Hong Kong Housing Authority

Po Shek Wu Road, Sheung Shui

Environmental Assessment Study
Draft Final Report

276006-12

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Executive Summary

Ove Arup & Partners Hong Kong Ltd (Arup) was commissioned by the Hong Kong Housing Authority (HKHA) to conduct an Environmental Assessment Study (EAS) for the proposed public housing development in Po Shek Wu Road (Scheme received on 3 November 2023) with respect to the Hong Kong Planning Standards and Guidelines (HKPSG).

The subject site is located to the north of Po Shek Wu Estate with a gross site area of about 1.4 hectares. According to the Fanling / Sheung Shui Outline Zoning Plan (OZP) S/FSS/27, the current land use zoning of the site is "Residential (Group A)5" ("R(A)5"). This EAS is conducted to support the Section 16 Planning Application of this site.

Road traffic noise assessment results indicate that a total of 749 residential flats will be exposed to noise level in excess of the 70dB(A) criterion with a noise compliance rate is 61.1% for Scenario A (before commissioning of Po Shek Wu Interchange improvement works to be carried out by Civil Engineering and Development Department (CEDD)); and a total of 869 residential flats is predicted to exceed the 70dB(A) criterion with a noise compliance rate of 54.9% for Scenario B (after commissioning of Po Shek Wu Interchange improvement works and within 15 years upon occupation of the development). Various forms of noise mitigation measures have been investigated. In order to alleviate potential road traffic noise impacts, acoustic window, enhanced acoustic balcony (EAB) 3.0 and fixed glazing are proposed. With all these mitigation measures in place, a 100% noise compliance rate could be achieved.

East Rail Line (EAL) is running parallel to San Wan Road to the south of the subject site. Rail noise assessments indicate that with provision of EAB 3.0 in the residential units facing the rail line, the development could comply with the respective Acceptable Noise Level (ANL) under Noise Control Ordinance (NCO) and HKPSG's standard.

There are a number of fixed noise sources in the vicinity of the subject site. Assessment results indicate that the southeastern and northeastern facades of Block B facing the bazaar will exceed the noise criterion during daytime when the street washing vehicle is in use. A 2.5m high movable barrier to screen the pump for the water tank on the vehicle during the street washing activity is recommended. With installation of the movable barrier, no adverse fixed noise impact on the proposed housing site is anticipated.

A Public Transport Interchange (PTI) is planned at Sheung Shui Areas 4 & 30 at about 130m to the southwest of the subject site. The proposed PTI will be designed with due consideration to the HKPSG. It will be covered under a podium decking with full height side walls. The existing PTI at Landmark North is completely decked under the podium and at about 200m away. Potential noise nuisance arising from the existing and planned PTI is therefore not anticipated.

Kindergarten, management offices and social welfare activities are planned at G/F, 1/F and 2/F. Their locations and layout plans are being studied and yet to be available at this stage. Hence, noise assessments on the kindergarten and social welfare facilities will be supplemented when the layout is confirmed in the next stage.

The current scheme has allowed sufficient setback distances to meet the minimum requirement as stipulated in HKPSG. The internal layout plans for kindergarten, management offices and social

welfare facilities at G/F, 1/F and 2/F are yet to be available at this stage. It is recommended that any planned air sensitive rooms shall be provided with the setback distance requirements as stipulated in HKPSG. No chimney is identified within 500m of the subject site. It is concluded that no adverse air quality impact is anticipated.

Potential land contamination may occur within the subject site due to the operation of existing bus depot. HKHA has confirmed that detailed land contamination assessment is being carried out by CEDD in accordance with the EPD's Practice Guide for Investigation and Remediation of Contaminated Land and any necessary remediation works will be implemented. Hence, potential land contamination issue is not anticipated.

It is concluded that with proper building layout, design and mitigation measures, there are no insurmountable environmental impacts on the subject site at Po Shek Wu Road, Sheung Shui, for public housing development.

1 Introduction

1.1.1.1 Ove Arup & Partners Hong Kong Ltd (Arup) was commissioned by the Hong Kong Housing Authority (HKHA) to conduct an Environmental Assessment Study (EAS) on the potential public housing development at Po Shek Wu Road, Sheung Shui.

1.1.1.2 The subject site is located to the north of Po Shek Wu Estate. It is bounded by Po Shek Wu Road to the northwest and San Wan Road to the southwest. The gross site area is about 1.4 hectares.

1.1.1.3 The first EAS for this proposed public housing site was conducted in 2017 and the last submission of the Final EAS Report and Preliminary Environmental Assessment (PEA) Report for supporting the landuse rezoning was prepared and approved in 2018/2019. In accordance with the Fanling / Sheung Shui Outline Zoning Plan (OZP) S/FSS/27, the current land use zoning of the site is "Residential (Group A)5" ("R(A)5").

1.1.1.4 This EAS is conducted on the updated Scheme received on 3 November 2023 provided by HKHA to support the Section 16 planning application of this site. It evaluates the potential environmental impacts on the proposed development with respect to guidance for environmental considerations provided in Chapter 9 – Environment of the Hong Kong Planning Standards & Guidelines (HKPSG). Road traffic noise impact, rail noise impact and fixed noise impact are the major environmental concerns for the development site. In addition, potential noise nuisance arising from the existing bus terminus, planned PTI, potential air quality impacts as well as land contamination issue have also been reviewed.

1.1.1.5 The site is located adjacent to Po Shek Wu Road and it will interface with the planned Fanling North (FLN) New Development Area (NDA) and its associated road infrastructures (including new slip road of Fanling Highway and realigned Po Shek Wu Road) under the Agreement No. CE 61/2007 North East New Territories NDA (NENT-NDA) Planning and Engineering Study undertaken by Civil Engineering and Development Department (CEDD) and Planning Department (PlanD). According to the latest implementation programme under the CE20/2019 (HY) – "Improvement of Tai Tau Leng Roundabout and Fanling Highway (Kwu Tung Section) – Design and Construction" as advised by CEDD, the Po Shek Wu Interchange improvement work is planned to be commissioned by 2031. The EAS has conducted with consideration of the latest updated information on the proposed Po Shek Wu Interchange improvement works.

1.1.1.6 The EAS was previously conducted on the following scheme:

Scheme	EAS version	Submission date
Scheme dated 22 March 2023	Draft EAS Report	27 April 2023

1.1.1.7 After submission of the Draft EAS Report for Scheme dated 22 March 2023 in April 2023, the building layout plan has been slightly modified and the anticipated occupation year of population of the development has been shifted from Year 2028 to Year 2030. This EAS has been updated using the updated traffic forecast for the Scheme dated 3 November 2023 with incorporation of EPD's comments provided on 23 June 2023. Besides, the road layout and at-source mitigation measures on Po Shek Wu Road improvement work have been

updated by CEDD, the latest provided information has been also incorporated into the current EAS.

2 Site Location and Preliminary Building Layout

2.1 Site Location and Description

2.1.1.1 The subject site is located to the north of Po Shek Wu Estate and adjacent to the south of Shek Wu Hui Jockey Club Playground. It has a gross site area of about 1.4 hectares (**Figure 2.1**). It is bounded by Po Shek Wu Road to the northwest and San Wan Road to the southwest. The site was being occupied by KMB bus depot. The area to the east of the site is Shek Wu Hui where a number of residential and commercial buildings are found.

2.1.1.2 The East Rail Line (EAL) is running parallel with San Wan Road and the Sheung Shui MTR Station is located at approximately 200m to southeast from the site. There are two public housing development sites planned in its vicinity, namely Sheung Shui Areas 4 & 30 Site 1 and Site 2 to the west across Po Shek Wu Road.

2.1.1.3 In accordance with the Fanling / Sheung Shui Outline Zoning Plan (OZP) S/FSS/27, the existing land use zoning of the subject site is "Residential (Group A)5" ("R(A)5"). (see **Figure 2.2**). The areas in vicinity of the site are mainly zoned as "Commercial" ("C"), "Commercial/Residential" ("C/R"), "Residential (Group A)" ("R(A)"), "Government, Institution or Community" ("G/IC"), "Green Belt" ("GB"), "Open Space" ("O"), "Village Type Development" ("V") and "Other Specified Uses" ("OU").

Figure 2.1: Site location

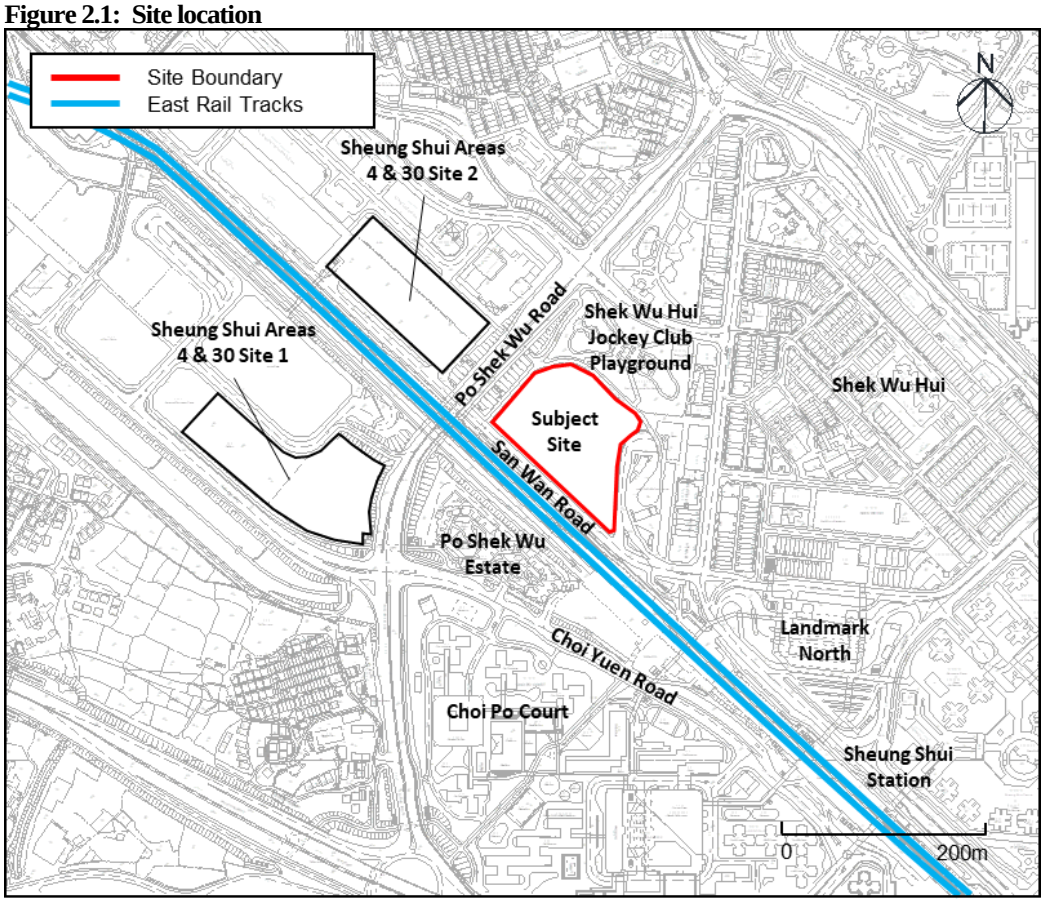
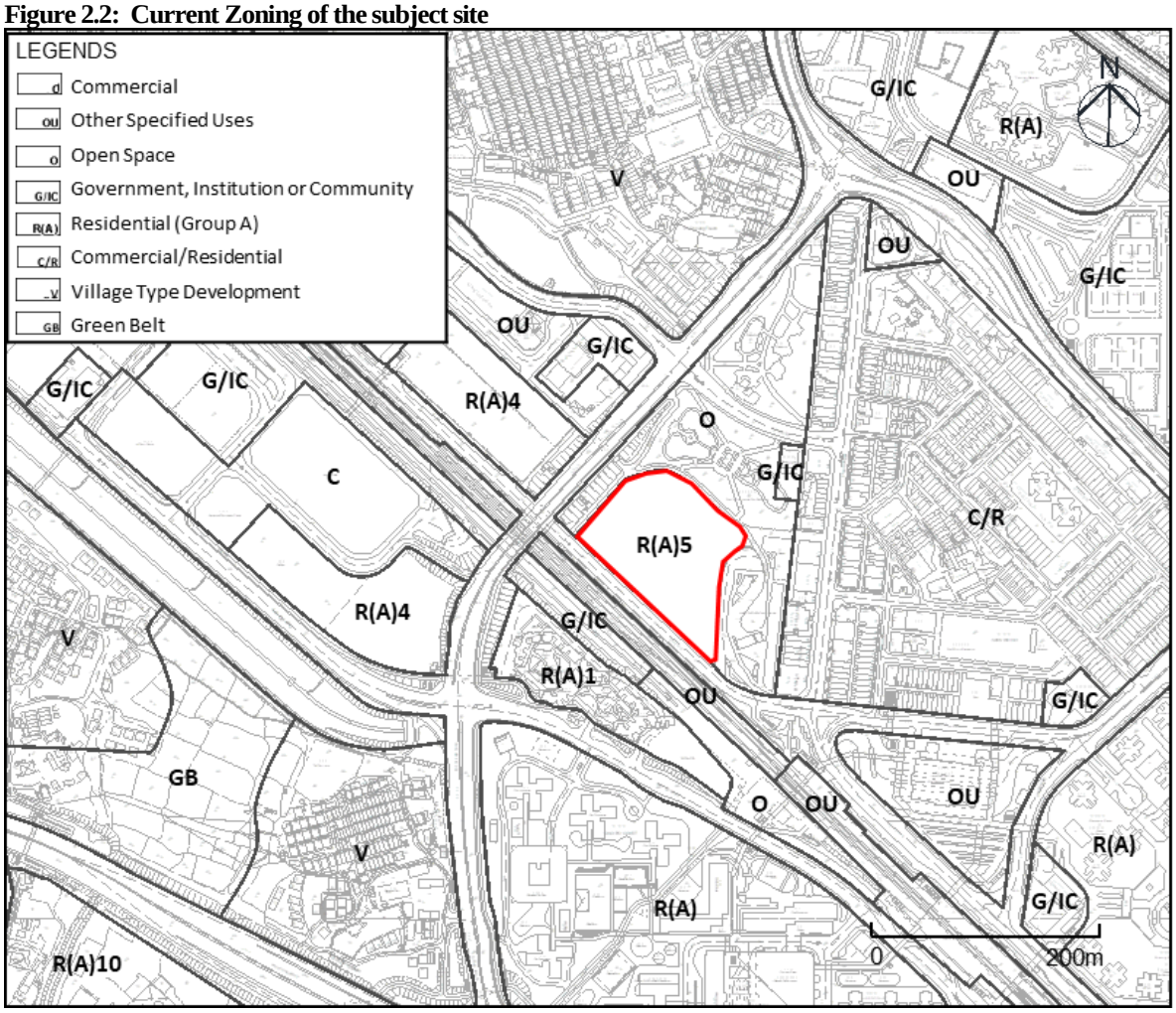


Figure 2.2: Current Zoning of the subject site



2.2 Building Design

2.2.1.1 The latest site layout plan (Scheme received on 3 November 2023) is illustrated in **Figure 2.3**. The proposed development consists of two quasi-T shaped domestic blocks with a total of 1,927 residential flats. **Figure 2.4 to Figure 2.5** illustrate the typical floor plans of the residential blocks. In consideration of potential noise reverberance at the semi-enclosed cavities at flats facing the railway, fixed glazing at side windows has been adopted in the building design (**Figure 2.5**).

2.2.1.2 Kindergarten, management offices and social welfare facilities are planned on G/F, 1/F and 2/F of the proposed development. Their locations and layout plans are still being investigated. Hence, assessments on the kindergarten, management offices and social welfare facilities will be supplemented when the layout is confirmed in the next stage.

2.2.1.3 The anticipated occupation year of population of the development is Year 2030. The key development parameters for the current scheme are given in **Table 2.1**. The detailed layout plan and schematic section plan are provided in **Appendix 2.1**.

Table 2.1: Key development parameters

Parameters	Block A	Block B
No. of Storeys	41 domestic storeys + 1 storey refuge floor	41 domestic storeys + 1 storey refuge floor
Floor to Floor Height (m) [1]	2.75	2.75
First NSR Level (mPD)	33.0	33.0
Main Roof Level (mPD)	148.115[2]	148.115[2]
Number of Flats per Storey	23	24
Total of Flats	943	984
Total Number of Flats	1,927	
Proposed Occupation of Population	2030	

Note:
[1] For modeling purpose, a floor-to-floor height of 2.7m is assumed for domestic block.
[2] For modeling purpose, the main roof level is round down to one decimal place for Block A and Block B.

Figure 2.3: Site layout plan (Scheme received on 3 November 2023)

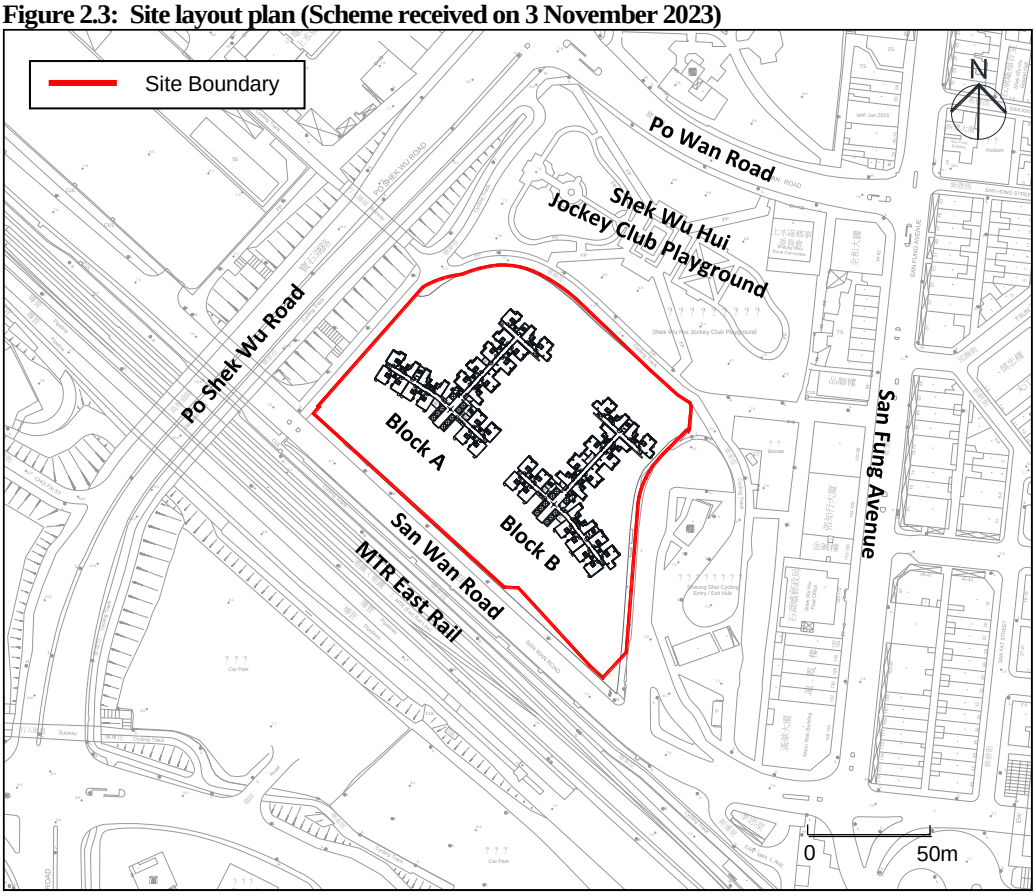


Figure 2.4: Typical floor plan of Block A (Scheme received on 3 November 2023)

