph • Section near NAP LR-E2, 36 kph

Notes:
[a] "West Rail Operation Noise Assessment Report" prepared by MTR Corporation Limited in July 2015.
[b] "Light Rail Transit (LRT) works for Tin Shui Wai Reserve Zone and Grade Separation of the LRT with Pui To Road and Tsing Lun Road in Tuen Mun , 1999".

Proposed HSK Station

4.8.6 A new HSK railway station (HSK Station) is proposed within the Project area. No detail layout is available at this EIA stage. The new station should match the existing West Rail alignment such that station platforms would be constructed on both sides of the tracks (i.e. sided platform design) and enclosed by 4 m screen doors, side wall and top cover. The track section of the station is remain uncovered in the centre. The assumed layout of proposed HSK Station is shown in **Figure 4.8.1**.

4.8.7 As mentioned in **Section 2.4.44**, the proposed HSK Station is a separate DP under Item A.2 of Schedule 2 of EIAO-TM, a separate EIA study would be conducted by the rail operator to fulfil all the statutory requirements and procedures under the Ordinance.

Phasing of HSK Development

4.8.8 The site layouts for rail noise assessment have been confirmed with Planning Department. Commercial developments Site 5-18 of 125 mPD are strategically planned to protect planned residential Site 5-17 of 115 mPD. Therefore Site 5-18 should be developed prior to Site 5-17 in purpose. This phasing approach also applied to the HSK WRL Station which should be developed before or concurrent with the residential development Sites 4-25 and 4-29 nearby. A review would be conducted for the environmental noise performance of the sites if the above development phasing programme cannot meet the specific arrangement.

Prediction and Evaluation of Noise Impacts

WRL Noise

4.8.9 The predicted air-borne noise levels from WRL with respect to the representative site layouts confirmed with relevant departments are presented in **Table 4.36**. The predicted noise level with full mPD level of all NSRs are shown in **Appendix 4.8.3.** Exceedances were predicted at representative NSRs WR-P5d, P5e, P5f, P7b & P7c at night-time period. While exceedance of day time criteria was predicted at WR-P10. It is predicted that a total of about 155 planned dwellings will be exposed to WR noise impact under unmitigated scenario. Mitigation measures are therefore required to reduce the rail noise impact for above NSRs during WRL operation.

Table 4.36 WRL Noise Calculation Summary – Unmitigated

NAP	Description	Area Sensitivity Rating	Noise Criteria, dB(A)		mPD	Leq, 30min, dB(A)		L_{max}, dB(A)	Leq, 24 hrs, dB(A)
			0700-2300 hrs	2300-0700 hrs		0700-2300 hrs	2300-0700 hrs		
Existing WRL NSRs									
WR-E1	Premises to the southwest of Yick Yuen Tsuen	A	60	50	8.7	50	48	57	49
WR-E2	Premises to the east of Oakland Court	A	60	50	8.5	48	47	54	48
WR-E3	Premises to the southwest of Tin Sum Tsuen	A	60	50	7.7	43	41	48	43
WR-E4	Premises to the West of San Lee Uk Tsuen	A	60	50	6.5	47	46	51	47

