# ATTACHMENT 8

HERRING STORER ACOUSTICS



# GOLDBLAZE NOMINEES PTY LTD

## MULTI-USE DEVELOPMENT
## LOT 2 & 3 BANK STREET VICTORIA PARK

## SPP 5.4 NOISE MANAGEMENT PLAN

December 2023

OUR REFERENCE: 28737-4-21454

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# LOT 2 & 3 BANK STREET VICTORIA PARK

Job No: 21454

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FOR

# GOLDBLAZE NOMINEES PTY LTD

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# APPENDICES

# 1. INTRODUCTION

Herring Storer Acoustics were commissioned by Rowe Group, on behalf of Goldblaze Nominees Pty Ltd to carry out an acoustic study with regards to passenger rail noise for the residential component of the proposed mixed-use development to be located at Lots 2 and 3 Bank Street, Victoria Park.

The purpose of the study was to:

- Assess the noise that would be received within the development area from the Perth to Armadale Passenger Rail Line for future traffic volumes.
- Compare the results with accepted criteria and if exceedances exist, develop the framework for the management of noise.
- Comment on vibration impact from future passenger rail system.

A plan is attached in Appendix A.

# 2. ACOUSTIC CRITERIA

## 2.1 NOISE

The Western Australian Planning Commission (WAPC) released on 6th September 2019 State Planning Policy 5.4 *"Road and Rail Noise".* The requirements of State Planning Policy 5.4 are outlined below.

*POLICY APPLICATION (Section 4)*

*When and where it applies (Section 4.1)*

*SPP 5.4 applies to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia, where there is proposed:*

*a) noise-sensitive land-use within the policy's trigger distance of a transport corridor as specified in **Table 1**;*

*b) New or major upgrades of roads as specified in **Table 1** and maps **(Schedule 1,2 and 3);** or*

*c) New railways or major upgrades of railways as specified in maps (**Schedule 1, 2 and 3);** or any other works that increase capacity for rail vehicle storage or movement and will result in an increased level of noise.*

*Policy trigger distances (Section 4.1.2)*

***Table 1** identifies the State's transport corridors and the trigger distances to which the policy applies.*

*The designation of land within the trigger distances outlined in **Table 1** should not be interpreted to imply that land is affected by noise and/or that areas outside the trigger distances are un-affected by noise.*

*Where any part of the lot is within the specified trigger distance, an assessment against the policy is required to determine the likely level of transport noise and management/*

*mitigation required. An initial screening assessment (**guidelines: Table 2: noise exposure forecast**) will determine if the lot is affected and to what extent."*

***TABLE 1: TRANSPORT CORRIDOR CLASSIFICATION AND TRIGGER DISTANCES***

| ***Transport corridor classification*** | ***Trigger distance*** | ***Distance measured from*** |
|---|---|---|
| ***Roads*** | | |
| ***Strategic freight and major traffic routes*** *Roads as defined by Perth and Peel Planning Frameworks and/or roads with either 500 or more Class 7 to 12 Austroads vehicles per day, and/or 50,000 per day traffic volume* | *300 metres* | *Road carriageway edge* |
| ***Other significant freight/traffic routes*** *These are generally any State administered road and/or local government road identified as being a future State administered road (red road) and other roads that meet the criteria of either >=23,000 daily traffic count (averaged equivalent to 25,000 vehicles passenger car units under region schemes)* | *200 metres* | *Road carriageway edge* |
| ***Passenger railways*** | | |
| | *100 metres* | *Centreline of the closest track* |
| ***Freight railways*** | | |
| | *200 metres* | *Centreline of the closest track* |

*Proponents are advised to consult with the decision making authority as site specific conditions (significant differences in ground levels, extreme noise levels) may influence the noise mitigation measures required, that may extend beyond the trigger distance.*

*POLICY MEASURES (Section 6)*

*The policy applies a performance-based approach to the management and mitigation of transport noise. The policy measures and resultant noise mitigation will be influenced by the function of the transport corridor and the type and intensity of the land-use proposed. Where there is risk of future land-use conflict in close proximity to strategic freight routes, a precautionary approach should be applied. Planning should also consider other broader planning policies. This is to ensure a balanced approach takes into consideration reasonable and practical considerations.*

*Noise Targets (Section 6.1)*

***Table 2** sets out noise targets that are to be achieved by proposals under which the policy applies. Where exceeded, an assessment is required to determine the likely level of transport noise and management/mitigation required.*

