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Instruction No. K02
Proposed Public Housing Development
at Shap Pat Heung Road

Report (Revision 4a)

Hong Kong Housing Authority

January 2024





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1. Introduction

1.1. Project Background

1.1.1. The Hong Kong Government has identified a potential site for a public housing development at Shap Pat Heung Road (hereafter referred as “the proposed development”).

1.1.2. Atkins China Limited was commissioned by HKHA to undertake an Environmental Assessment Study (EAS) for the proposed development.

1.2. Scope

1.2.1. The scope of this EAS Report is outlined as follow:

- Assess the road traffic noise impacts upon the proposed development with reference to the Hong Kong Planning Standards and Guidelines (HKPSG);
- Assess the potential noise impacts of other fixed type noise sources upon the proposed development with reference to HKPSG;
- Assess the potential air quality impacts due to vehicular emissions from the surroundings road network upon the proposed development with reference to HKPSG;
- Assess the potential air quality impacts due to chimney emissions from the nearby industrial premises with reference to HKPSG, and
- Recommend appropriate environmental mitigation measures as required.

1.3. Site Location and Scale

1.3.1. The Site is located at Shap Pat Heung Road in south of the Yuen Long Town and Shap Pat Heung. It is bounded by the Shap Pat Heung Road. According to the Draft Yuen Long Outline Zoning Plan No. S/YL/26, the site is located in an area zoned as "Residential (Group A)1"("R(A)1"). Based on the Preliminary Environmental Review conducted by CEDD, the site was previously a car park, no land contamination hotspot and no contamination activity were identified. The Government has handed over the site to HKHA for public housing development in November 2022.

1.3.2. The proposed development comprises of 2 building blocks; Block A and B, consist of 560 and 384 flats respectively. With total 944 flats and 0.7 hectare in area. Location of the proposed development in shown in **Figure 1-1**.

1.4. Development Layout Details

1.4.1. The proposed development layout under this EAS comprises two residential blocks, car park, garden, Home Care Services (HCS), Halfway House (HWH), and Management Office (MO), etc. Details of the proposed facilities are summarised in **Table 1-1** below and the layout plan is attached in **Appendix 1-1**.



Table 1-1 Summary of the Proposed Facilities for the Development

| Location | Floor level (mPD) | Name of Proposed Facility | Type of Use |
|--|-------------------|---------------------------|---|
| Podium G/F – 1/F | +7.00 to + 13.00 | Car park | Car park |
| Podium 2/F | +17.00 | Car park / MO / HCS | Car park, Management Office, Welfare Facilities |
| Podium 3/F | +22.00 | HWH | Welfare Facilities |
| Domestic Tower | +30.95 to +127.24 | Domestic | Residential |
| Remarks: The final list and layout of social welfare facilities shall be subject to confirmation by user departments at later stage. | | | |

1.4.2. The key development parameters of the proposed development are summarised in **Table 1-2** below.

Table 1-2 Key Development Parameter for the Proposed Development

| | Block A | Block B |
|--|------------------|-------------|
| Domestic floor | 4/F to 38/F | 4/F to 35/F |
| No. of domestic storey | 35 | 32 |
| No. of flats per floor | 16 | 12 |
| Total No. of flats | 560 | 384 |
| Tentative Completion of Construction | End of Year 2028 | |
| Tentative Population Intake Year | Year 2029 | |
| Typical floor to floor height – domestic | 2.75 m | |
| First domestic floor level | +30.95 mPD | |

1.4.3. The development layout has allowed sufficient setback distance between the nearest air sensitive uses at the proposed development and the kerb of the nearby roads according to recommended buffer zone as required by HKPSG. No planned Air Sensitive Uses with openable windows and fresh air intake as well as active and passive recreational uses would be located within the recommended buffer zone. There are no active industrial emissions within 500m from the proposed development. Adverse air quality impacts are not expected.

1.4.4. Portion of the proposed development would face a busy road section, Shap Pat Heung Road. The road traffic noise impacts are discussed in **Section 2** and the proposed noise mitigation measures has been outlined in **Figures 2-3 & 2-4**. Fixed plant noise impacts are discussed in **Section 3**. Adverse fixed plant noise impact on the proposed development is not anticipated.



2. Road Traffic Noise Impacts

2.1. Assessment Criteria

- 2.1.1. According to the HKPSG, the road traffic noise criterion of $L_{10}(\text{peak hour})$ 70 dB(A) is applicable to the domestic premises and convalescences, homes for the aged and offices in the proposed development.
- 2.1.2. The domestic premises within the proposed development rely on openable window for ventilation. Locations of the noise assessment points on domestic floors and on welfare facilities (3/F) are illustrated in **Figure 2.1** and **Figure 2.2** respectively. Noise assessment points in the proposed domestic floor are identified and summarised in **Table 2-1**.

Table 2-1 Summary of the Noise Sensitive Receivers in the Development

| Location | Floor Level (mPD) | Name of the Proposed Welfare Facility ^[1] / Area | Noise Criterion $L_{10}(1\text{-hr})$ in dB(A) | Noise Assessment Point ID |
|-----------------|-------------------|---|--|---|
| Podium 2/F | +17.00 | HCS | - | As there will be no openable windows along Shap Pat Heung Road, there will be no Noise Assessment Points. |
| Podium 3/F | +22.00 | HWH | - | HWH-1 to HWH-15 HWH-27 to HWH-35 |
| Domestic Towers | +30.95 and above | Domestic | 70 | Blk A-011 to Blk A-164 Blk B-011 to Blk B-122 |

Note:
 [1] The standards in HKPSG Chapter 9 table 4.1 apply to uses which rely on opened window for ventilation. The internal layouts used for domestic floors and 3/F are indicative and subject to detailed design. All the windows provided are assumed to be openable for ventilation and will be included in detailed traffic noise assessment.

2.2. Assessment Methodology

- 2.2.1. Road traffic noise level prediction has been carried out using the NoiseMap model, which is a computerized model developed on the basis of the UK Department of Transport's Calculation of Road Traffic Noise (CRTN) procedures, which is a method accepted by Environmental Protection Department (EPD) for use in Hong Kong.
- 2.2.2. Existing roads within 300m from the sites of the proposed development have been included in the assessment.
- 2.2.3. All openable windows for ventilation at all noise sensitive rooms at domestic floors of the proposed development are assigned with noise assessment points and included for the assessment. The noise assessment points, building structures with noise screening effects, topographical contours and road segments with traffic flow data have been input into the NoiseMap model in predicting the potential traffic noise impacts.



- 2.2.4. The traffic noise impact assessment in this EAS will be based on flow data from the approved PER of the same site conducted by CEDD, and the traffic flow data provided by CEDD's Consultant is extracted in **Appendix 2-1**. EPD has no further technical comments on the PER from noise planning point of view in October 2022, and also the methodology for the assessment of flow data has obtained TD's no in-principle comment.
- 2.2.5. The flow data corresponds to the projected peak hourly traffic flows in year 2044, which is the highest within 15 years from upon occupancy of the Proposed Development and is then adopted for the purpose of traffic noise impact assessment in this EAS.

2.3. Design Consideration for the Base-case Scenario

- 2.3.1. The proposed layout scheme of the public housing blocks studied in this EAS has implemented the following design consideration in order to minimize the road traffic noise impacts as much as practicable and with an aim to achieve a high compliance rate.

Provision of Podium

- 2.3.2. For the base-case scenario, podiums have been adopted as building features for residential building blocks. Podiums are to be provided at +7.0 mPD to +22.0 mPD for the proposed development. The provision of such building feature is to reduce the noise impact to the lower floor levels.

Internal Layout Design

- 2.3.3. In general, standard modular flat design is adopted in public housing design including those with acoustic windows.

Further Setback

- 2.3.4. The Project Site is abutting nearby road and existing buildings, further setback is considered not feasible for the proposed development.

2.4. Impact Assessment

Predicted Road Traffic Noise Impacts on Public Housing Units (Base-case Scenario)

- 2.4.1. The noise assessment has been undertaken for the base-case scenario in accordance with the given layout plan. Locations of the noise assessment points are illustrated in **Figure 2-1**. The predicted road traffic noise levels at all noise assessment points are summarised in **Table 2-2** below.



Table 2-2 Summary of Predicted Peak Hourly Road Traffic Noise Results for the Public Housing Units (Base-case Scenario)

| Parameter | Overall | | | |
|--|-----------|---------|-----------|---------|
| | AM Peak | | PM Peak | |
| Traffic Scenario | Block A | Block B | Block A | Block B |
| Residential Block | Block A | Block B | Block A | Block B |
| Total No. of Flats | 560 | 384 | 560 | 384 |
| Predicted Maximum L ₁₀ (peak hour), dB(A) | 71 | 71 | 73 | 73 |
| No. of Dwellings with Noise Exceedance | 14 | 8 | 39 | 24 |
| | Total: 22 | | Total: 64 | |
| Compliance Rate, % | 98% | | 93% | |

2.4.2. The predicted maximum road traffic noise level of the public housing units in the proposed development is 73 dB(A) which exceeds the relevant noise criterion of 70 dB(A) by up to 3 dB(A). The worst noise compliance rate of the proposed development is 93% at PM peak scenario.

Predicted Road Traffic Noise Impacts on Non-domestic Uses (Base-case Scenario)

2.4.3. For the proposed welfare facilities and office, location of the noise assessment points are illustrated in **Figure 2-3**. The predicted road traffic noise levels at all noise assessment points are summarised in below.

Table 2-3 Summary of Predicted Peak Hourly Road Traffic Noise Result of the Non-domestic Uses (Base-case Scenario)

| Parameter | Overall | |
|--|---|---|
| | AM Peak | PM Peak |
| Traffic Scenario | AM Peak | PM Peak |
| Welfare Facilities | Half-Way House for Discharged Mental Patients (HWH) 3/F | Half-Way House for Discharged Mental Patients (HWH) 3/F |
| Predicted Maximum L ₁₀ (peak hour), dB(A) | 73 | 74 |
| No. of Dwellings with Noise Exceedance | 11 | 13 |
| | Total: 13 | Total: 15 |
| Compliance Rate, % | 52% | 44% |

2.4.4. Based on predicted road traffic noise result, it is recommended to install horizontal panels in 3/F for the openable windows at the dormitories towards Shap Pat Heung Road (as shown in **Figure 2-3**), as well as not to provide openable windows in 2/F towards the busy road section, i.e. Shap Pat Heung Road.



Mitigation Measures for Domestic Uses

Provision of Acoustic Window

- 2.4.5. Acoustic window has been proposed for flats predicted with noise exceedance to mitigate the impact of road traffic noise. The proposed acoustic windows are at both Block A and Block B façade facing Shap Pat Heung Road and is illustrated graphically in **Figure 2-4**. In the base case assessment, the domestic façade location with noise exceedance are mainly with Flat Type B, Type C and Type D.
- 2.4.6. It should be noted that the sound attenuation performance is subject to actual design and configurations of the acoustic window system as well as setting and orientation of the acoustic window. Sound attenuation performance and configurations of the acoustic window for typical public housing units are detailed in **Appendix 2-2**. To achieve the sound attenuation performance, the setting and orientation of the acoustic window shall follow the Final Report of Acoustic Design and Performance Evaluation of the Acoustic Window (ADPEAW). Relevant pages have been extracted from the report and presented in **Appendix 2-3** for reference.

Acoustic Window Configuration

- 2.4.7. The sound attenuation of the acoustic window system is dependent on the window configuration. Design details of the acoustic window system in MFD-MiC are provided in **Appendix 2-2**. The summary of noise attenuation performance for MFD-MiC with acoustic window are listed in **Table 2-4** below.

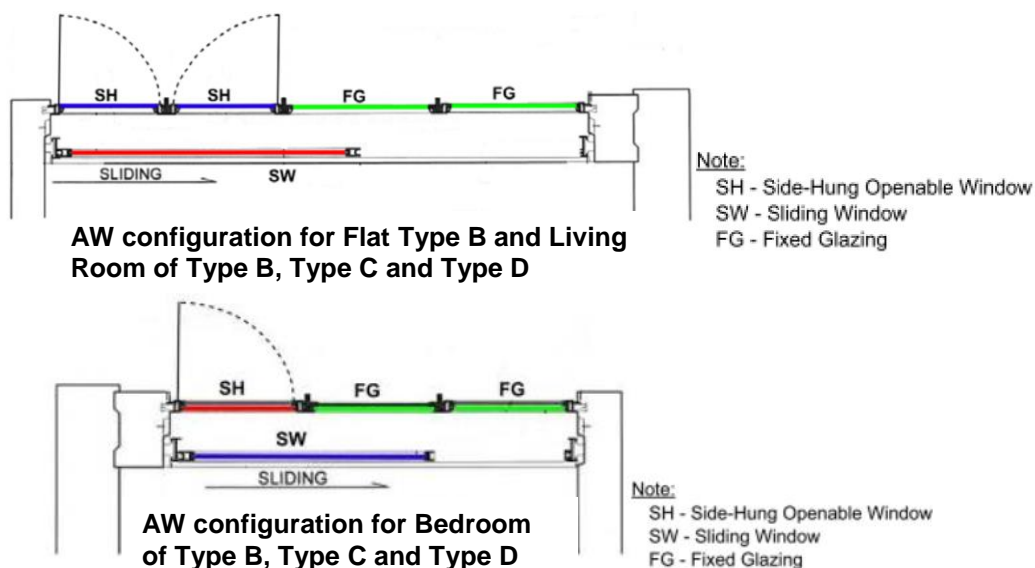
Table 2-4 Summary of Noise Attenuation Performance for MFD-MiC with Acoustic Window

| | | Acoustic Window Configurations | | | | Noise Attenuation dB(A) | |
|------------------|------------------------------|--------------------------------|------------------------|---------------------------|--------------------------------|------------------------------|---------------------------------|
| Flat Type | Floor size (m ²) | Inner Window Opening | Outer Window Opening | Window Overlapping Length | Gap Width between Window Panel | With Sound Absorptive Lining | Without Sound Absorptive Lining |
| Type B-M2 | 15.592 | 1352mm (H) x 895mm (W) | 1352mm (H) x 945mm (W) | 200mm | 175mm | 6.9 | 5.8 |
| Type C-M2 | | | | | | | |
| Living Room | 16.414 | 1352mm (H) x 915mm (W) | 1352mm (H) x 985mm (W) | 100mm | 175mm | 7.1 | 5.6 |
| Bedroom 1 | 6.117 | 1352mm (H) x 660mm (W) | 1352mm (H) x 633mm (W) | 607mm | 175mm | | |



| | | Acoustic Window Configurations | | | | Noise Attenuation dB(A) | |
|------------------|------------------------------|--------------------------------|-------------------------|---------------------------|--------------------------------|------------------------------|---------------------------------|
| Flat Type | Floor size (m ²) | Inner Window Opening | Outer Window Opening | Window Overlapping Length | Gap Width between Window Panel | With Sound Absorptive Lining | Without Sound Absorptive Lining |
| Type C-M3 | | | | | | | |
| Living Room | 16.736 | 1352mm (H) x 985mm (W) | 1352mm (H) x 1125mm (W) | 330mm | 175 mm | 7.1 | 5.6 |
| Bedroom 1 | 6.094 | 1352mm (H) x 660mm (W) | 1352mm (H) x 633mm (W) | 607mm | 175 mm | | |
| Type D-M2 | | | | | | | |
| Living Room | 16.414 | 1352mm (H) x 915mm (W) | 1352mm (H) x 985mm (W) | 100mm | 175 mm | 7.1 | 5.6 |
| Bedroom 1 | 6.117 | 1352mm (H) x 660mm (W) | 1352mm (H) x 633mm (W) | 607mm | 175 | | |

2.4.8. The acoustic windows are designed with two layers of window including push open window at outer layer and sliding window at inner layer as illustrated in the figures below. The opening and gap between the two layers of windows allow sufficient air flow to satisfy ventilation requirement; while at the same time, direct transmitted noise to the room is obstructed by the 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 while the fixed glazing should be kept at close as shown in the figures below. Special locking device (e.g. allen key) would be installed to the fixed glazing at the outer layer of keeping them in the above 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 / Deed of Mutual Covenant (DMC) and Sales Brochure (subject to the housing type) to let the future occupants be well aware of its intended purpose, appropriate use and correct setting of the acoustic window.



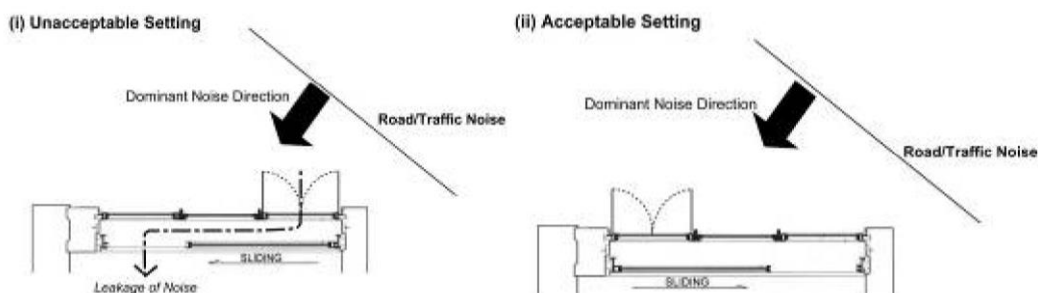
Acoustic Window Settings

2.4.9. For achieving the sound attenuation assessed in the study, the acoustic window should be set at the intended orientation as described in the Final Report of ADPEAW. The setting and orientation are summarised and described in **Table 2-5**. Only one opening with acoustic window design will be allowed in each habitable room, side windows are fixed (fixed glazing) to ensure the noise reduction performance of the acoustic window.