NAP	Description	Area Sensitivity Rating	Noise Criteria, dB(A)		mPD	Leq, 30min, dB(A)		L_{max}, dB(A)	Leq, 24 hrs, dB(A)
			0700-2300 hrs	2300-0700 hrs		0700-2300 hrs	2300-0700 hrs		
WR-E5	Premises to the West of San Lee Uk Tsuen Block 3,Galore Garden	A	60	50	6.9-9.9	47-48	46-47	52-54	47-48
WR-E6	Shek Po Tsuen Village House Premises to the southwest of Yick Yuen Tsuen Premises to the east of Oakland Court	A	60	50	6.4-15.4	47-49	45-47	51-54	47-49
WR-E7	Premises to the southwest of Tin Sum Tsuen	A	60	50	5.2-8.2	45	44	46-47	45
Project Planned WRL NSRs									
WR-P1	Residential Development in Site 4-6	B	65	55	10.0-141.0	42-52	41-51	42-53	42-52
WR-P2	School in Site 4-8	B	65	[a]	11.0-47.0	42-47	[a]	41-48	42-48
WR-P3	Residential Development in Site 4-10	B	65	55	11.0-166.0	43-54	41-52	43-55	43-54
WR-P4	Residential Development in Site 4-20	B	65	55	11.0-19.0	50-54	48-53	56-62	49-54
WR-P5a	Residential Development in Site 4-22	B	65	55	11.0-127.0	42-53	41-52	48-62	40-53
WR-P5b	Residential Development in Site 4-22	B	65	55	11.0-127.0	41-53	40-51	49-64	40-53
WR-P5c	Residential Development in Site 4-2	B	65	55	11.0-127.0	39-49	39-48	45-60	36-49
WR-P5d	Residential Development in Site 4-22	B	65	55	11.0-127.0	45-58	44-**56**	51-67	44-58
WR-P5e	Residential Development in Site 4-22	B	65	55	11.0-127.0	46-58	45-**57**	51-65	45-58
WR-P5f	Residential Development in Site 4-22	B	65	55	11.0-127.0	47-59	46-**58**	52-66	47-59
WR-P6a	Residential Development in Site 4-25	B	65	55	12.0-178.0	39-52	38-51	40-57	37-52
WR-P6b	Residential Development in Site 4-25	B	65	55	12.0-178.0	39-52	37-51	39-57	37-52
WR-P6c	Residential Development in Site 4-25	B	65	55	12.0-178.0	38-51	37-49	37-55	37-51

NAP	Description	Area Sensitivity Rating	Noise Criteria, dB(A)		mPD	Leq, 30min, dB(A)		L_{max}, dB(A)	Leq, 24 hrs, dB(A)
			0700-2300 hrs	2300-0700 hrs		0700-2300 hrs	2300-0700 hrs		
WR-P7a	Residential Development in Site 4-29	B	65	55	13.0-171.0	44-56	43-55	49-63	44-56
WR-P7b	Residential Development in Site 4-29	B	65	55	13.0-171.0	47-59	45-**57**	50-64	47-59
WR-P7c	Residential Development in Site 4-29	B	65	55	13.0-171.0	45-57	44-**56**	50-64	45-57
WR-P8	School in Site 4-36	B	65	[a]	12.0-48.0	43-52	[a]	46-56	43-52
WR-P9a	Residential Development in Site 5-17	B	65	55	7.0-111.0	42-54	41-53	48-61	42-54
WR-P9b	Residential Development in Site 5-17	B	65	55	7.0-111.0	44-55	42-54	49-62	44-55
WR-P10	School in Site 5-21	B	65	[a]	6.0-43.0	49-**67**	[a]	56-74	48-**67**
WR-P11	School in Site 5-34	B	65	[a]	7.0-43.0	42-46	[a]	42-47	42-46

Notes:
[a] Educational use is not considered as a night-time NSR.
Numbers in bold denote exceedances of the noise criteria.

LRT Noise

4.8.10 The predicted air-borne noise levels from LRT with respect to the representative site layouts confirmed with relevant departments are presented in **Table 4.37**. The full list of predicted levels with respect to mPD is shown in **Appendix 4.8.4.** It is noticed that low level of the NSRs LR-P5a & P6 would exceed the night-time criteria. It is predicted that a total of about 30 planned dwellings will be exposed to LRT noise impact under unmitigated scenario. Mitigation measures are required to reduce the rail noise impact during LRT operation.