*In the application of the noise targets the objective is to achieve:*

- *indoor noise levels as specified in **Table 2** in noise sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and*

- *a reasonable degree of acoustic amenity for outdoor living areas on each residential lot. For non-residential noise-sensitive developments, for example schools and child care centres the design of outdoor areas should take into consideration the noise target.*

*It is recognised that in some instances, it may not be reasonable and/or practicable to meet the outdoor noise targets. Where transport noise is above the noise targets, measures are expected to be implemented that balance reasonable and practicable considerations with the need to achieve acceptable noise protection outcomes.*

***TABLE 2: NOISE TARGETS***

| ***Proposals*** | ***New/Upgrade*** | ***Noise Targets*** | | |
|---|---|---|---|---|
| | | ***Outdoor*** | | ***Indoor*** |
| | | ***Day ($L_{Aeq}$(Day) dB) (6 am-10 pm)*** | ***Night ($L_{Aeq}$(Night)dB) (10 pm-6 am)*** | ***($L_{Aeq}$ dB)*** |
| *Noise-sensitive land-use and/or development* | *New noise sensitive land use and/or development within the trigger distance of an existing/proposed transport corridor* | *55* | *50* | *$L_{Aeq}$ (Day) 40(Living and work areas) $L_{Aeq}$ (Night) 35 (bedrooms)* |
| *Roads* | *New* | *55* | *50* | *N/A* |
| | *Upgrade* | *60* | *55* | *N/A* |
| *Railways* | *New* | *55* | *50* | *N/A* |
| | *Upgrade* | *60* | *55* | *N/A* |

*Notes:*

- *The noise target is to be measured at one metre from the most exposed, habitable façade of the proposed building, which has the greatest exposure to the noise-source. A habitable room has the same meaning as defined in State Planning Policy 3.1 Residential Design Codes.*
- *For all noise-sensitive land-use and/or development, indoor noise targets for other room usages may be reasonably drawn from Table 1 of Australian Standard/New Zealand Standard AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors (as amended) for each relevant time period.*
- *The 5dB difference in the criteria between new and upgrade infrastructure proposals acknowledges the challenges in achieving noise level reduction where existing infrastructure is surrounded by existing noise-sensitive development.*
- *Outdoor targets are to be met at all outdoor areas as far as is reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines. For example, it is likely unreasonable for a transport infrastructure provider to achieve the outdoor targets at more than 1 or 2 floors of an adjacent development with direct line of sight to the traffic.*

*<u>Noise Exposure Forecast (Section 6.2)</u>*

*When it is determined that SPP 5.4 applies to a planning proposal as outlined in Section 4, proponents and/or decision makers are required to undertake a preliminary assessment using **Table 2**: noise exposure forecast in the guidelines. This will provide an estimate of the potential noise impacts on noise-sensitive land-use and/ or development within the trigger distance of a specified transport corridor. The outcomes of the initial assessment will determine whether:*

- *no further measures are required.*
- *noise-sensitive land-use and/or development is acceptable subject to deemed-to-comply mitigation measures; or*
- *noise-sensitive land-use and/or development is not recommended. Any noise-sensitive land-use and/ or development is subject to mitigation measures outlined in a noise management plan."*

## 2.2 VIBRATION CRITERIA

From previous projects we understand that AS 2670.2-1990 *"Evaluation of human exposure to whole-body vibration; Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)"* has been used to assess compliance with ground vibration. However, this standard has been revised and redesignated as AS ISO 2631.2-2014 *Mechanical vibration and shock – Evaluation of human exposure to whole-body vibration. Part : Vibration in buildings (1 Hz to 80 Hz).*

As AS ISO 2631.2014 provides guidance to vibration source types and measurement methodology, it does not provide an acceptable level for vibration. Therefore, guidance from AS2670.2-1990 is also used as a reference when considering an acceptable level of vibration.

Table 2 in Appendix A of the AS2670.2-1990 lists acceptable criteria. In this situation the passing trains would be considered as transient vibration. As such the recommended range of multiplying factors range from 1.4 to 4.0 times the base curve is provided. We believe that from previous studies the 2.0 times the base curve should be used as the acceptable criteria. However, we understand that the Department of Environmental Regulation has expressed a preference that the 1.4 times the base curve be used as the criteria. However, as per AS2631.2-2014 the transient nature and duration of the vibration also requires consideration.