Table 2-5 Proposed Location of Acoustic Windows

| NSR | Mitigation Type [1] | Flat Type [1] | With/Without sound absorption | Floor Range |
|-----------|---------------------|---------------|-------------------------------|-------------|
| Blk A-024 | AW(BT) | D-M2 | Without | 4/F - 10/F |
| Blk A-025 | AW(BT) | D-M2 | Without | 4/F - 10/F |
| Blk A-032 | AW(BT) | C | Without | 4/F - 11/F |
| Blk A-033 | AW(BT) | C | Without | 4/F - 11/F |
| Blk A-042 | AW(BT) | C | Without | 4/F - 11/F |
| Blk A-043 | AW(BT) | C | Without | 4/F - 11/F |
| Blk A-052 | AW(BT) | C | Without | 4/F - 11/F |
| Blk A-053 | AW(BT) | C | Without | 4/F - 11/F |
| Blk A-062 | AW(BT) | C | Without | 4/F - 11/F |
| Blk A-063 | AW(BT) | C | Without | 4/F - 11/F |
| Blk B-102 | AW(BT) | C | Without | 4/F - 11/F |
| Blk B-103 | AW(BT) | C | Without | 4/F - 11/F |
| Blk B-112 | AW(BT) | B-M2 | Without | 4/F - 11/F |
| Blk B-121 | AW(BT) | B-M2 | Without | 4/F - 11/F |

Note: 1) Detail acoustic window configuration refers to Table 2-4



Window NOT in parallel with traffic noise source

Advice to Future Residents for the Use of Acoustic Window

2.4.10. The sound attenuation achieved by the acoustic window refers to the designated setting of windows. Hence the future residents in the flats equipped with acoustic windows should be advised of such settings stated in **Section 2.4.9** above for achieving the intended attenuation. Deviation from the recommended setting might affect the noise level in the flat.

2.4.11. The noise reduction purpose of the acoustic window and its setting to achieve the noise reduction effect would be incorporated in the Decoration Handbook / Deed of Mutual Covenant (DMC) and Sales Brochure (subject to the housing type) to inform the future occupants.

Predicted Road Traffic Noise Impacts on Public Housing Units (Mitigated Scenario)

2.4.12. The predicted peak hourly road traffic noise levels of the mitigated scenario with incorporation of fixed glazing with maintenance window and acoustic window are summarised in **Table 2-6**.

Table 2-6 Summary of Predicted Peak Hourly Road Traffic Noise Results for the Public Housing Units (Mitigated Scenario)

| Parameter | Overall | |
|--|---------|---------|
| | Block A | Block B |
| Residential Block | Block A | Block B |
| Total No. of Flats | 560 | 384 |
| Predicted Maximum L ₁₀ (peak hour), dB(A) | 70 | 70 |
| No. of Dwellings with Noise Exceedance | 0 | 0 |
| Compliance Rate, % | 100% | |

Notes: Noise Criterion L₁₀ (peak hour) = 70 dB(A)

2.4.13. With proper layout design and room arrangement as well as incorporation of suitable mitigation measures, adverse road traffic noise impacts on the noise sensitive room at residential floors is not anticipated to occur.



2.5. Summary

- 2.5.1. The overall noise compliance rate for the proposed development in base-case scenario is 93%. The predicted maximum peak hourly road traffic noise level in the base-case scenario is 73 dB(A) which exceeds the noise criterion by 3 dB(A). With the provisions of fixed glazing with maintenance window and acoustic window on the public housing blocks, the overall noise compliance rate is 100%, and the predicted maximum peak hourly road traffic noise level is 70 dB(A).
- 2.5.2. It is planned to provide social welfare facilities, communal facilities and management office together with the proposed public housing developments. It is not recommended to provide openable windows in 2/F towards the busy road section, i.e. Shap Pat Heung Road. However, horizontal panels are suggested to be installed in 3/F for the openable windows at the dormitories towards Shap Pat Heung Road. With careful design and room arrangement included the consideration of noise criteria and provision of proper mitigation measures, adverse road traffic noise impacts on these facilities are not expected to occur.



3. Fixed Plant Noise Impacts

3.1. Assessment Criteria

- 3.1.1. According to 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), published under the Noise Control Ordinance. IND-TM lays down statutory Acceptable Noise Levels (ANL). The ANLs for fixed noise sources as stipulated in the IND-TM are provided in **Table 3-1** below:

Table 3-1 Acceptable Noise Level in IND-TM

| Time Period | Acceptable Noise Level, $L_{eq\ 30\ min}$, dB(A) | | |
|--------------------------------|---|---------|---------|
| | ASR "A" | ASR "B" | ASR "C" |
| Day-time (0700 – 1900 hours) | 60 | 65 | 70 |
| Evening (1900 – 2300 hours) | | | |
| Night-time (2300 – 0700 hours) | 50 | 55 | 60 |

Notes: ASR = Area Sensitivity Rating

- 3.1.2. The Acceptable Noise Levels (ANLs) are dependent on the Area Sensitivity Rating (ASR) defined and the time period of the day. The ASR of the NSR is determined by the type of area containing it and the presence of any influencing factors (IF) such as industrial areas, major roads, etc. The noise study area contains village type developments and high-rise residential developments with small-scale shops. The type of area is therefore classified as 'Area other than those above' based on IND-TM.
- 3.1.3. The noise study area contains village type developments and high-rise residential developments with small-scale shops. The type of area is therefore classified as "Area other than those above". Yuen Long Highway is located at the south of the Site and has an Annual Average Daily Traffic (AADT) in Year 2022 of 90,880 (from Shap Pat Heung Interchange to Tong Yan San Tsuen Interchange). Since the AADT figure on Yuen Long Highway is above 30,000 vehicles, it is considered as an 'Influencing Factors (IF). The representative NSRs facing to Yuen Long Highway are considered to be "C" due to directly affected by the IF. However, for the representative NSRs facing to Yuen Long Highway but behind Park Signature Block 5 to 10 and the representative NSRs are indirectly facing to Yuen Long Highway, they are considered to be "B" according to the IND-TM. The consolidated fixed noise criteria for the Development is summarized in **Table 3-2**.

Table 3-2 Consolidated Fixed Plant Noise Criteria

| Facade | ASR | Degree to which NSR is affected by IF | Criteria – Daytime and Evening, dB(A) | Criteria – Nighttime, dB(A) |
|--|-----|---------------------------------------|---------------------------------------|-----------------------------|
| Facades directly affected by Yuen Long Highway | C | Directly affected | 70 | 60 |
| Facades indirectly/not affected by Yuen Long Highway | B | Indirectly affected | 65 | 55 |



3.2. Identified Fixed Noise Sources

3.2.1. The study area for fixed plant noise assessment includes the areas within 300m from the proposed development site. Fixed noise sources were identified based on the desktop study and confirmed by the site visits in Mar 2023. Locations of the identified fixed noise sources are presented in **Figure 3.1**. Within the noise study area, existing potential fixed plant noise sources which might potentially affect the noise sensitive use at the Site have been identified and summarised in **Table 3-3**. No potential fixed plant noise sources were identified for the village houses and residential buildings located at the north, east and south of the Site.

Table 3-3 Identified Fixed Plant Noise Sources within 300m Assessment Area

| Noise Source ID | Location | Type / Identified activity | Approximate distance from Site Boundary (m) |
|-----------------|---|--|---|
| NS01 | Ma Tin Sewage Pumping Station | Pumping Station | ~100 |
| NS02 | United Car Trading Platform | Vehicle Parking / Second-hand Car Trading Workshop | ~60 |
| NS03 | Fu Shing Motor Service Limited | Car Washing | ~105 |
| NS04 | Win Fat Warehouse | Storage of Construction Material | ~145 |
| NS05 | 28 Car Wash House | Self-service Car Washing | ~160 |
| NS06a | Open Space at the southwest of the Site | Storage of Construction Material | ~50 |
| NS06b | | Vehicle Parking | ~5 |
| NS07 | Vehicle Workshops along Kiu Hing Road | Vehicle Workshops | ~195 |
| NS08 | Storage Area Along Lam Hi Road | Storage | ~90 |

Planned Fixed Plant Noise Sources

3.2.2. Based on the current scheme, there is no planned fixed noise source within the Site. Should there be any planned fixed noise sources within the Site at the later stage, these noise sources will be designed to meet the noise criteria under Ch.9 of the HKPSG.

3.2.3. The Site is proposed for housing development. In case there is any planned fixed noise sources designed in the later stage, to ensure the fixed plant noise generated from the Development would not cause excessive noise impact to the NSRs in the vicinity, potential noise sources from the Development (e.g. pump rooms, transformer rooms, lift machine room, emergency set rooms, etc.), shall be designed to meet the relevant noise criteria as stipulated in the HKPSG. Proper noise control measures, such as silencers and acoustic lining, shall be provided for those potential noise sources designed in the later stage when necessary. Thus, it is anticipated that the fixed plant noise impact on the NSRs in the vicinity due to the operation of the Development will not exceed the relevant noise standard of the HKPSG and the NCO.



Existing Fixed Plant Noise Sources

- 3.2.4. The existing fixed plant noise sources in the vicinity might potentially affect the planned NSRs at the Site. Desktop studies and site inspections were conducted within the noise study area to identify and verify the locations of existing fixed plant noise sources and to understand the operation details. According to the HKPSG, noise assessments for fixed noise sources would make reference with the IND-TM, published under the NCO.

3.3. Impact Assessment

Assessment Methodology

Existing Fixed Plant Noise Sources

- 3.3.1. The assessment of the fixed noise sources was undertaken in accordance with the following standard acoustic principle:

$$\text{SPL} = \text{SWL} - \text{DAC} + \text{FC} + \text{BC}$$

Where SPL = Predicted façade noise level, dB(A)

SWL = Sound Power Level, dB(A)

Distance attenuation correction, dB(A),

DAC = $20 \log_{10} D + 8$, dB(A), where D is distance in metres (m)

FC = Façade correction of 3 dB(A)

BC = Barrier correction, dB(A)

- 3.3.2. The total predicted façade noise level (SPL) contributed from adjacent identified fixed noise sources at representative NSR is then calculated by the following formula:

$$\text{Total SPL}_{\text{NSR}} = 10 \log_{10} \sum 10^{\text{SPL}_i / 10}$$

Where Total SPL_{NSR} = Total predicted façade noise level from all noise sources in the calculations, dB(A)

SPL_i = Predicted façade noise level at receiver by individual noise source, dB(A)

Location of Representative NSRs

- 3.3.3. Locations of the representative NSRs for fixed plant noise impact assessment are identified based on its orientation and potential impact from fixed plant noise sources, including Blk A-011, Blk A-121, Blk A-133, Blk B-042 and Blk B-051. The locations of the identified representative NSRs are illustrated in **Figure 3.2**.



Prediction and Evaluation of Environmental Impacts

- 3.3.4. Site inspections were conducted on 7 March 2023 to identify the existing major fixed plant noise sources in the vicinity which might potentially affect the noise sensitive uses at the Site. The locations of the potential fixed plant noise sources and site photos taken during site inspections are shown in **Appendix 3.1**. The details of the site inspection findings are described in the following sections and are summarized in **Table 3-3**.
- 3.3.5. The majority of the identified fixed plant noise sources are located within the area bounded by Shap Pat Heung Road, Kung Um Road, Lam Hi Road, Lam Yu Road, Lam Yu Road and Lam Hau Tsuen Road. Some fixed plant noise sources are located outside this area (i.e. NS07 – Vehicle Workshops along Kiu Hing Road and NS08 – Storage Area along Lam Hi Road), adverse noise impact is not anticipated due to the large separation distance and shielding from nearby buildings.
- 3.3.6. NS01 – Ma Tin Sewage Pumping Station locates at the northwest of the Site, at around 100 meters away from the Site boundary. No outdoor equipment was identified, and no significant noise was identified from the building façade louver during site inspections. Therefore, no adverse fixed plant noise impacts from Ma Tin Sewage Pumping Station to the noise sensitive uses at the Site is anticipated.
- 3.3.7. NS02 – United Car Trading Platform locates at the west of the Site, at around 60 meters away from the Site boundary. The car trading platform consisted of several stores offering second-hand vehicle buying and selling services. The area was mainly occupied by parked cars and the storage of vehicle maintenance tools during site inspections. Interview was conducted with site staffs during the site inspection on 8 March 2023, there was no night-time operation for the car trading platform. No active vehicle maintenance activities were observed during site inspections. It is considered that no significant fixed plant noise impact from the United Car Trading Platform to the noise sensitive uses at the Site is anticipated. Nevertheless, for assessment purpose, a SWL of 98dB(A) for the vehicle workshop is assumed with reference to the noise measurement finding of similar premises from the Approved EIA 263/2020.
- 3.3.8. NS03 – Fu Shing Motor Service Limited locates at the west of the Site, at around 105 meters away from the Site boundary. Car washing and car waxing services were provided. The working area of the car washing and car waxing services was semi-enclosed, with opening facing away from the Site. Car washing for a short period of time was observed and no outdoor car washing or car waxing services were identified during site inspections. Through an interview with the site staff during the site inspection on 8 March 2023, all services will be closed in the evening (i.e. around 6 pm) so no night-time car washing and car waxing services would be provided. It is considered that fixed plant noise impact from the car washing and car waxing services is not significant to the noise sensitive uses at the Site. Nevertheless, for assessment purpose, a SWL of 98dB(A) for the vehicle workshop is assumed with reference to the noise measurement finding of similar premises from the Approved EIA EIA 263/2020.



- 3.3.9. NS04 – Win Fat Warehouse locates at the west of the Site, at around 145 meters away from the Site boundary. The main purpose of the warehouse was for the construction material storage (i.e. sand). According to the company website¹, Win Fat Warehouse would operate from 7:30 am to 6 pm, from Monday to Saturday. Night-time operation was not anticipated at the warehouse. No active noise emitting activities were observed during site inspections. It is anticipated that no significant fixed plant noise impact is induced from the Win Fat Warehouse to the noise sensitive uses at the Site. Nevertheless, for assessment purpose, a SWL of 99dB(A) for the open storage is assumed with reference to the noise measurement finding of similar premises from the Approved EIA (AEIAR-205/2017).
- 3.3.10. NS05 – 28 Car Wash House locates at the west of the Site, at around 160 meters away from the Site boundary. It provided 24/7 self-service car washing services and there were 8 self-service car washing booths. During site inspection on 7 March 2023, the measured sound pressure level at a distance of approximate 5 meters away from a car washing activity is around 70 dB(A), i.e. SWL level of 92dB(A). Considering a distant separation (i.e. more than 150 meters) between the Site boundary and car washing machine, significant distance attenuation could be applied and noise level at the noise sensitive uses at the Site was significantly reduced. Nevertheless, as a conservative approach, the worst case scenario with all 8 booths in operation are adopted, i.e. a maximum SWL level of 101 dB(A) is assumed for the impact assessment.
- 3.3.11. NS06a and 6b – Open Space at the southwest of the Site locates at around 5 meters away from the Site boundary. The major uses of this open space were for car parking (NS06b) and construction material storage (i.e. metal and others) and equipment storage (NS06a) while part of the site is under construction, night-time operation was not anticipated for the equipment storage. During site inspection, the carpark is mainly for private cars and no light and heavy vehicles were observed, it is a low capacity carpark and no obvious noise where observed. Therefore, a quantitative assessment is not considered to NS06b. In addition, the storage area at NS06a is for general construction material and equipment. For assessment purpose, a SWL of 99dB(A) for the open storage is assumed with reference to the noise measurement finding of similar premises from the Approved EIA (AEIAR-205/2017).
- 3.3.12. In the previous PER, there was an open storage space between La Grove and Park Signature locates at around 10 meters away from the Site boundary (NS07 in previous PER). The area was occupied as a storage of construction materials (i.e. metal) in the PER. However, during the latest site visit, this open storage space is found vacant and no longer serves as open storage purpose. Thus it is no longer considered as a noise source.

Assessment Results

- 3.3.13. The cumulative fixed plant noise levels due to the above sources are predicted for both daytime, evening and night-time scenario. No noise level exceedance found.
- 3.3.14. Fixed noise impact assessment is summarized below in **Table 3-4**. No noise exceedance to the fixed plant noise criteria is envisaged.

¹ Win Fat Warehouse Company Website: <https://www.facebook.com/WINFAT1266/>



Table 3-4 Fixed Plant Noise Assessment Results of the Representative NSRs

| NSR ID | Area Sensitivity Rating | Noise Criteria, dB(A) | Predicted Façade Noise Levels, dB(A) | |
|----------------------------|-------------------------|-----------------------|--------------------------------------|------------|
| | | | Existing Noise Sources | Compliance |
| Day-time/ Evening Scenario | | | | |
| Blk A-011 | C | 70 | 56 | Y |
| Blk A-121 | B | 65 | 55 | Y |
| Blk A-133 | C | 70 | 56 | Y |
| Blk B-042 | B | 65 | 53 | Y |
| Blk B-051 | B | 65 | 53 | Y |
| Night-time Scenario | | | | |
| Blk A-011 | C | 60 | 48 | Y |
| Blk A-121 | B | 55 | 48 | Y |
| Blk A-133 | C | 60 | 49 | Y |
| Blk B-042 | B | 55 | 46 | Y |
| Blk B-051 | B | 55 | 46 | Y |

3.4. Summary

3.4.1. Based on the fixed plant noise impact assessment results, the predicted accumulative noise levels at the representative NSRs will comply with the daytime and evening and night-time noise criteria. As such, adverse fixed plant noise impacts on the proposed development are not anticipated.



4. Air Quality Impacts

4.1. Assessment Criteria

- 4.1.1. This assessment has been prepared based on the criteria and guidelines stated in Chapter 9 of the Hong Kong Planning Standards and Guidelines (HKPSG).
- 4.1.2. The HKPSG recommends a buffer distance on usage of “open space” site for active and passive recreational from roads and industrial areas. Evaluation of potential air quality impacts on the proposed public housing development due to roads and industrial chimney emissions has made reference to the HKPSG guidelines. **Table 4-1** provides the HKPSG recommended buffer distances for recreational uses in open space.
- 4.1.3. This EAS is to assess the environmental nuisances to the development at operation stage (i.e. 15 years after completion) and hence construction phase would not be included in the EAS. In addition, the Government has handed over the formed site to HKHA in November 2022 for the subsequent housing development. There will be no major site formation/excavation works. Nevertheless, HKHA will ensure the contractors to comply with the Air Pollution Control Ordinance and its subsidiary regulations including Air Pollution Control (Construction Dust) Regulation. Furthermore, dust monitoring would be implemented under the construction contracts as a standard practice.