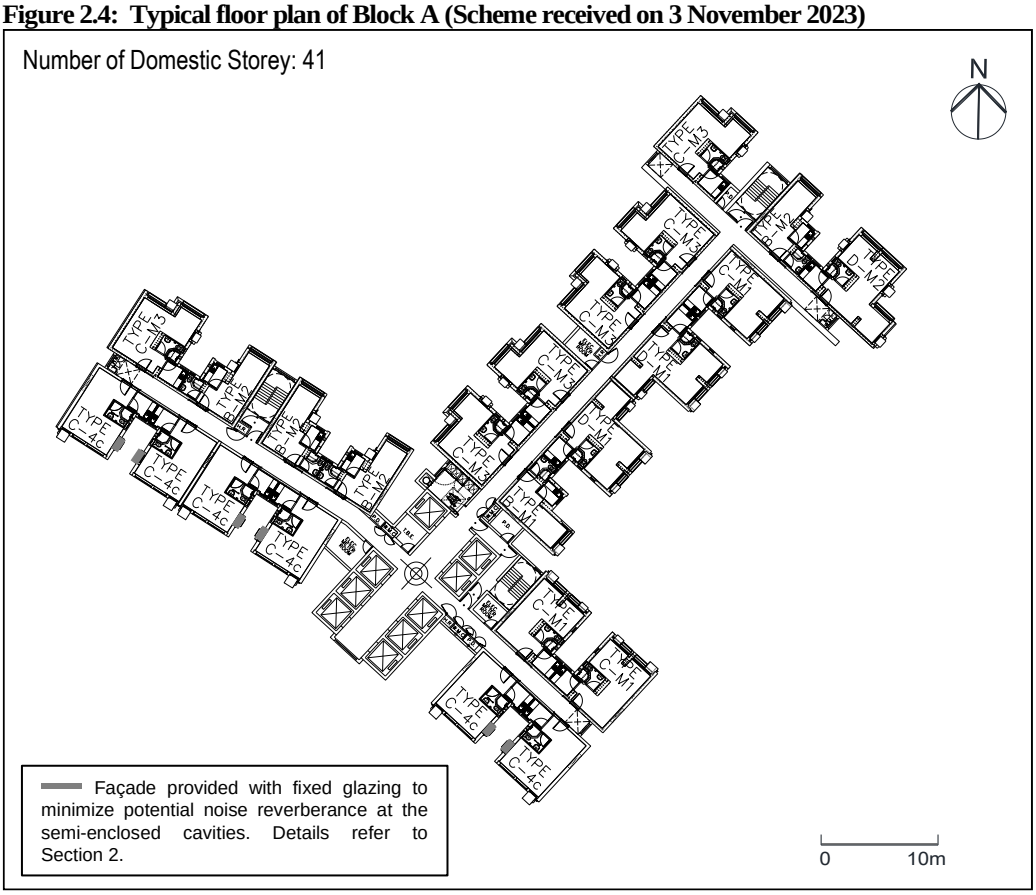
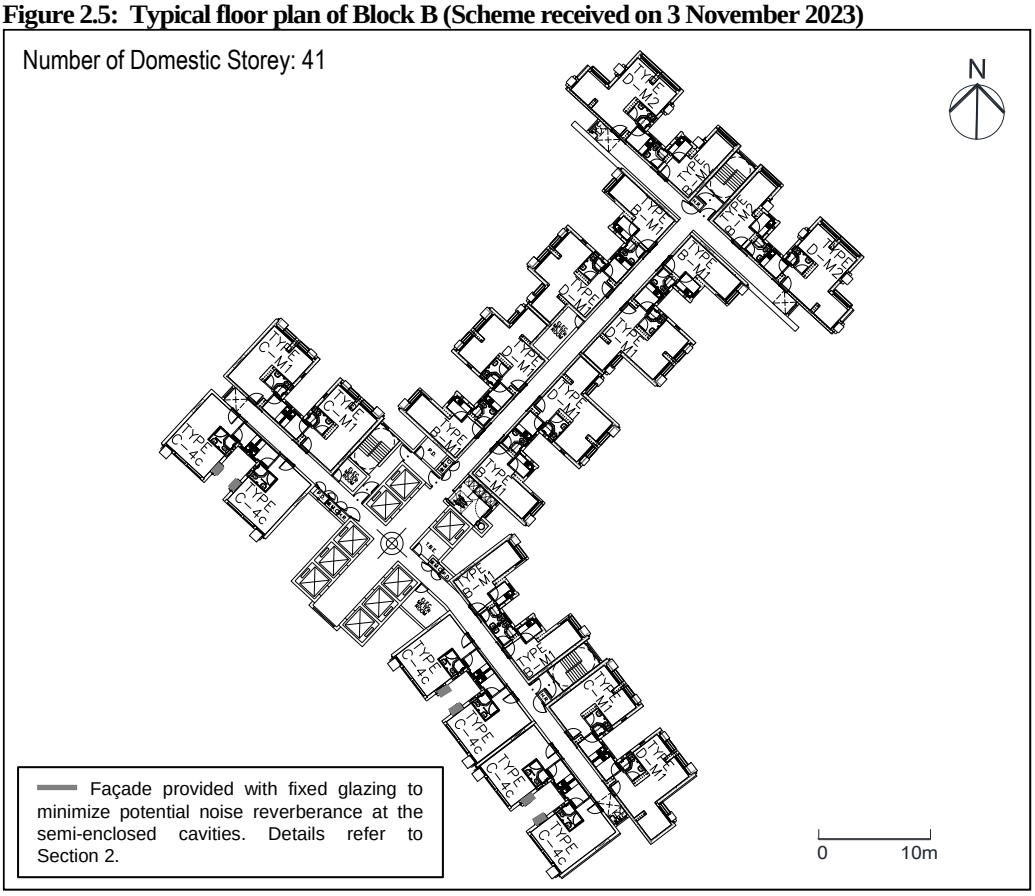


Figure 2.5: Typical floor plan of Block B (Scheme received on 3 November 2023)



3 Site Inspection

3.1.1.1 Site visits were carried out in December 2021, January 2022 and August 2022. Photographs taken at site and the neighbouring areas are given in **Photo 1** to **Photo 8** below.

3.1.1.2 The site was currently being occupied by the KMB Bus Depot. Immediately adjacent to the north of the site is the Shek Wu Hui Jockey Club Playground. The Sheung Shui Cycling Entry/ Exit Hub and Shek Wu Hui Agricultural Produce Bazaar are located adjacent to the east of the site. A number of industrial and commercial buildings are located at Shek Wu Hui and an industrial area is found across Po Shek Wu Road. Some fixed noise sources were observed in vicinity of the site, including chillers and condensers on podium level or rooftop of the nearby industrial/commercial buildings and retails, as well as some loading and unloading activities at Sheung Shui Agricultural Produce Bazaar.

3.1.1.3 The EAL is running at-grade on a ballast track parallel with San Wan Road and the Sheung Shui MTR Station is located at about 200m southeast from the site. Vertical barrier is installed along the nearside track of the rail section between Sheung Shui Station and Po Shek Wu Road.

3.1.1.4 Based on site observation, the noise climate in vicinity of the site was generally dominated by road traffic noise from the nearby Po Shek Wu Road and rail noise from the EAL. The Shek Wu Hui Agricultural Produce Bazaar was found to be operated in the morning. No noticeable noisy activities from the bazaar were observed, except the street washing truck to be operated after the bazaar is closed at 1100.

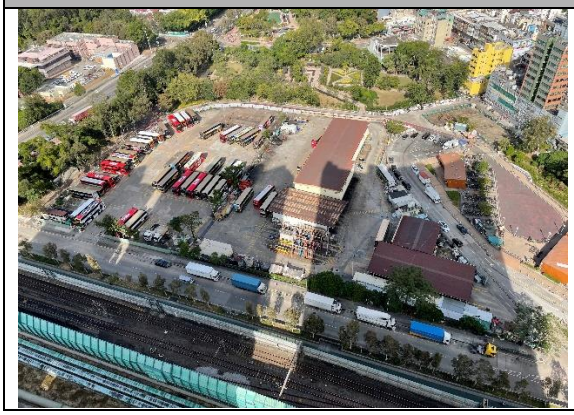
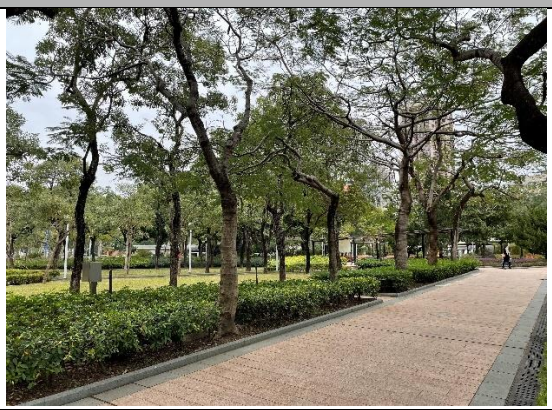
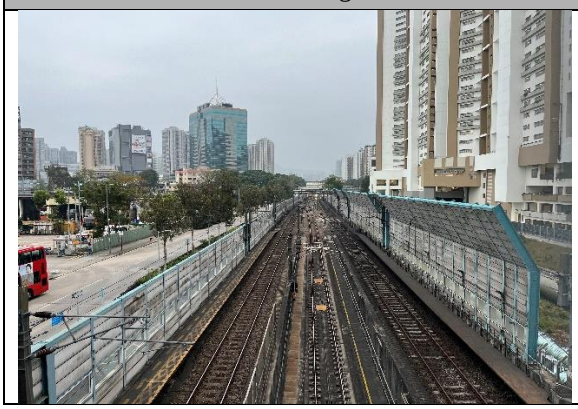
Photo 1: Existing site conditions	**Photo 2:** Shek Wu Hui Jockey Club Playground
	

Photo 3: Sheung Shui Cycling Entry/ Exit Hub	**Photo 4:** Shek Wu Hui Agricultural Produce Bazaar
	
Photo 5: Shek Wu Hui	**Photo 6:** Industrial areas to the west of the site
	
Photo 7: East Rail and Sheung Shui Station	**Photo 8:** Po Shek Wu Road
	

4 Road Traffic Noise Impact Assessment

4.1 Concerned Road Sections and Noise Sensitive Receivers

4.1.1.1 As described in the sections above, the prevailing noise environment in the vicinity of the subject site was primarily dominated by road traffic noise from the nearby Po Shek Wu Road. Fanling Highway is located at more than 500m away and is screened by the high-rise residential developments such as Choi Po Court, Choi Yuen Estate and Po Shek Wu Estate. Traffic noise from Fanling Highway was found not noticeable during the site visit.

4.1.1.2 With reference to HKPSG, Noise Sensitive Receivers (NSRs) shall include residential uses (all domestic premises including temporary housing accommodation), institutional uses (educational institutions including kindergarten, child care centres and all others where unaided voice communication is required), hotels, hostels, offices, places of public worship, courts of law, hospitals, clinics, convalescences, residential care homes for the elderly, amphitheatres, auditoria, libraries, performing arts centres and country parks. Based on the current development plan, the proposed domestic blocks, kindergarten, management offices and social welfare facilities are planned within the site and all of them are regarded as NSRs.

4.2 Noise Criteria

4.2.1.1 In accordance with the HKPSG, the maximum permissible hourly road traffic noise levels at the external facades of different uses of Nosie Sensitive Receivers (NSRs) for the proposed development are summarized in **Table 4.1**. These criteria apply to premises relying on opened windows as a primary means for ventilation. As mentioned in **Section 2.2**, the layouts of the kindergarten, management offices and social welfare facilities at G/F, 1/F and 2/F are still being investigated. Hence, assessment will be supplemented in the next stage.

Table 4.1: Summary of noise criteria for road traffic noise

Proposed Developments / Facilities	Noise Sensitive Room with Openable Windows for Ventilation [1]	Uses	Noise Standards for Road Traffic Noise, $L_{10(1\ hour)}$ dB(A)
Residential Block A to Block B	Residential Units	Domestic	70

Note:
[1] All sensitive rooms which rely on opened windows for ventilation are identified.

4.3 Noise Assessment Points

4.3.1.1 Assessment points for the residential blocks have been assigned to all openable windows of the NSRs for ventilation. The locations of selected assessment points are given in **Figure 4.1 to Figure 4.2**.

Figure 4.1: Selected assessment points for Block A (road traffic noise assessment)

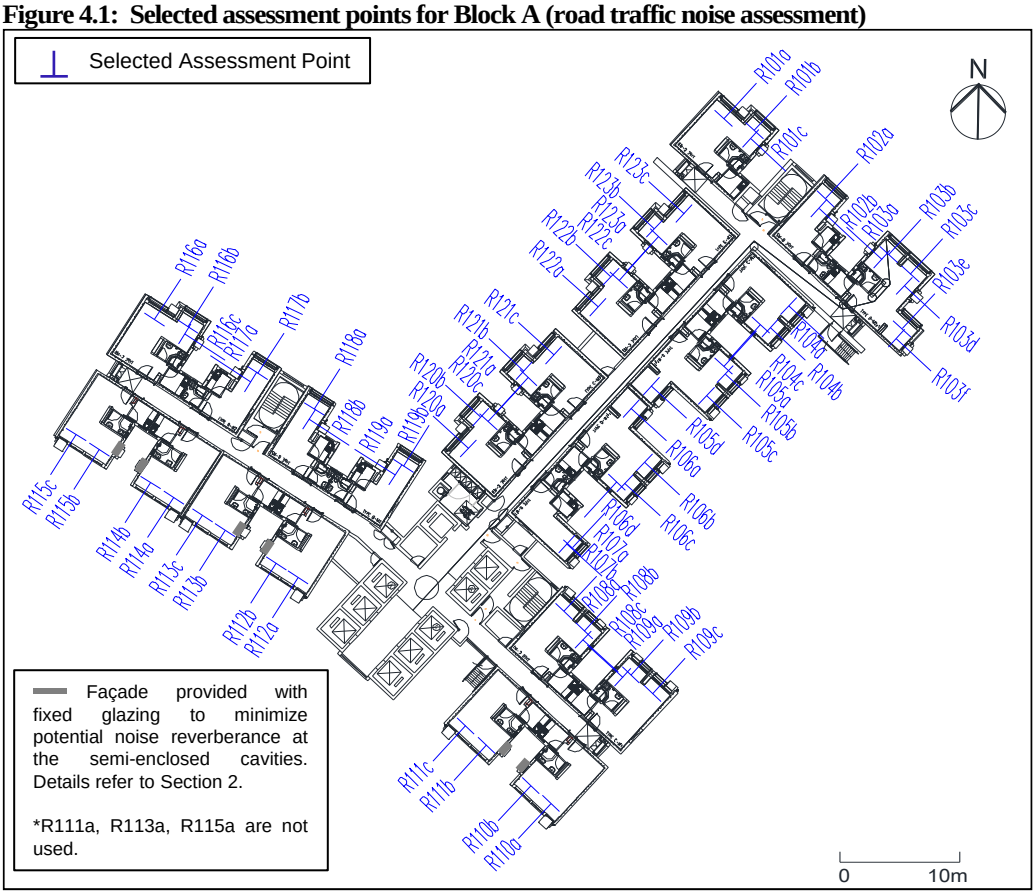
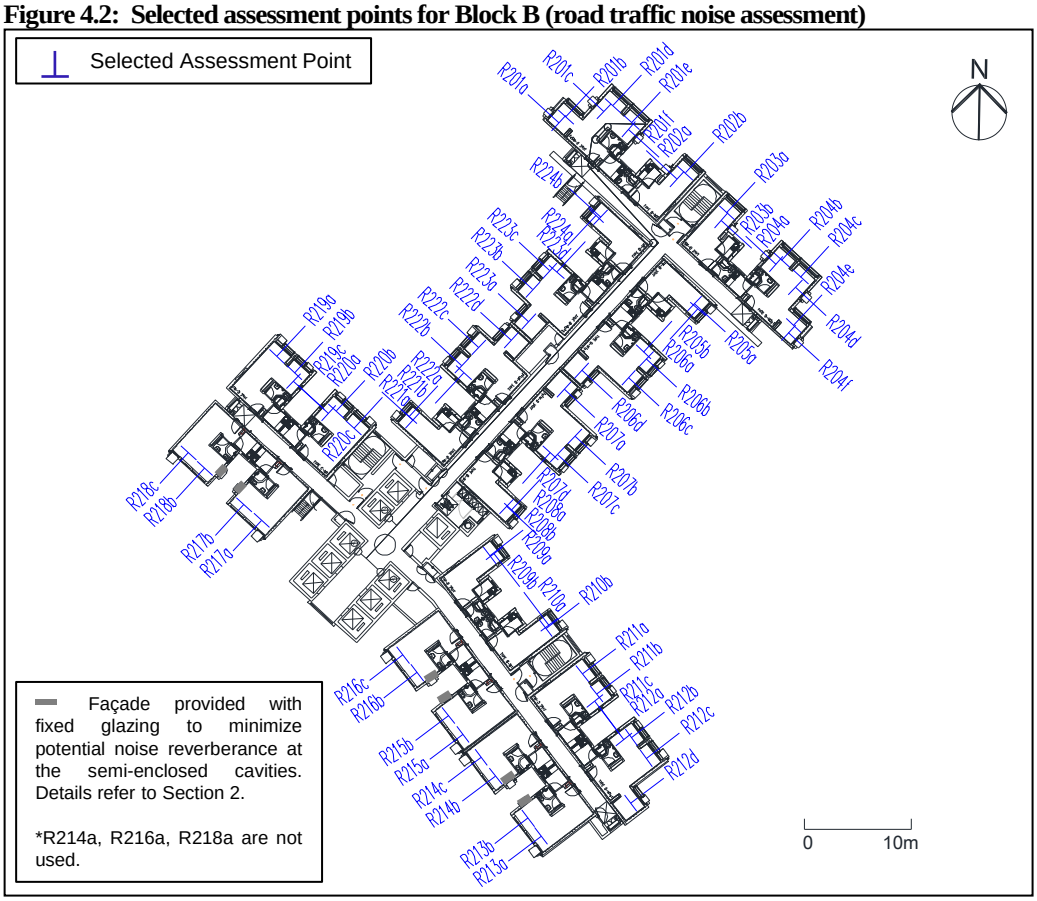


Figure 4.2: Selected assessment points for Block B (road traffic noise assessment)



4.4 Assessment Methodology

4.4.1.1 The prediction is based on the calculation method in accordance with the UK Department of Transport "Calculation of Road Traffic Noise" (CRTN). Based on the information provided by HKHA, the proposed occupation year would be Year 2030. Road traffic noise assessment has been carried out for two scenarios: Scenario A for Year 2031 (i.e. highest traffic flow before commissioning of the Po Shek Wu Interchange improvement works) and Scenario B for Year 2045 (i.e. maximum traffic projection within 15 years upon the occupation of the development and after Po Shek Wu Interchange improvement works in place).

4.4.1.2 To cater for the traffic demand from future population in the area before Po Shek Wu Interchange Improvement Work recommended under NENT NDA in place, there are minor road improvement works prior to the occupation of the housing sites, including:

- Junction 9 (between Po Wan Road and Po Shek Wu Road) undertaken by CEDD;
- Junction 10 (between Choi Yuen Road and Po Shek Wu Road) undertaken by CEDD; and
- Po Shek Wu Road undertaken by HKHA in Year 2025.

4.4.1.3 These road improvement works have been considered in the assessment scenarios as appropriate.

4.4.1.4 A 3m vertical barrier is currently in place along the eastbound of Po Wan Road adjacent to Po Sheung Tsuen and has been incorporated into Scenario A of the traffic noise model in the assessment. The location of this existing barrier is illustrated in **Figure 4.3**.

4.4.1.5 Retrofitting of noise barriers are proposed along Po Shek Wu Road under the project of "Retrofitting of noise barriers on Po Shek Wu Road" (PWP Item No. 833TH). The proposal was gazetted in October 2022, however, there is no confirmed implementation programme for these retrofitting noise barriers. Thus, they have been excluded for conservative assessment.

4.4.1.6 In addition, CEDD has also recommended some at-source noise mitigation measures on Po Shek Wu Road to relieve the noise impacts caused by its associated new road infrastructure works. Based on the CE20/2019 (HY) – "Improvement of Tai Tau Leng Roundabout and Fanling Highway (Kwu Tung Section) – Design and Construction", the latest recommended mitigation measures (version Oct 2023 provided by CEDD) in relation to the traffic noise environment at the development site include the following:

A. A 7m vertical barrier (absorptive) with 3m cantilevered arm at central divider along the section of Po Shek Wu Road adjacent to Shek Wu Hui Jockey Club Playground;

B. A semi-enclosure along the section of Po Shek Wu Road adjacent to Po Shek Wu Estate with opening on west side;

C. A semi-enclosure along the section of Po Shek Wu Road adjacent to Choi Ying House of Choi Po Court with opening on west side;

D. A semi-enclosure along the new slip road of Fanling Highway with opening on west side; and

E. A full enclosure along the section of Po Shek Wu Road adjacent to Choi Ngan House of Choi Po Court.

4.4.1.7 **Figure 4.4** shows the location of these proposed mitigation measures on Po Shek Wu Road. The details are extracted from the CE20/2019 (HY) – "Improvement of Tai Tau Leng Roundabout and Fanling Highway (Kwu Tung Section) – Design and Construction" and are given in **Appendix 4.1**.

4.4.1.8 The proposed improvement works of Po Shek Wu Road is planned to be commissioned by 2031. The existing and planned at-source mitigation measures described above have been incorporated in Scenario B and their locations are shown in **Figure 4.4**.