AS 2670.2-1990 states that:

*The vibration evaluations shall always include measurements of the weighted root-mean-square (r.m.s.) acceleration as defined as*

$$rms = \sqrt{\left[\frac{1}{T}\int_0^T a_w{}^2(t)\,dt\right]}$$

*Where*

$a_w(t)$ *is the weighted acceleration as a function of time in metres per second squared;*

$T$ *is the duration of the measurements in seconds.*

Using the 'running rms' method *AS2670.1-2001 Section 6.3.1* which is entitled *"Additional evaluation of vibration when the basic evaluation method is not sufficient".* Indicates that the basic evaluation method would be sufficient for most cases, except under specified circumstances. Further to this, the *Section 6.2 "Applicability of the basic evaluation method"* states *"For vibration with crest factors below or equal to 9, the basic evaluation method is normally sufficient."*

*AS2670.2-1990 3.3 "Characterization of transient, continuous and intermittent vibration with respect to human response*" states "*intermittent vibration is a string of vibration incidents, each of short duration, separated by intervals of much lower vibration magnitudes… (for example intermittent machinery, lifts* ***railway trains and traffic passing by****).*" Which indicates that railway trains would fall under the intermittent type of vibration type.

Based on the information provided in the above standards, and from experience in the assessment of rail vibration within the distances considered, we believe the appropriate criteria is as follows:

| | |
|---|---|
| Target Criteria | 1.4 times the base curve |
| Limit Criteria | 4 times the base curve |

Whilst the above forms the basis of the assessable criteria, for completeness, the maximum vibration level for each train pass has also been provided for informational purposes. The maximum is the highest level of vibration (acceleration) in each frequency for the pass-by event.

# 3. ACOUSTIC ENVIRONMENT

## 3.1 NOISE MEASUREMENTS

Measurements of the current passenger rail system have been conducted. Noise level measurements of individual train pass-by events were made at the Perth to Armadale line for current speeds and train configuration, i.e. 90km/hr, and 2 and 4 carriage A Series passenger trains, (and the diesel Australind).

Noise measurements were conducted with a Larson Davis 831 Sound Level Meter. The Sound Level Meter was calibrated prior to and after use with a Bruel and Kjaer 4230 Calibrator. All equipment used is currently NATA laboratory calibrated. Calibration certificates are available on request.

The resultant noise levels for a sample of the measurements are contained in Table 3.1.

**TABLE 3.1: SUMMARY OF MEASURED NOISE LEVELS**

| Train type | Size | Speed | Measurement Distance Metres | $L_{Amax}$ ($95^{th}$ percentile) | $L_{Aeq}$ Average |
|---|---|---|---|---|---|
| A-Series | 2 Carriage Train (43m long) | 90km per hour | 18 | ***80.0*** | ***74.4*** |
| A-Series | 2 Carriage Train (43m long) | 90km per hour | 21 | ***79.0*** | ***72.1*** |
| A-Series | 4 Carriage Train (86m long) | 90km per hour | 18 | ***85.2*** | ***76.9*** |
| A-Series | 4 Carriage Train (86m long) | 90km per hour | 21 | ***82.8*** | ***74.5*** |
| Diesel Passenger (Australind) | 2 Carriage Train (43m long) | 90km per hour | 18 | ***74.2*** | ***68.9*** |

The above individual train pass noise level can be used to calculate the $L_{Aeq(16hour)}$ Day, and the $L_{Aeq(8hour)}$ Night noise levels. This is based on the quantity of trains for each period, referencing the passenger rail timetable. Hence, Table 3.2 contains the details used for the calculations.

**TABLE 3.2 – RELATIONSHIP BETWEEN MEASURED NOISE LEVELS AND TRAIN VOLUMES**

| Description | Value |
|---|---|
| Train Qty per 24 hours | 149* |
| Train Qty per 16 hours Day | 129 |
| Train Qty per 8 hours Night | 20 |
| Distance of receiver (metres) | 15 |
| $L_{Aeq(20second)}$ at receiver (Train pass by event) | 77.0 |
| Time train noise is present (Seconds) | 20 |
| Total time noise present (Minutes) Day | 43 |
| Total time noise present (Minutes) Night | 7 |
| Total time noise present (Minutes) 24 hours | 50 |
| **$L_{Aeq(16hour)}$ Day period** | **63.5** |
| **$L_{Aeq(8hour)}$ Night period** | **58.4** |

*Based on the public timetable for this section of rail line.