Table 4-1 HKPSG Recommended Buffer Distance for Open Space

| Source | Parameter | Buffer Distance | Permitted Uses |
|-------------------|--|--------------------------------------|--------------------------------------|
| Road and Highways | <i>Type of Road</i> | | |
| | Trunk Road and Primary Distributor | >20m | Active and passive recreation uses |
| | | 3 - 20m | Passive recreational uses |
| | | <3m | Amenity areas |
| | District Distributor | >10m | Active and passive recreational uses |
| | | <10m | Passive recreational uses |
| | Local Distributor | >5m | Active and passive recreational uses |
| <5m | | Passive recreational uses | |
| Under Flyovers | | Passive recreational uses | |
| Industrial Areas | <i>Difference in Height between Industrial Chimney Exit and the Site</i> | | |
| | <20m | >200m | Active and passive recreational uses |
| | | 5 - 200m | Passive recreational uses |
| | 20 - 30m (*) | >100m | Active and passive recreational uses |
| | | 5 - 100m | Passive recreational uses |
| | 30m - 40m | >50m | Active and passive recreational uses |
| | | 5 - 50m | Passive recreational uses |
| >40m | >10m | Active and passive recreational uses | |



4.2. Industrial Emission

- 4.2.1. The study area included all areas within 500m from the sites of the proposed development. Initial desktop study was first conducted to review the nature of all buildings within the study area based on latest street maps and statutory plans. Followed by the desktop review, chimneys within study area were then identified by site visit in October 2023, with focus on the industrial buildings identified from the desktop study.
- 4.2.2. The review summarised that there are no active industrial emissions within 500m from the Subject Site. There is a sewage pumping station, Ma Tin Sewage Pumping Station within the air quality study area, potential odour nuisance is also assessed in **Section 4.4**.

4.3. Vehicular Emissions

Open Roads in Close Vicinity

- 4.3.1. Roads located around the proposed development is Shap Pat Heung Road and Park Signature Access Road.
- 4.3.2. Shap Pat Heung Road is a Local Distributor (LD) as confirmed by the Transport Department (TD), **TD confirmation is provided in Appendix 4-1**. The section of Shap Pat Heung Road near the Site is an at-grade road. Horizontal distance measured from the road kerb to the nearest Site Boundary is about 4 meters. **Figure 4-1** illustrates the 5m buffer zone from the kerbside of the Shap Pat Heung Road with reference to the recommended buffer distance requirements for roads as listed in **Table 4-1**. No air sensitive uses of the Proposed Development, including openable windows, fresh air intake of mechanical ventilation and recreational uses in the open area, would be located within the buffer zone. Thus, no adverse vehicular emission impact from Shap Pat Heung Road to the Site would be anticipated.
- 4.3.3. The surrounding land uses are mainly residential development, village houses, schools and open areas. Nearby godowns, workshops and carparks are located about 80 metres to the west of the proposed development boundary in relatively open areas such that ample open space is available for ventilation to avoid the accumulation of aerial emissions. Potential odour or air nuisances arising from these uses is not anticipated and no odour impact/nuisance was found along the site boundary of the proposed development during the recent 25 October 2023 site survey.
- 4.3.4. Park Signature Access Road is used for the exit of Park Signature, serving as a residential vehicular access with low traffic volume. For good air quality planning, 5m buffer distance shall be provided from the road kerb of the Park Signature Access Road. **Figure 4-1** illustrates the 5m buffer zone from the kerbside of the Park Signature Access Road. No air sensitive uses of the Proposed Development, including openable windows, fresh air intake of mechanical ventilation and recreational uses in the open area, would be located within the buffer zone. Thus, no adverse vehicular emission impact from **Park Signature Access Road** to the Site would be anticipated.



4.3.5. There will be carparks in the Site and the proposed carparks should be designed in accordance with the ProPECC PN2/96 Control of Air Pollution in Car Parks in order to ensure the exhaust air discharged to the atmosphere from the carparks would not cause adverse air quality impact to neighbouring air sensitive uses. The exhaust outlets (if any) of the carparks should be located away from any nearby ASRs. Therefore, no adverse air quality impact arising from the proposed carpark on the nearby ASRs is anticipated during the operational phase of the Development.

4.3.6. The setback distance of the nearest air sensitive uses at the proposed development from the kerb of the nearby roads are summarised in **Table 4-2** below. No planned Air Sensitive Uses with openable windows and fresh air intake as well as active and passive recreational uses would be located within the recommended buffer zone. Adverse emissions impacts are not expected.

Table 4-2 Separation Distances between Nearest Roads and Nearest Air Sensitive Uses of the Public Housing Blocks

| Road | Road Type | Recommended Buffer Distance for Active and Passive Recreation Uses | Comply (Y/N) |
|---------------------|------------------------|--|--------------|
| Shap Pat Heung Road | Local Distributor (LD) | >5m | Y |

4.3.7. Therefore, adverse vehicular emission due to open roads in close vicinity is not envisaged.

4.4. Odour Impact Assessment

4.4.1. One potential odour source within 200m of the site boundary is the existing Ma Tin Sewage Pumping Station (SPS), which is located around 100 meters away. **With reference to the Final Preliminary Environmental Review Report (approved PER report) conducted by CEDD under Agreement No. CE46/2020 (CE), this study has conducted further site surveys in March 2022 and Oct 2023 to identify any odour impact from the Ma Tin SPS on the surrounding area. No odour was perceived and no odour generating activity was observed during the odour patrol around the boundary of Ma Tin SPS. The sewage pumping station is fully enclosed during operation, whilst it is also equipped with adequate deodorisation facilities.** As advised by DSD, the design sewerage capacity of this SPS is 7,344m³/d and typical H₂S removal efficiency of activated carbon DOU is over 99.5%. DSD and EPD also advised that no previous odour complaints were received against the Ma Tin SPS during the past five years (2019 to 2023). **The correspondence with DSD and EPD can be found in Appendix 4-2.** Therefore adverse odour nuisance arisen from the sewage pumping stations would not be anticipated.



5. Overall Conclusion

5.1. Noise

- 5.1.1. The road traffic noise compliance rate for the base-case scenario of the proposed domestic development at Shap Pat Heung Road is 93%. With incorporation of acoustic window and fixed glazing with maintenance window on the public housing blocks as mitigation measures, 100% compliance rate for the proposed development is achieved.
- 5.1.2. For proposed non-domestic development at Shap Pat Heung Road is 44%. With incorporation of horizontal panel on the proposed welfare facilities in 3/F as mitigation measures, 100% compliance rate for the proposed welfare provision facilities in 3/F is achieved. And for the welfare facilities in 2/F, it is suggested that not to provide openable windows towards the busy road sections, i.e. Shap Pat Heung Road.
- 5.1.3. Based on the review of fixed plant noise sources in the vicinity, adverse fixed plant noise impacts on the proposed development are not anticipated.

5.2. Air Quality

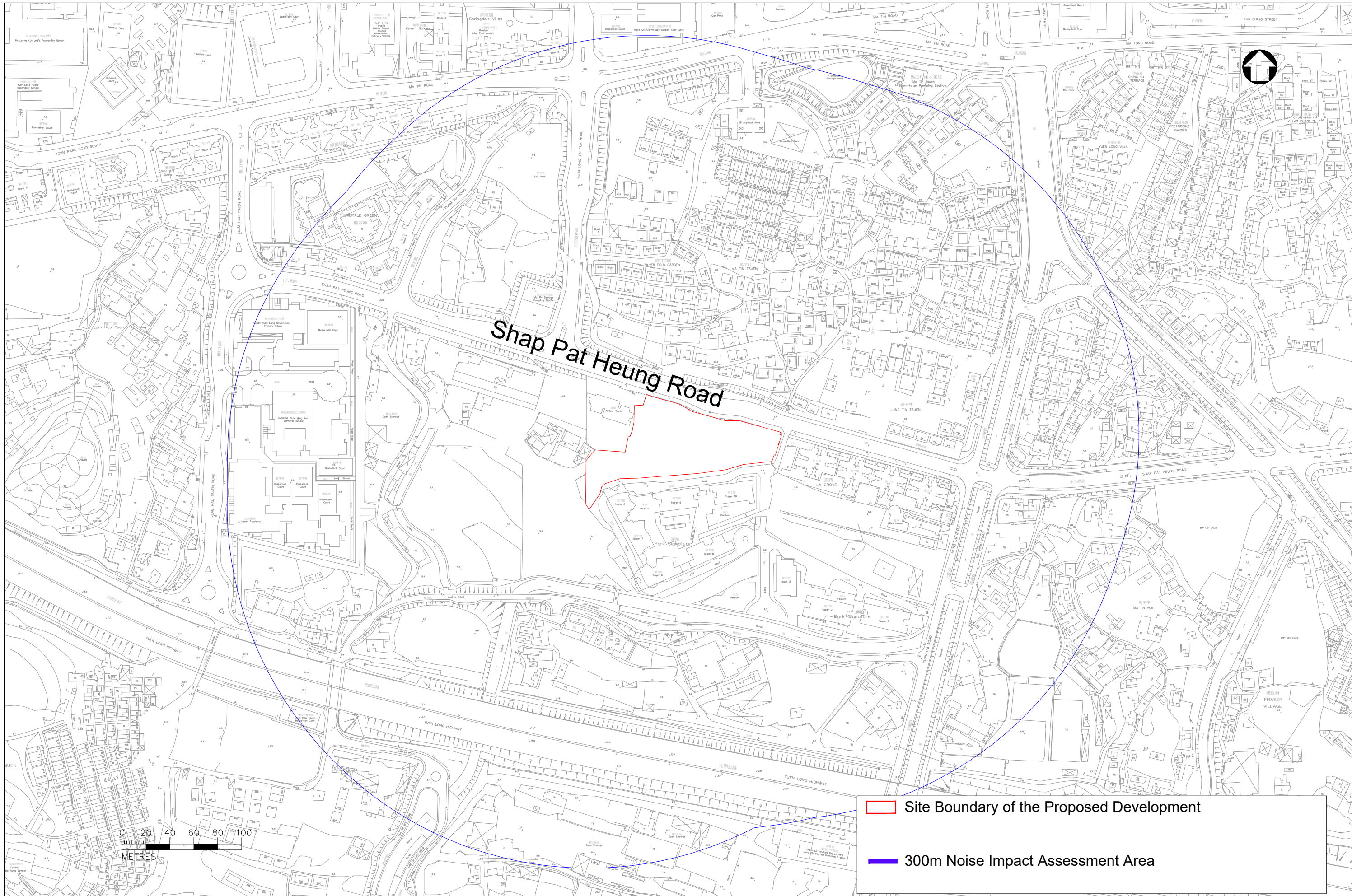
- 5.2.1. Potential air quality impact due to vehicular emissions and chimney emissions have been reviewed. No adverse air quality impacts due to vehicular emissions and chimney emissions are anticipated as the recommended buffer distances stipulated in the HKPSG can be met for the proposed development.
- 5.2.2. A site survey was also conducted in October 2023 for Ma Tin Sewage Pumping Station, which is 100m from the site boundary and fully enclose. No odour was perceived and no odour generating activity was observed during the patrol. No adverse odour nuisance to the Site is anticipated.


5.3. Next Stage


- 5.3.1. The EAS concluded that with common mitigation measures, the proposed housing development will have no insurmountable environmental impact. HD will continue to carry out the EAS under the existing mechanism between HD and EPD in the detailed design stage to address the potential environmental impacts with suitable mitigation measures and obtain agreement with EPD.

Figures

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 Site Boundary of the Proposed Development

 300m Noise Impact Assessment Area



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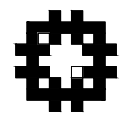
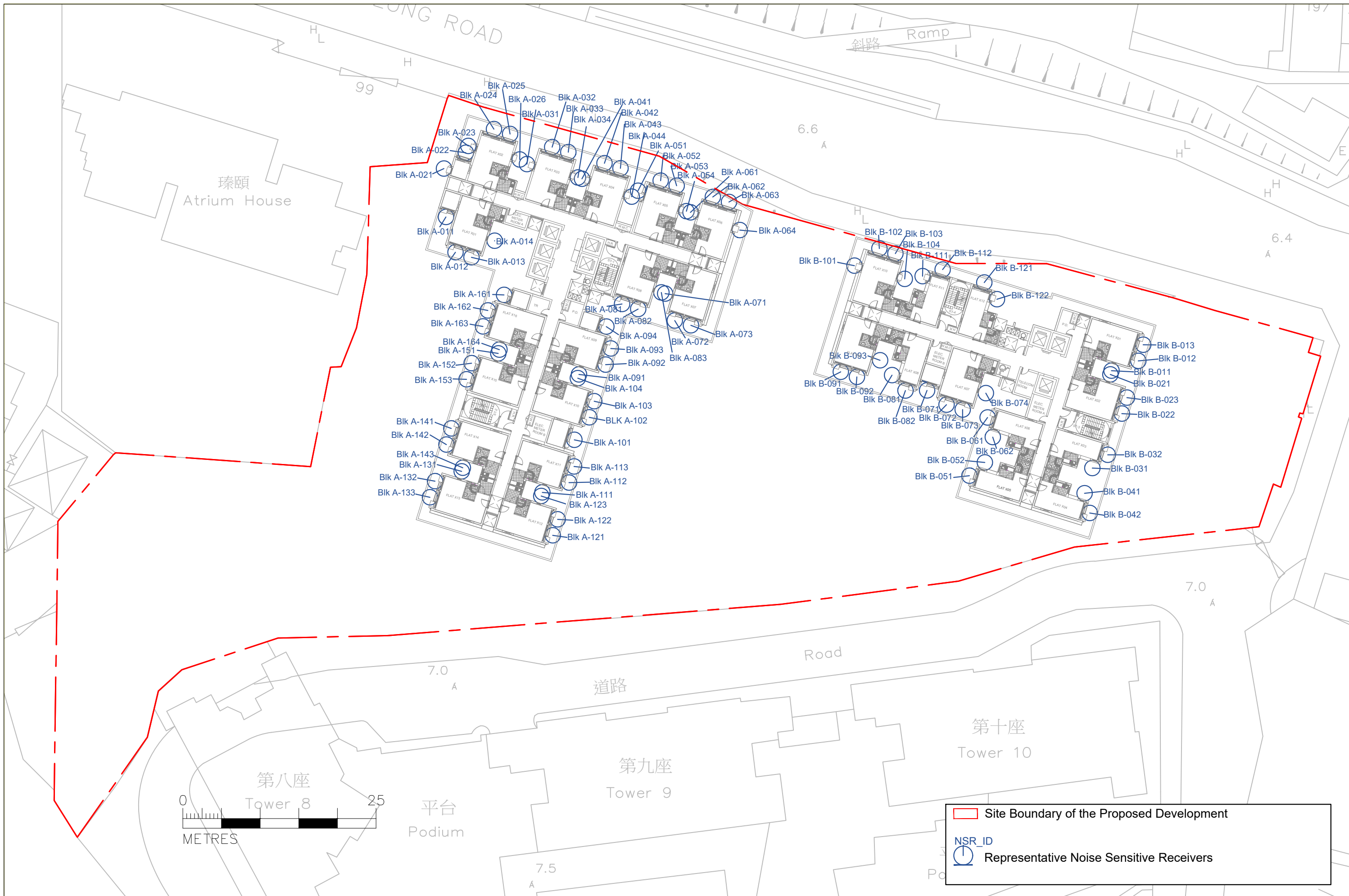


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Proposed Public Housing Development at Shap Pat Heung Road Environmental Assessment Study

| | |
|--------------------------------------|------------|
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| Scale at A3 | Date |
| As Shown | Jul 2023 |
| Figure No. | Figure 1-1 |

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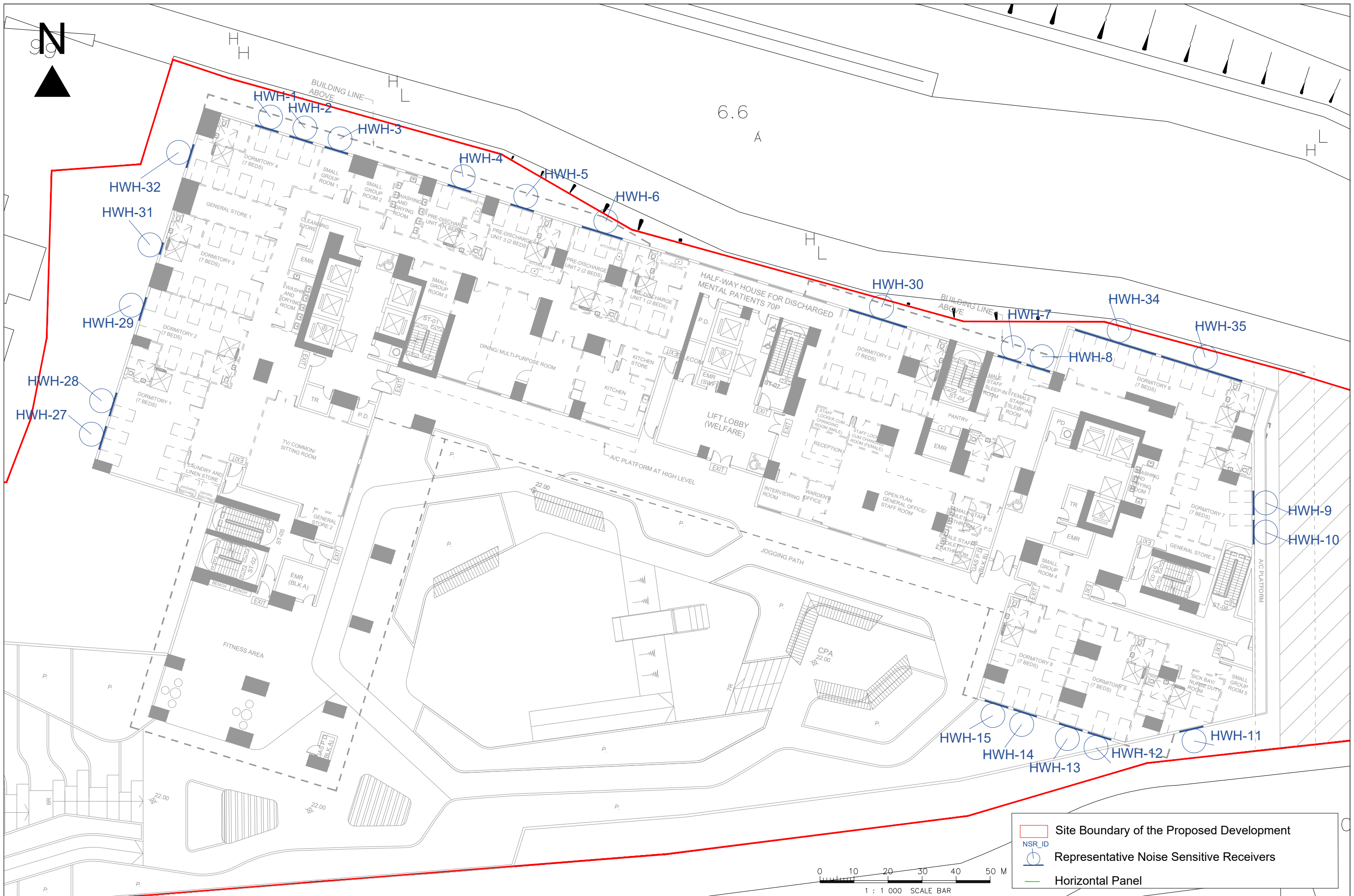
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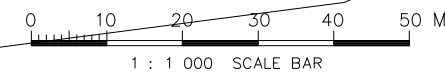
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| | | |
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| Title Location Plan of Representative Noise Sensitive Receiver at Domestic Floor | | |
| Scale at A3 As shown | Date Jul 2023 | Figure No. Figure 2-1 |