Figure 4.3: Noise mitigation measures in vicinity of the subject site in Scenario A

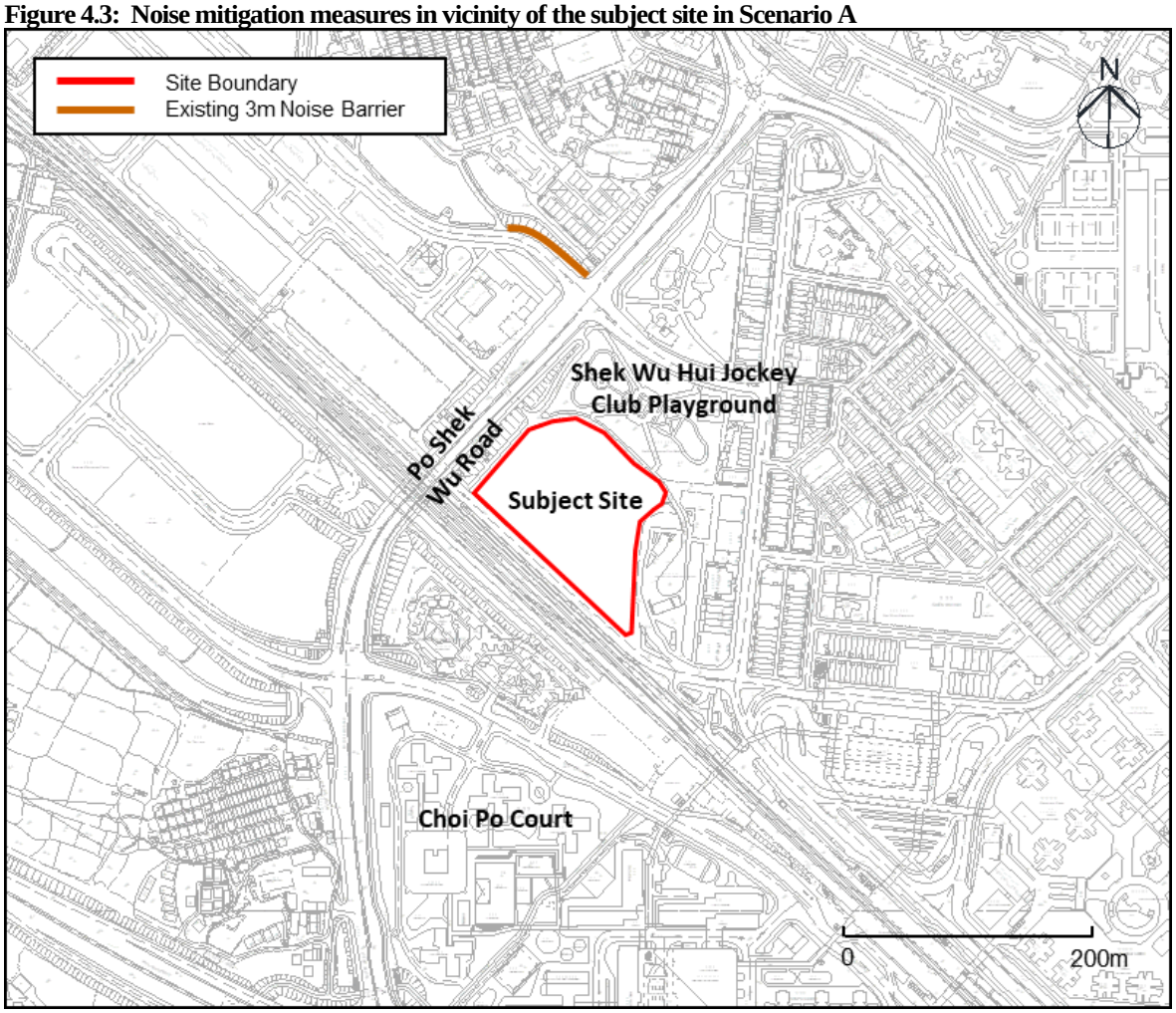
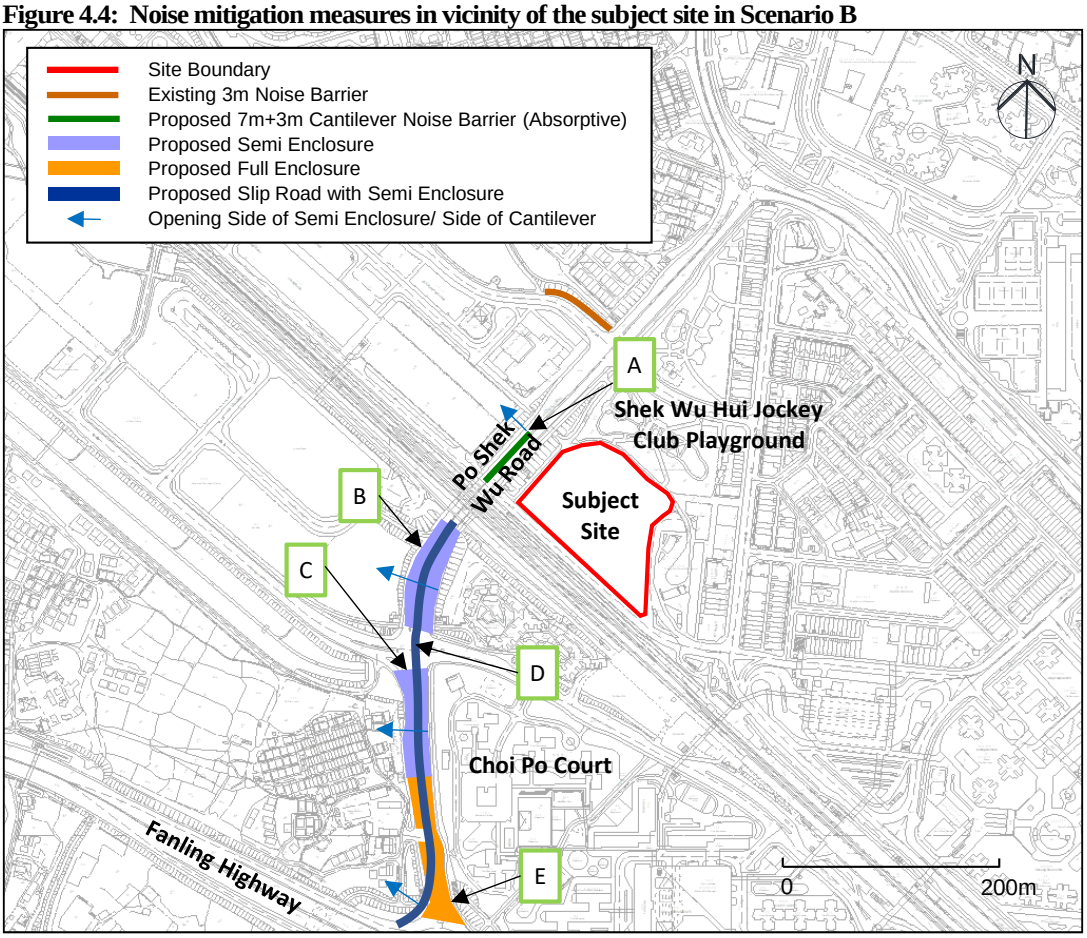


Figure 4.4: Noise mitigation measures in vicinity of the subject site in Scenario B



4.5 Traffic Flow Data for Assessment

4.5.1.1 Based on information provided by HKHA, the tentative occupation year for the proposed development would be Year 2030. The traffic noise levels have been predicted based on the maximum traffic projection within 15 years after occupation of the population. As mentioned in previous section, two scenarios (Scenario A - before commissioning of Po Shek Wu Interchange improvement works and Scenario B - after commissioning of Po Shek Wu Interchange improvement works) have been carried out in this EAS. The traffic projection has also taken into account the planned housing sites in Sheung Shui Areas 4 & 30 Site 1 and Site 2.

4.5.1.2 As advised by the Traffic Consultant, the maximum traffic flow after occupation of the population of the housing development and before commissioning of Po Shek Wu Interchange improvement works will be Year 2031; while the maximum traffic flow after commissioning year of Po Shek Wu Interchange improvement works and within 15 years after occupation of the population of the housing development will be Year 2045.

4.5.1.3 A separate Technical Note on the traffic forecast for EAS study has been submitted to Transport Department (TD) for endorsement. Reply from TD is yet to be provided at the time of preparing this report and will be supplemented in later stage. The traffic consultant had checked and confirmed the validity of the traffic data, which was derived based on the traffic forecast methodology submitted to TD.

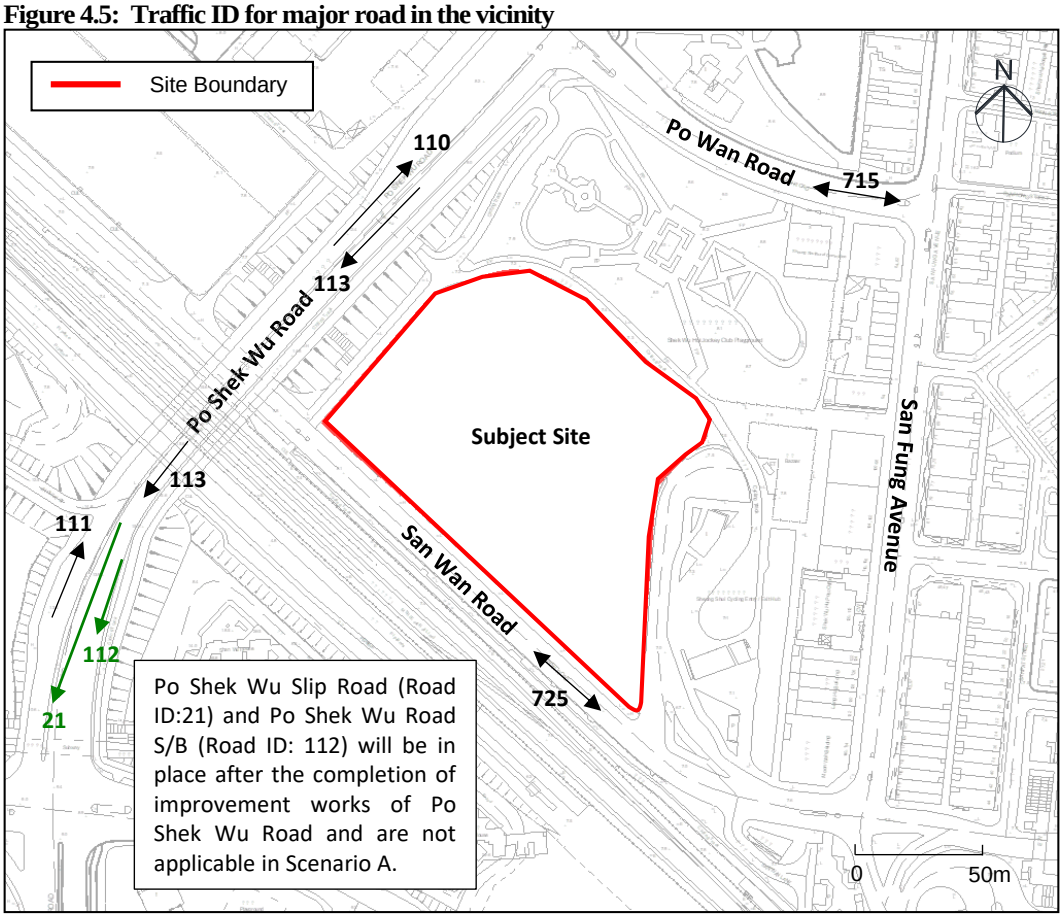
4.5.1.4 The traffic flow data for the major roads surrounding the subject site is presented in **Figure 4.5** and **Table 4.2** below. Details are given in **Appendix 4.2**.

Table 4.2: Predicted peak hourly traffic flow data

Road ID [1]	Street[2]	Speed Limit (Km/hr)	Year 2031		Year 2045	
			Traffic Flow (veh/hr)	% of HV	Traffic Flow (veh/hr)	% of HV
21[3]	Po Shek Wu Road Slip Road S/B	50	-	-	1326	57.5
110	Po Shek Wu Road N/B	50	1720	47.5	1780	48.8
111	Po Shek Wu Road N/B	50	1519	42.8	1578	44.8
112[3]	Po Shek Wu Road S/B	50	-	-	885	36.1
113	Po Shek Wu Road S/B	50	1361	43.7	2208	48.9
715	Po Wan Road (two way)	50	845	56.5	644	63.1
725	San Wan Road (two way)	50	321	36.4	307	34.6

Note:
[1] Only the major roads are shown in the table above. Hence, the flow ID is not in sequential order.
[2] N/B = North bound, S/B = South bound
[3] Not applicable in Scenario A. See **Figure 4.5**.

Figure 4.5: Traffic ID for major road in the vicinity



4.6 Assessment Results for Residential Blocks

4.6.1.1 Optimised building layout, design and orientation have already been incorporated into the current layout scheme for the basecase scenario, as described below:

Building Block Design, Layout and Orientation

4.6.1.2 During the process of designing the development layout, due consideration has been given to avoiding noise impacts from road traffic as much as practicable. Quasi-T shape block designs have been adopted which could provide self-screening and reduce angle of view to Po Shek Wu Road. Block A is also deposited such that it could provide screening effect to Block B from Po Shek Wu Road.

4.6.1.3 Other different block designs have been investigated. The current scheme is found to be the optimal option from perspectives of development efficiency, flat production, noise performance, scenery and angle of view, etc.

Building setback

4.6.1.4 The subject site has limited space available for building setback to reduce the noise impacts effectively. A wind corridor is maintained between the two blocks to allow natural air ventilation. Nonetheless, the building blocks have been deposited with optimised setback distance from Po Shek Wu Road and San Wan Road as far as practicable.

4.6.1.5 With the above proper designs, it is estimated that a total of 749 residential flats will be exposed to noise level in excess of the 70dB(A) criterion and the overall noise compliance rate is 61.1% for Scenario A; while for Scenario B, a total of 869 residential flats is predicted in excess of the 70dB(A) criterion with an overall noise compliance rate of 54.9%. The maximum noise levels are 76dB(A) and 77dB(A) for Scenarios A and B respectively. Results of the road traffic noise assessments for the proposed residential development are summarised in **Table 4.3**. Details are presented in **Appendix 4.3** for Scenario A and **Appendix 4.4** for Scenario B. Without these building designs, it is expected that the noise compliance rate would be lower.

Table 4.3: Road traffic noise assessment results – Residential Blocks (Basecase Scenarios)

Scenario	Total No. of Flats	No. of Flats Exceeding the Noise Criteria	Max Noise Levels, dB(A)	Compliance Rate
Scenario A	1927	749	76	61.1%
Scenario B		869	77	54.9%

4.6.1.6 Results indicate that the predicted exceedances are located on the northern, northwestern, northeastern and southwestern facades which are primarily affected by Po Shek Wu Road for both scenarios. A comparison of the locations of the predicted exceedances is given in **Table 4.4** below and shown in **Figures 4.6 to 4.9** below. It is found that Scenario B is in general worse than Scenario A.

Table 4.4: Location of predicted exceedances – Residential Blocks (Basecase Scenarios)

Block	Exceeded NSR	Scenario A		Scenario B	
		Exceeded Floor	Number of Exceedance	Exceeded Floor	Number of Exceedance
A	R101a	4/F – 45/F	41	4/F – 45/F	41
	R101b	4/F – 45/F		4/F – 45/F	
	R102a	4/F – 45/F	41	4/F – 45/F	41
	R103a	-	40	5/F – 19/F	41
	R103b	5/F – 45/F		4/F – 45/F	
	R103c	5/F – 45/F		4/F – 45/F	
	R110a	7/F – 39/F	34	7/F – 37/F	32
	R110b	6/F – 40/F		6/F – 38/F	
	R111b	6/F – 42/F	38	6/F – 40/F	36
	R111c	5/F – 43/F		5/F – 41/F	
	R112a	4/F – 45/F	41	4/F – 45/F	41
	R112b	4/F – 45/F		4/F – 45/F	
	R113b	4/F – 45/F	41	4/F – 45/F	41
	R113c	4/F – 45/F		4/F – 45/F	
	R114a	4/F – 45/F	41	4/F – 45/F	41
	R114b	4/F – 45/F		4/F – 45/F	
	R115b	4/F – 45/F	41	4/F – 45/F	41

Block	Exceeded NSR	Scenario A		Scenario B	
		Exceeded Floor	Number of Exceedance	Exceeded Floor	Number of Exceedance
	R115c	4/F – 45/F		4/F – 45/F	
	R116a	4/F – 45/F	41	4/F – 45/F	41
	R116b	4/F – 45/F		4/F – 45/F	
	R117a	4/F – 26/F	41	4/F – 42/F	41
	R117b	4/F – 45/F		4/F – 45/F	
	R118a	4/F – 45/F	41	4/F – 45/F	41
	R119a	4/F – 30/F	41	4/F – 45/F	41
	R119b	4/F – 45/F		4/F – 45/F	
	R120a	4/F – 45/F	41	4/F – 45/F	41
	R120b	4/F – 45/F		4/F – 45/F	
	R120c	4/F – 20/F		4/F – 29/F	
	R121a	-	41	9/F – 11/F	41
	R121b	4/F – 45/F		4/F – 45/F	
	R121c	4/F – 45/F		4/F – 45/F	
	R122a	4/F – 45/F	41	4/F – 45/F	41
	R122b	4/F – 45/F		4/F – 45/F	
	R122c	4/F – 18/F		4/F – 33/F	
	R123a	4/F – 18/F	41	4/F – 21/F	41
	R123b	4/F – 45/F		4/F – 45/F	
	R123c	4/F – 39/F		4/F – 45/F	
B	R201a	-	17	8/F – 17/F	40
	R201b	-		7/F – 28/F	
	R201c	-		6/F – 31/F	
	R201d	12/F – 29/F		5/F – 45/F	
	R201e	16/F – 26/F		5/F – 45/F	
	R202b	-	-	6/F – 45/F	39
	R203a	-	-	8/F – 45/F	37
	R204b	-	10	10/F – 45/F	36
	R204c	23/F – 32/F		9/F – 45/F	
	R217a	10/F – 21/F	16	9/F – 21/F	15
	R217b	9/F – 25/F		9/F – 24/F	
	R218b	9/F – 27/F	20	8/F – 26/F	19
	R218c	8/F – 28/F		8/F – 27/F	
Total number of Exceedance		-	749	-	869