Table 4.37 LRT Noise Calculation Summary – Unmitigated

NAP	Site No.	Area Sensitivity Rating	Noise Criteria, dB(A)		mPD	Leq, 30min, dB(A)		Lmax, dB(A)	Leq, 24 hrs, dB(A)
			0700-2300 Hrs	2300-0700 hrs		0700-2300 hrs	2300-0700 hrs		
Existing LRT NSRs									
LR-E1	Parkview Garden Block 24 - 27	C	70	60	12.5-21.5	60-61	60	71-72	59
LR-E2	Tak Cheung Building	C	70	60	11.6-29.6	57-60	57-60	66-70	56-59
LR-E3	Beauty Court Block 1	C	70	60	10.4-46.4	54-57	54-57	61-66	53-56
LR-E4	Coronet Court	C	70	60	10.1-46.1	55-58	55-58	62-67	54-57
LR-E5	Park Nara Tower 1	C	70	60	10.6-46.6	55-58	54-58	62-68	53-57
LR-E6	Village House in Hung Uk Tsuen facing Kiu Hung Road	C	70	60	5.5-14.5	58	58	64	57
LR-E7	Ling Liang Church	C	70	[a]	13.5-16.5	58	[a]	66	56-57
Project Planned LRT NSRs									
LR-P1	Residential Development in Site 4-22	C	70	60	11.0-127.0	48-51	48-51	49-55	46-50
LR-P2	Residential Development in Site 4-26	C	70	60	12.0-152.0	49-54	48-54	48-58	47-52
LR-P3a	Residential Development in Site 4-28	C	70	60	13.0-144.0	51-57	51-57	55-66	50-55
LR-P3b	Residential Development in Site 4-28	C	70	60	13.0-144.0	50-58	50-57	55-68	49-56
LR-P4	School in Site 4-33	C	70	[a]	12.0-48.0	59-64	[a]	69-78	58-63
LR-P5a	Residential Development in Site 5-7b	B	65	55	5.0-142.0	50-55	50-**56**	49-61	50-55
LR-P5b	Residential Development in Site 5-7b	B	65	55	5.0-142.0	49-55	49-55	49-60	49-55
LR-P5c	Residential Development in Site 5-7b	B	65	55	5.0-142.0	48-54	49-55	50-62	49-54
LR-P6	Residential Development in Site 5-9	B	65	55	5.0-152.0	50-56	51-**56**	52-63	50-56

Notes:
[a] Educational use and church is not considered as a night-time NSR.
Numbers in bold denote exceedances of the noise criteria.

Rail Noise Mitigation Measures Options

4.8.11 Based on the assessment results, those rail noise level of exceeding the criteria are less than 3 dB(A), the acoustic fins, non-sensitive use or fixed glazing and layout set back at the NSR are considered effective to reduce the noise impact. Moreover, planning strategy including commercial buildings screening and residential buildings orientation are considered against rail noise during the development of the revised RODP. Predicted noise levels of mitigated NSRs are enclosed in **Appendix 4.8.5**. None of the dwellings will exceed the noise criteria due to rail noise under mitigated scenario.

Architectural Fins

4.8.12 Architectural fins are typical noise mitigation measure for buildings units impacted by traffic or rail noise. For NSR WR-P5d and LR-P5a, 2 m fins has been proposed for the dwellings to narrow the angle of view to the railway track. The noise level of the NSR screened by architectural fins were assessed and the mitigated noise level satisfy the noise criteria as shown in **Table 4.38** and **Figure 4.8.2 – 4.8.4**.

Non-Sensitive Use or Fixed Glazing

4.8.13 For those façade NAP with exceedance, the NAP would be relocated to another positions with smaller angle of view facing the railway and the façade NAP with exceeded the criteria are designed as non-sensitive use or fixed glazing. The noise level of relocated NAPs at WR-P5e, P5f and LR-P6a are satisfied the noise criteria and shown in **Table 4.38** and **Figure 4.8.2 & 4.8.4**.