— Site Boundary of the Proposed Development
○ NSR_ID Representative Noise Sensitive Receivers
— Horizontal Panel



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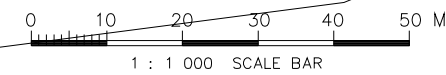
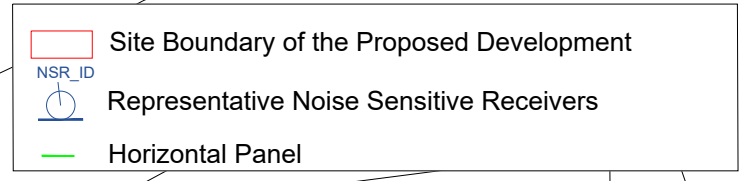
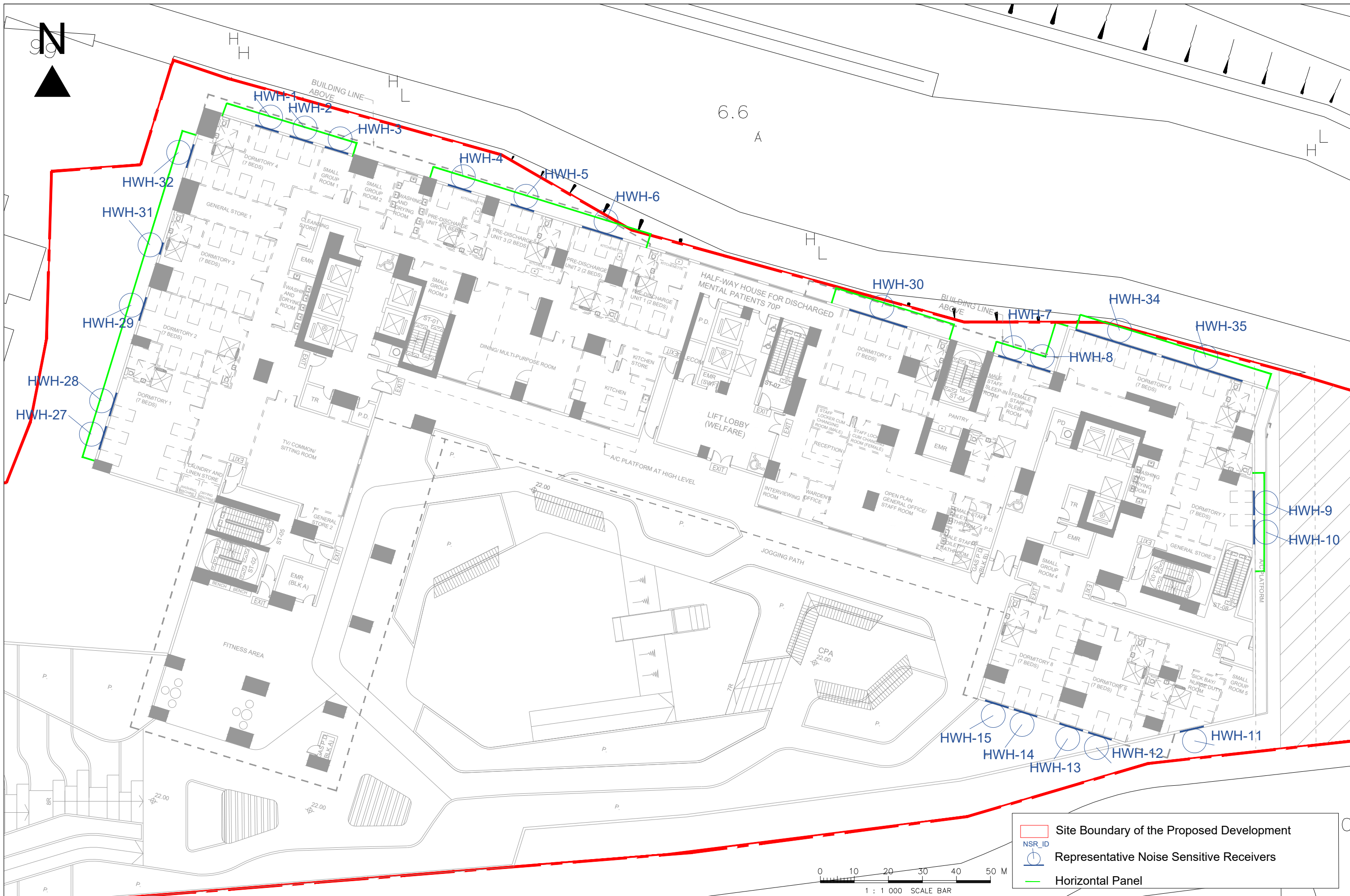


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Title
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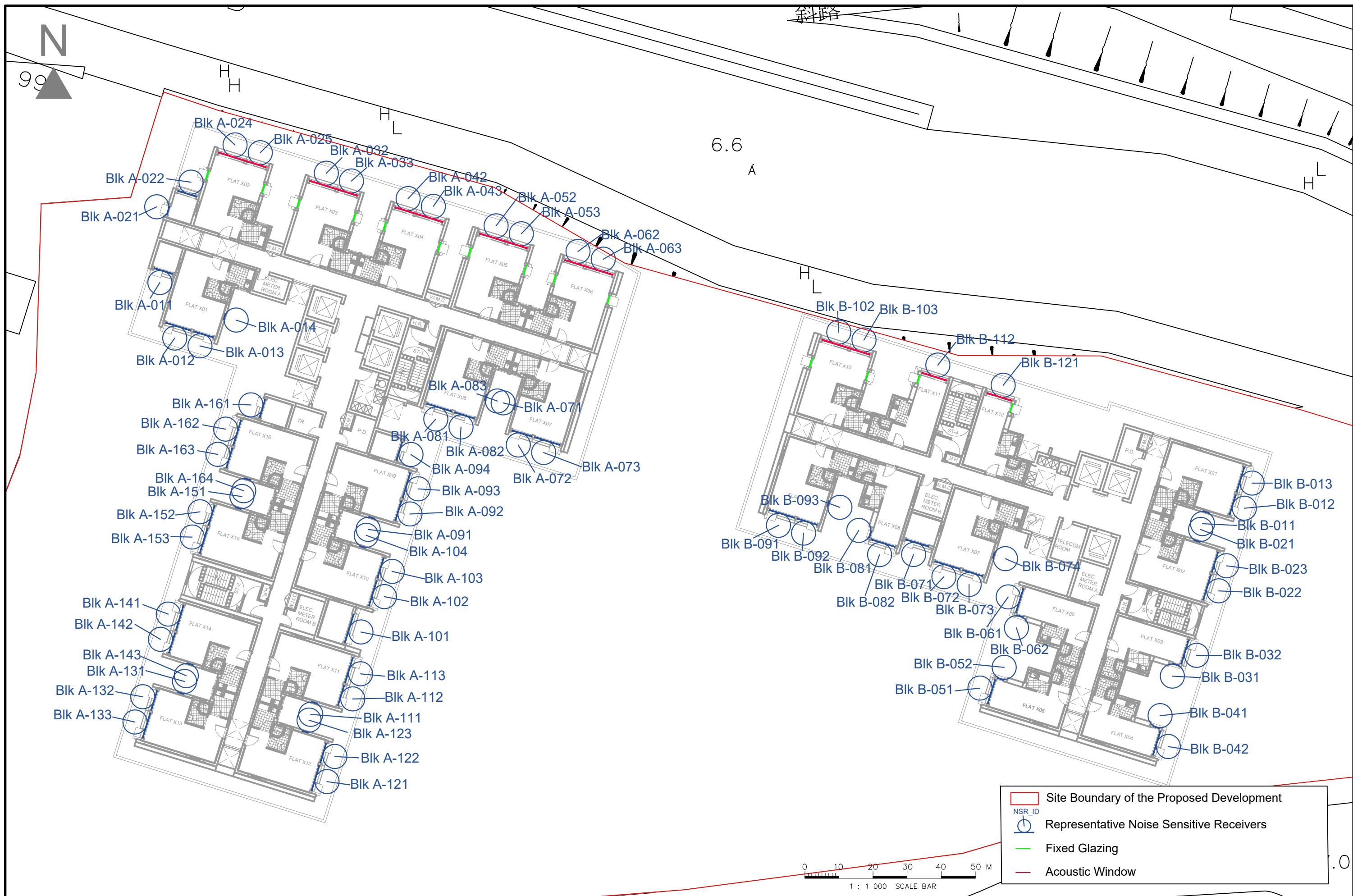
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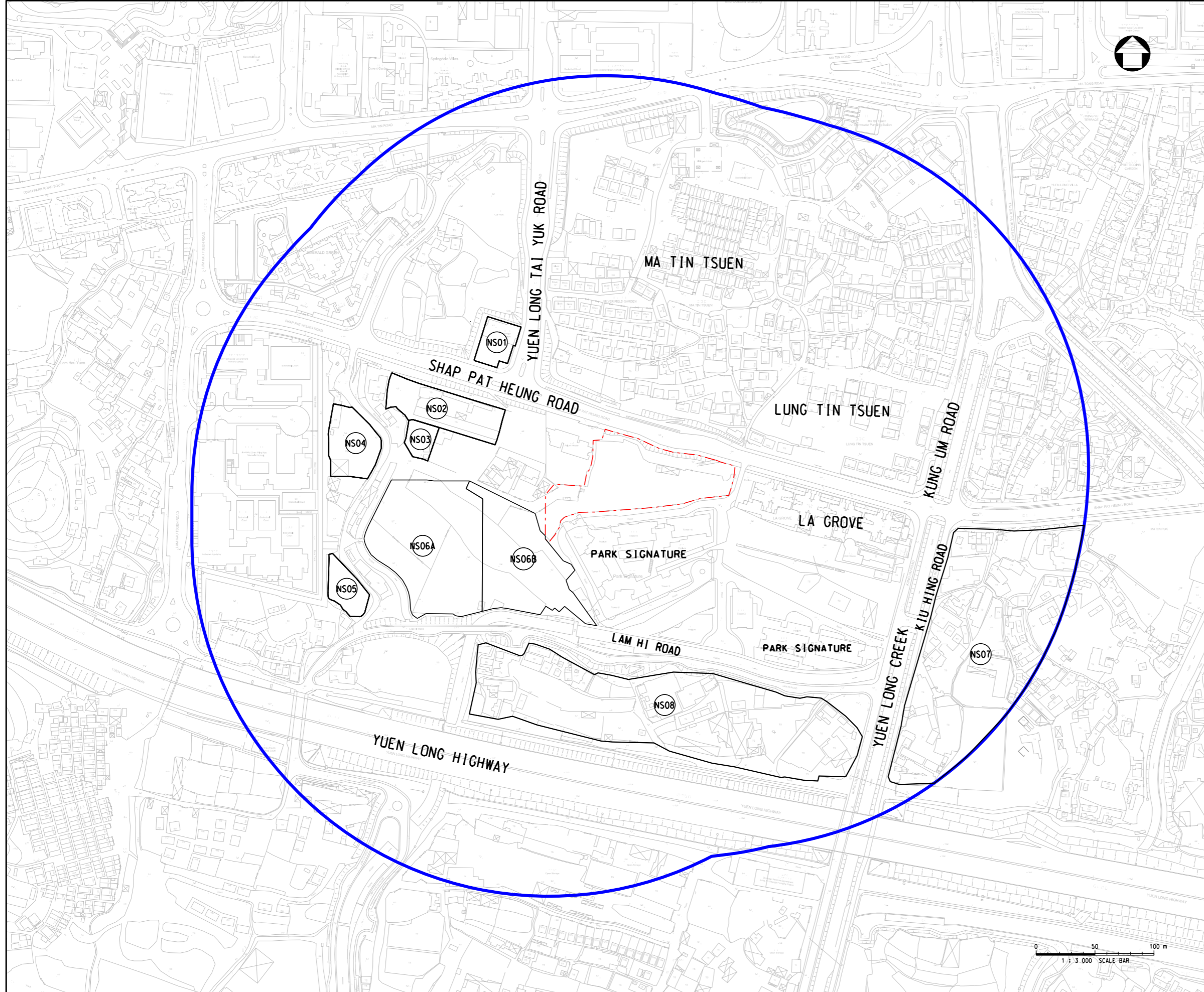
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Proposed Public Housing Development at Shap Pat Heung Road Environmental Assessment Study

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LEGEND:

- SITE BOUNDARY
- 300M NOISE STUDY AREA

POTENTIAL NOISE SOURCES:

- NS01 MA TIN SEWAGE PUMPING STATION
- NS02 UNITED CAR TRADING PLATFORM
- NS03 FU SHING MOTOR SERVICE LIMITED
- NS04 WIN FAT WAREHOUSE
- NS05 28 CAR WASH HOUSE
- NS06A OPEN SPACE AT SOUTHWEST OF THE SITE (STORAGE OF CONSTRUCTION MATERIAL)
- NS06B OPEN SPACE AT SOUTHWEST OF THE SITE (Vehicle Parking)
- NS07 VEHICLE WORKSHOPS ALONG KIU HING ROAD
- NS08 STORAGE AREA ALONG LAM HI ROAD



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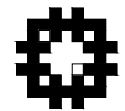
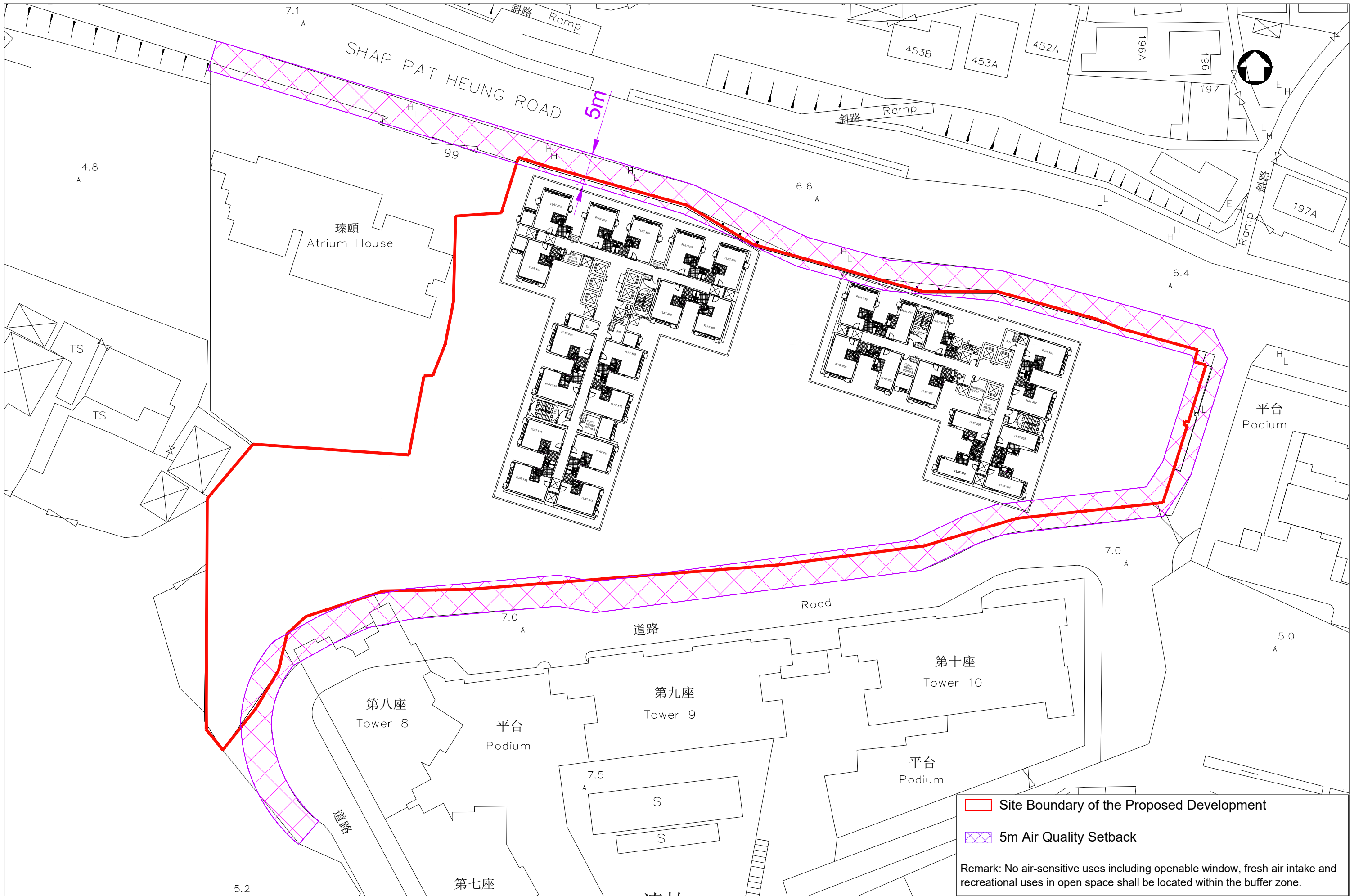


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 PROPOSED PUBLIC HOUSING DEVELOPMENT AT SHAP PAT HEUNG ROAD ENVIRONMENTAL ASSESSMENT STUDY

| | | | |
|-------------|--------|--|------------|
| Title | | LOCATIONS OF POTENTIAL FIXED PLANT NOISE SOURCES | |
| Scale at A3 | 1:3000 | Date | MAR 2023 |
| | | Figure No. | Figure 3-1 |