Figure 4.6: Location of predicted exceedances in Block A in Scenario A

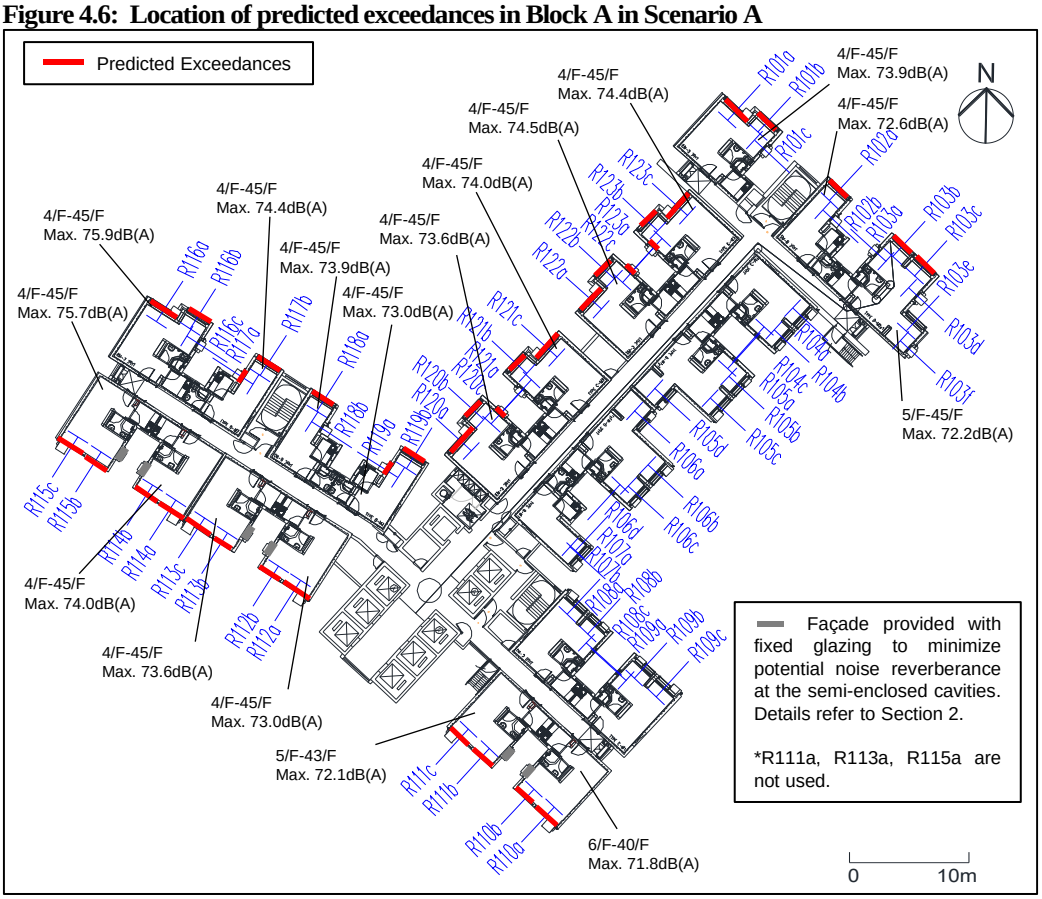


Figure 4.7: Location of predicted exceedances in Block B in Scenario A

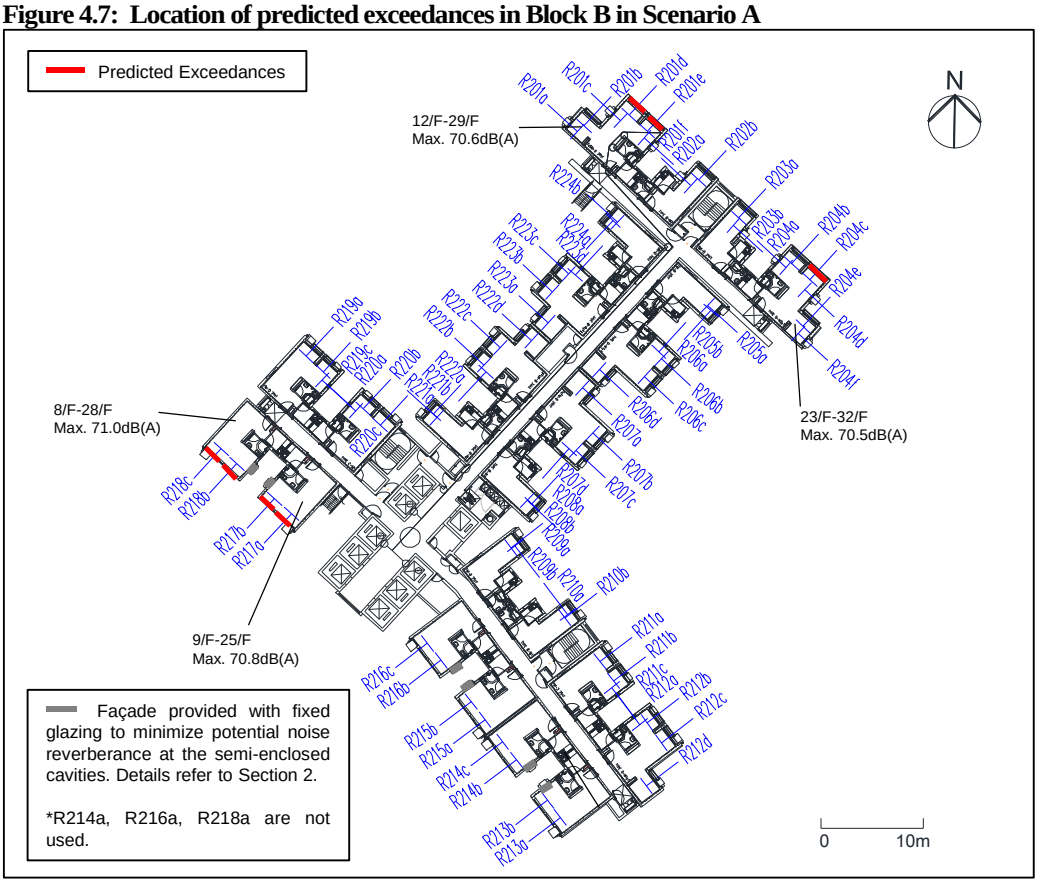


Figure 4.8: Location of predicted exceedances in Block A in Scenario B

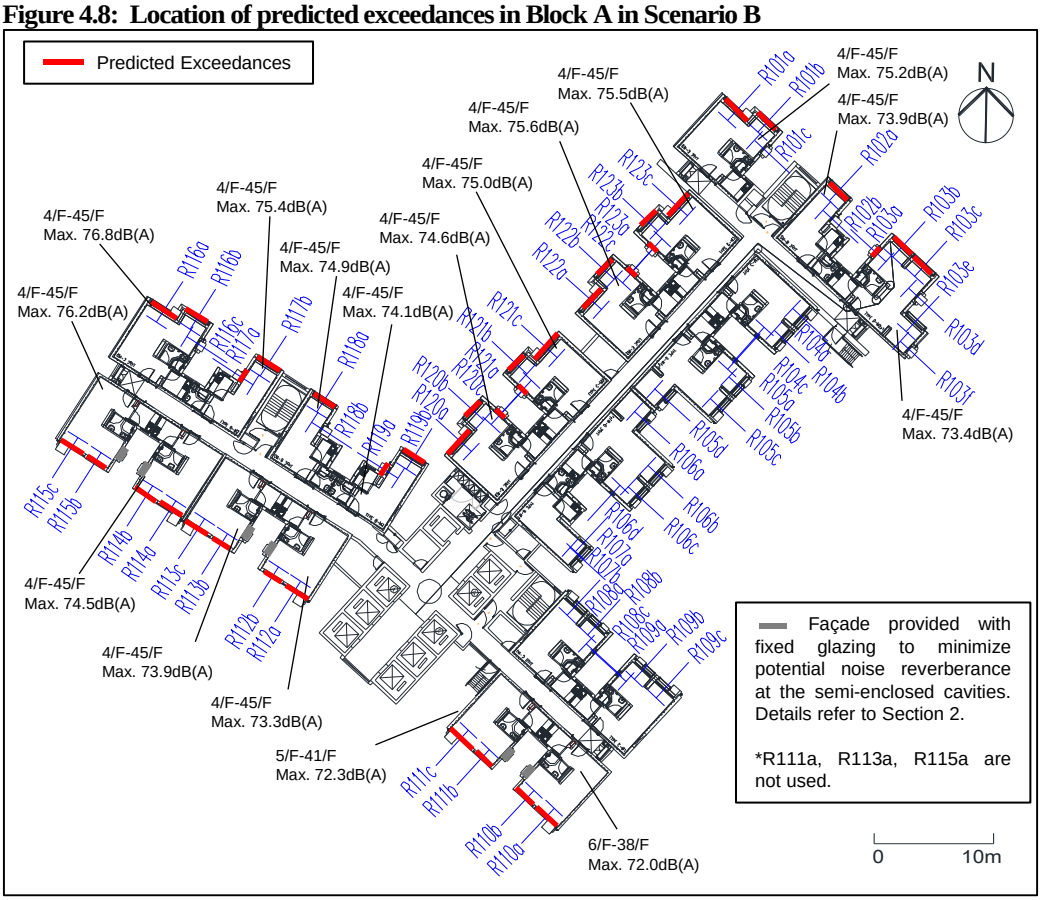
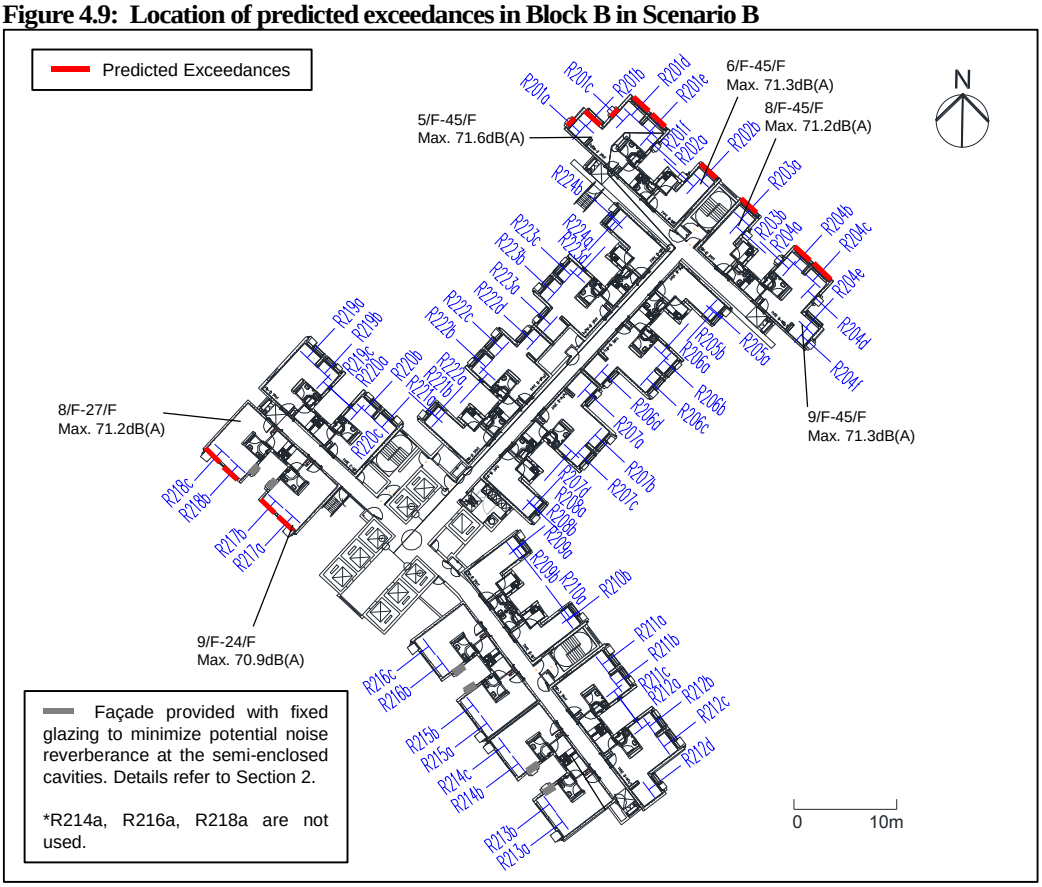


Figure 4.9: Location of predicted exceedances in Block B in Scenario B



4.7 Noise Mitigation Measures for Residential Blocks

4.7.1.1 Proper building layout and design have been adopted in the current scheme as described in the section above. In addition, all other practicable noise mitigation measures have also been investigated exhaustively and the findings are discussed as follows:

Boundary Wall / Barrier

4.7.1.2 Since the affected residential units are found from low to high floors, barriers along the site boundary would not be able to provide effective screening to the upper floor units. Hence, other forms of mitigation measures such as fixed glazing, acoustic windows or enhanced acoustic balconies have been considered instead (see below sections).

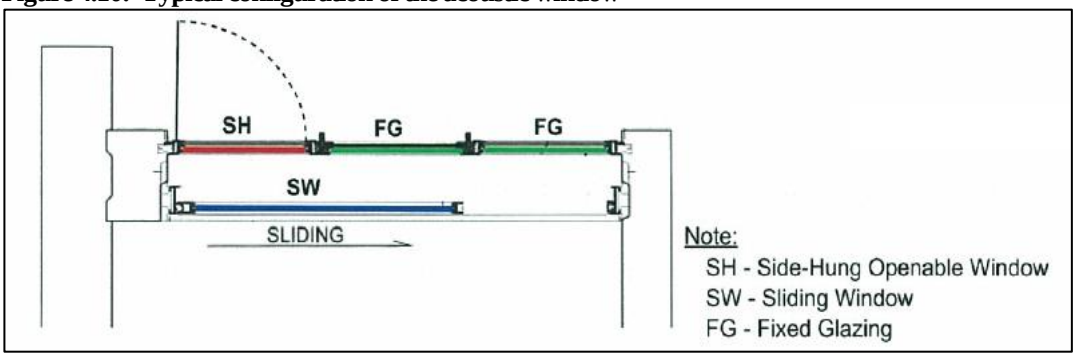
Noise Shielding Building

4.7.1.3 The subject site has limited space available for noise shielding building and hence will not be considered.

Acoustic Window Design

4.7.1.4 The acoustic window is designed with two layers of window including push open window at outer layer and sliding window at inner layer as illustrated in **Figure 4.10**. The opening and gap between the two layers of window allows sufficient air flow to satisfy ventilation requirement; while at the same time, direct transmitted noise to the room is obstructed by inner sliding window and hence noise reduction could be achieved. In order to achieve the intended noise reduction, the sliding window should be behind the opened side-hung window. Fixed glazing should be kept close as shown in **Figure 4.10**. Special locking device (e.g. allen key) would be installed to the fixed glazing at the outer layer for keeping them in the mentioned setting, the fixed glazing at the outer layer needs not be opened for ventilation and could be opened by the key for cleansing and maintenance purposes only. The above information about the acoustic window will be stated in the Decoration Handbook to let the future occupants be aware of its appropriate use and correct setting besides its intended purpose.

Figure 4.10: Typical configuration of the acoustic window



4.7.1.5 For the affected flats (i.e. NSRs R101 - R103, R116 - R123 and R201 - 204) facing directly to Po Shek Wu Road, acoustic windows are recommended to protect the affected main windows. The locations of the proposed acoustic window are summarized in **Table 4.5** and indicated in **Figure 4.11 to 4.12** (the worst combination taking into account Scenarios A

and B). For the affected flats (i.e. NSRs R110 - R115 and R217 - R218) which are directly facing San Wan Road and also affected by the East Rail, enhanced acoustic balcony 3.0 (EAB 3.0) will be adopted to alleviate both road traffic and rail noise impact (see **Section 5** as well).

4.7.1.6 The configurations of the proposed acoustic window to be adopted in this project are shown in **Appendix 4.5**. The flat unit and the window configurations to be adopted in the current scheme of this project are based on the latest Modular Flat Design - Modular Integrated Construction (MFD-MiC), except with minor modification on the size of the openable windows. As advised by HKHA, the noise attenuation of acoustic window for Modular Flat Type B-M2 should be applied to Flat Type B, Modular Flat Type C-M3 should be applied to Flat Type C, and Modular Flat Type D-M2 should be applied to Flat Type D in the assessment (see **Appendix 4.6** for details). The height of the windows has been slightly adjusted from 1352mm to 1310mm for Flat Type B, Type C and Type D. Nonetheless, the smaller window opening area would not affect the noise attenuation. Besides, the gap width of the proposed acoustic windows for all flat types has been reduced from 175mm to 115mm. With such configuration, a better noise attenuation of the acoustic window is anticipated.

4.7.1.7 Based on the current design, 6mm window pane will be provided to the proposed acoustic window. The openable side-hung windows and fixed glazing of the acoustic windows are in the normal or favourable setting for noise reduction as shown in **Figure 4.11 to 4.12**. The design of the proposed acoustic window can meet the relevant ventilation requirement under the Building (Planning) Regulations. According to the Practice Note on Lighting and Ventilation Requirements-Performance-based Approach (APP-130) issued by Buildings Department, for optimum performance with the inner sliding glass pane in a closed position, the air gap should have a length of not less than 100mm and a width between 100mm and 175mm. The length and width of the air gap of the proposed acoustic window also meet these conditions.

Table 4.5: Locations of proposed acoustic windows for mitigating road traffic noise

Acoustic Window at NSR	Floor Requiring Acoustic Window	Type of Flat	Ref. Modular Flat Type	Acoustic Window Configurations			With / Without Absorption (W / WO)
				Gap Width, mm	Inner/Outer Window Width, mm	Overlapping Length, mm	
R101a	4/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R101b	4/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R102a	4/F – 45/F	B	B-M2	115	895/945	200	WO
R103b	4/F – 45/F	D	D-M2 (BR1)	115	660/633	607	WO
R103c	4/F – 45/F	D	D-M2 (LR)	115	915/985	100	WO
R116a	4/F – 11/F	C	C-M3 (LR)	115	985/1125	330	W
R116a	12/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R116b	4/F – 11/F	C	C-M3 (BR)	115	660/633	607	W
R116b	12/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R117b	4/F – 45/F	B	B-M2	115	895/945	200	WO
R118a	4/F – 45/F	B	B-M2	115	895/945	200	WO
R119b	4/F – 45/F	B	B-M2	115	895/945	200	WO
R120a	4/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R120b	4/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO

Acoustic Window at NSR	Floor Requiring Acoustic Window	Type of Flat	Ref. Modular Flat Type	Acoustic Window Configurations			With / Without Absorption (W / WO)
				Gap Width, mm	Inner/Outer Window Width, mm	Overlapping Length, mm	
R121b	4/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R121c	4/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R122a	4/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R122b	4/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R123b	4/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R123c	4/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R201b	7/F – 28/F	D	D-M2 (BR2)	115	545/545	680	WO
R201d	5/F – 45/F	D	D-M2 (LR)	115	915/985	100	WO
R201e	5/F – 45/F	D	D-M2 (BR1)	115	660/633	607	WO
R202b	6/F – 45/F	B	B-M2	115	895/945	200	WO
R203a	8/F – 45/F	B	B-M2	115	895/945	200	WO
R204b	9/F – 45/F	D	D-M2 (BR1)	115	660/633	607	WO
R204c	9/F – 45/F	D	D-M2 (LR)	115	915/985	100	WO

Enhanced Acoustic Balcony (EAB 3.0) Design

4.7.1.8 For the affected flats Type C-4 directly facing San Wan Road which are also affected by the East Rail (i.e. NSRs R110 - R115 and R217 - R218), EAB 3.0 is proposed to alleviate both road traffic and rail noise impact. The proposed EAB 3.0 consists of some or all of the following key features for achieving the required noise reduction:

- Concrete parapet in front and full height concrete walls on two sides.
- Outer screen walls (in the form of sliding glass panels) above the front parapet in front of the balcony door, which should be fixed at its position for intended noise attenuation performance.
- Sound absorptive materials, of noise reduction coefficient not less than 0.7, applied on the ceiling and on the inner side of the side wall away from the balcony door.
- A projected inclined solid panel extending out from the front parapet.

The dimensions and configuration of the proposed EAB 3.0 is shown in **Appendix 4.7**.

4.7.1.9 In order to achieve the intended noise reduction by EAB 3.0, one of the outer screen wall should be located in front of the opened balcony door and the other one in front of the acoustic window adjacent to the side wall while the fixed glazing on the plane of balcony door should be kept closed as shown in the schematic design of the enhanced acoustic balcony. Special locking device (e.g. allen key) would be installed to the frames of the sliding glass panels above the front parapet and the fixed glazing on the plane of balcony door for keeping them in the above setting. The fixed glazing on the plane of the balcony door needs not to be opened for ventilation and could be opened by special looking device mentioned above for cleansing and maintenance purposes only. It has been found that sufficient air ventilation can be maintained under the above setting. The outer screen walls should only be slid away from the above locations occasionally for cleansing and maintenance purpose while the fixed glazing should only be opened occasionally for decoration purpose. The above information about the enhanced acoustic balcony will be

stated in the Decoration Handbook to let the future occupants be well aware of its setting and intended purpose.

4.7.1.10 The locations of the proposed EAB 3.0 are indicated in **Figure 4.11 to 4.12** and summarised in **Table 4.6**. The noise attenuation performance of EAB 3.0 for mitigating road traffic has been made reference to that of the enhanced acoustic balcony (latest version dated Jun 2018) in current assessment (**Appendix 4.8**). Compared to the MFD Flat Type C-5 of the version dated Jun 2018, the EAB 3.0 for current Type C-4 unit has deeper balcony, longer full height concrete walls on two sides, as well as higher parapet (for Scenarios 1 – Basic shell and 2 – Acoustic lining) and projected inclined panel (for Scenarios 3 – Projected inclined solid panel and 4 – Acoustic lining and projected inclined solid panel). Hence, the noise attenuation performance for EAB 3.0 for current Type C-4 unit would be better.

4.7.1.11 The sound attenuations of enhanced acoustic balcony for Type C-5 range from 2dB(A) to 10dB(A) depending on their design and inclination angle from the noise source to NSR (see **Appendix 4.9** for details).

Table 4.6: Locations of proposed EAB 3.0 for mitigating road traffic noise

Enhanced Acoustic Balcony at NSR	Floor Requiring Acoustic Balcony	Type of Flat	Enhanced Acoustic Balcony Type "C"		
			Floor with Type C1C1 [1]	Floor with Type C1C2 [2]	Floor with Type C1C4 [3]
R110a	6/F – 40/F	C	6F – 40/F	–	–
R110b					
R111b	5/F – 43/F		5/F – 43/F	–	–
R111c					
R112a	4/F – 45/F		4/F, 6F – 8/F, 10/F – 45/F	5/F, 9/F	–
R112b					
R113b	4/F – 45/F		16/F – 45/F	4/F – 15/F	–
R113c					
R114a	4/F – 45/F		20/F – 45/F	4/F – 19/F	–
R114b					
R115b	4/F – 45/F		21/F – 45/F	17/F – 20/F	4/F – 16/F
R115c					
R217a	9/F – 25/F		9/F – 25/F	–	–
R217b					
R218b	8/F – 28/F		8/F – 28/F	–	–
R218c					

Note:
[1] Enhanced acosutic balcony with basic shell.
[2] Enhanced acosutic balcony with acoustic lining.
[3] Enhanced acosutic balcony with acoustic lining and projected inclined solid panel.

4.7.1.12 As advised by the Project Team, the ventilation requirements for these flats could comply with the Buildings Ordinance. The purpose of EAB 3.0 will be stated in the Decoration Handbook to let the future occupants be well aware of its intended purpose.

Conversion of Openable Window to Fixed Glazing at Side Window

4.7.1.13 With acoustic windows at the main window of the affected flats mentioned above, it is proposed to convert the openable side window to fixed glazing. The proposed fixed glazing should be normally closed for noise reduction and need not to be opened for meeting the

ventilation requirement. With reference to the HKPSG, 6mm window panel is considered sufficient for shielding off noise and appropriate for sound insulation purpose. At least 6mm window panel will be provided to the proposed fixed glazing from noise perspective and these fixed glazing could only be opened by Allen key for cleansing and maintenance purposes. The purpose of fixed glazing will be stated in the Decoration Handbook to let the future occupants be well aware of its intended purpose. The locations of the proposed fixed glazing windows are summarized in **Table 4.7** and indicated in **Figure 4.11 to 4.12**.

Table 4.7: Location of proposed fixed glazing for mitigating road traffic noise

Fixed glazing at NSR	Floor Requiring Fixed glazing
R101c	4/F – 45/F
R102b	4/F – 45/F
R103a	4/F – 45/F
R103d	4/F – 45/F
R116c	4/F – 45/F
R117a	4/F – 45/F
R118b	4/F – 45/F
R119a	4/F – 45/F
R120c	4/F – 45/F
R121a	4/F – 45/F
R122c	4/F – 45/F
R123a	4/F – 45/F
R201a	7/F – 28/F
R201c	5/F – 45/F
R201f	5/F – 45/F
R202a	6/F – 45/F
R203b	8/F – 45/F
R204a	9/F – 45/F
R204d	9/F – 45/F

4.7.1.14 With the provision of the recommended acoustic windows, EAB 3.0 and fixed glazing, all residential flats will be protected and a compliance rate of 100% could be achieved. Detailed results are attached in **Appendix 4.10.**

Figure 4.11: Location of proposed mitigation measures in Block A

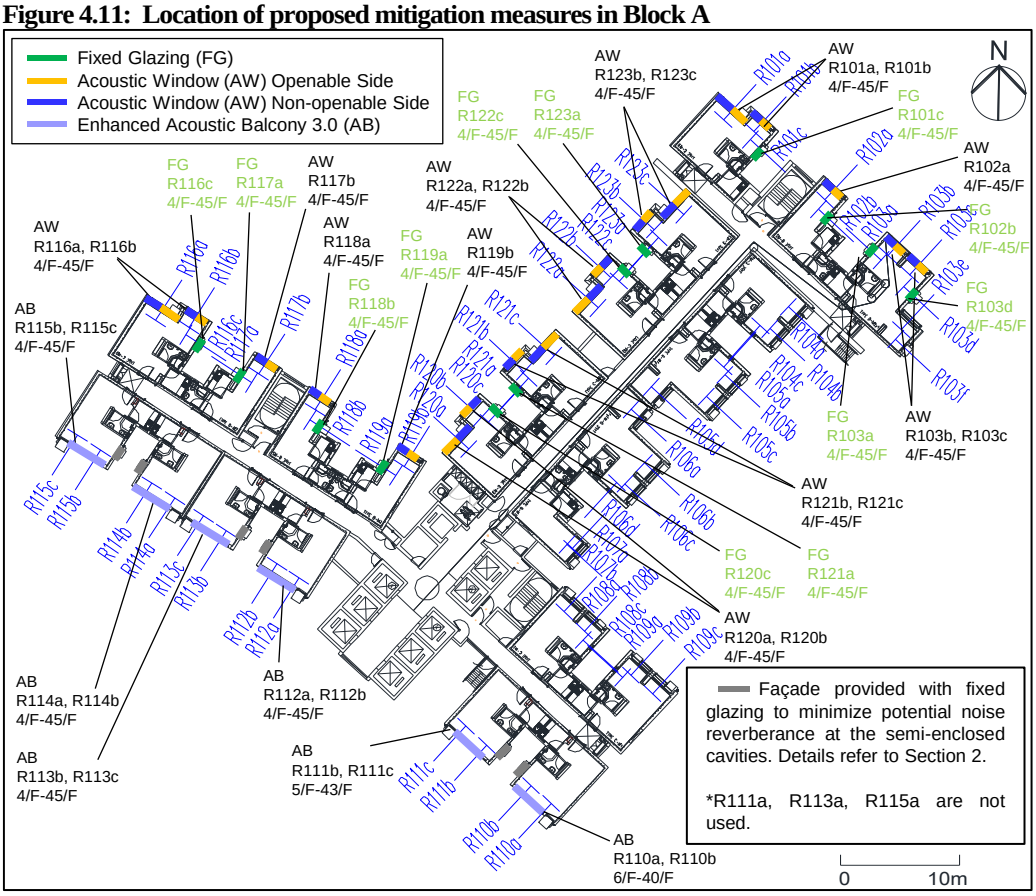
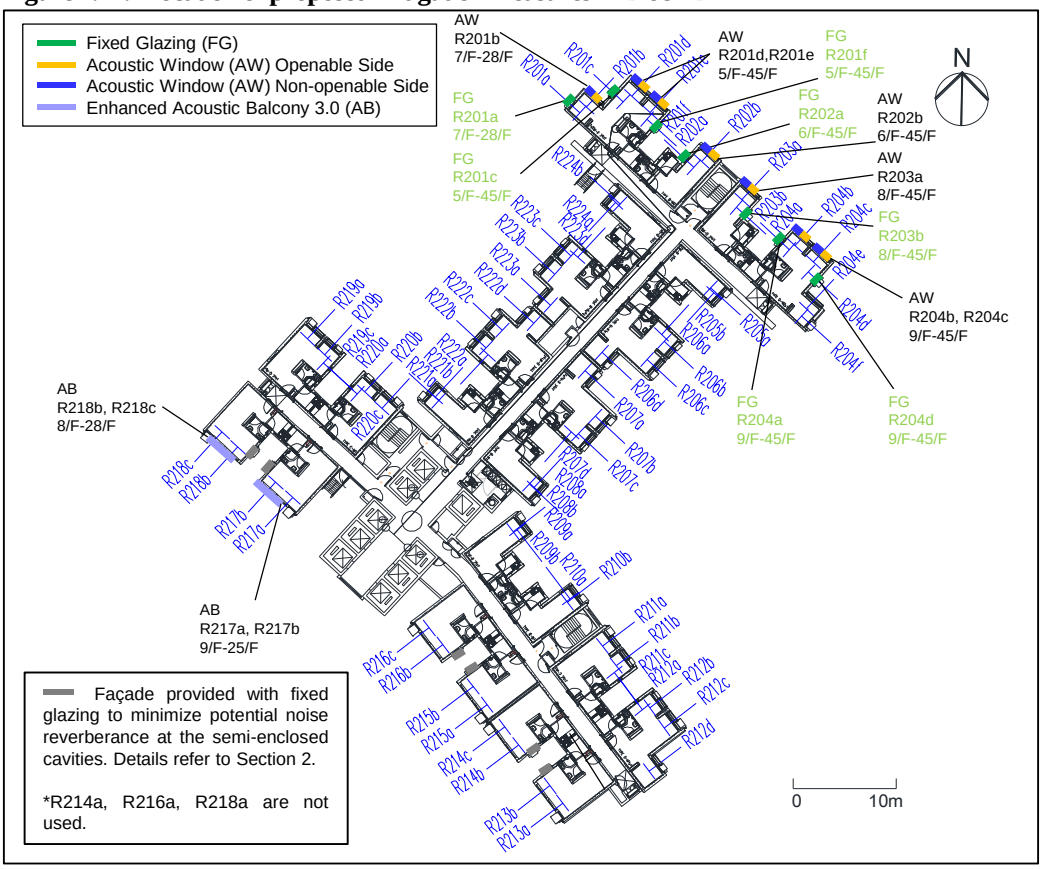


Figure 4.12: Location of proposed mitigation measures in Block B



5 Rail Noise Impact Assessment

5.1 Rail Noise Criteria

5.1.1.1 Noise planning standards for rail noise have been specified in Table 4.1 of the HKPSG Chapter 9, i.e. $L_{eq(24hr)}$ of 65 dB(A) and $L_{max(2300-070hours)}$ of 85 dB(A). Besides, Acceptable Noise Levels (ANL) are also stipulated in the Technical Memorandum for Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites (IND-TM) issued under the Noise Control Ordinance as shown in **Table 5.1**. Rail noise impact is assessed according to the recommendation of the HKPSG, which include compliance with the relevant requirement of the NCO.