Based on the above monitoring results, for this project, the difference between the $L_{Aeq,8hr}$ and the $L_{Aeq,16hr}$ has been taken to be those listed in Table 3.2. It was assumed that these differences would apply in the future.

We note that with the difference between the $L_{Aeq,8hr}$ and the $L_{Aeq,16hr}$ being greater than 5 dB(A), achieving compliance with the day period criteria will also achieve compliance with the night period criteria. Thus, only noise contour plots for the day period have been shown.

## 3.2 VIBRATION

Measured vibration levels were conducted at a nearby project at a similar distance to the proposed.

Analysis of the measured vibration level for each train pass has been undertaken. An example time history of a single train pass is shown below in Figure 3.1.

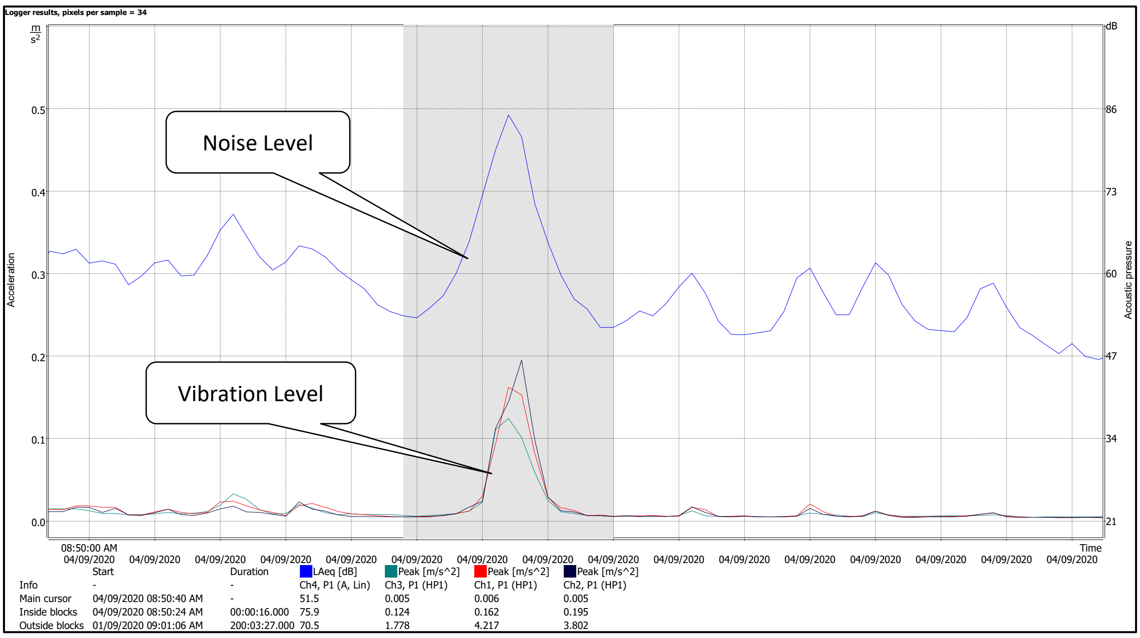


**FIGURE 3.1 - NOISE AND VIBRATION TIME HISTORY INDIVIDUAL TRAIN PASS EVENT**

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Individual train vibration events were analysed for the monitoring location, which is 37m from the rail line, with an example of the above event and comparison to the criteria, shown in Figure 3.2.