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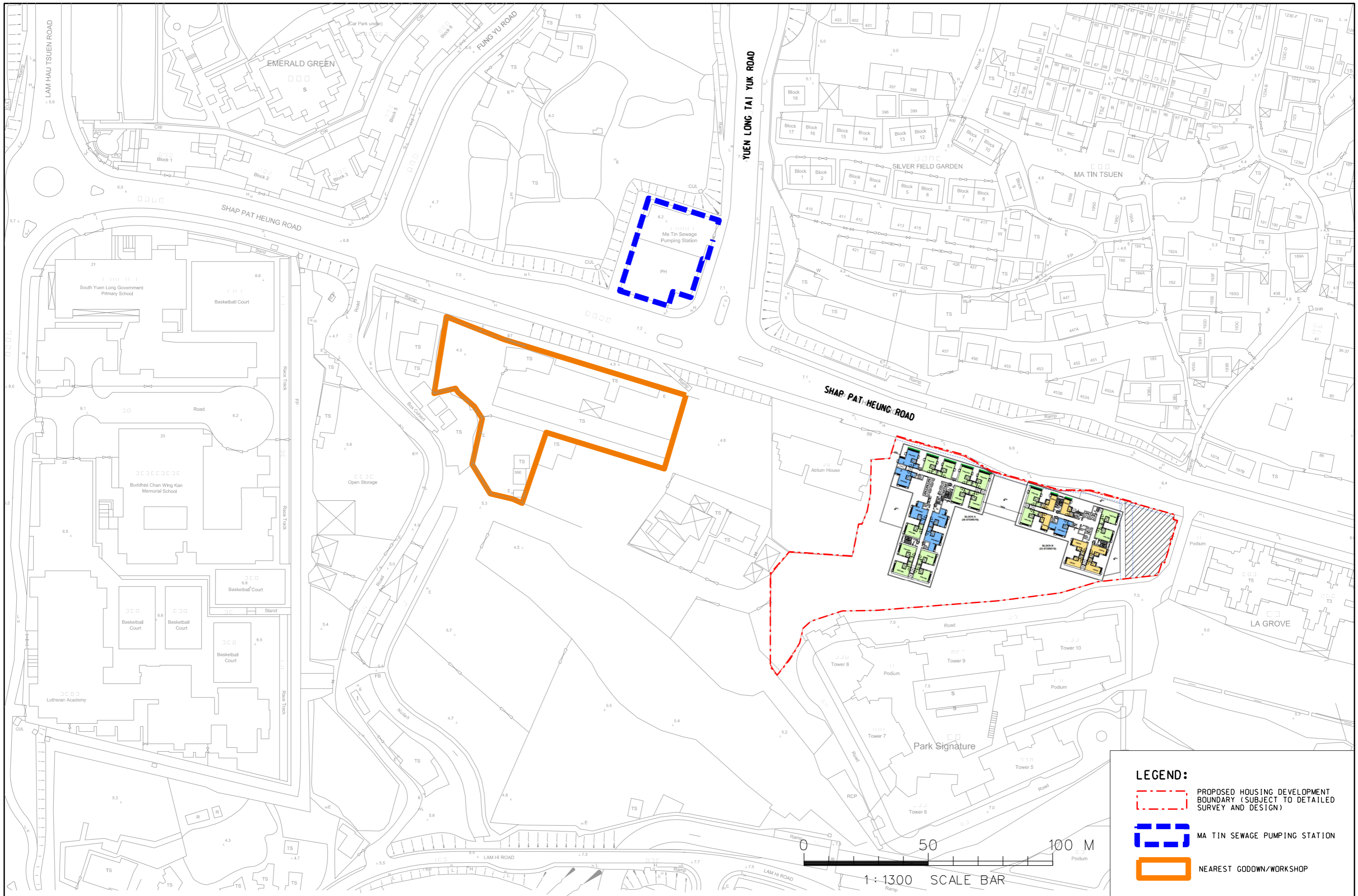
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Proposed Public Housing Development at Shap Pat Heung Road Environmental Assessment Study

| | | | |
|---|------------|------|----------|
| Title Buffer for Air Quality Setback for the Development | | | |
| Scale at A3 | As Shown | Date | Mar 2023 |
| Figure No. | Figure 4-1 | | |



LEGEND:

- PROPOSED HOUSING DEVELOPMENT BOUNDARY (SUBJECT TO DETAILED SURVEY AND DESIGN)
- MA TIN SEWAGE PUMPING STATION
- NEAREST GODDOWN/WORKSHOP



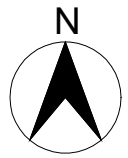
AGREEMENT NO. : CB 20210426 - TERM TRAFFIC AND ENVIRONMENTAL CONSULTANCY SERVICES 2021-2024 FOR NEW TERRITORIES WEST REGION
 INSTRUCTION NO.K02: PROPOSED PUBLIC HOUSING DEVELOPMENT AT SHAP PAT HEUNG ROAD ENVIRONMENTAL ASSESSMENT STUDY (EAS)

| | | |
|---|------------------|--------------------------|
| Title LOCATION OF SEWAGE PUMPING STATION, GODOWN AND WORKSHOP | | |
| Scale at A3 AS SHOWN | Date NOV 2023 | Figure No. FIGURE 4.2 |

Appendices

Appendix 1-1

Development Layout Plan



臻頤
ATRIUM HOUSE

SHAP PAT HEUNG ROAD

原築
LA GROVE

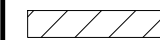






溱柏
PARK
SIGNATURE

ACCESS ROAD TO PARK SIGNATURE

NO. OF LIGHT GOODS
VEHICLE
(3.5m x 6.0m x 3.6m H.)
PARKING SPACE: 5

NO. OF LOADING/
UNLOADING SPACE
(3.5m x 12.0m x 4.7m H.)
PARKING SPACE: 5

LEGEND:

-  NON-BUILDING AREA
-  SITE BOUNDARY
-  5M SET BACK FROM CURB TO MEET AIR QUALITY STANDARD
-  FENCE WALL
-  DOMESTIC
-  NON-DOMESTIC
-  PARKING SPACE (SWD)

**PUBLIC HOUSING DEVELOPMENT AT
SHAP PAT HEUNG ROAD, YUEN LONG**

DRAWING TITLE

G/F LAYOUT PLAN

SCALE 1:250 (A1) 1:500 (A3)

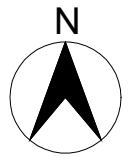


房屋署
HOUSING DEPARTMENT

DRAWING NO.
YL56/-/BC/BLK/A/LO-01

日期 DATE:
SEPTEMBER 2023

04



臻頤
ATRIUM HOUSE

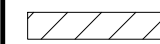




SHAP PAT HEUNG ROAD

ACCESS ROAD TO PARK SIGNATURE

原築
LA GROVE

溱柏
PARK
SIGNATURE

LEGEND:

-  NON-BUILDING AREA
-  SITE BOUNDARY
-  5M SET BACK FROM CURB TO MEET AIR QUALITY STANDARD
-  DOMESTIC
-  NON-DOMESTIC

**PUBLIC HOUSING DEVELOPMENT AT
SHAP PAT HEUNG ROAD, YUEN LONG**

DRAWING TITLE

1/F LAYOUT PLAN

SCALE 1:250 (A1) 1:500 (A3)

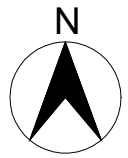


房屋署
HOUSING DEPARTMENT

DRAWING NO.
YL56/-/BC/BLK/A/LO-02

日期 DATE:
SEPTEMBER 2023

05



臻頤
ATRIUM HOUSE

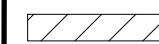






SHAP PAT HEUNG ROAD

ACCESS ROAD TO PARK SIGNATURE

原築
LA GROVE

溱柏
PARK
SIGNATURE

LEGEND:

-  NON-BUILDING AREA
-  SITE BOUNDARY
-  5M SET BACK FROM CURB TO MEET AIR QUALITY STANDARD
-  DOMESTIC
-  NON-DOMESTIC
-  MANAGEMENT OFFICES (MOs)
-  HOME CARE SERVICES FOR FRAIL ELDERLY PERSONS (HCS)

**PUBLIC HOUSING DEVELOPMENT AT
SHAP PAT HEUNG ROAD, YUEN LONG**

DRAWING TITLE

2/F LAYOUT PLAN

SCALE 1:250 (A1) 1:500 (A3)

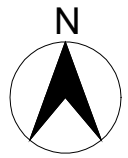


房屋署
HOUSING DEPARTMENT

DRAWING NO.
YL56/-/BC/BLK/A/LO-03

日期 DATE:
SEPTEMBER 2023

06



臻頤
ATRIUM HOUSE







SHAP PAT HEUNG ROAD

ACCESS ROAD TO PARK SIGNATURE

原築
LA GROVE

溱柏
PARK
SIGNATURE

LEGEND:

-  NON-BUILDING AREA
-  SITE BOUNDARY
-  5M SET BACK FROM CURB TO MEET AIR QUALITY STANDARD
-  DOMESTIC
-  NON-DOMESTIC
-  HALF-WAY HOUSE FOR DISCHARGED MENTAL PATIENTS 70P (HWH)

PUBLIC HOUSING DEVELOPMENT AT SHAP PAT HEUNG ROAD, YUEN LONG

DRAWING TITLE

3/F LAYOUT PLAN

SCALE 1:250 (A1) 1:500 (A3)

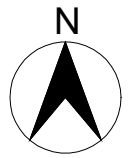


房屋署
HOUSING DEPARTMENT

DRAWING NO.
YL56/-/BC/BLK/A/LO-04

日期 DATE:
SEPTEMBER 2023

07



臻頤
ATRIUM HOUSE

SHAP PAT HEUNG ROAD

ACCESS ROAD TO PARK SIGNATURE

原築
LA GROVE

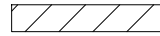



BLOCK A
(35 STOREYS)

BLOCK B
(32 STOREYS)

溱柏
PARK
SIGNATURE

| FLAT MIX | | | | |
|----------------------|-----------------|------------------|-----------------|---------------|
| | B | C | D | TOTAL |
| BLK A (35 STOREY) | - | 385 (11 x 35) | 175 (5 x 35) | 560 |
| BLK B (32 STOREY) | 224 (7 x 32) | 128 (4 x 32) | 32 (1 x 32) | 384 |
| TOTAL | 224 (23.7%) | 513 (54.3%) | 207 (22.0%) | 944 (100%) |

LEGEND:

| | |
|---|--|
|  | NON-BUILDING AREA |
|  | SITE BOUNDARY |
|  | 5M SET BACK FROM CURB TO MEET AIR QUALITY STANDARD |
|  | ACOUSTIC WINDOW |

**PUBLIC HOUSING DEVELOPMENT AT
SHAP PAT HEUNG ROAD, YUEN LONG**

DRAWING TITLE

TYPICAL FLOOR PLAN

SCALE 1:250 (A1) 1:500 (A3)



房屋署
HOUSING DEPARTMENT

DRAWING NO.

YL56/-/BC/BLK/A/LO-05

日期 DATE:

SEPTEMBER 2023

08

Appendix 2-1

Traffic Forecast Data (Year 2044)