Table 5.1: Noise criteria for rail noise

Area Sensitivity Rating	Time Period [1]	Acceptable Noise Levels, $L_{eq(30\ mins)}$ dB(A) under IND-TM	Maximum A-weighted SPL, $L_{max\ (2300-0700hrs)}$ dB(A) under HKPSG	24 hours Equivalent SPL, $L_{eq(24\ hr)}$ dB(A) under HKPSG
A	Daytime & Evening	60	85	65
	Night-time	50		
B	Daytime & Evening	65		
	Night-time	55		
C	Daytime & Evening	70		
	Night-time	60		

Note:
[1] Daytime: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night-time: 2300 to 0700 hours

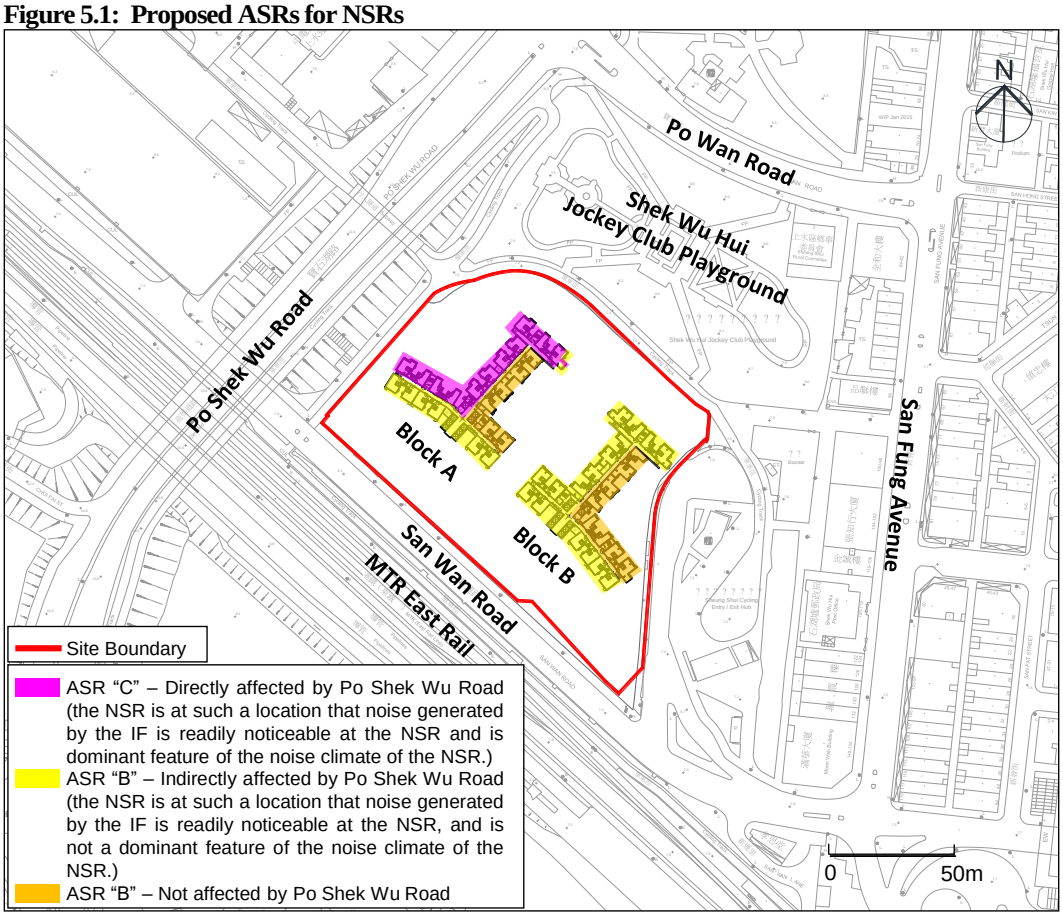
5.1.1.2 In consideration of the type of area within which the NSRs are located, the future context of the environs should also be taken into account. The site is planned for high rise residential developments. It is surrounded immediately by high density developments including the planned Po Shek Wu Estate to the south, planned housing developments at Sheung Shui Areas 4 & 30 and various industrial and commercial buildings to the west, as well as Landmark North and Shek Wu Hui to the east. The types of area (i) rural area, (ii) low density residential area consisting of low-rise or isolated high-rise developments; and (iii) urban area according to IND-TM cannot reflect the future environs of the subject site and are all not applicable. Thus the whole site shall fall into type (iv) “Area other than those above" according to IND-TM.

5.1.1.3 Review of the Annual Traffic Census (ATC) for Year 2022 indicates that Po Shek Wu Road had an Annual Average Daily Traffic (AADT) of 33,260, which is considered as an Influencing Factor (IF) under the IND-TM. For the facades having a relatively open view angle facing Po Shek Wu Road, these NSRs are at such a location that noise generated by the IF is readily noticeable at the NSR and is dominant feature of the noise climate of the NSR. They are considered to be directly affected by the IF and hence an ASR of C is

assigned. The Acceptable Noise Level (ANL) for ASR of "C" should be 70dB(A) for daytime & evening and 60dB(A) for night-time.

5.1.1.4 Some NSRs with smaller view angle to Po Shek Wu Road and/or largely screened by noise enclosure would be indirectly affected. They are at such location that noise generated by the IF, whilst noticeable at the NSR, but is not a dominant feature of the noise climate of the NSRs. They are considered to be indirectly affected by the IF and hence an ASR of B is assigned. For residential units which are screened by the residential block or facing away from Po Shek Wu Road, road traffic noise generated from Po Shek Wu Road is expected to be not noticeable. Therefore, these facades are considered to be not affected by the IF and an ASR of "B" is assigned. The ANL for ASR of "B" should be 65dB(A) for daytime & evening time, and 55dB(A) for night-time. The proposed ASRs for the NSRs are indicated in **Figure 5.1** below.

Figure 5.1: Proposed ASRs for NSRs



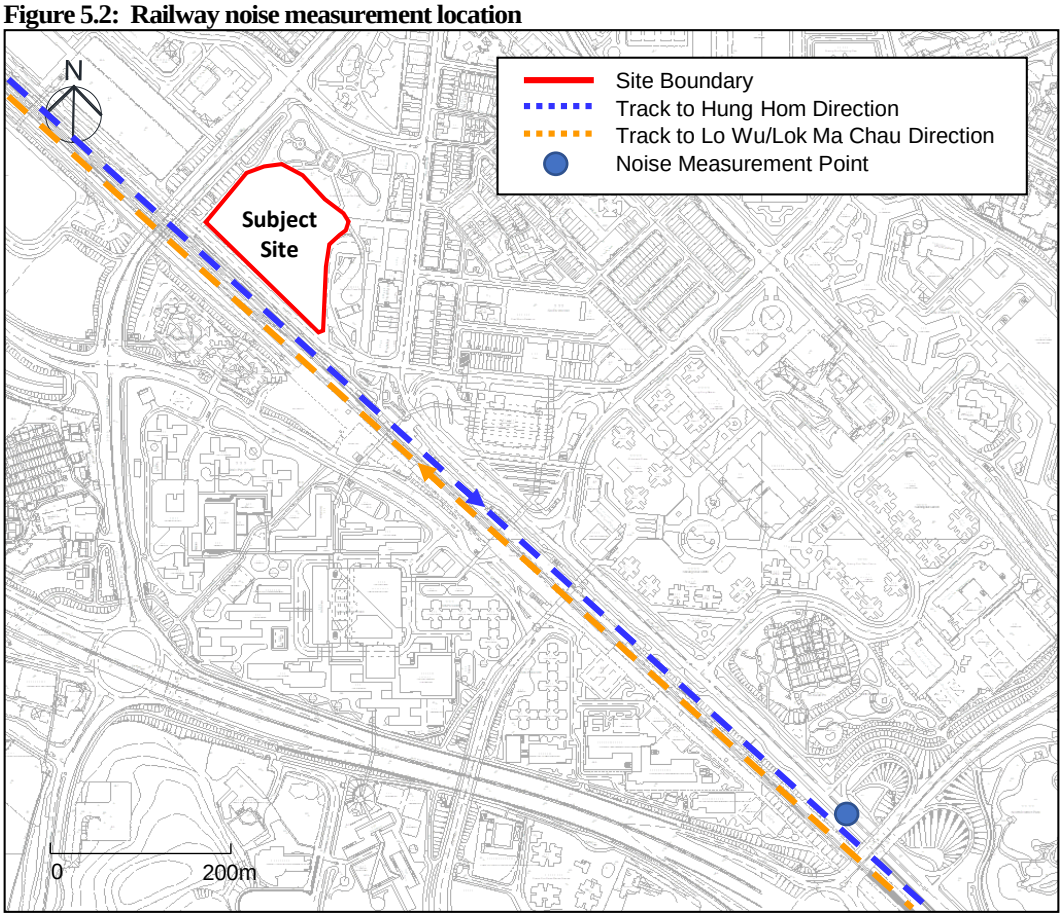
5.2 Assessment Methodology

5.2.1.1 All possible locations along the section between Sheung Shui Station and Po Shek Wu Road for rail noise measurement have been considered. The subject site is currently occupied by the KMB bus depot and access into the bus depot for noise measurements was not allowed by the operator. Trackside barriers are erected along both sides of the rail section from Sheung Shui Station to Po Shek Wu Road. Noise measurements along this rail section would not be representative. In addition, the noise environment near San Wan Road next to Sheung Shui Areas 4 & 30 Site 2 is dominated by road traffic noise. Also, there are retaining walls,

5m high vertical noise barrier (opposite to the nearby Po Shek Wu Road Site) and 1.3m barrier wall along this rail section. Noise measurements along this rail section would not be representative. In consideration of all these constraints, noise measurement next to the subject development site is not practical.

5.2.1.2 The rail noise measurements were taken at an open ground near North District Park located at about 790m to the southeast of the subject housing site, to where there is no trackside barrier and with view directly overlooking the rail tracks. The measurement location is illustrated in **Figure 5.2**. The track form and operational characteristics at the selected measurement point are very similar to that of the development site. Hence, the measured sound exposure level (SEL) of train event is considered representative for assessment on the subject site. Since joint/crossing was found on the rail track for the direction to Lo Wu/ Lok Ma Chau (LMC), measurement was conducted for the direction to Hung Hom only. Measurement details including the measurement date, time, equipment, etc. are given in **Appendix 5.1**.

Figure 5.2: Railway noise measurement location



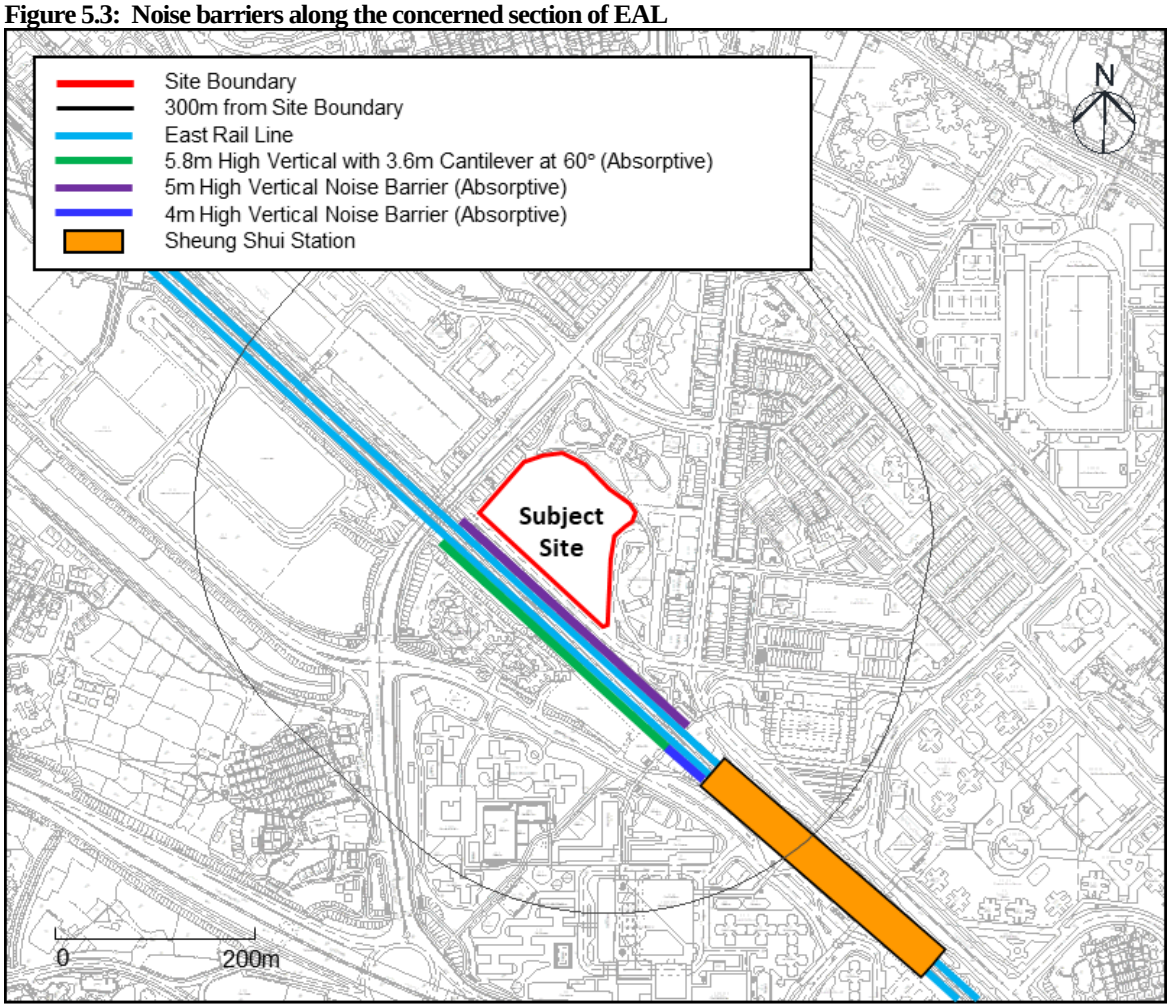
5.2.1.3 The 9-cars and 12-cars Electric Multiple Unit (EMU) passenger trains were found in operation for the East Rail Line (EAL) during the measurement. According to the latest Environmental Permit (EP) for Shatin to Central Link (SCL) – Mong Kok East to Hung Hom Section (EP-437/2012/A), the new 9-cars EMU trains will be used in place of the 12-cars trains in future which is required to prepare for the extension of the EAL services to Hong Kong Island. The existing 12-cars EMU trains have already been replaced by new 9-cars trains in May 2022. Therefore, only measurements for 9-cars trains are used in the

assessment. Speed of EAL was also obtained from on-site measurement near the Project Site as in **Appendix 5.1**.

5.2.1.4 In view of the suspended Intercity train service due to outbreak of COVID-19 at the time of noise measurement taken in Year 2021, measurement could not be conducted for Intercity through train. Measurement data including the train speed from Final EAS Report for the HKHA housing development at Po Shek Wu Estate was referenced and extracted (refer to **Appendix 5.2**) for the assessment. According to the Final EAS Report for the HKHA housing development at Po Shek Wu Estate, the average SEL corrected to 25m are 86.5dB(A) and 87.9dB(A) for intercity through train to Hung Hom direction and Lo Wu/LMC direction, respectively at location with effect of joint/crossing. The measurement results extracted from the said Final EAS Report are presented in **Appendix 5.2**.

5.2.1.5 According to the as-built drawings of the barriers provided by MTRC, one 5m high vertical absorptive barrier is currently installed along the nearside track for the section between Sheung Shui Station and Po Shek Wu Road. The barrier would provide screening effect to the proposed development and has been taken into account in the calculations. Two sections of barriers including one 4m high absorptive vertical barrier and one 5.8m high vertical with 3.6m cantilever arm at 60° absorptive barrier are installed on the opposite side of the track. These barriers are included in the assessment. The locations of the existing noise barriers are illustrated in **Figure 5.3**.

Figure 5.3: Noise barriers along the concerned section of EAL



5.2.1.6 Considering the confidentiality issue of the information, the letter of reply on operation parameter and as-built drawings of the noise barriers from MTRC will be provided to EPD separately upon request.

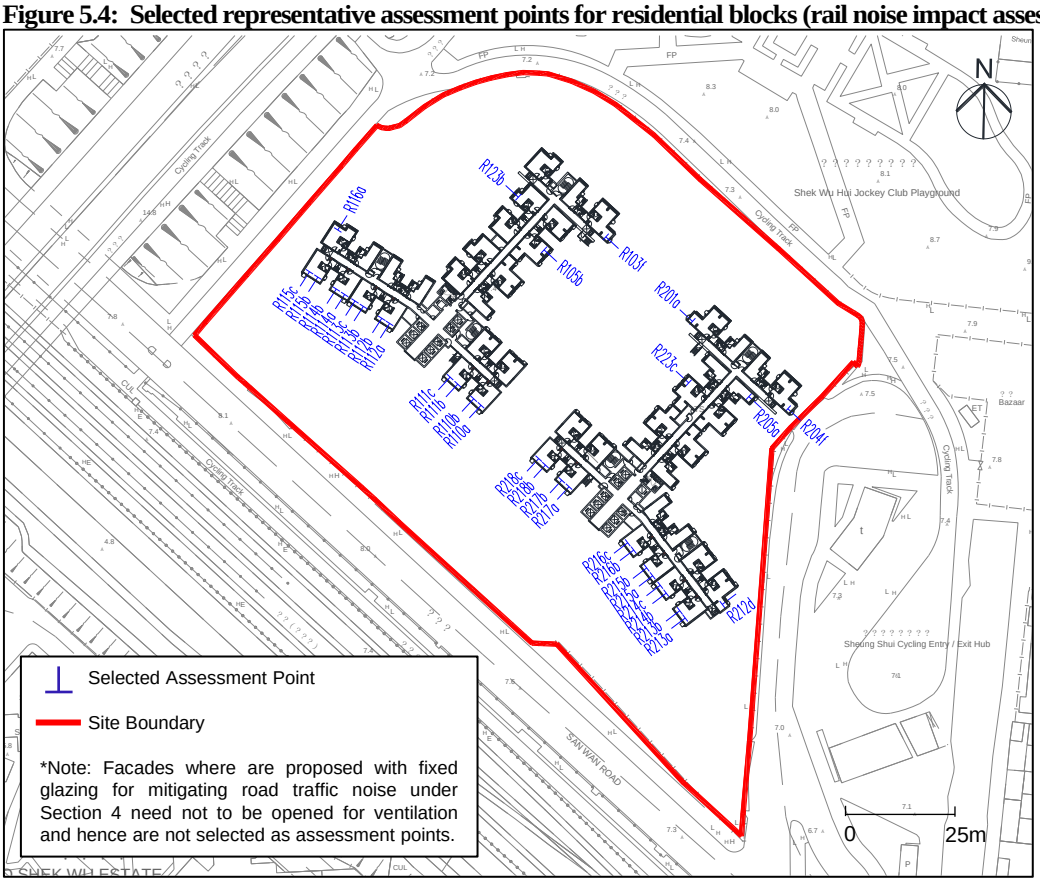
5.2.1.7 The assessment methodology generally follows the UK Department of Transport "Calculation of Rail Noise" (CRN). The computational model "RailNoise" has been adopted for the assessment, and the modelling methodology for propagation is based on the prediction procedures in CRN. L_{max} has also been predicted by "RailNoise" according to "Train Noise Prediction Model" (TNPM) which adopted for Channel Tunnel Rail Link (HS1) in the UK. A summary of correction factors has been included in the rail noise prediction model is given in **Appendix 5.3**. Sound pressure levels ($L_{eq(30min)}$) at receivers are predicted based on the measured SEL with corrections for rail deterioration, distance attenuation, speed, angle of view, barrier effect and no. of train frequency. The predicted L_{max} at the selected receiver is determined from the measured L_{max} of each track; and the calculation has taken into account the correction for speed, rail deterioration and distance attenuation.