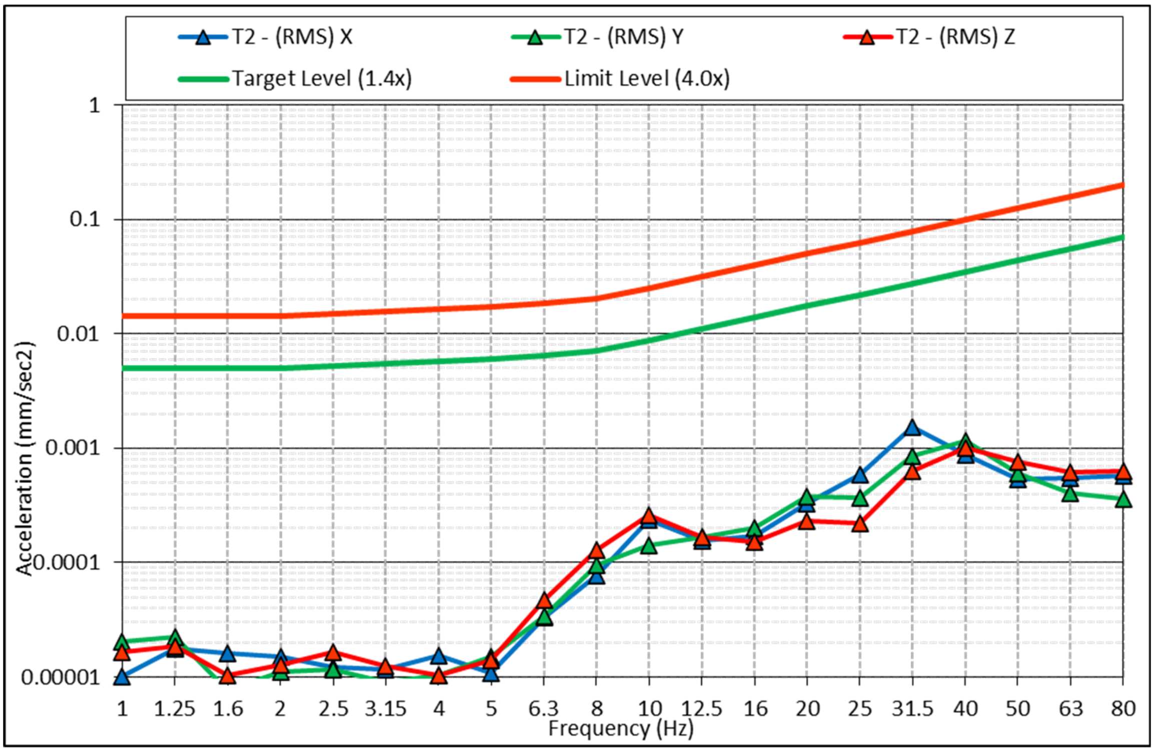


**FIGURE 3.2 TRAIN PASS BY EVENT VIBRATION PLOT – MONITOR (37m)**

Given the distance of the development in regard to the passenger rail line, i.e. around 40m from the nearest rail line, the vibration levels would be below any criteria required.

Therefore, no vibration control to the proposed development is recommended and standards construction would be suitable.

It is noted that the above is based on the existing, "at grade" passenger rail line. As the future passenger rail line is to be elevated, in a viaduct, the vibration levels would be further attenuated from those currently measure, hence would likely be non-existent.

## 4. MODELLING

Using the measured levels of the train as a basis for calibration, predictive noise modelling using Soundplan has been carried out.

The input data for the model included:

- Topographical data obtained from SMEC / Downer.
- Current passenger rail volumes as per information contained on https://www.transperth.wa.gov.au/timetables.
- A +2.5 dB adjustment to allow for façade reflection.
- Calibrated noise levels for the $L_{Aeq(day)}$ and $L_{Aeq(night)}$ as per the monitored noise levels, summarised in Table 4.2. Note calibration is against the current traffic flow.

- Existing residential housing / building throughout the study area.

Two scenarios were considered for the assessment, being the current train configuration and the proposed future train traffic volumes. Details for these scenarios are as follows:

- Current trains – 129 per day period (LAeq16hour) at 90km/hr, consisting of both 2 and 4 carriage A-Series trains.
- Future trains – 240 per day (LAeq16hour) i.e. 15 per hour at 90km/hr consisting of 6 carriage B-Series trains

For the future passenger rail line, it is understood that this section of rail will be elevated in a viaduct rail system. Future predictive noise modelling has considered this alignment, with the rail source increased in height to allow for the Elevate Project.

Predictive noise levels for the rail line which is both at grade and elevated have been calculated. Nord2000 railway algorithms have been used with the elevated section of the rail being modelled in a viaduct.

## 5. RESULTS

Using the data contained in Tables 3.1 and 3.2, modelling was carried out under existing conditions for calibration. The Sound Plan model for the site has been set up for the 2041 scenario.

Individual noise levels receiver points were calculated for the façade at each of the residential levels (Level 2 to 15) of the proposed building. Each receiver point relates to an apartment type which is shown in Appendix A. The individual noise levels for the current rail system, and the future proposed rail system are shown in Table 5.1 below.