Year 2044 Traffic Data - Design

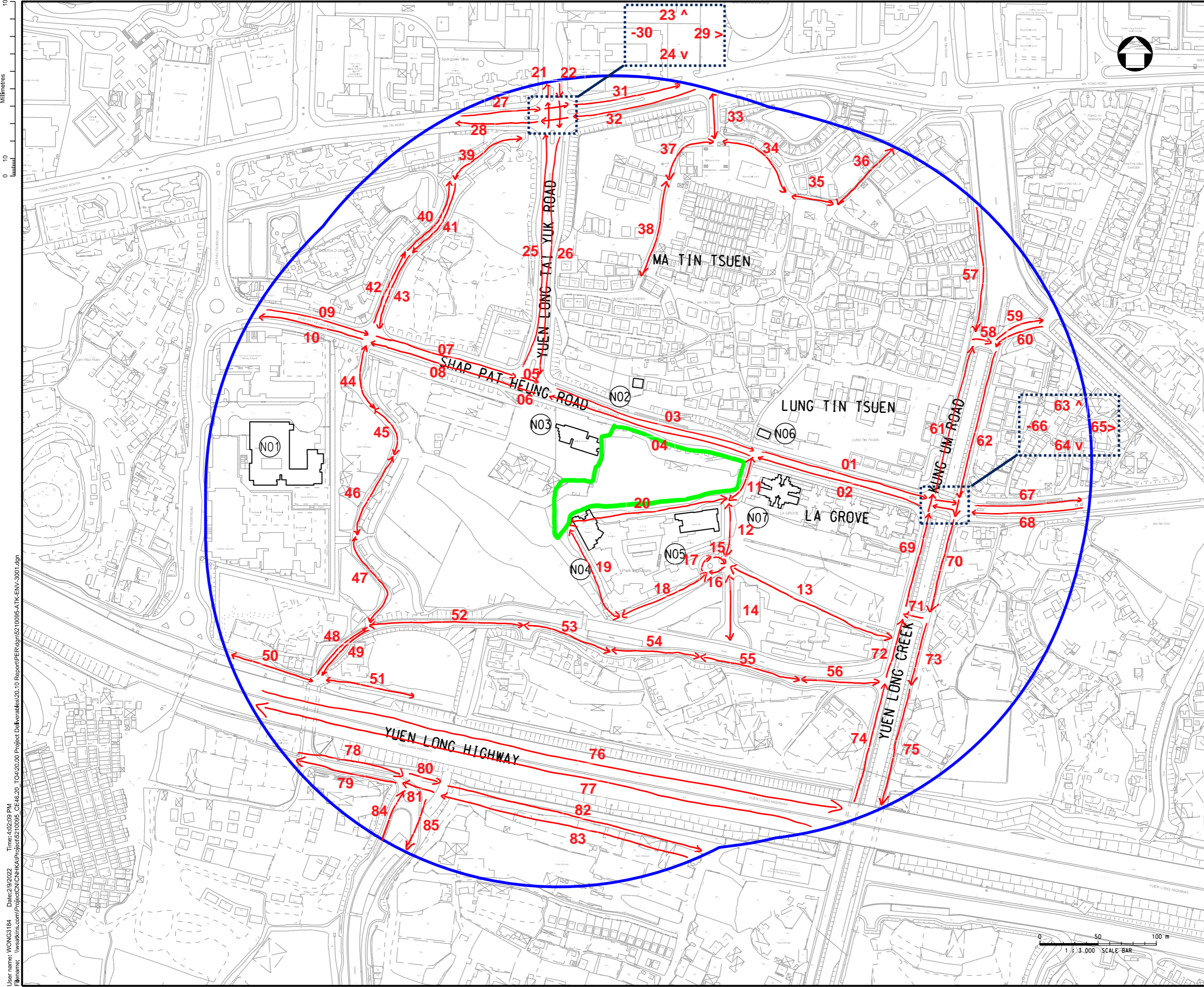
| Index * | Road | Direction | One way / Two ways | Speed Limit (km/h) | Design Traffic Flows | | | | | |
|---------|----------------------------|-----------|--------------------|--------------------|--------------------------|---------------------|-----|--------------------------|---------------------|-----|
| | | | | | AM | | | PM | | |
| | | | | | Total Demand (veh/hr) ** | Vehicle Breakdown # | | Total Demand (veh/hr) ** | Vehicle Breakdown # | |
| | LV | HV | | LV | HV | | | | | |
| 1 | Shap Pat Heung Road | E | 1 | 50 | 390 | 90% | 10% | 240 | 80% | 20% |
| 2 | Shap Pat Heung Road | W | 1 | 50 | 390 | 85% | 15% | 440 | 80% | 20% |
| 3 | Shap Pat Heung Road | E | 1 | 50 | 390 | 90% | 10% | 230 | 80% | 20% |
| 4 | Shap Pat Heung Road | W | 1 | 50 | 430 | 90% | 10% | 510 | 80% | 20% |
| 5 | Shap Pat Heung Road | E | 1 | 50 | 210 | 90% | 10% | 120 | 85% | 15% |
| 6 | Shap Pat Heung Road | W | 1 | 50 | 590 | 90% | 10% | 600 | 80% | 20% |
| 7 | Shap Pat Heung Road | E | 1 | 50 | 550 | 90% | 10% | 350 | 85% | 15% |
| 8 | Shap Pat Heung Road | W | 1 | 50 | 340 | 95% | 5% | 280 | 90% | 10% |
| 9 | Shap Pat Heung Road | E | 1 | 50 | 490 | 90% | 10% | 300 | 85% | 15% |
| 10 | Shap Pat Heung Road | W | 1 | 50 | 330 | 95% | 5% | 200 | 95% | 5% |
| 11 | Park Signature Access Road | NS | 2 | 50 | 10 | 100% | 0% | 10 | 100% | 0% |
| 12 | Park Signature Access Road | NS | 2 | 50 | 10 | 100% | 0% | 10 | 100% | 0% |
| 13 | Park Signature Access Road | EW | 2 | 50 | 30 | 95% | 5% | 30 | 95% | 5% |
| 14 | Park Signature Access Road | NS | 2 | 50 | 10 | 100% | 0% | 10 | 100% | 0% |
| 15 | Park Signature Access Road | E | 1 | 50 | 30 | 95% | 5% | 30 | 95% | 5% |
| 16 | Park Signature Access Road | S | 1 | 50 | 30 | 95% | 5% | 30 | 95% | 5% |
| 17 | Park Signature Access Road | N | 1 | 50 | 30 | 95% | 5% | 30 | 95% | 5% |
| 18 | Park Signature Access Road | EW | 2 | 50 | 10 | 100% | 0% | 10 | 100% | 0% |
| 19 | Park Signature Access Road | NS | 2 | 50 | 10 | 100% | 0% | 10 | 100% | 0% |
| 20 | Park Signature Access Road | EW | 2 | 50 | 10 | 100% | 0% | 10 | 100% | 0% |
| 21 | Yuen Long Tai Tuk Road | N | 1 | 50 | 720 | 85% | 15% | 610 | 80% | 20% |
| 22 | Yuen Long Tai Tuk Road | S | 1 | 50 | 450 | 85% | 15% | 420 | 85% | 15% |
| 23 | Yuen Long Tai Tuk Road | N | 1 | 50 | 720 | 85% | 15% | 610 | 80% | 20% |
| 24 | Yuen Long Tai Tuk Road | S | 1 | 50 | 360 | 95% | 5% | 210 | 85% | 15% |
| 25 | Yuen Long Tai Tuk Road | N | 1 | 50 | 620 | 90% | 10% | 550 | 80% | 20% |
| 26 | Yuen Long Tai Tuk Road | S | 1 | 50 | 360 | 95% | 5% | 210 | 85% | 15% |
| 27 | Ma Tin Road | E | 1 | 50 | 540 | 80% | 20% | 440 | 80% | 20% |
| 28 | Ma Tin Road | W | 1 | 50 | 270 | 80% | 20% | 240 | 80% | 20% |
| 29 | Ma Tin Road | E | 1 | 50 | 560 | 80% | 20% | 600 | 80% | 20% |
| 30 | Ma Tin Road | W | 1 | 50 | 270 | 80% | 20% | 230 | 75% | 25% |
| 31 | Ma Tin Road | E | 1 | 50 | 560 | 80% | 20% | 600 | 80% | 20% |
| 32 | Ma Tin Road | W | 1 | 50 | 250 | 80% | 20% | 300 | 75% | 25% |
| 33 | Ma Tin Tsuen Access Road | NS | 2 | 50 | 60 | 100% | 0% | 50 | 100% | 0% |
| 34 | Ma Tin Tsuen Access Road | EW | 2 | 50 | 20 | 100% | 0% | 20 | 100% | 0% |
| 35 | Ma Tin Tsuen Access Road | EW | 2 | 50 | 20 | 100% | 0% | 20 | 100% | 0% |
| 36 | Ma Tin Tsuen Access Road | EW | 2 | 50 | 10 | 100% | 0% | 10 | 100% | 0% |
| 37 | Ma Tin Tsuen Access Road | NS | 2 | 50 | 30 | 100% | 0% | 30 | 100% | 0% |
| 38 | Ma Tin Tsuen Access Road | NS | 2 | 50 | 30 | 100% | 0% | 30 | 100% | 0% |
| 39 | Fung Yu Road | NS | 2 | 50 | 40 | 100% | 0% | 30 | 100% | 0% |
| 40 | Fung Yu Road | N | 1 | 50 | 10 | 100% | 0% | 20 | 100% | 0% |
| 41 | Fung Yu Road | S | 1 | 50 | 30 | 100% | 0% | 10 | 100% | 0% |
| 42 | Fung Yu Road | N | 1 | 50 | 10 | 100% | 0% | 20 | 100% | 0% |
| 43 | Fung Yu Road | S | 1 | 50 | 30 | 100% | 0% | 10 | 100% | 0% |
| 44 | Access Road | NS | 2 | 50 | 20 | 80% | 20% | 20 | 80% | 20% |
| 45 | Access Road | NS | 2 | 50 | 20 | 80% | 20% | 20 | 80% | 20% |
| 46 | Access Road | NS | 2 | 50 | 10 | 100% | 0% | 10 | 100% | 0% |
| 47 | Access Road | NS | 2 | 50 | 10 | 100% | 0% | 10 | 100% | 0% |
| 48 | Lam Hi Road | E | 1 | 50 | 30 | 95% | 5% | 20 | 95% | 5% |
| 49 | Lam Hi Road | W | 1 | 50 | 20 | 95% | 5% | 20 | 95% | 5% |
| 50 | Lam Yu Road | EW | 2 | 50 | 50 | 95% | 5% | 40 | 95% | 5% |
| 51 | Access Road | EW | 2 | 50 | 10 | 100% | 0% | 10 | 100% | 0% |
| 52 | Lam Hi Road | EW | 2 | 50 | 50 | 95% | 5% | 40 | 95% | 5% |
| 53 | Lam Hi Road | EW | 2 | 50 | 50 | 95% | 5% | 40 | 95% | 5% |
| 54 | Lam Hi Road | EW | 2 | 50 | 50 | 95% | 5% | 40 | 95% | 5% |
| 55 | Lam Hi Road | EW | 2 | 50 | 50 | 95% | 5% | 40 | 95% | 5% |
| 56 | Lam Hi Road | EW | 2 | 50 | 50 | 95% | 5% | 40 | 95% | 5% |
| 57 | Kung Um Road | NS | 2 | 50 | 20 | 95% | 5% | 20 | 90% | 10% |
| 58 | Kung Um Road | EW | 2 | 50 | 40 | 90% | 10% | 50 | 90% | 10% |
| 59 | Kiu Hung Road | E | 1 | 50 | 30 | 90% | 10% | 30 | 90% | 10% |
| 60 | Kiu Hung Road | W | 1 | 50 | 130 | 90% | 10% | 160 | 85% | 15% |
| 61 | Kung Um Road | N | 1 | 50 | 30 | 95% | 5% | 30 | 95% | 5% |
| 62 | Kiu Hung Road | S | 1 | 50 | 130 | 80% | 20% | 180 | 85% | 15% |
| 63 | Kung Um Road | N | 1 | 50 | 30 | 95% | 5% | 30 | 95% | 5% |
| 64 | Kiu Hung Road | S | 1 | 50 | 480 | 80% | 20% | 560 | 80% | 20% |
| 65 | Shap Pat Heung Road | E | 1 | 50 | 570 | 85% | 15% | 460 | 80% | 20% |
| 66 | Shap Pat Heung Road | W | 1 | 50 | 410 | 95% | 5% | 480 | 90% | 10% |
| 67 | Shap Pat Heung Road | E | 1 | 50 | 560 | 85% | 15% | 450 | 85% | 15% |
| 68 | Shap Pat Heung Road | W | 1 | 50 | 430 | 80% | 20% | 480 | 80% | 20% |
| 69 | Kung Um Road | N | 1 | 50 | 480 | 80% | 20% | 580 | 80% | 20% |
| 70 | Kiu Hung Road | S | 1 | 50 | 480 | 80% | 20% | 560 | 75% | 25% |
| 71 | Kung Um Road | W | 1 | 50 | 50 | 85% | 15% | 40 | 75% | 25% |
| 72 | Kung Um Road | N | 1 | 50 | 440 | 85% | 15% | 540 | 75% | 25% |
| 73 | Kiu Hung Road | S | 1 | 50 | 440 | 75% | 25% | 530 | 80% | 20% |
| 74 | Kung Um Road | N | 1 | 50 | 450 | 85% | 15% | 530 | 75% | 25% |
| 75 | Kiu Hung Road | S | 1 | 50 | 440 | 75% | 25% | 530 | 80% | 20% |
| 76 | Yuen Long Highway | E | 1 | 80 | 5,850 | 75% | 25% | 5,750 | 80% | 20% |
| 77 | Yuen Long Highway | W | 1 | 80 | 5,380 | 80% | 20% | 5,320 | 75% | 25% |
| 78 | Lam Hi Road | E | 1 | 50 | 380 | 75% | 25% | 210 | 75% | 25% |
| 79 | Lam Hi Road | W | 1 | 50 | 620 | 75% | 25% | 630 | 75% | 25% |
| 80 | Future Road | E | 1 | 50 | 340 | 80% | 20% | 230 | 80% | 20% |
| 81 | Future Road | W | 1 | 50 | 620 | 75% | 25% | 630 | 75% | 25% |
| 82 | Future Road | E | 1 | 50 | 340 | 80% | 20% | 230 | 80% | 20% |
| 83 | Future Road | W | 1 | 50 | 530 | 80% | 20% | 530 | 75% | 25% |
| 84 | Lam Tai West Road | N | 1 | 50 | 440 | 75% | 25% | 470 | 85% | 15% |
| 85 | Lam Tai East Road | S | 1 | 50 | 400 | 80% | 20% | 350 | 75% | 25% |

* Refer to attached Index Plan

** Numbers are rounded to nearest 10.

Numbers are rounded to nearest 5.

100
0 10
Millimetres



LEGEND:

- SITE BOUNDARY
- 300M NOISE STUDY AREA

- NOISE SENSITIVE RECEIVERS:**
- (N01) BUDDHIST CHAN WING KAN MEMORIAL SCHOOL
 - (N02) 457, MA TIN TSUEN
 - (N03) ATRIUM HOUSE
 - (N04) TOWER 8, PARK SIGNATURE
 - (N05) TOWER 10, PARK SIGNATURE
 - (N06) 197A, LUNG TIN TSUEN
 - (N07) TOWER 5, LA GROVE

| Rev. | Date | Description | By | CHK'd | App'd | Subtable |
|--------------------------|------|-------------|----|-------|-------|----------|
| FEASIBILITY STUDY | | | | | | |

SNC-LAVALIN **ATKINS**
Member of the SNC-Lavalin Group

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

Project Title: AGREEMENT NO. 46/2020 (CE) TERM CONSULTANCY FOR SITE FORMATION AND INFRASTRUCTURE WORKS FOR PROPOSED HOUSING DEVELOPMENT (TASK ORDER 4) IN ZONE 1(2021-2024) - FEASIBILITY STUDY (SHAP PAT HEUNG ROAD)

REPRESENTATIVE NOISE SENSITIVE RECEIVER

| Scale | Designed | Drawn | Checked | Authorised |
|----------------------|----------|----------|----------|------------|
| 1:3 000 | IT | IT | RC | WW |
| Original Size | Date | Date | Date | Date |
| A3 | NOV 2021 | NOV 2021 | NOV 2021 | NOV 2021 |
| Drawing Number | Revision | | | |
| 5210095-ATK-ENV-3001 | A | | | |

User name: WONG3184 Date: 2/9/2022 Time: 4:02:09 PM
Filename: \\swatkins.com\Project\CNC\HK\Project\5210095_CE\46_20_TO4\20.00_Project Data\Revables\20.10_Report\PER\095210095-ATK-ENV-3001.dgn

Appendix 2-2

Summary of Noise Attenuation Performance for MFD-MiC with Acoustic Window

8. Conclusion

8.1 The noise attenuation of the MFD-MiC with acoustic window for the public housing development, with suitable correction applied are summarized in **Table 8**.

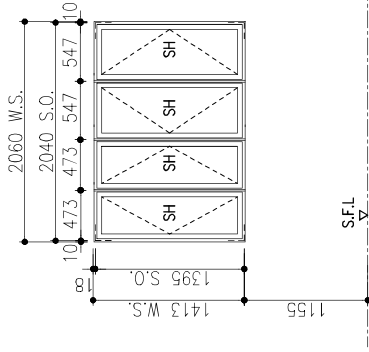
Table 8 – Summary of Noise Attenuation Performance for MFD-MiC with Acoustic Window

| | | Acoustic Window Configurations | | | | Noise Attenuation dB(A) | |
|------------------|------------------------------|--------------------------------|-------------------------|---------------------------|--------------------------------|------------------------------|---------------------------------|
| Flat Type | Floor Size (m ²) | Inner Window Opening | Outer Window Opening | Window Overlapping Length | Gap Width between Window Panel | With Sound Absorptive Lining | Without Sound Absorptive Lining |
| Type A-M2 | 9.357 | 1352mm (H) x 820mm (W) | 1352mm (H) x 700mm (W) | 340mm | 175 mm | 7.1 | 5.9 |
| Type B-M2 | 15.592 | 1352mm (H) x 895mm (W) | 1352mm (H) x 945mm (W) | 200mm | 175 mm | 6.9 | 5.8 |
| Type C-M2 | | | | | | | |
| Living Room | 16.414 | 1352mm (H) x 915mm (W) | 1352mm (H) x 985mm (W) | 100mm | 175 mm | 7.1 | 5.6 |
| Bedroom 1 | 6.117 | 1352mm (H) x 660mm (W) | 1352mm (H) x 633mm (W) | 607mm | 175 mm | | |
| Type C-M3 | | | | | | | |
| Living Room | 16.736 | 1352mm (H) x 985mm (W) | 1352mm (H) x 1125mm (W) | 330mm | 175 mm | 7.1 | 5.6 |
| Bedroom 1 | 6.094 | 1352mm (H) x 660mm (W) | 1352mm (H) x 633mm (W) | 607mm | 175 mm | | |
| Type D-M2 | | | | | | | |
| Living Room | 16.414 | 1352mm (H) x 915mm (W) | 1352mm (H) x 985mm (W) | 100mm | 175 mm | 7.1 | 5.6 |
| Bedroom 1 | 6.117 | 1352mm (H) x 660mm (W) | 1352mm (H) x 633mm (W) | 607mm | 175 mm | | |
| Bedroom 2 | 4.692 | 1352mm (H) x 545mm (W) | 1352mm (H) x 545mm (W) | 680mm | 175 mm | 4.2 | 3.0 |

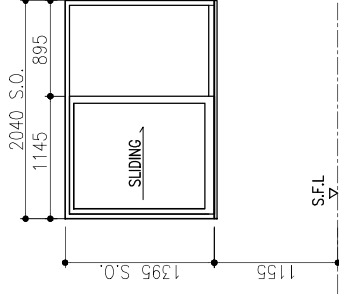
8.2 The above values are estimated noise attenuation for use. For the acoustic window configuration deviated from those considered in this technical note/ more refined estimation of the noise attenuation value is required, further discussion with EPD is required on project basis.

Annex A

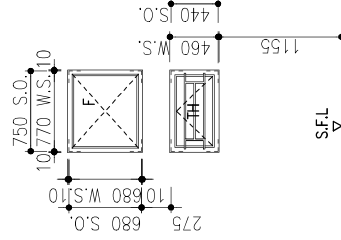
MFD-MiC with Acoustic Window



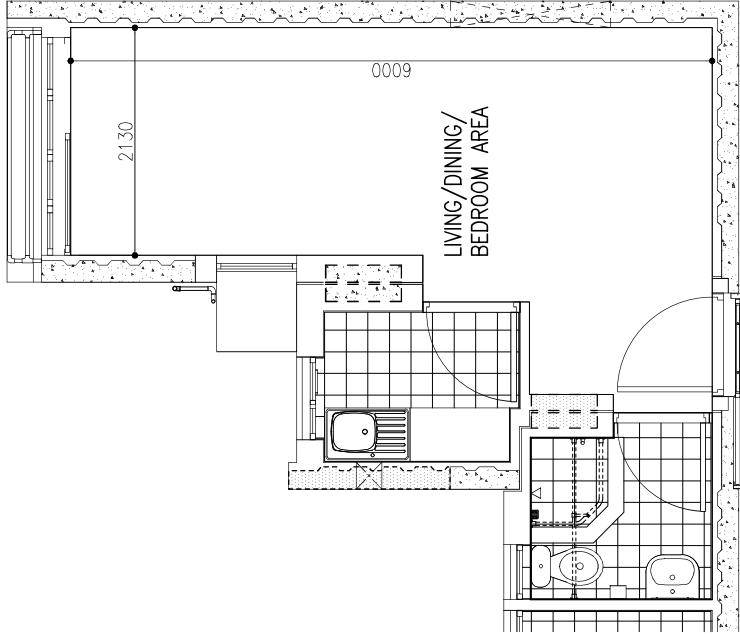
ELEVATION (OUTER LAYER)
SCALE 1:50(A3)



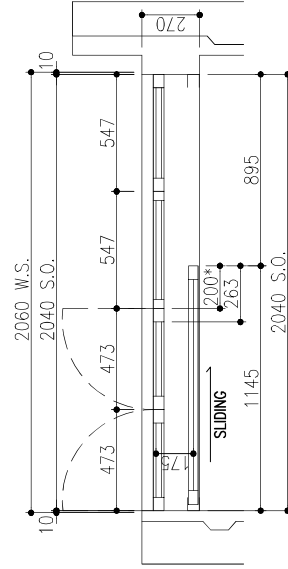
ELEVATION (INNER LAYER)
SCALE 1:50(A3)



SIDE ELEVATION - LIVING ROOM
SCALE 1:50(A3)



TYPE B - M2 FLAT (WITH ACOUSTIC WINDOW) SCALE 1:50(A3)



PART PLAN OF ACOUSTIC WINDOW
SCALE 1:25(A3)

IFA

LIVING ROOM: 15.592m²

NOTE: ELEVATIONS VIEWED FROM INSIDE

F - FIXED WINDOW

TH - TOP HUNG WINDOW

SH - SIDE HUNG WINDOW

S.O. - STRUCTURAL OPENING

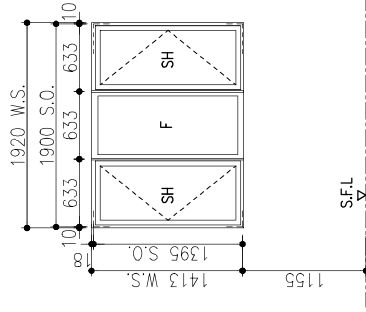
W.S. - WINDOW DIMENSION

MODULAR FLAT (MIC) WITH

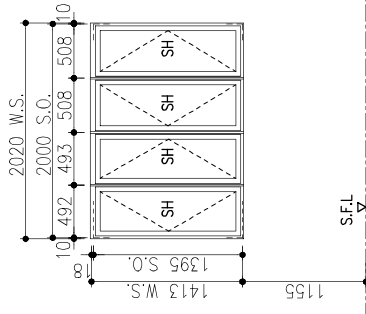
ACOUSTIC WINDOW

TYPE B-M2 FLAT

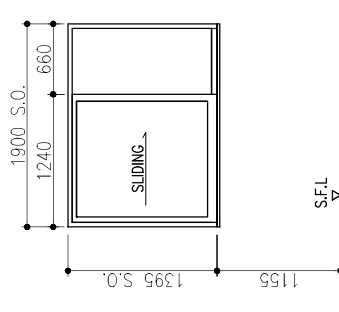
NOVEMBER 2022 (FOR EPD)



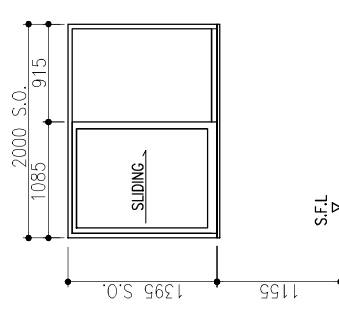
ELEVATION-BEDROOM1
(OUTER LAYER) SCALE 1:50(A3)