5.3 Predicted Rail Noise Level for Residential Blocks

5.3.1.1 During the process of designing the development layout, due consideration has been given to avoid noise impacts from the East Rail as much as practicable. Setback distance from the

rail track has been maximized and a podium has been designed such that the first domestic floor has been raised to 24mAG. Taking into account the development layout design, representative NSRs at the residential blocks with line of sight to the rail are selected for the assessment. The locations of the selected representative assessment points at the residential blocks are illustrated in **Figure 5.4**.

Figure 5.4: Selected representative assessment points for residential blocks (rail noise impact assessment)



5.3.1.2 The results are summarised in **Table 5.2** for daytime & evening time and **Table 5.3** for night-time. Detailed results are given in **Appendix 5.4**. Results indicate that the predicted noise levels at the representative worst affected NSRs would comply with the daytime & evening noise criteria but exceed the night-time noise criteria. However, noise exceedances are predicted at all NSRs facing directly the rail track with ASR of B during night-time.

Table 5.2: Daytime & evening time railway noise impact assessment results – Residential Blocks (Basecase Scenario)

Block	Representative NSR ID	Proposed ASRs	Predicted Noise Level [1], Leq 30mins dB(A)	Daytime & Evening Noise Criterion, dB(A)	Comply [Y/N]
A	R103f	B	48	65	Y
	R105b		44		Y
	R110a		60		Y
	R110b		60		Y
	R111b		60		Y

Block	Representative NSR ID	Proposed ASRs	Predicted Noise Level [1], Leq 30mins dB(A)	Daytime & Evening Noise Criterion, dB(A)	Comply [Y/N]
	R111c		60		Y
	R112a		60		Y
	R112b		60		Y
	R113b		60		Y
	R113c		60		Y
	R114a		60		Y
	R114b		60		Y
	R115b		60		Y
	R115c		60		Y
	R116a	C	41	70	Y
	R123b		49		Y
B	R201a	B	49	65	Y
	R204f		50		Y
	R205a		48		Y
	R212d		47		Y
	R213a		60		Y
	R213b		60		Y
	R214b		60		Y
	R214c		60		Y
	R215a		60		Y
	R215b		60		Y
	R216b		60		Y
	R216c		60		Y
	R217a		60		Y
	R217b		60		Y
	R218b		60		Y
	R218c		60		Y
	R223c		44		Y

Note:
[1] Only the predicted noise levels for the worst floor are presented. Details shall be referred to **Appendix 5.4.**

Table 5.3: Night-time railway noise impact assessment results – Residential Blocks (Basecase Scenario)

Block	Representative NSR ID	Proposed ASRs	Predicted Noise Level [1], Leq 30mins dB(A)	Night-time Noise Criterion, dB(A)	Comply [Y/N]
A	R103f	B	45	55	Y
	R105b		41		Y

Block	Representative NSR ID	Proposed ASRs	Predicted Noise Level [1], Leq 30mins dB(A)	Night-time Noise Criterion, dB(A)	Comply [Y/N]
	R110a		57		N
	R110b		57		N
	R111b		57		N
	R111c		57		N
	R112a		57		N
	R112b		57		N
	R113b		57		N
	R113c		57		N
	R114a		57		N
	R114b		57		N
	R115b		57		N
	R115c		57		N
	R116a	C	<40	60	Y
	R123b		47		Y
B	R201a	B	45	55	Y
	R204f		47		Y
	R205a		45		Y
	R212d		44		Y
	R213a		57		N
	R213b		57		N
	R214b		57		N
	R214c		57		N
	R215a		57		N
	R215b		57		N
	R216b		57		N
	R216c		57		N
	R217a		57		N
	R217b		57		N
	R218b		57		N
	R218c		57		N
	R223c		41		Y

Note:
[1] Only the predicted noise levels for the worst floor are presented. Details shall be referred to **Appendix 5.4**.

5.4 Noise Mitigation Measures for Residential Blocks

5.4.1.1 As shown in **Table 5.3**, the maximum noise exceedance is 2 dB(A) only at the affected NSRs (i.e. R110 - R115, R213 - R218) during night-time. These affected NSRs are windows directly facing the East Rail. Proper building layout and design including maximised setback distance from the rail track and high podium have been already adopted in the current scheme as described in **Section 5.3**. The following practicable noise mitigation measures have also been investigated and recommended:

Enhanced Acoustic Balcony (EAB 3.0) Design

5.4.1.2 EAB 3.0 is proposed to mitigate the rail noise impact on the affected flats. Details of the EAB 3.0 can be referred to **Section 4.7** and **Appendix 4.7**. As advised by HKHA, the template for calculating the train-noise-weighted in-out noise level difference (IOD) for EAB 3.0 for mitigating the rail noise impact has been finalised in October 2023. Based on the finalised results provided by HKHA, the IOD normalised by rail noise obtained at Po Shek Wu Road for Flat Type C-4 of EAB 3.0 Scenario 2 - with sound absorptive lining at wall and ceiling running parallel to the railway ranges from 14.4dB(A) - 16.1dB(A), while EAB 3.0 Scenario 4 - with sound absorptive lining at wall and ceiling, and projected inclined panel parallel to the railway ranges from 12.1dB(A) - 17.9dB(A) subject to the elevation (see **Appendix 5.5** for details).

5.4.1.3 According to **Section 4.7**, EAB 3.0 Scenarios 1, 2 and 4 have been proposed to mitigate road traffic noise. However, to mitigate rail noise impact on the affected flats, at least EAB 3.0 Scenario 2 is required. For NSR R115b and R115c from 6/F to 16/F, EAB 3.0 Scenario 4 is proposed for mitigating both the road traffic noise and rail noise impacts. For other NSRs affected by rail noise, EAB 3.0 Scenario 2 will be adopted, which can also achieve better noise attenuation for road traffic noise compared to EAB 3.0 Scenario 1. For those NSRs not affected by rail noise but traffic noise, the type of EAB 3.0 has been proposed in **Table 4.6**. The locations of the proposed EAB 3.0 are summarized in **Table 5.4** and indicated in **Figure 5.5 to Figure 5.6**.

Table 5.4: Locations of proposed acoustic balconies for mitigating rail noise

Enhanced Acoustic Balcony at NSR	Floor Requiring Acoustic Balcony	Type of Flat	Enhanced Acoustic Balcony Type "C"	
			Floor with Type C-4 Scenario 2 - with acoustic lining (wall and ceiling)	Floor with Type C-4 Scenario 4 - with acoustic lining (wall and ceiling) & projected inclined panel
R110a	7/F – 45/F	C	7/F – 45/F	–
R110b				
R111b	8/F – 45/F		8/F – 45/F	–
R111c				
R112a	8/F – 45/F		8/F – 45/F	–
R112b				
R113b	8/F – 45/F		8/F – 45/F	–
R113c				
R114a	7/F – 45/F		7/F – 45/F	–
R114b				

Enhanced Acoustic Balcony at NSR	Floor Requiring Acoustic Balcony	Type of Flat	Enhanced Acoustic Balcony Type "C"	
			Floor with Type C-4 Scenario 2 - with acoustic lining (wall and ceiling)	Floor with Type C-4 Scenario 4 - with acoustic lining (wall and ceiling) & projected inclined panel
R115b	6/F – 45/F		17/F – 45/F	6/F – 16/F
R115c				
R213a	6/F – 45/F		6/F – 45/F	–
R213b				
R214b	6/F – 45/F		6/F – 45/F	–
R214c				
R215a	6/F – 45/F		6/F – 45/F	–
R215b				
R216b	7/F – 45/F		7/F – 45/F	–
R216c				
R217a	7/F – 45/F		7/F – 45/F	–
R217b				
R218b	7/F – 45/F		7/F – 45/F	–
R218c				

5.4.1.4 As advised by the Project Team, the ventilation requirements for these flats could comply with the Buildings Ordinance. The purpose of enhanced acoustic balcony will be stated in the Decoration Handbook to let the future occupants be well aware of its intended purpose.

5.4.1.5 With the provision of the recommended EAB 3.0 at the affected NSRs, according to the IND-TM, the appropriate ANL shall be 10dB(A) less than the ANL at an internal location of a building in which the NSR is located. Results indicate that all residential flats will be protected and would comply with the indoor noise criteria. Mitigated results for those NSRs with EAB 3.0 provided are presented in **Table 5.5**, and detailed results are attached in **Appendix 5.6**.

Table 5.5: Predicted $L_{eq(30mins)}$ during night-time for the NSRs with EAB 3.0 provided (Mitigated Scenario)

Block	Representative NSR ID	Predicted Noise Level, $L_{eq\ 30mins}$ dB(A)	Indoor Noise Criterion [1], dB(A)	Comply [Y/N]
A	R110a	42	45	Y
	R110b	42		Y
	R111b	42		Y
	R111c	41		Y
	R112a	42		Y
	R112b	41		Y
	R113b	42		Y
	R113c	41		Y
	R114a	42		Y
	R114b	42		Y
	R115b	44		Y
	R115c	44		Y

Block	Representative NSR ID	Predicted Noise Level, $L_{eq\ 30mins}$ dB(A)	Indoor Noise Criterion [1], dB(A)	Comply [Y/N]
B	R213a	42		Y
	R213b	42		Y
	R214b	42		Y
	R214c	42		Y
	R215a	42		Y
	R215b	42		Y
	R216b	42		Y
	R216c	42		Y
	R217a	42		Y
	R217b	42		Y
	R218b	42		Y
	R218c	42		Y

Note:
[1] ANL-10dB(A) is used for checking compliance.

5.4.1.6 According to the MTRC's train schedule, the operation hours of East Rail are from 05:30 to 01:17. The predicted $L_{eq(24hours)}$ is calculated based on the assumption of 16 hours daytime & evening operation (i.e. 07:00 to 23:00) with daytime & evening time $L_{eq(30mins)}$, 5 hours night-time operation (i.e. 05:00 to 07:00 and 23:00 to 02:00) with night-time $L_{eq(30mins)}$ and 3 non-service hours (i.e. 02:00 to 05:00) at the selected representative NSRs. The predicted $L_{eq(24hours)}$ at the representative NSRs are summarised in **Table 5.6** below. Results indicate that the predicted $L_{eq(24hours)}$ at the representative NSRs would comply with the noise criterion of 65dB(A).

Table 5.6: Predicted $L_{eq(24hours)}$ at the representative NSRs for residential block

Block	Representative NSR ID	Predicted Noise Level, $L_{eq\ 24hours}$, dB(A)	Noise Criterion, dB(A)	Comply [Y/N]
A	R103f	47	65	Y
	R105b	43		Y
	R110a	59		Y
	R110b	59		Y
	R111b	59		Y
	R111c	59		Y
	R112a	59		Y
	R112b	59		Y
	R113b	59		Y
	R113c	59		Y
	R114a	59		Y
	R114b	59		Y

Block	Representative NSR ID	Predicted Noise Level, $L_{eq\ 24hours}$, dB(A)	Noise Criterion, dB(A)	Comply [Y/N]
	R115b	59		Y
	R115c	59		Y
	R116a	40		Y
	R123b	48		Y
B	R201a	48		Y
	R204f	49		Y
	R205a	47		Y
	R212d	46		Y
	R213a	59		Y
	R213b	59		Y
	R214b	59		Y
	R214c	59		Y
	R215a	59		Y
	R215b	59		Y
	R216b	59		Y
	R216c	59		Y
	R217a	59		Y
	R217b	59		Y
	R218b	59		Y
	R218c	59		Y
	R223c	43		Y

5.4.1.7 The predicted maximum rail noise level (L_{max}) is 81.1dB(A) at R115c. Detailed calculation is shown in **Appendix 5.7**. Results indicate that the predicted L_{max} at all representative NSRs would comply the noise criteria of 85dB(A).

Figure 5.5: Location of proposed mitigation measures in Block A

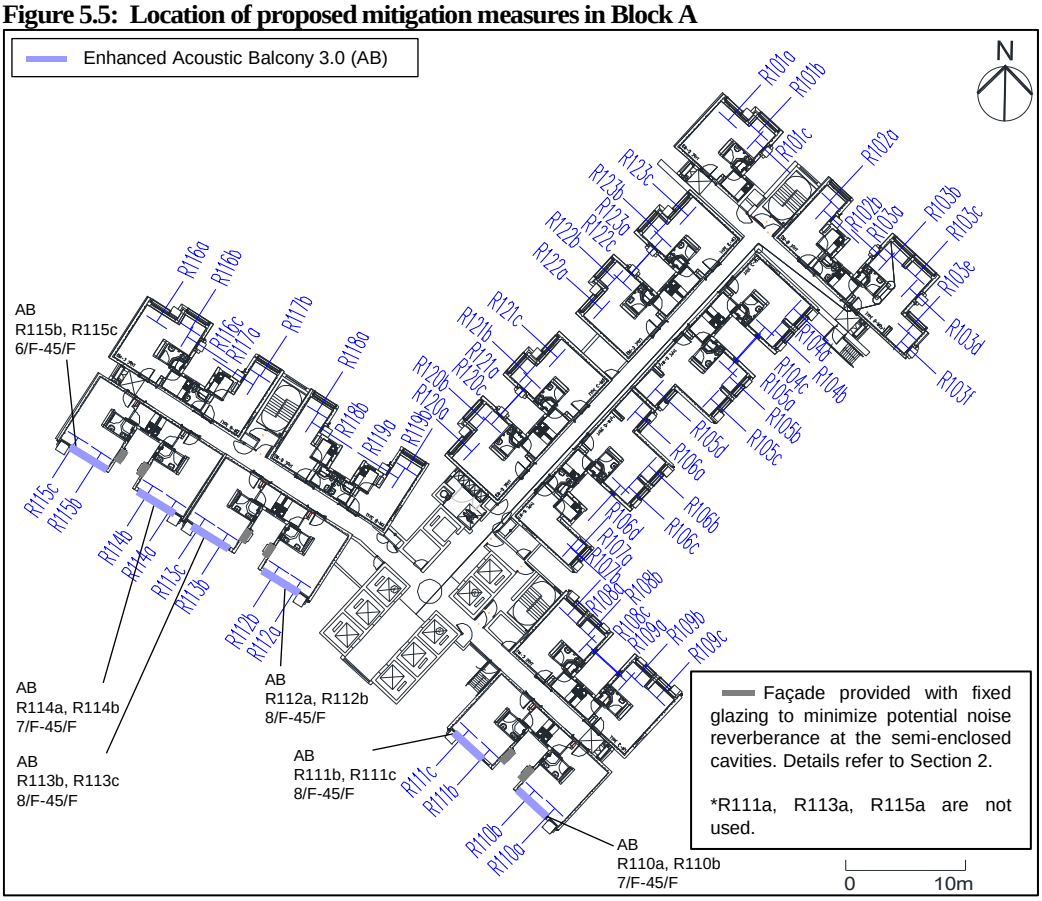
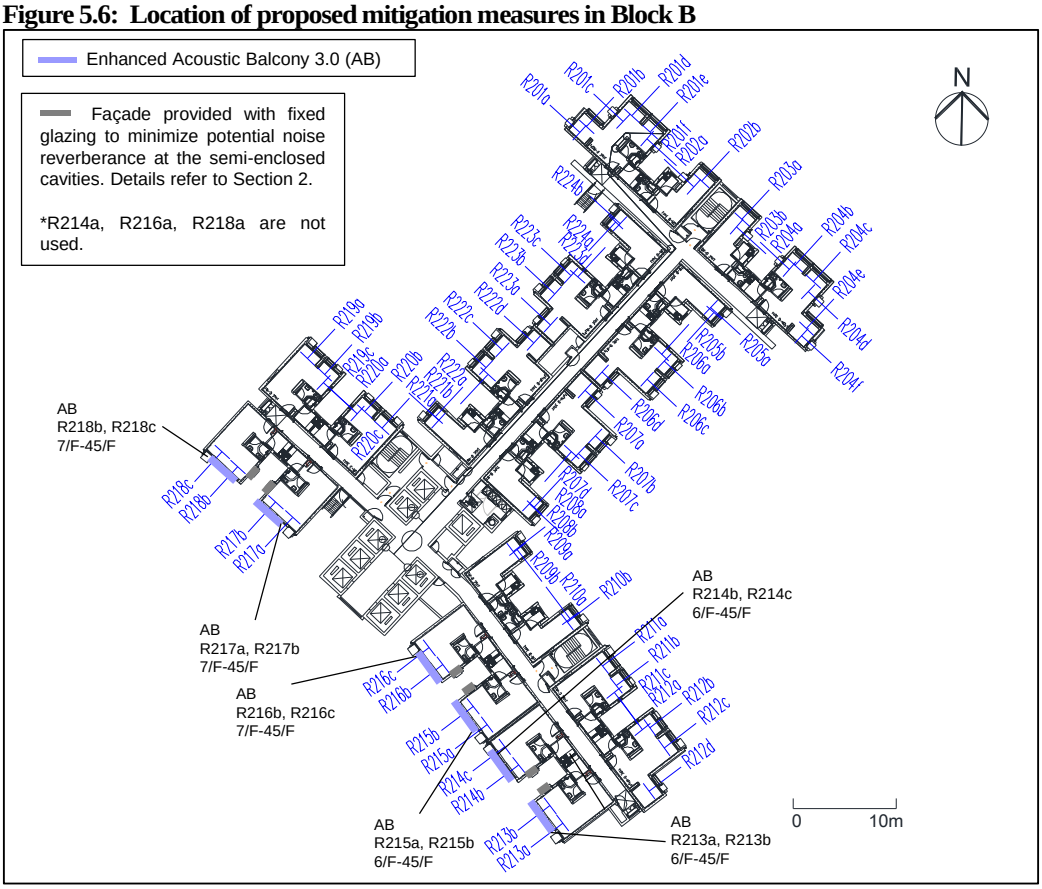


Figure 5.6: Location of proposed mitigation measures in Block B



5.5 Summary of Road Traffic and Rail Noise Assessment Results

5.5.1.1 A summary of combined mitigation measures recommended in the current scheme to mitigate the road traffic and rail noise impacts is given below and illustrated in **Table 5.7 to Table 5.9**, and **Figure 5.7 to Figure 5.8**:

- Provision of acoustic window at the affected flats facing Po Shek Wu Road in Block A and Block B (see **Table 5.7**);
- Provision of EAB3.0 at the affected flats facing San Wan Road and rail track in Block A and Block B (see **Table 5.8**); and
- Provision of fixed glazing at side windows of the affected flats in Block A and Block B (see **Table 5.9**).

Table 5.7: Locations of proposed acoustic windows

Acoustic Window at NSR	Floor Requiring Acoustic Window	Type of Flat	Ref. Modular Flat Type	Acoustic Window Configurations			With / Without Absorption (W / WO)
				Gap Width, mm	Inner/Outer Window Width, mm	Overlapping Length, mm	
R101a	4/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R101b	4/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R102a	4/F – 45/F	B	B-M2	115	895/945	200	WO
R103b	4/F – 45/F	D	D-M2 (BR1)	115	660/633	607	WO
R103c	4/F – 45/F	D	D-M2 (LR)	115	915/985	100	WO
R116a	4/F – 11/F	C	C-M3 (LR)	115	985/1125	330	W
R116a	12/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R116b	4/F – 11/F	C	C-M3 (BR)	115	660/633	607	W
R116b	12/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R117b	4/F – 45/F	B	B-M2	115	895/945	200	WO
R118a	4/F – 45/F	B	B-M2	115	895/945	200	WO
R119b	4/F – 45/F	B	B-M2	115	895/945	200	WO
R120a	4/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R120b	4/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R121b	4/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R121c	4/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R122a	4/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R122b	4/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R123b	4/F – 45/F	C	C-M3 (BR)	115	660/633	607	WO
R123c	4/F – 45/F	C	C-M3 (LR)	115	985/1125	330	WO
R201b	7/F – 28/F	D	D-M2 (BR2)	115	545/545	680	WO
R201d	5/F – 45/F	D	D-M2 (LR)	115	915/985	100	WO
R201e	5/F – 45/F	D	D-M2 (BR1)	115	660/633	607	WO
R202b	6/F – 45/F	B	B-M2	115	895/945	200	WO
R203a	8/F – 45/F	B	B-M2	115	895/945	200	WO
R204b	9/F – 45/F	D	D-M2 (BR1)	115	660/633	607	WO
R204c	9/F – 45/F	D	D-M2 (LR)	115	915/985	100	WO

Table 5.8: Locations of proposed EAB 3.0

Enhanced Acoustic Balcony at NSR	Floor Requiring Acoustic Balcony	Type of Flat	Enhanced Acoustic Balcony Type "C" (3/4P)		
			Floor with Type C-1/C1 [1]	Floor with Type C-1/C2 [2]	Floor with Type C-1/C4 [3]
R110a	6/F – 45/F	C	6/F	7/F – 45/F	–
R110b					
R111b	5/F – 45/F		5/F – 7/F	8/F – 45/F	–
R111c					
R112a	4/F – 45/F		4/F, 6/F – 7/F	5/F, 8/F – 45/F	–
R112b					
R113b	4/F – 45/F		–	4/F – 45/F	–
R113c					
R114a	4/F – 45/F		–	4/F – 45/F	–
R114b					
R115b	4/F – 45/F		–	17/F – 45/F	4/F – 16/F
R115c					
R213a	6/F – 45/F		–	6/F – 45/F	–
R213b					
R214b	6/F – 45/F		–	6/F – 45/F	–
R214c					
R215a					

Enhanced Acoustic Balcony at NSR	Floor Requiring Acoustic Balcony	Type of Flat	Enhanced Acoustic Balcony Type "C" (3/4P)		
			Floor with Type C-1/C1 [1]	Floor with Type C-1/C2 [2]	Floor with Type C-1/C4 [3]
R215b	6/F – 45/F		–	6/F – 45/F	–
R216b	7/F – 45/F		–	7/F – 45/F	–
R216c					
R217a	7/F – 45/F		–	7/F – 45/F	–
R217b					
R218b	7/F – 45/F		–	7/F – 45/F	–
R218c					

Note:
[1] Enhanced acosutic balcony with basic shell.
[2] Enhanced acosutic balcony with acoustic lining.
[3] Enhanced acosutic balcony with acoustic lining and projected inclined solid panel.