**TABLE 5.1 – CALCULATED NOISE LEVELS DB(A)**

| Location | Scenario 1 – Current (2021) | Scenario 2 – Future (Elevated 2041) | Location | Scenario 1 – Current (2021) | Scenario 2 – Future (Elevated 2041) |
|---|---|---|---|---|---|
| L2 Type A Bed 2 | 55 | 42 | L9 Type A Bed 2 | 57 | 59 |
| L2 Type A Living | 39 | 21 | L9 Type A Living | 38 | -4 |
| L2 Type A M.Bed | 40 | 16 | L9 Type A M.Bed | 39 | 2 |
| L2 Type B Bed 2 | 55 | 43 | L9 Type B Bed 2 | 58 | 59 |
| L2 Type B Bed / Living | 51 | 39 | L9 Type B Bed / Living | 55 | 51 |
| L2 Type C Living | 43 | 5 | L9 Type B Living | 58 | 59 |
| L2 Type C M.Bed | 43 | 11 | L9 Type C Bed 2 | 59 | 61 |
| L2 Type D Living | 41 | 0 | L9 Type C Living | 53 | 49 |
| L2 Type D M.Bed | 42 | 11 | L9 Type C M.Bed | 62 | 63 |
| L3 Type A Bed 2 | 56 | 44 | L9 Type D Bed 2 | 60 | 61 |
| L3 Type A Living | 38 | 10 | L9 Type D Living | 60 | 61 |
| L3 Type A M.Bed | 39 | 9 | L9 Type D M.Bed | 58 | 59 |
| L3 Type B Bed 2 | 57 | 45 | L9 Type E Living | 59 | 60 |
| L3 Type B Bed / Living | 52 | 43 | L9 Type E M.Bed | 58 | 57 |
| L3 Type B Living | 57 | 45 | L9 Type F Living | 39 | 9 |
| L3 Type C Bed 2 | 58 | 46 | L9 Type F M.Bed | 39 | 7 |
| L3 Type C Living | 60 | 47 | L9 Type G Living | 39 | -2 |
| L3 Type C M.Bed | 62 | 50 | L9 Type G M.Bed | 40 | 27 |
| L3 Type D Bed 2 | 62 | 49 | L10 Type A Bed 2 | 57 | 59 |
| L3 Type D Living | 62 | 50 | L10 Type A Living | 38 | 1 |
| L3 Type D M.Bed | 61 | 49 | L10 Type A M.Bed | 39 | 7 |
| L3 Type E Living | 61 | 49 | L10 Type B Bed 2 | 58 | 59 |
| L3 Type E M.Bed | 61 | 48 | L10 Type B Bed / Living | 55 | 53 |
| L3 Type F Living | 40 | 1 | L10 Type B Living | 58 | 59 |
| L3 Type F M.Bed | 40 | 2 | L10 Type C Bed 2 | 59 | 62 |
| L3 Type G Living | 40 | 5 | L10 Type C Living | 52 | 45 |
| L3 Type G M.Bed | 40 | 18 | L10 Type C M.Bed | 62 | 63 |
| L4 Type A Bed 2 | 57 | 46 | L10 Type D Bed 2 | 59 | 60 |
| L4 Type A Living | 38 | 8 | L10 Type D Living | 59 | 59 |
| L4 Type A M.Bed | 39 | 10 | L10 Type D M.Bed | 57 | 57 |
| L4 Type B Bed 2 | 57 | 46 | L10 Type E Living | 58 | 58 |
| L4 Type B Bed / Living | 53 | 45 | L10 Type E M.Bed | 57 | 57 |
| L4 Type B Living | 58 | 46 | L10 Type F Living | 39 | 16 |
| L4 Type C Bed 2 | 59 | 48 | L10 Type F M.Bed | 39 | 11 |
| L4 Type C Living | 59 | 49 | L10 Type G Living | 39 | 0 |
| L4 Type C M.Bed | 62 | 53 | L10 Type G M.Bed | 40 | 28 |
| L4 Type D Bed 2 | 62 | 52 | L11 Type A Bed 2 | 57 | 59 |
| L4 Type D Living | 62 | 52 | L11 Type A Living | 39 | 2 |
| L4 Type D M.Bed | 61 | 51 | L11 Type A M.Bed | 40 | 9 |
| L4 Type E Living | 61 | 52 | L11 Type B Bed 2 | 57 | 60 |