Layout Setback

4.8.14 Some of the proposed development sites has a potential of shifting the layout as well as set-back away from the existing railway line. The setback provides a sufficient buffer distance and attenuation in terms of noise propagation. It was proposed to setback the layout of Site 4-29 and Site 5-21 from the WRL to a distance of 70 m and 25 m as shown in **Figure 4.8.5 and Figure 4.8.6 respectively**, the assessed noise level at NAP WR-7b, WR-P7c and WR-P10 would satisfy the noise criteria as shown in **Table 4.38**.

Table 4.38 Rail Noise Calculation Summary – Mitigated

NAP	Proposed Mitigation Measures	Noise Criteria, dB(A)		mPD	Leq, 30min, dB(A)		Lmax, dB(A)	Leq, 24 hrs, dB(A)
		Daytime /evening	Night-time		0700-2300 hrs	2300-0700 hrs		
WR-P5d	2 m Architectural fin	65	55	11.0-127.0	42-51	41-50	45-60	37-51
WR-P5e.1	1.5 m Architectural fin + Relocation to non-sensitive use or fixed glazing	65	55	11.0-127.0	43-55	42-54	49-63	43-55
WR-P5f.1	Relocation to non-sensitive use or fixed glazing	65	55	11.0-127.0	45-57	43-55	51-65	44-57
WR-P7b	Layout Set Back to 70 m from WRL	65	55	13.0-171.0	45-57	44-55	48-61	45-57
WR-P7c	Layout Set Back to 70 m from WRL	65	55	13.0-171.0	44-56	43-54	48-61	44-56
WR-P10	Layout Set Back to 25 m from WRL	65	[a]	6.0-43.0	48-63	[a]	54-70	47-63
LR-P5a	2 m Architectural fin	65	55	5.0-142.0	49-54	49-55	49-61	49-54
LR-P6.1	Relocation to non-sensitive use or fixed glazing	65	55	5.0-152.0	48-53	49-54	53-63	48-53

NAP	Proposed Mitigation Measures	Noise Criteria, dB(A)		mPD	Leq, 30min, dB(A)		Lmax, dB(A)	Leq, 24 hrs, dB(A)
		Daytime /evening	Night-time		0700-2300 hrs	2300-0700 hrs		
LR-P6.2	1.3 m Architectural fin + Relocation to non-sensitive use or fixed glazing	65	55	5.0-152.0	47-53	48-54	51-62	47-53
LR-P6.3	Relocation to non-sensitive use or fixed glazing	65	55	5.0-152.0	49-55	49-55	52-63	49-55

Notes:
[a] Educational use is not considered as a night-time NSR.

Rail Noise Impact Assessment for Development Sites

4.8.15 For the new developments in the OZP, the future development proponents should conduct a stand-alone Railway Noise Impact Assessment (RNIA) to assess the potential noise impacts from rail operations on future occupants, and implement the aforesaid or other specific designed noise mitigation measures at their respective development sites to the satisfaction of EPD, to ensure full compliance with the statutory noise limits. The above development requirements would be imposed through relevant Planning Briefs or Land Lease conditions to be fulfilled by the future development proponents. Sites require RNIA include: 4-6, 4-8, 4-10, 4-22, 4-25c, 4-26, 4-28, 4-29, 4-31, 4-32, 4-33, 4-36, 5-7b, 5-9, 5-17, 5-21, 5-32 and 5-34.

Environmentally Friendly Transport Services

4.8.16 An EFTS is proposed to be introduced to operate within the Project. The alignment of EFTS is shown in **Figure 4.8.7.**

4.8.17 Several modes of EFTS, including LRT, trolley bus, automatic people mover (APM), monorails, modern tramway and electric / LPG bus, will be investigated in later stage. No updated information was available at the time of preparing this report. For conservative noise assessment, the rail based EFTS was assumed for rail noise impact assessment. As shown in **Figure 4.8.7**, all of the NSRs are planned with at least 10 m buffer distance from the proposed alignment for EFTS. A reference scheme was developed with the assumptions and assessed level shown in **Table 4.39**.