Table 5.9: Location of proposed fixed glazing

Fixed glazing at NSR	Floor Requiring Fixed glazing
R101c	4/F – 45/F
R102b	4/F – 45/F
R103a	4/F – 45/F
R103d	4/F – 45/F
R116c	4/F – 45/F
R117a	4/F – 45/F
R118b	4/F – 45/F
R119a	4/F – 45/F
R120c	4/F – 45/F
R121a	4/F – 45/F
R122c	4/F – 45/F
R123a	4/F – 45/F
R201a	7/F – 28/F
R201c	5/F – 45/F
R201f	5/F – 45/F
R202a	6/F – 45/F
R203b	8/F – 45/F
R204a	9/F – 45/F
R204d	9/F – 45/F

Figure 5.7: Location of proposed mitigation measures for road traffic and rail noise in Block A

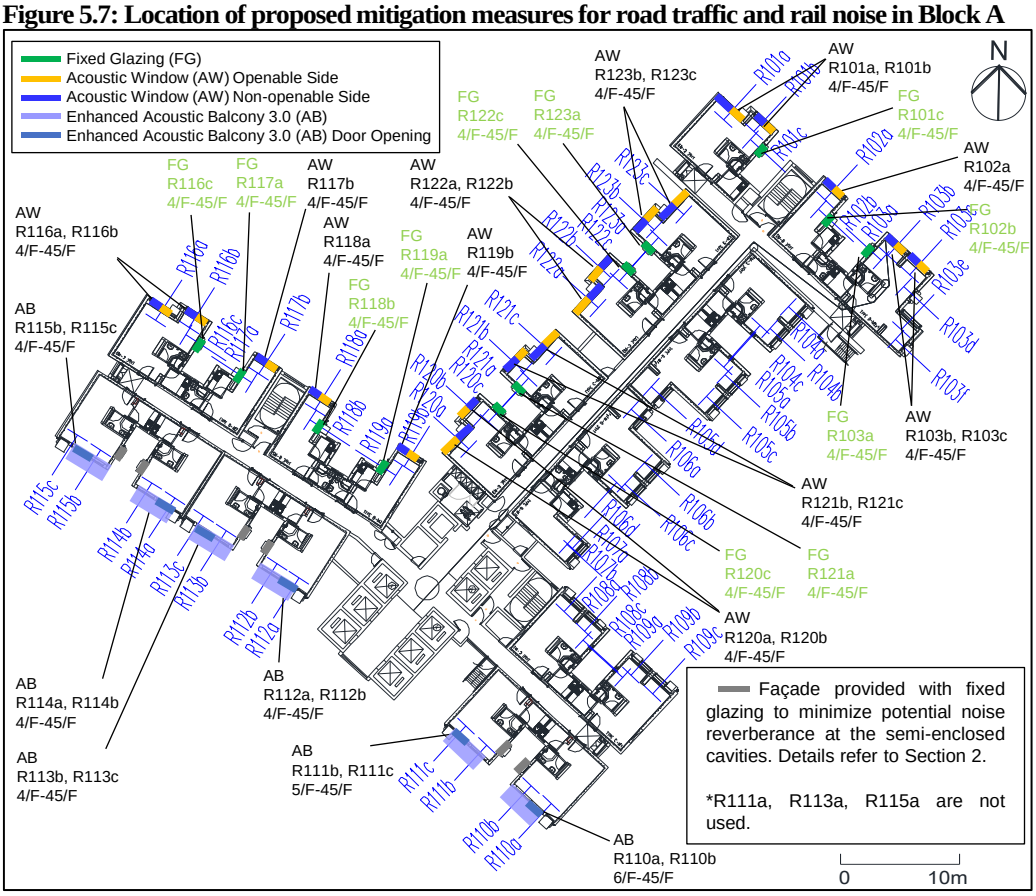
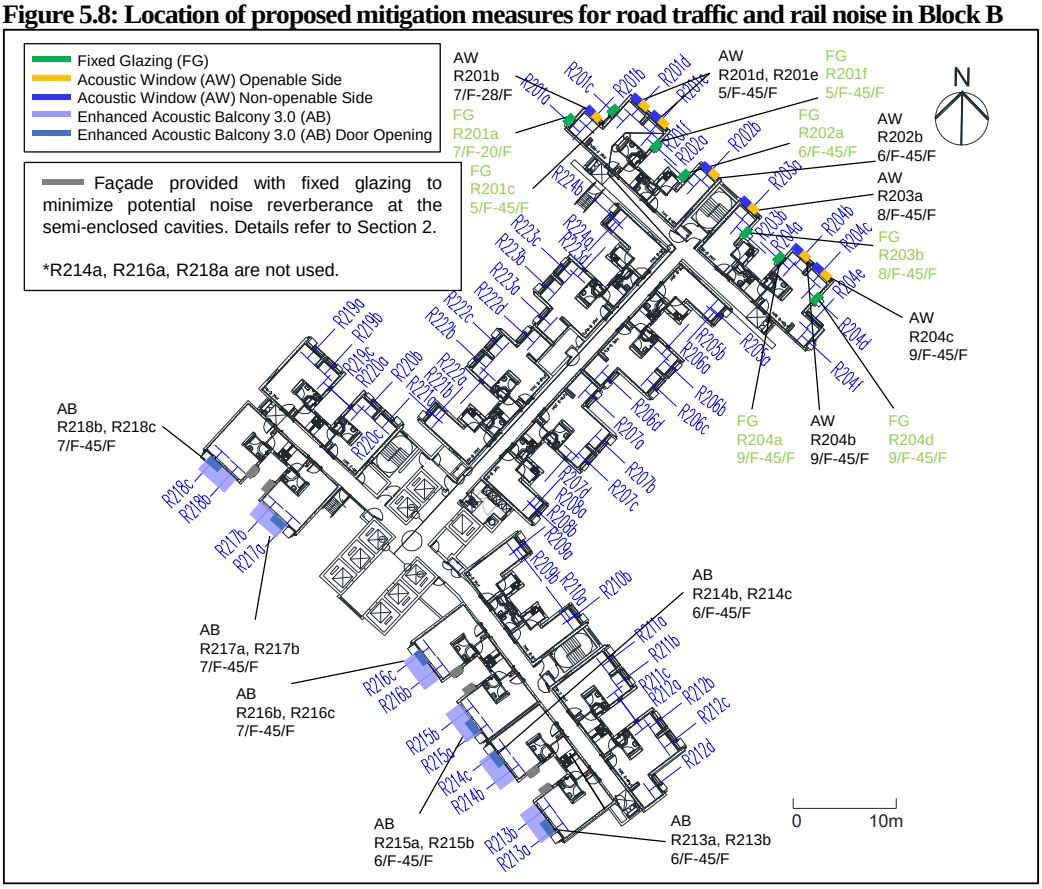


Figure 5.8: Location of proposed mitigation measures for road traffic and rail noise in Block B



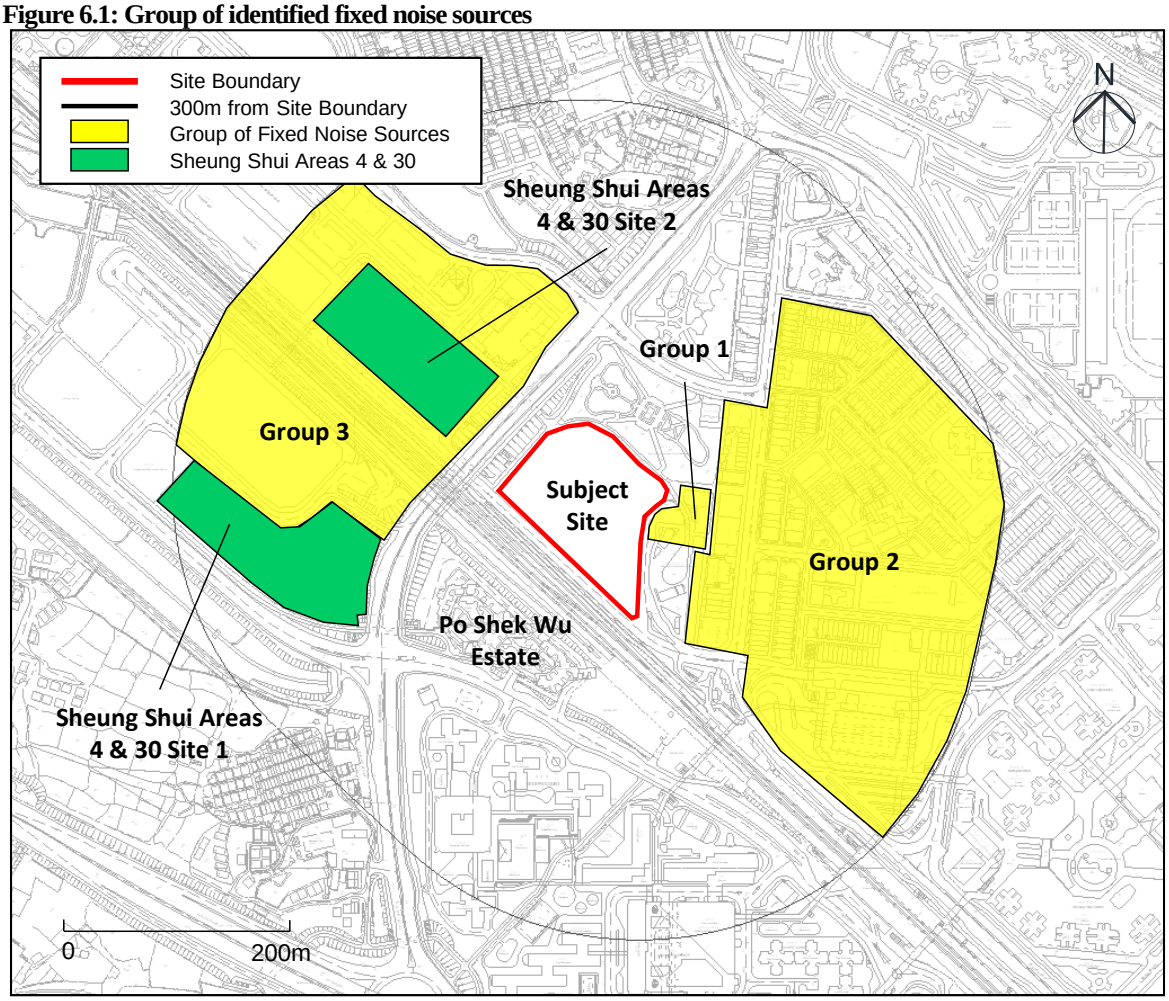
6 Fixed Noise Sources Impact Assessment

6.1 Identification of Fixed Noise Sources

6.1.1.1

Site visits have identified a number of fixed noise sources within 300m from the boundary of the subject site. **Figure 6.1** indicates the locations of the identified fixed noise sources. They are grouped and described based on their geographical locations. The first group of noise sources (Group 1) is the Shek Wu Hui Agricultural Produce Bazaar located adjacent to east of the site. By site observation, potential noise sources at the bazaar are mainly the loading and unloading activities, pumps on fish transportation vehicles and street washing vehicle. According to the notice posted by Food and Environmental Hygiene Department, the bazaar is open daily from 06:00 to 11:00 in the morning. The market is closed after 11:00 and cleansing works are then carried out using a street washing vehicle until approximately 12:00. The second group of noise sources (Group 2) includes fixed plants on the roof/podium of commercial buildings scattered at Shek Wu Hui. There are also some fixed plants and louvers found at the back lanes. The third group (Group 3) is the sources within the industrial area to the west of the site which include fixed plants on the roof/podium of the industrial buildings and louvers at their ground levels.

Figure 6.1: Group of identified fixed noise sources



6.1.1.2 **Appendix 6.1** summarises the major noise sources based on site observation, together with the photographs taken on site.

6.2 Fixed Noise Criteria

6.2.1.1 According to Section 4.2.13 in Chapter 9 of the HKPSG, noise assessments for fixed noise sources would normally be conducted in accordance with the Technical Memorandum for the Assessment of Noise from Places Other Than Domestic Premises, Public Places or Construction Sites (IND-TM) under the Noise Control Ordinance. The IND-TM lays down statutory Acceptable Noise Levels (ANL). The HKPSG also states that in order to plan for a better environment, all planned fixed noise sources should be so located and designed that when assessed in accordance with the TM, the level of the intruding noise at the facade of the nearest sensitive use should be at least 5 dB(A) below the appropriate ANL shown in Table 3 of the IND-TM or, in the case of the prevailing background being 5 dB(A) lower than the ANL, should not be higher than the prevailing background.

6.2.1.2 The proposed ASRs and respective ANLs for the development are described in **Section 5.1** above. An ASR of "C" shall be applied to facades directly affected by Po Shek Wu Road and an ASR of "B" shall be applied to the other facades. The ANL for ASR of "C" should be 70dB(A) and 60dB(A) for daytime & evening time and night-time respectively, while the ANL for ASR of "B" should be 65dB(A) and 55dB(A) for daytime & evening time and night-time respectively. There is no planned fixed noise source and hence the criteria of ANL-5dB(A) are not applicable to this site.

6.3 Assessment Methodology

6.3.1.1 Noise measurements had been conducted to establish the Sound Pressure Level (SPL) of the identified industrial noise sources. Measurements were taken at locations where influences from other noisy activities such as road traffic were as minimal as possible.

6.3.1.2 Where possible, enquires were directly made to premises' owners/employee to obtain the information on operation for each identified fixed plant as far as practicable. Operational details for the noise sources are given in **Appendix 6.1**.

6.3.1.3 Noise measurements for the identified noise sources were conducted between November and December 2015, August and October 2016, April 2017, August 2018, December 2021, January 2022 and August 2022. During the measurement, some premises were not in operation or site access was not allowed. Reference has therefore been made to other plant of similar mode, nature and scale from other HKHA's projects. **Appendix 6.2** presents all the measured SPLs at reference distance for all the noise sources.

6.3.1.4 The tonal, impulsive and intermittent characteristics of the identified noise sources were investigated and considered in accordance with IND-TM. No impulsive and intermittent character has been identified for all noise sources and therefore no correction for impulsiveness or intermittency has been applied. Tonal character has been identified due to the operation of the street washing vehicle at the bazaar and a +6dB(A) correction has therefore been applied to respective noise source (BZ001c) (**Appendix 6.3**). No tonal character has been identified for other sources, therefore no correction has been applied.

6.3.1.5 Based on the measured SPLs at reference distance for all the fixed noise sources, fixed noise levels are predicted at selected representative NSRs using standard acoustic principles. The assessment has taken into account the distance attenuation, screening effect and facade effect etc. where appropriate. A summary of the corrections and assumptions adopted in the calculation are presented in **Appendix 6.3**.

6.3.1.6 Representative NSRs at 4/F, 14/F, 24/F and 44/F of the residential blocks are selected for the assessment. The locations of the selected representative NSRs are shown in **Figure 6.2**.

Figure 6.2: Selected representative assessment points for residential blocks (fixed noise impact assessment)

6.4 Predicted Fixed Noise Impact for Residential Blocks

6.4.1.1 The predicted fixed noise levels at selected representative NSRs are summarized in **Table 6.1**. Detailed calculations are given in **Appendix 6.4**. Results indicate that the southeastern and northeastern facades of Block B (i.e. NSRs R204c, R204e, R206b and R212c) facing the bazaar will exceed the noise criterion during daytime when the street washing vehicle is in use. Other representative NSRs are predicted to be in compliance with the ANL during both daytime & evening time, and night time.

Table 6.1: Predicted fixed noise assessment results for residential blocks

NSRs ID	Predicted Noise Level, dB(A)		ASRs	ANL, dB(A)		Comply with ANL (Y/N)	
	Daytime & Evening	Night-time		Daytime & Evening	Night-time	Daytime & Evening	Night-time
R101b	63	45	C	70	60	Y	Y
R115c	59	36				Y	Y
R116a	58	36				Y	Y
R204c	70	52	B	65	55	N	Y
R204e	70	53				N	Y
R206b	68	50				N	Y
R212c	67	52				N	Y
R213a	55	49				Y	Y

Note:
[1] Only the predicted noise levels for the worst floor are presented.

6.5 Noise Mitigation Measures for Residential Blocks

6.5.1.1 As discussed in **Section 6.1**, the street washing vehicle at the Shek Wu Hui Agricultural Produce Bazaar (BZ001c) operates at 11am to 12pm every day. Considering that the street washing activities are daily event that would last for around 0.5 -1 hour for each operation and are undertaken at a designated location at the nearest 35m from proposed housing development, provision of a movable noise barrier to screen the noisy part of the pump for the water tank on the vehicle during the street washing activity is considered as the most practicable measures.

6.5.1.2 A 2.5m high movable barrier with surface density of at least 10kg/m^2 is recommended to achieve a noise attenuation of at least 5dB(A). With installation of the movable barrier, all representative NSRs could comply with the ANL. Hence, no adverse fixed noise impact on the proposed housing site is anticipated. The predicted fixed noise levels at the selected representative NSRs are summarized in **Table 6.2**. Detailed calculations with schematic section drawings of the movable barrier are given in **Appendix 6.5**.

Table 6.2: Predicted fixed noise assessment results for residential blocks – With provision of movable noise barrier

NSRs ID	Predicted Noise Level, dB(A)		ASRs	ANL, dB(A)		Comply with ANL (Y/N)	
	Daytime & Evening	Night-time		Daytime & Evening	Night-time	Daytime & Evening	Night-time
R101b	60	45	C	70	60	Y	Y
R115c	59	36				Y	Y
R116a	58	36				Y	Y
R204c	65	52	B	65	55	Y	Y
R204e	65	53				Y	Y
R206b	63	50				Y	Y
R212c	62	52				Y	Y
R213a	55	49				Y	Y

Note:
[1] Only the predicted noise levels for the worst floor are presented.

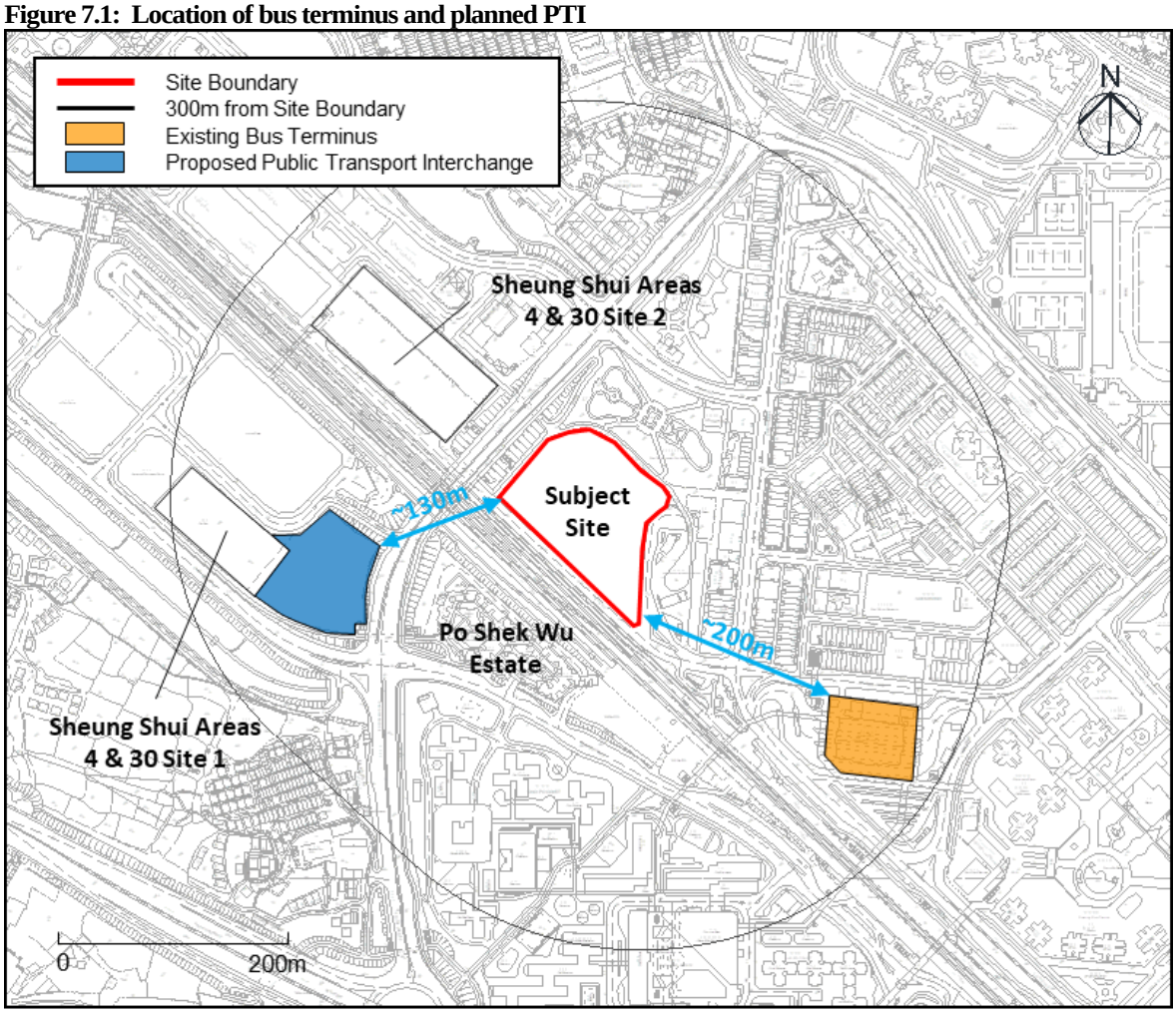
6.5.1.3 HKHA has committed to liaise with FEHD on the deployment of the proposed movable barrier to screen the street washing vehicle during its operation or use of other alternative measures such as replacement by a quieter vehicle to ensure it could comply with the ANL.