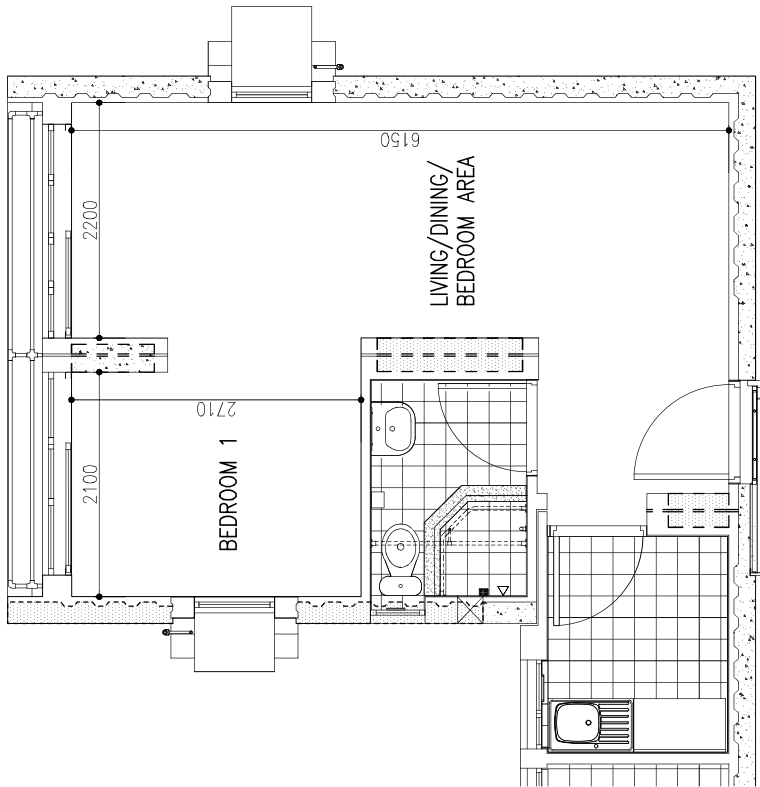
ELEVATION-LIVING ROOM
(OUTER LAYER) SCALE 1:50(A3)



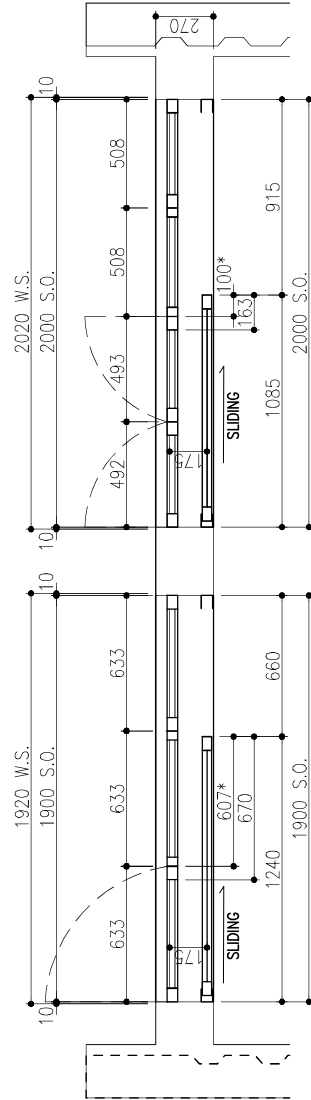
ELEVATION-BEDROOM1
(INNER LAYER) SCALE 1:50(A3)



ELEVATION-LIVING ROOM
(INNER LAYER) SCALE 1:50(A3)



TYPE C - M2 FLAT (WITH ACOUSTIC WINDOW) SCALE 1:50(A3)



PART PLAN OF ACOUSTIC WINDOW
SCALE 1:25(A3)

IFA

LIVING ROOM: 16.414m²

BR1: 6.117m²

NOTE: ELEVATIONS VIEWED FROM INSIDE

F -FIXED WINDOW

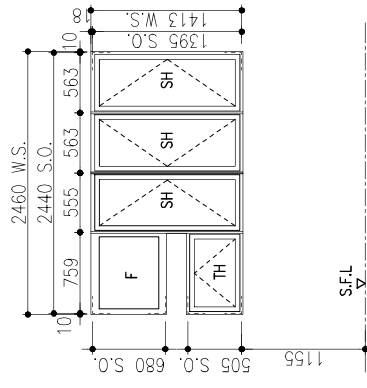
SH -SIDE HUNG WINDOW

S.O. -STRUCTURAL OPENING

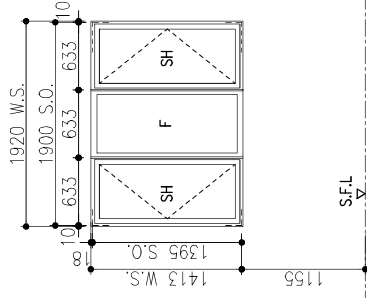
W.S. -WINDOW DIMENSION

**MODULAR FLAT (MIC) WITH
ACOUSTIC WINDOW
TYPE C-M2 FLAT**

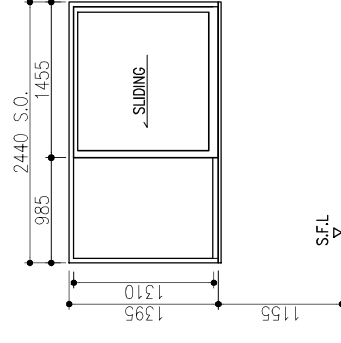
MARCH 2022 (FOR EPD)



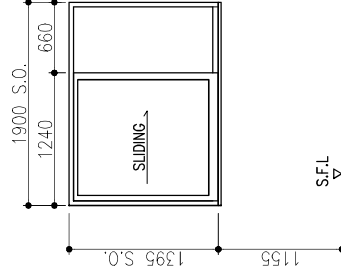
ELEVATION—LIVING ROOM
(OUTER LAYER) SCALE 1:50(A3)



ELEVATION—BEDROOM1
(OUTER LAYER) SCALE 1:50(A3)



ELEVATION—LIVING ROOM
(INNER LAYER) SCALE 1:50(A3)



ELEVATION—BEDROOM1
(INNER LAYER) SCALE 1:50(A3)

IFA

LIVING ROOM: 16.736m²

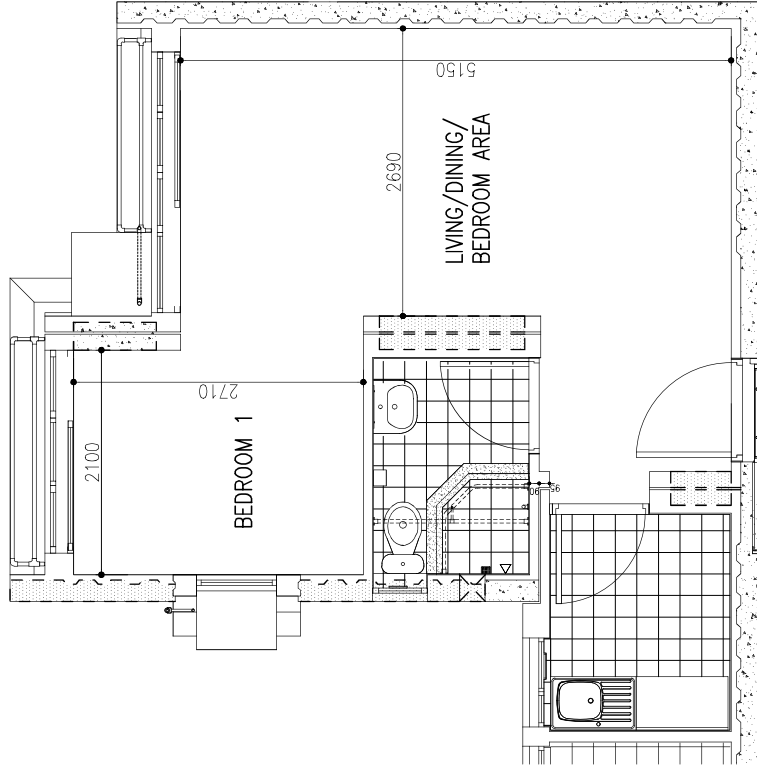
BR1: 6.094m²

NOTE: ELEVATIONS VIEWED FROM INSIDE

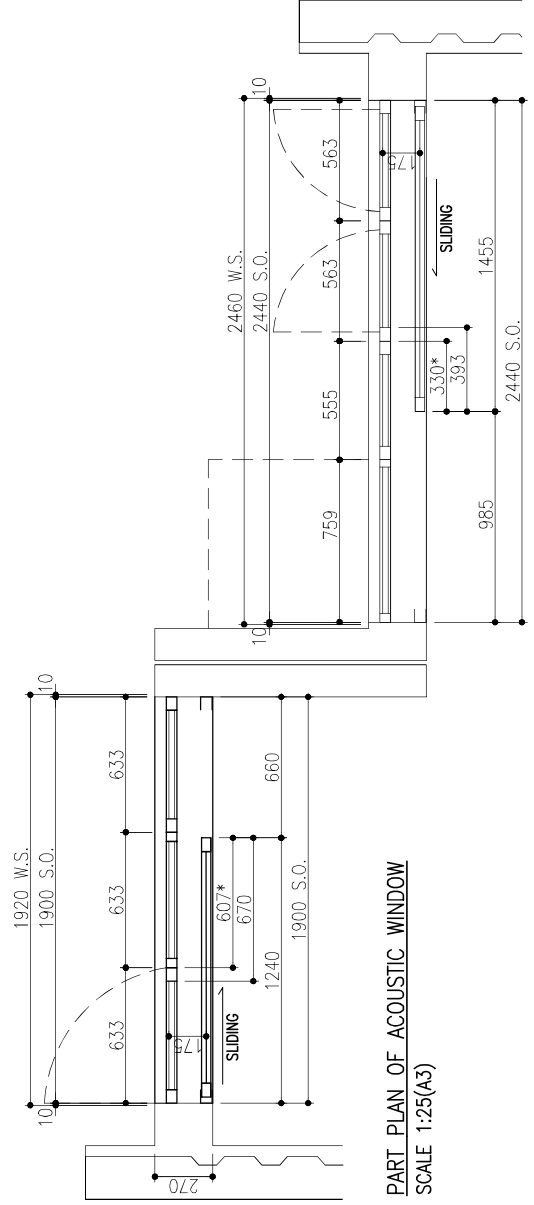
- F —FIXED WINDOW
- TH —TOP HUNG WINDOW
- SH —SIDE HUNG WINDOW
- S.O. —STRUCTURAL OPENING
- W.S. —WINDOW DIMENSION

**MODULAR FLAT (MIC) WITH
ACOUSTIC WINDOW
TYPE C-M3 FLAT**

MARCH 2022 (FOR EPD)



TYPE C — M3 FLAT (WITH ACOUSTIC WINDOW) SCALE 1:50(A3)



PART PLAN OF ACOUSTIC WINDOW
SCALE 1:25(A3)

Appendix 2-3

Extracts from Final Report of Acoustic Design and Performance Evaluation of the Acoustic Window (ADPEAW)



Term Traffic and Environmental Consultancy Services 2010-2012 for Hong Kong Island and Kowloon East Region

Instruction No. M1 Acoustic Design and Performance Evaluation of the Acoustic Window



Final Report

8. IMPLEMENTATION

8.1 Application in San Po Kong Housing Development

- 8.1.1 As the design of the Acoustic Window was developed and evolved under this study with a view to be applied in SPK housing development, laboratory test and in-situ test of the acoustic window at ex-San Po Kong Flatted Factory (ex-SPKFF) site was carried out in 2009 and 2010. With the sound attenuation of 1B flat measured by in-situ test as a basis, attenuations for other flat types were also evaluated by numerical analysis.
- 8.1.2 As the in-situ test and numerical analysis already eliminated most uncertainty factors and are regarded as under worst case scenario, the derived sound attenuation performance is considered applicable and appropriate to be adopted in subsequent road traffic noise impact assessment study adopting the same window system in ex-SPKFF site.
- 8.1.3 The summary of sound attenuation performance to be applied in the subsequent EAS is shown below:

| Type of Acoustic Window System | 1/2P | 2/3P | 1B | 2B | |
|--|------|------|-----|-----------|-------|
| | | | | (LIV+BR1) | (BR2) |
| Sliding window, without absorption at window | 5.9 | 6.6 | 6.6 | 6.6 | 3.5 |
| Sliding window, with absorption at window | 7.1 | 7.7 | 8.1 | 8.1 | 4.7 |
| Sliding door, without absorption at window | 7.2 | 7.8 | 7.5 | 7.5 | 3.5 |
| Sliding door, with absorption at window | 7.7 | 8.2 | 7.9 | 7.9 | 4.7 |

- 8.1.4 For those flat units equipped with acoustic window in the EAS, the equivalent noise level of the corresponding noise sensitive receivers would be the results of deducting the noise level at 1 m away from façade calculated by CRTN method by the sound attenuation of the acoustic window assessed in this report. For example, the noise level at 1 m away from façade of a 2/3P flat at 10/F of the building block at San Po Kong development assessed by CRTN is 77.6 dBA. If acoustic window with sound absorption material (sound attenuation = 7.7 dBA) is installed for the flat, the equivalent noise level for the flat would be 77.6 dBA - 7.7 dBA = 69.9 dBA. As such, the flat mitigated by installation of acoustic window with sound absorption material becomes complying with HKPSG requirement.

8.2 Application in Other Housing Development

- 8.2.1 The sound attenuation performance assessed in this study, although targeted to be applied in SPK housing development as a pilot project, can be considered as reference for generic application of the window system in housing development of other sites.
- 8.2.2 In general, the sound attenuation of non-typical noise mitigation measures may need to be justified on case by case basis to demonstrate that the proposed sound attenuation is applicable to the specific site. EPD's view/agreement should be sought in principle on whether the acoustic window system could be applied to other public housing developments with severe traffic noise impact while other direct mitigation measures are not sufficient to achieve an acceptable noise performance.

8.2.3 The performance of acoustic windows in this report is assessed with a view to be applied for SPK housing development. For other housing development, this report may be considered as reference for generic application of the window system and could be used as the basis of the said case by case justification in the projects of other housing development.

8.3 Application summary

Acoustic Window configuration

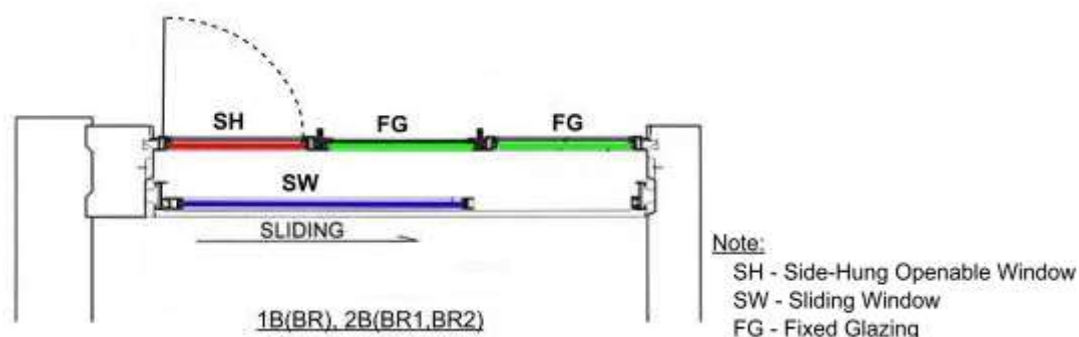
8.3.1 For the acoustic window system, sound attenuation is dependent on the window configuration, namely the inner and outer openings, overlapping length and pane separation. **Appendix H** shows the design of the acoustic window system in different types of flats. The configuration of acoustic window is listed below:

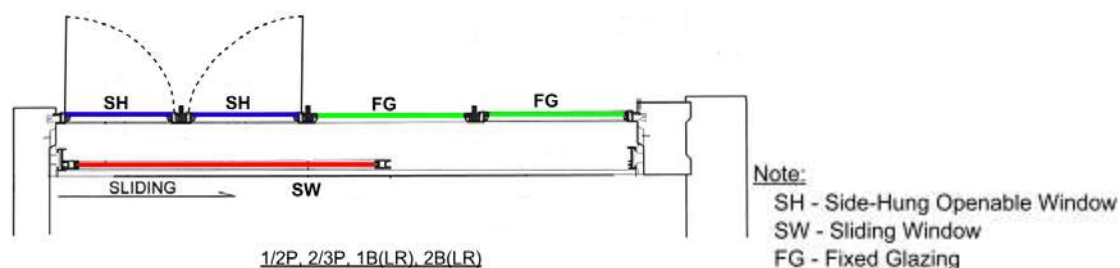
| Flat Type | Inner Window Opening | Outer Window Opening | Window Overlapping Length | Window Pane Separation |
|-----------------------------------|-------------------------|-------------------------|---------------------------|------------------------|
| Flat 1/2P | 1352mm (H) x 850mm (W) | 1352mm (H) x 870mm (W) | 340mm | 175mm |
| Flat 2/3P | 1352mm (H) x 980mm (W) | 1352mm (H) x 1010mm (W) | 340mm | 175mm |
| Flat 1B1, 1B2 & 2B2 – Living Room | 1352mm (H) x 1020mm (W) | 1352mm (H) x 1050mm (W) | 340mm | 175mm |
| Flat 1B1, 1B2 & 2B2 – Bedroom | 1352mm (H) x 550mm (W) | 1352mm (H) x 560mm (W) | 525mm | 175mm |
| Flat 2B2 – Bedroom 2 | 1352mm (H) x 658mm (W) | 1352mm (H) x 668mm (W) | 634mm | 175mm |

8.3.2 Based on the acoustic window system design,

- outer layer of the window system consists of fixed glazing and side-hung openable gasketed window.
- inner layer consists of one sliding window.