Table 4.39 Rail based EFTS Reference Scheme

Items	Description
Type of source	Automated guideway transit, steel wheel, welded rail
Noise source level	SEL 80 dB(A) at 50 feet and 50 mph Ref: Table 5-1 Transit Noise and Vibration Impact Assessment FTA-VA-90-1003-06 May 2006 by Office of Planning and Environment Federal Transit Administration
NSR Distance from track	10 m
Operating speed	Assumed 40 kph
Frequency	Assumed 5 trains per headway
Calculated Noise level at NSR boundary	57.2 dB(A) > night-time noise criteria of 55 dB(A)
Track enhancement	• Embedded rail of 3 dB(A) reduction • Green track with vegetation 2 dB(A) reduction Reference material as shown in **Appendix 4.8.6**
Noise level at NSR after track enhancement	< 55 dB(A) complied with night-time noise criteria of HSKNDA

4.8.18 In case a rail cross or joint is designed for the EFTS, such cross joint location should be located at the section with largest distance between the track and the NSR. Alternatively, erect a noise barrier or enclosure at the cross joint section to control the noise impact to the nearby NSRs.

4.8.19 There is no design and operation detail of the EFTS during this Schedule 3 EIA. In any case there are changes to the assumption in **Table 4.39** and causing an exceed of the noise level compared with the criteria, the EFTS project proponent should implement further noise mitigation measures such as noise barrier and enclosure to control the noise impact by the EFTS to satisfy the noise criteria. Noise barrier and enclosure are effective and traditional mitigation measures to reduce rail noise by 10 dB(A) and 15 dB(A) respectively.

4.8.20 As discussed in **Chapter 2** of this report, the proposed EFTS is a Schedule 2 DP under the EIAO. The proposed EFTS will be designed, constructed and operated by the others. The associated environmental impacts will be adequately addressed in a further detailed EIA study to be prepared and submitted under the EIAO by the respective project proponent. Adverse noise impacts from EFTS are therefore not expected.

Cumulative Impact

4.8.21 The existing WRL is running at the centre of the Project area and the LRT is running along Castle Peak Road close to the southern Project area. The cumulative impact is not anticipated by both existing rail to the planned and existing NSRs. However, the proposed EFTS would run from the southern Project area near Nai Wai LRT station to the northern of the Project area and end at TSW Station. As shown in the EFTS alignment, there is potential cumulative rail noise impact to those NSRs by both EFTS, LRT and WRL for Site 4-22 at the southern Project area. If the cumulative noise level to Site 4-22 evaluated by the EFTS project proponent exceeds the noise criteria, the noise level of the EFTS should be further mitigated by means of measure mentioned in **Section 4.8.17** to a level of ANL-10 dB(A) at the Site 4-22 NSR.

Evaluation of Residual Environmental Impacts

4.8.22 WRL would be the major mass transit railway for the Project area. A new HSK Station would be built to serve the community to and from urban area. The operation of WRL will generate noise impact to some of the planned development. Noise control measure should be considered during the planning of the land use and the design of building. Different noise mitigation measures such as layout set back, relocation of noise sensitive uses or implementation of fixed glazing and architectural fins are considered effective mitigation measures. With the mitigation measures in place, the predicted noise level of all dwellings would satisfy the noise criteria in the TM.

4.8.23 LRT will continue running in Castle Peak Road along the southern Project area. Planned developments may expose to the LRT noise without any screening obstacles and result in noise impact. Mitigation measures such as architectural fin and relocation of habitable windows are suggested to abate the rail noise impact.

4.8.24 In conclusion, the future development proponents should conduct a stand-alone Noise Impact Assessment (NIA) to assess the potential noise impacts from rail operations on future occupants, and implement the aforesaid or other specific designed noise mitigation measures at their respective development sites to the satisfaction of EPD, to ensure full compliance with the statutory noise limits. The above development requirements would be imposed through relevant Planning Briefs or Land Lease conditions to be fulfilled by the future development proponents.