7 Review of Potential Noise Impact Arising from the Existing Bus Terminus and Proposed Public Transport Interchange

7.1 Location of Existing Bus Terminus and Planned PTI

7.1.1.1 A bus terminus is currently located at about 200m to the southeast of the subject site. A PTI is planned within Site 1 of Sheung Shui Areas 4 & 30, at about 130m to the southwest of the subject site. Location of the bus terminus and planned PTI are shown in **Figure 7.1** below.

Figure 7.1: Location of bus terminus and planned PTI



7.2 Existing Bus Terminus

7.2.1.1 There are a number of existing noise sensitive receivers located in much closer proximity to the bus terminus than the development site, including Metropolis Plaza, Lung Fung Garden, Sheung Shui Alliance Primary School and residential buildings along Lung Sum Avenue. The bus terminus is completely decked under the podium of Landmark North as shown in **Photo 1 to Photo 4**, such that there is no direct line of sight to these nearby noise sensitive uses.

7.2.1.2 Besides, the East Rail is running along San Wan Road to the south of the subject site and next to the bus terminus. The existing noise climate is dominated by rail and traffic noise. Based on site inspection, noise generated from the bus terminus was not noticeable.

7.2.1.3 In consideration of the decking over design, large separation distance and predominant noise climate by rail and road traffic, potential noise impact arising from the bus terminus on the subject development site is therefore not anticipated.

Photo 1: Bus Terminus decked under Landmark North	**Photo 2:** South facade of Landmark North G/F
	
Photo 3: Lung Sum Avenue and north facade of Landmark North	**Photo 4:** Exit of Bus Terminus (west facade of Landmark North)
	

7.3 Proposed Public Transport Interchange (PTI)

7.3.1.1 Existing noise climate is dominated by road traffic noise from Po Shek Wu Road. It is expected that the noise generated from the PTI will not be noticeable in view of the large separation distance to the subject site.

7.3.1.2 The design of the proposed PTI has been addressed in separate EAS for Sheung Shui Areas 4 & 30. According to the latest design, the proposed ingress/egress of PTI will be connecting to Choi Fai Street, which is facing away from the subject site. As advised by HKHA, the proposed PTI will also be designed with due consideration to the HKPSG. The PTI will be covered under a podium decking with full height side walls to avoid line of sights to the planned and existing noise sensitive uses in the proximity including the subject development as far as practicable. In case there are any opening or exhaust on the side walls of the PTI,

louvers and silencers will be provided if necessary to ensure the noise level at nearby NSRs including the subject development in compliance with the relevant noise standards.

7.3.1.3 Besides, absorptive lining will be provided on ceiling and interior walls of the PTI as far as practicable to minimise the reverberance. The design of PTI will meet the requirements of the Technical Schedule of Public Transport Interchange to be conducted in detailed design stage. Therefore, potential noise nuisance arising from the planned PTI on the subject site is not anticipated.

8 Review of Potential Air Quality Impact

8.1 Vehicular Emissions

8.1.1.1 Hong Kong Planning Standards and Guidelines (HKPSG) provides environmental guidance for residential developments on air quality. The guidelines recommend the minimum buffer distance required for active and passive recreational uses.

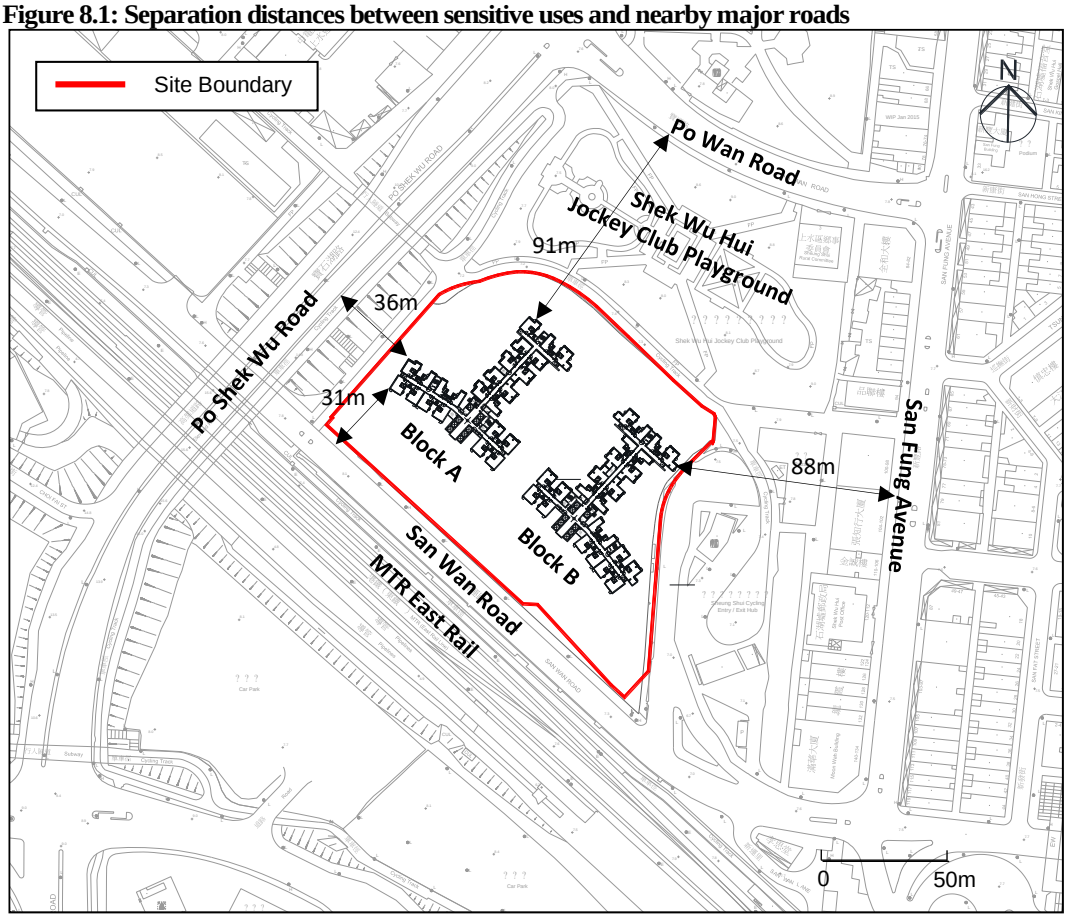
8.1.1.2 The buffer distances between the sensitive uses of the current development scheme and the surrounding major roads are summarised in **Table 8.1** and illustrated in **Figure 8.1** below.

Table 8.1: Separation distances between sensitive uses and nearby major roads

Name of Road	Type of Road[1]	HKPSG Recommended Buffer Distance for Active and Passive Recreational Use	Shortest Horizontal Distance from the Residential Block to Road Kerb
Po Shek Wu Road	PD	>20m	36m
San Wan Road	DD	>10m	31m
San Fung Avenue	DD	>10m	88m
Po Wan Road	DD	>10m	91m

Note:
[1] In accordance with AADT 2022: PD – Primary Distributor Road; DD – District Distributor Road.

Figure 8.1: Separation distances between sensitive uses and nearby major roads



8.1.1.3 It can be found that the current scheme can satisfy the setback distance requirements as stipulated in HKPSG. There are no sensitive active and passive uses located within the minimum buffer zone. Adverse vehicular emission impacts on the proposed development are therefore not anticipated.

8.2 Chimney Emissions

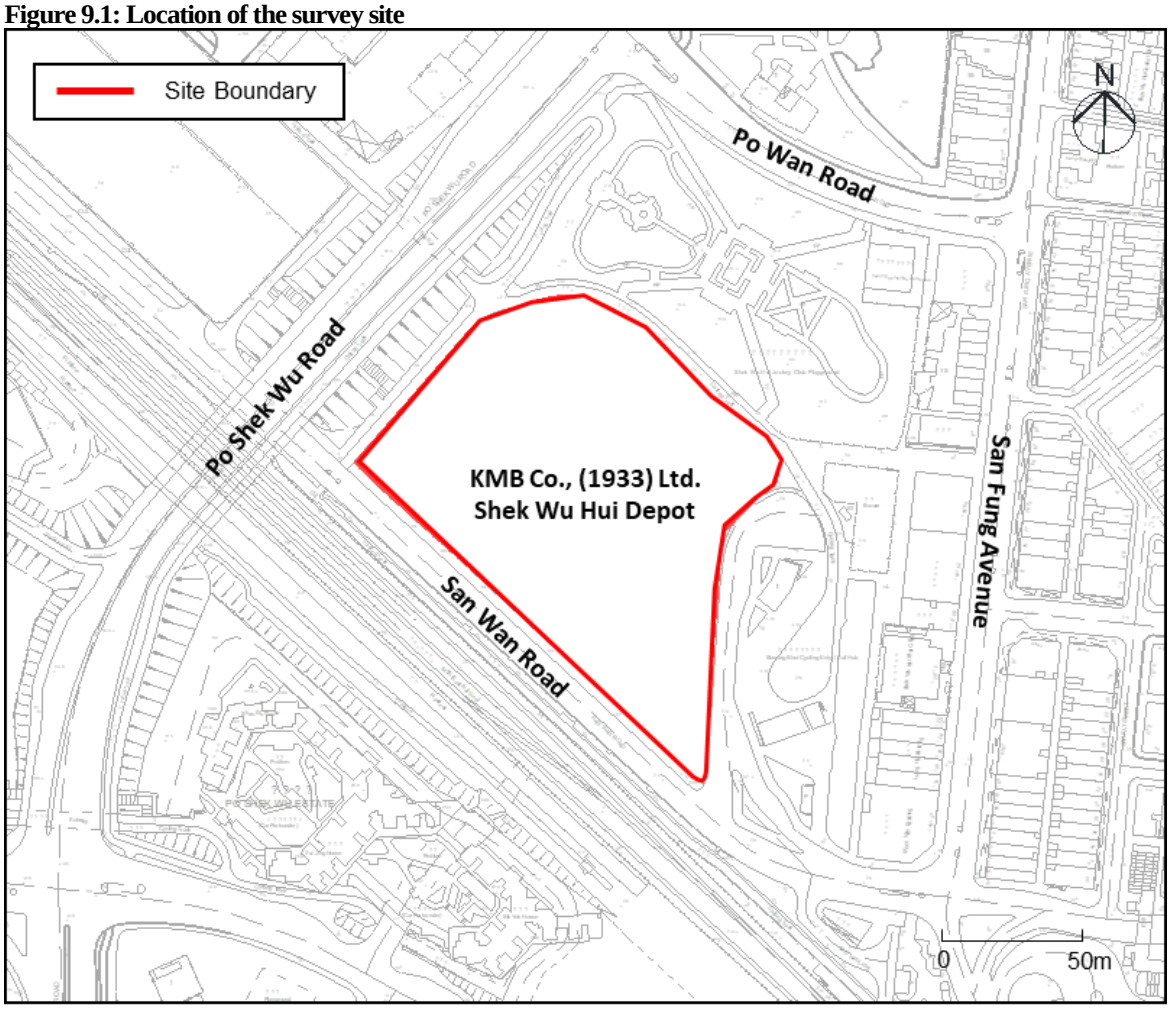
8.2.1.1 No existing and/or planned chimney is identified within 500m of the subject site. Hence, no adverse air quality due to chimney is anticipated.

9 Land Contamination

9.1 Site Description

9.1.1.1 As described in **Section 2.1**, the subject site is bounded by Shek Wu Hui Jockey Club Playground to the north, Po Shek Wu Road to the west and San Wan Road to the south. The areas to the east of the site is Shek Wu Hui which mainly consist of residential and commercial buildings. The site is currently occupied by Kowloon Bus Co. Ltd. (KMB) as a bus depot. The site location is indicated in **Figure 9.1**.

Figure 9.1: Location of the survey site



9.2 Statutory Legislation and Evaluation Criteria

9.2.1.1 Land contamination assessment is conducted in accordance with the following Technical Memorandum and Guidance Notes:

- Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management, EPD, 2007;
- Guidance Note for Contaminated Land Assessment and Remediation, Environmental Protection Department (EPD), 2007; and

- Practice Guide for Investigation and Remediation of Contaminated Land, EPD, 2011.

9.2.1.2 The EPD's *Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management* introduces the background of RBRGs and provides guidelines for comparison of soil and groundwater data to RBRGs. The RBRGs have been designed to protect the health of people who could potentially be exposed to land contaminated by chemicals. They are intended to be used as site assessment criteria that will be appropriate on a stand-alone basis for the majority of sites in Hong Kong, where human health is the only significant receptor that needs to be protected.

9.2.1.3 In accordance with EPD's *Guidance Note for Contamination Land Assessment and Remediation*, a contamination assessment evaluation should:

- provide a clear and detailed account of the present land use and the relevant past land history, in relation to possible land contamination;
- identify areas of potential contamination and associated impacts, risks or hazards; and
- submit a plan to evaluate the actual contamination conditions for soil and/or groundwater, if required.

9.2.1.4 The EPD's *Practice Guide for Investigation and Remediation of Contaminated Land* outlines the process for conducting land contamination assessment and remediation in Hong Kong. It sets out the requirements for:

- planning and implementation of the contaminated land investigation;
- interpretation of the investigation results using the RBRGs;
- reporting the contaminated land assessment;
- planning and implementation of remediation actions; and
- reporting the remediation works.

9.3 Review of Aerial Photographs and Historical Landuse

9.3.1.1 A total of six historical aerial photographs taken from 1973 to 2022 have been reviewed and the key findings are summarized below. The historical aerial photographs are shown in **Appendix 9.1**.

Table 9.1: Summary of historical land use within the site

Year	Site Description
1973	The site mainly comprised village houses at the northern half and agricultural land and vacant land at the south.
1982	Village houses and agricultural lands were removed. The northwestern half of the site was left vacant and the southeastern part was observed to be a formed land with a few containers / temporary structures scattered on it.
1993	The vacant part was observed to be covered by grass and scattered trees. The formed land at the southeast was occupied as a bus depot.
2000	The bus depot area extended to cover the whole site.

Year	Site Description
2015	The bus depot remained unchanged.
2022	The bus depot remained unchanged.

9.4 Information from Government Authorities

9.4.1 Information from Environmental Protection Department (EPD)

9.4.1.1 Information request on any Chemical Waste Producer (CWP) registered, and any records of chemical spillage / leakage incidents within the site were made to EPD. Based on the reply from EPD, there was no record of spillage/leakage of chemicals within the concerned site in the past five years. Chemical waste producer record was also reviewed at the EPD's Territory Control Office. It is noted that KMB at the site is currently registered as a CWP. The correspondence with EPD is attached in **Appendix 9.2**.

9.4.2 Information from Fire Services Department (FSD)

9.4.2.1 Information request on any Dangerous Goods (DG) license registered, and any records of DG spillage / leakage incidents within the site were made to FSD. Based on the reply from FSD, there is one DG license record for storage of diesel oils at the site, but no leakage incidents were found associated with the site. The correspondence with FSD is attached in **Appendix 9.3**.

9.5 Site Visit

9.5.1.1 The site is still being occupied by KMB. Detailed site appraisal which requires KMB's permission for access would be conducted at a later stage. Nonetheless, site visit along the periphery of the site was conducted on 12 September 2016, 2 August 2018 and 29 August 2022 and the site condition was recorded. It was observed that the site was generally divided into northwestern and southeastern portions. The northwest portion was mainly used for bus parking, while car washing and maintenance activities were suspected to occur inside the sheltered area and building structure in the southeast portion of the site. **Figure 9.2** illustrates the general site condition in Year 2018 and Year 2022. The site condition was generally the same in recent years.

Figure 9.2: Condition of the subject site

Photo taken in Year 2022

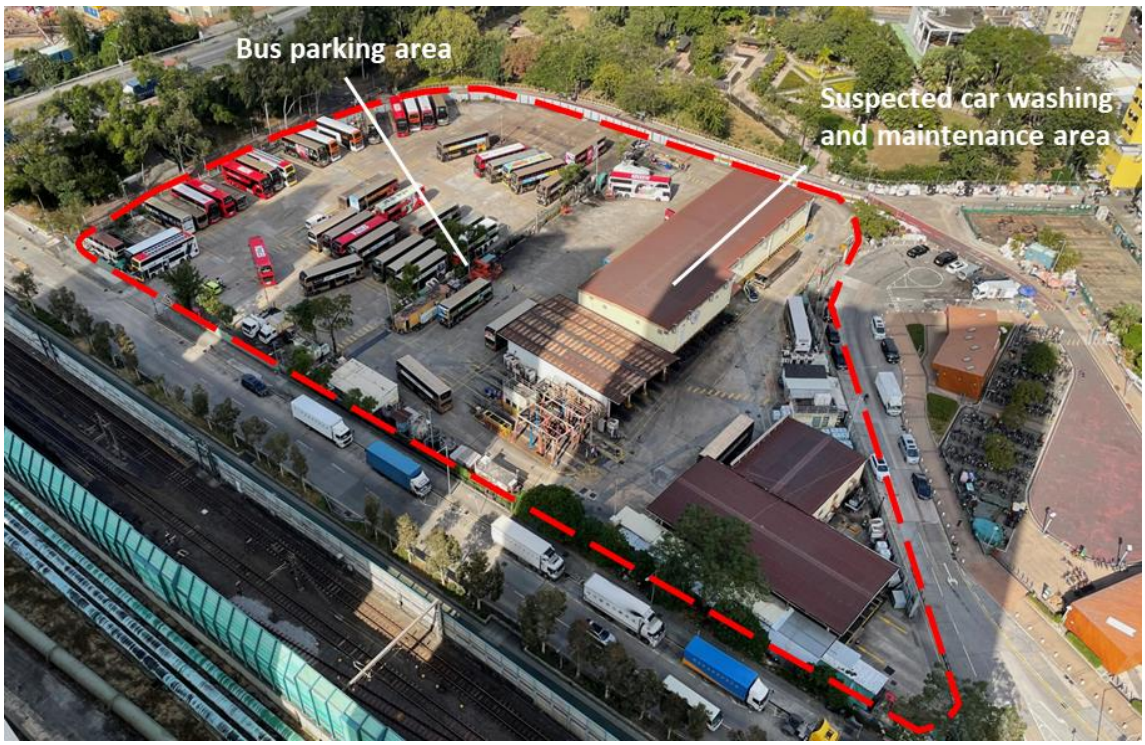


Photo taken in 2018

9.6 Site Appraisal

9.6.1.1 Based on desktop research and review of historical photographs, it is found that the site was used to be of rural land use including village houses and agricultural land in the 1970s. As

observed from the aerial photograph of Year 1982, the rural communities were removed and the site was left vacant in the northwestern part while a land was formed in the southwestern part. The formed land in the southwestern part was occupied by KMB bus depot in 1993. In the aerial photograph of Year 2000, the northwestern portion of the site was also occupied by KMB, but mainly for bus parking. Since then, the land use for a bus depot remained unchanged till recent site visit in 2022.

9.6.1.2 Since the site has been used as a bus depot for more than 20 years where potential contamination activities such as car washing and maintenance works may have occurred, potential land contamination within the site is anticipated.

9.7 Recommendation

9.7.1.1 Based on the findings of the preliminary site appraisal, it is considered that the site may have potential land contamination issue due to the historical and on-going operation of KMB bus depot. Currently, the site is on lease from Lands Department (LandsD) to KMB. HKHA has confirmed that detailed land contamination assessment is being carried out by CEDD in accordance with the EPD's Practice Guide for Investigation and Remediation of Contaminated Land and any necessary remediation works will be implemented. Therefore, potential health risk associated with the potentially contaminated land to future public housing residents of the site is not anticipated.

10 Conclusion

10.1.1.1 An EAS has been conducted for the proposed housing development at Sheung Shui Po Shek Wu Road.

10.1.1.2 During the process of designing the development layout, due consideration has been given to avoiding noise impacts from road traffic and the East Rail. Acoustic window, EAB3.0 and fixed glazing are recommended. With the provision of these mitigation measures, adverse road traffic noise and rail noise impacts on the proposed development are not anticipated.

10.1.1.3 Various fixed noise sources are identified on the rooftop, podium and ground levels of industrial and commercial buildings, and at the bazaar adjacent to the site. Fixed noise impact assessments indicate that the southeastern and northeastern facades of Block B facing the bazaar will exceed the noise criterion during daytime when the street washing vehicle is in use. A 2.5m high movable barrier to screen the pump for the water tank on the vehicle during the street washing activity is recommended. With installation of the movable barrier, no adverse fixed noise impact on the proposed housing site is anticipated.

10.1.1.4 In consideration of the decking over design, large separation distance and predominant noise climate, it is anticipated that there is no adverse potential noise nuisance arising from the existing bus terminus and the planned PTI on the subject development. The proposed PTI at Sheung Shui Areas 4 & 30 will also be designed with due consideration to the HKPSG to avoid direct line of sight to the subject development. Potential noise nuisance arising from the planned PTI is not anticipated.

10.1.1.5 Kindergarten, management offices and social welfare facilities are planned at G/F, 1/F and 2/F. However, their layouts are still being investigated. Hence, assessments on the kindergarten and social welfare facilities will be supplemented when the layout is confirmed in the next stage.

10.1.1.6 The current scheme has allowed sufficient setback distances from the surrounding roads to meet the minimum requirement for active and passive recreational uses as stipulated in HKPSG and hence potential vehicular emission impact is not anticipated. There is also no chimney found within 500m of the study area. Hence no adverse air quality impact is anticipated.

10.1.1.7 Based on the preliminary site appraisal and desktop study, potential land contamination may occur within the subject site due to the operation of existing bus depot. HKHA has confirmed that detailed land contamination assessment is being carried out by CEDD in accordance with the EPD's Practice Guide for Investigation and Remediation of Contaminated Land and any necessary remediation works will be implemented. Therefore, potential land contamination issue to the proposed housing site is not anticipated.

10.1.1.8 It is concluded that with proper building layout, design and mitigation measures, there is no insurmountable environmental impacts on the proposed housing development at Po Shek Wu Road.