8.3.3 The basic configuration of the acoustic window is shown below:





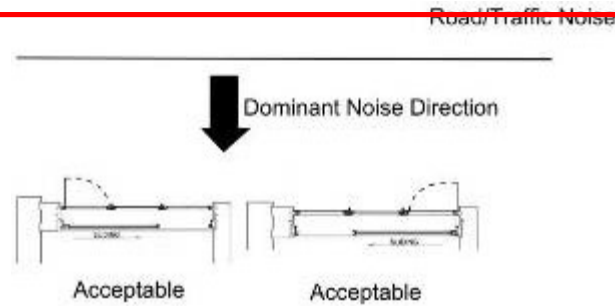
- 8.3.4 Nevertheless, for operation and maintenance purpose, the fixed glazing specified as FG might be equipped with side-hung openable window. For those “F.G. equipped with side-hung openable window”, provision of special window opening device would be considered for incorporation if and when such need is warranted. More information can be referred to **Annex K**. However, the future resident shall be advised of the caution that such window should be closed to achieve the intended sound attenuation and that opening of the windows for purpose of other operation, maintenance or additional ventilation would compromise the indoor noise level in the flat.
- 8.3.5 For the modified acoustic window system, with a view to reduce the thickness of the wall façade in the living room, acoustic window system will adopt inner sliding door (instead of inner sliding window) in only the living room of 1B flat (or 2B flat), 1/2P and 2/3P flats. The acoustic window system in the bedroom of 1B or 2B flats would still adopt the sliding window versions. **Annex H** shows the design of the modified acoustic window system (with sliding door) in different types of flats. The configuration of the modified acoustic window (with sliding door) is listed below table:

| Flat Type | Inner Window Opening | Outer Window Opening | Window Overlapping Length | Window Pane Separation |
|-----------------------|-------------------------|-------------------------|---------------------------|------------------------|
| Flat 1/2P | 2492mm (H) x 842mm (W) | 1352mm (H) x 870mm (W) | 340mm | 175mm |
| Flat 2/3P | 2492mm (H) x 972mm (W) | 1352mm (H) x 1010mm (W) | 340mm | 175mm |
| Flat 1B – Living Room | 2492mm (H) x 1012mm (W) | 1352mm (H) x 1050mm (W) | 340mm | 175mm |
| Flat 2B – Living Room | 2492mm (H) x 1012mm (W) | 1352mm (H) x 1050mm (W) | 340mm | 175mm |

- 8.3.6 Basically, dimensions and all other parameters of the outer window system of the original acoustic window design would be adopted in the modified acoustic window system. The modified window design will only be adopted in the flat type 1/2P, 2/3P and living room of flat type 1B and 2B.
- 8.3.7 The purpose of this modification is to provide an option to enhance the accessibility of drying facilities outside window of the living room area.

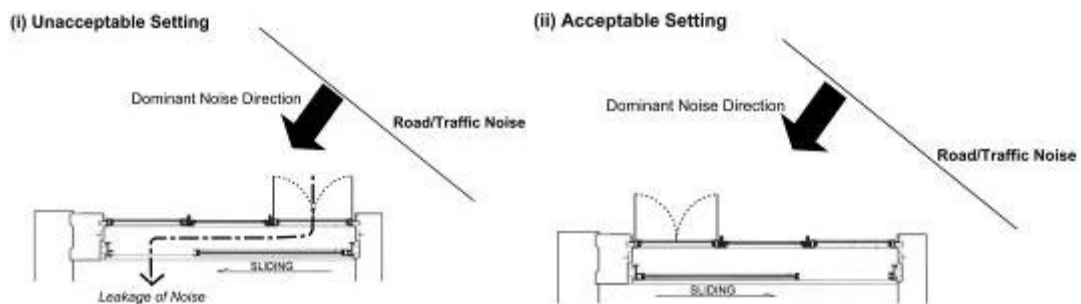
Acoustic Window Setting and Orientation

- 8.3.8 For achieving the sound attenuation assessed in the study, the acoustic window should be set at the intended orientation as described below.
- 8.3.9 In case a flat is fronting a major noisy road running in parallel with the façade, the left/right settings of the openings of its acoustic window are only mutual images; both of which could achieve the intended sound attenuation in the study.



Window in parallel with traffic noise source

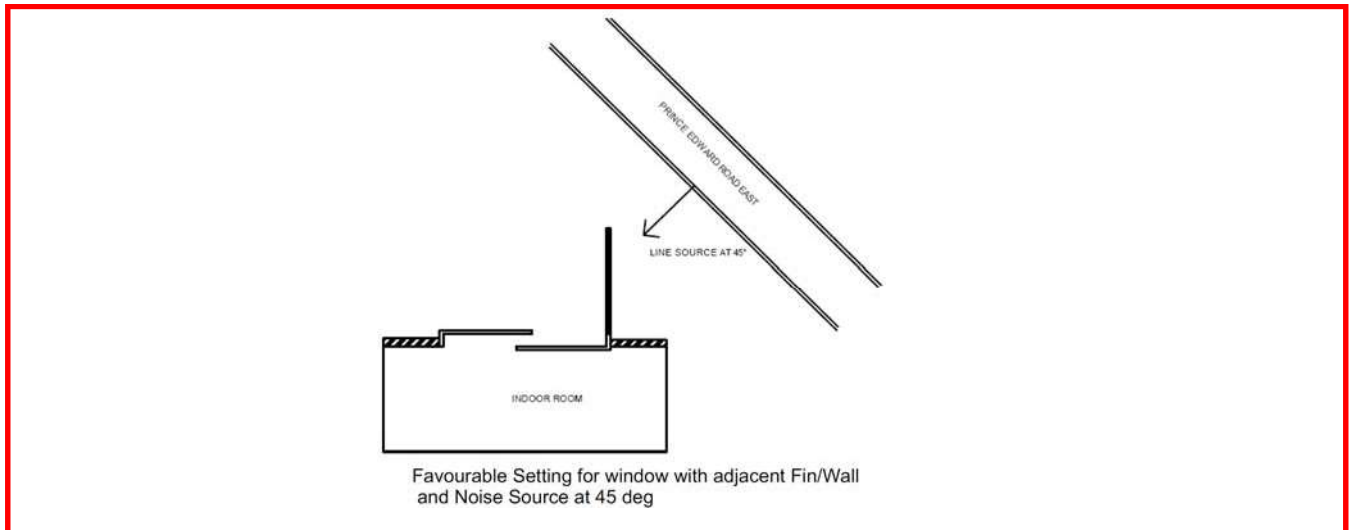
- 8.3.10 In case the road is located at one side of the flat, the traffic noise would propagate to the façade/flat more from the side of the road rather than right in front of it. The staggered openings of the acoustic window should be set to intercept direct propagation of noise through the openings and the gap between outer and inner panes. In general, the opening of the outer layer of window should be sited further away from the road, as illustrated below. The orientation of acoustic window under test (i.e. parallel to the road) represents the worst scenario based on the openings of the acoustic window not being set as 'unacceptable/unfavourable setting'



Window NOT in parallel with traffic noise source

However, if there exist other features near the acoustic window causing reflection/reverberation of noise (e.g. fins or side walls), separate assessment should be conducted for the setting of the openings to optimize the sound attenuation of the acoustic window.

- 8.3.11 In San Po Kong project, there are flats of acoustic window with vertical fins or side walls adjacent to the window. An additional study was conducted by using computer simulation for the purpose of determining the most favourable configuration / orientation of openings in terms of sound attenuation after adding building structure like fins. The finding indicated that in such case with fin/wall shielding of effective length of 1.8m long (1.5m long architectural fin in San Po King Project in addition to the standard 0.3m architectural feature) and the noise source at 45 deg., the favourable configuration will have the outer opening set next to the fin/wall and the inner opening away from it as illustrated below. The detail results and discussion of the computer simulation study were included in **Annex L**.



Materials Requirement

8.3.12 For the acoustic window (sliding window) system, the following materials requirement should be specified for construction:

- Window pane: 6 mm thick
- Sound Absorption Material (where applicable):
 - Thickness: 30 mm
 - NRC: minimum 0.7
 - Location: two sides and top
 - Lining Panel: 2 mm aluminium (or less) with perforation
 - Perforation: 40 % opening
 - Weather-proof Protection – SAM to be wrapped/sealed by protective sheet of biaxially oriented polyester film

8.3.13 Additional requirement for modified acoustic window system (sliding door), the following materials requirement should be specified for lower portion of one side of the sliding door facing to outer window:

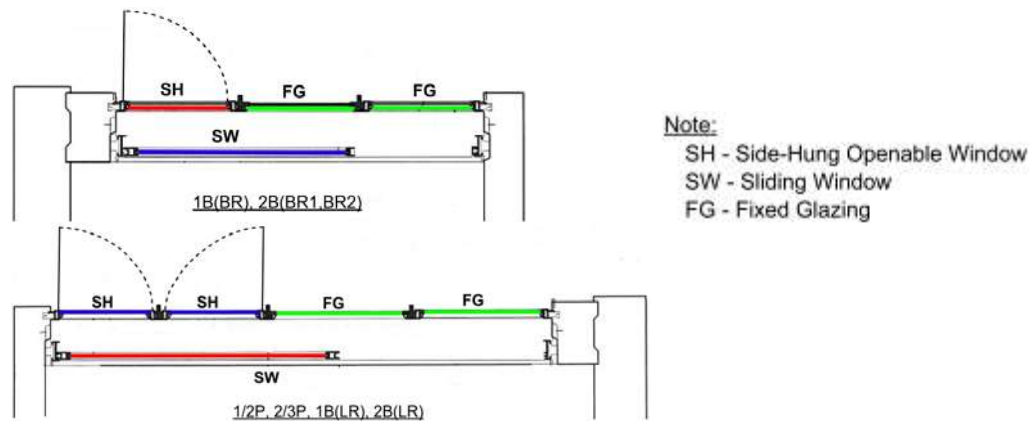
- Sound Absorption Material:
 - Thickness: 30 mm
 - Location: backing side of the lower part of sliding door (refers to plans at **Annex H**)
 - NRC: minimum 0.7
 - Lining Panel: 2 mm aluminium (or less) with perforation
 - Perforation: 40 % opening
 - Weather-proof Protection – SAM to be wrapped/sealed by protective sheet of biaxially oriented polyester film

8.3.14 To facilitate future maintenance for modular acoustic window system and modified acoustic window system, the detailing of the window should be designed to allow the SAM core to be replaceable.

Advice to Future Residents about Acoustic Window

8.3.15 The sound attenuation achieved by the acoustic window refers to the designated setting of windows. Hence the future residents in the flats equipped with acoustic windows should be advised of such settings for achieving the intended attenuation. The following may be considered as reference:

- This special window design is for mitigating traffic noise impact. To achieve the intended sound attenuation, the windows should be set as following:



- Deviation from the above setting by opening other windows might affect the noise level in the flat.

Monitoring and Audit after Completion

8.3.16 In order to obtain more data of sound attenuation performance of the acoustic window and for comparison with the assessment findings of this study, further on-site acoustic testing at constructed flats in San Po Kong housing development after completion is recommended. Similar on-site testing in Sai Chuen Road project for acoustic balcony could be used as reference.

8.3.17 The arrangement, details and programme on the further on-site testing would be further liaised and submitted to EPD for comment.

Appendix 3-1

Site Visit Record of Potential Fixed Plant Noise Sources

Site Photos



NS 01: Ma Tin Sewage Pumping Station

Date: 7 March 2023



NS 02: United Car Trading Platform

NS 03: Entrance of Fu Shing Motor Service Limited

Date: 7 March 2023



NS 04: Win Fat Warehouse – Storage of Construction Material (i.e. Sand)

Date: 7 March 2023



NS 05: Entrance of 28 Car Wash House

Date: 19 May 2022



NS 06a: Open Space at the Southwest of the Site – Storage of Construction Material

Date: 7 March 2023



NS 06b Open Parking at the Southwest of the Site (From Lam Hi Road)

Date: 7 March 2023



NS 06b Open Parking at the Southwest of the Site

Date: 7 March 2023



NS 06b Open Parking at the Southwest of the Site

Date: 7 March 2023



NS 06b Open Parking at the Southwest of the Site

Date: 7 March 2023



NS 07: Vehicle Workshops along Kiu Hing Road

Date: 7 March 2023



NS 08: Entrance of the storage area along Lam Hi Road

Date: 19 May 2022



NS 08: Storage area along Lam Hi Roads

Date: 19 May 2022



Current status of the Subject Site

Date: 7 March 2023



Previous Open Storage Space between La Grove and Park Signature –
Storage of Construction Material (i.e. metal)

Date: 7 March 2023

Appendix 4-1

Road Type Confirmation from TD on Shap Pat Heung Road

[REDACTED]

From: [REDACTED]
Sent: 08 March 2022 14:50
To: [REDACTED]
Subject: FW: Re: Site Formation and Infrastructure Works for Proposed Public Housing Development at Shap Pat Heung Road near Lung Tin Tsuen, Yuen Long – Feasibility Study

From: [REDACTED]@cedd.gov.hk <[REDACTED]@cedd.gov.hk>
Sent: Tuesday, March 8, 2022 2:50 PM
To: [REDACTED] <[REDACTED]@atkinsglobal.com>
Cc: [REDACTED]@cedd.gov.hk
Subject: 轉寄: Re: Site Formation and Infrastructure Works for Proposed Public Housing Development at Shap Pat Heung Road near Lung Tin Tsuen, Yuen Long – Feasibility Study

Dear [REDACTED]

fyi, please. Thanks!

Best Regards,
[REDACTED]
SE6/HP3, CEO, CEDD
Tel.: 3468 8735

----- Forwarded by CHEUNG TONG/CEDD/HKSARG on 08/03/2022 14:47 -----

From: [REDACTED] TD/HKSARG@TD
To: [REDACTED] CEDD/HKSARG@CEDD
Cc: [REDACTED] TD/HKSARG@TD
Date: 13/12/2021 12:06
Subject: Re: Site Formation and Infrastructure Works for Proposed Public Housing Development at Shap Pat Heung Road near Lung Tin Tsuen, Yuen Long – Feasibility Study

Regards,
[REDACTED]
E/YLS,TD

From: [REDACTED] TD/HKSARG
To: [REDACTED] TD/HKSARG@TD
Cc: [REDACTED] TD/HKSARG@TD
Date: 13/12/2021 12:05 PM
Subject: Site Formation and Infrastructure Works for Proposed Public Housing Development at Shap Pat Heung Road near Lung Tin Tsuen, Yuen Long – Feasibility Study
TENTW/EYLS

Dear [REDACTED]

The road type of the road section of Shap Pat Heung Road adjacent to the subject development is local distributor.

Regards,

[REDACTED]
E/YLS,TD

At Atkins - member of the SNC-Lavalin Group, we work flexible hours around the world. Although I have sent this email at a time convenient for me, I don't expect you to respond until it works for you.

Appendix 4-2

Correspondence with EPD and DSD

Urgent Return Receipt Requested Sign Mark Subject Restricted and Encrypt Expand groups

From: [REDACTED]EPD/HKSARG@EPD - 20/10/2023 03:21 下午
To: [REDACTED]HD/HKSARG@HD
Cc: [REDACTED]
Subject: Re: Enquiries on Ma Tin Sewage Pumping Station

History: This message has been replied to.

Dear [REDACTED]

I refer to your email dated 19 Oct 2023.

This office has no record of air/ odour-related complaint in relation to Ma Tin Sewage Pumping Station in the past five years. Nonetheless, you may also need to check with other relevant parties / departments for such information as appropriate.

Please contact our Mr. Fung at 2158 5847 or the undersigned at 2158 5823 should you have any further enquires. Thank you.

Best Regards,

[REDACTED]
EPD
20.10.2023

----- Forwarded by [REDACTED]HD/HKSARG on 20/10/2023 15:13 -----

From: [REDACTED]EPD/HKSARG
To: [REDACTED]HD/HKSARG@HD
Cc: [REDACTED]
Date: 19/10/2023 22:30
Subject: Re: Enquiries on Ma Tin Sewage Pumping Station

Dear [REDACTED]

Thanks for your email. Our colleague will come back to you soon.

Best regards,

[REDACTED]
19.10.2023

[REDACTED] 19/10/2023 17:08:04

From: [REDACTED]HD/HKSARG@HD
To: [REDACTED]@epd.gov.hk
Cc: [REDACTED]
Date: 19/10/2023 17:08
Subject: Enquiries on Ma Tin Sewage Pumping Station

Dear [REDACTED]

I am the Project Civil Engineer for the Public Housing Development at Shap Pat Heung Road, Yuen Long.

We have recently submitted an environmental study for EPD vetting. During the review process, EPD has raised some queries regarding the Ma Tin Sewage Pumping Station (SPS) and has requested us to consult ECD of EPD for checking whether there is any air/odour nuisance arising from Ma Tin SPS.

In light of this, we kindly request your assistance to advise **if there any records of air/odour nuisance arising from Ma Tin SPS** in the past few years please.

We would greatly appreciate it if you could provide the above information by 24 October 2023. Thank you very much.

Regards,

██████████

CE/TE2

Housing Department

3549 6120

Urgent Return Receipt Requested Sign Mark Subject Restricted and Encrypt Expand groups

From: [REDACTED]DSD/HKSARG@DSD - 24/10/2023 09:05 上午

To: [REDACTED]HD/HKSARG@HD

Cc: [REDACTED]

Subject: Fw: Enquiries on Ma Tin Sewerage Pumping ----- Housing Department

Dear [REDACTED]

Please find attached requested information in blue.

1. Sewage capacity of Ma Tin SPS.
[Design Capacity : 7,344m³/d](#)
2. Odour removal efficiency of Ma Tin SPS.
[Typical H₂S removal efficiency of activated carbon DOU is over 99.5%.](#)
3. Any odour nuisance complaints arising from Ma Tin SPS in the past few years.
[No related complaints received in the past 5 years.](#)

Please provide project brief and SIA/DIA for LDD, MND, BCM & ST1 comment.

Regards,

[REDACTED]
Ag. SE/ST1/3
DSD

From: [REDACTED]HD/HKSARG@HD
To: [REDACTED]@dsd.gov.hk
Cc: [REDACTED]
Date: 19/10/2023 15:08
Subject: Enquiries on Ma Tin Sewerage Pumping
Serial No.:

Dear [REDACTED]

I am the Project Civil Engineer for the Public Housing Development at Shap Pat Heung Road, Yuen Long.

We have recently submitted an environmental study for EPD vetting. During the review process, EPD has raised some queries regarding the Ma Tin Sewage Pumping Station (SPS), which falls within the study area of our site.

In light of this, we kindly request your assistance in providing the following information for us to address EPD's queries:

1. Sewage capacity of Ma Tin SPS.
2. Odour removal efficiency of Ma Tin SPS.
3. Any odour nuisance complaints arising from Ma Tin SPS in the past few years.

Your prompt response will greatly assist us in addressing EPD's queries. We would greatly appreciate it if you could provide the above information by 24 October 2023. Thank you very much.

Regards,

[REDACTED]

CE/TE2

Housing Department

3549 6120