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| Location | Scenario 1 – Current (2021) | Scenario 2 – Future (Elevated 2041) | Location | Scenario 1 – Current (2021) | Scenario 2 – Future (Elevated 2041) |
|---|---|---|---|---|---|
| L4 Type E M.Bed | 60 | 51 | L11 Type B Bed / Living | 54 | 52 |
| L4 Type F Living | 39 | 2 | L11 Type B Living | 56 | 58 |
| L4 Type F M.Bed | 38 | 2 | L11 Type C Bed 2 | 58 | 63 |
| L4 Type G Living | 39 | 1 | L11 Type C Living | 51 | 40 |
| L4 Type G M.Bed | 39 | 19 | L11 Type C M.Bed | 61 | 62 |
| L5 Type A Bed 2 | 57 | 47 | L11 Type D Bed 2 | 56 | 54 |
| L5 Type A Living | 38 | 7 | L11 Type D Living | 58 | 41 |
| L5 Type A M.Bed | 39 | 10 | L11 Type D Living | 48 | 58 |
| L5 Type B Bed 2 | 57 | 47 | L11 Type D M.Bed | 58 | 59 |
| L5 Type B Bed / Living | 54 | 46 | L11 Type E Living | 39 | 1 |
| L5 Type B Living | 58 | 48 | L11 Type E M.Bed | 40 | 35 |
| L5 Type C Bed 2 | 59 | 50 | L12 Type A Bed 2 | 57 | 60 |
| L5 Type C Living | 58 | 52 | L12 Type A Bed 2 | 57 | 61 |
| L5 Type C M.Bed | 62 | 56 | L12 Type A Living | 38 | 6 |
| L5 Type D Bed 2 | 62 | 55 | L12 Type A Living | 39 | 4 |
| L5 Type D Living | 62 | 56 | L12 Type A M.Bed | 40 | 10 |
| L5 Type D M.Bed | 61 | 55 | L12 Type A M.Bed | 40 | 11 |
| L5 Type E Living | 61 | 55 | L12 Type B Bed 2 | 57 | 61 |
| L5 Type E M.Bed | 60 | 54 | L12 Type B Bed 2 | 57 | 61 |
| L5 Type F Living | 39 | 2 | L12 Type B Bed / Living | 54 | 53 |
| L5 Type F M.Bed | 38 | 2 | L12 Type B Bed / Living | 54 | 52 |
| L5 Type G Living | 39 | -1 | L12 Type B Living | 57 | 61 |
| L5 Type G M.Bed | 39 | 20 | L12 Type B Living | 58 | 61 |
| L6 Type A Bed 2 | 57 | 48 | L12 Type C Bed 2 | 58 | 63 |
| L6 Type A Living | 38 | 9 | L12 Type C Bed 2 | 58 | 63 |
| L6 Type A M.Bed | 39 | 5 | L12 Type C Living | 49 | 38 |
| L6 Type B Bed 2 | 58 | 49 | L12 Type C Living | 48 | 40 |
| L6 Type B Bed / Living | 54 | 48 | L12 Type C M.Bed | 61 | 60 |
| L6 Type B Living | 58 | 50 | L12 Type C M.Bed | 61 | 62 |
| L6 Type C Bed 2 | 59 | 58 | L12 Type D Bed 2 | 55 | 52 |
| L6 Type C Living | 57 | 58 | L12 Type D Bed 2 | 55 | 48 |
| L6 Type C M.Bed | 62 | 63 | L12 Type D Living | 55 | 53 |
| L6 Type D Bed 2 | 61 | 63 | L12 Type D Living | 56 | 53 |
| L6 Type D Living | 62 | 62 | L12 Type D Living | 54 | 57 |
| L6 Type D M.Bed | 61 | 61 | L12 Type D Living | 57 | 58 |
| L6 Type E Living | 61 | 62 | L12 Type D M.Bed | 56 | 54 |
| L6 Type E M.Bed | 59 | 60 | L12 Type D M.Bed | 56 | 59 |
| L6 Type F Living | 39 | 3 | L12 Type E Living | 39 | 2 |
| L6 Type F M.Bed | 39 | 2 | L12 Type E Living | 39 | 4 |
| L6 Type G Living | 39 | -2 | L12 Type E M.Bed | 40 | 34 |
| L6 Type G M.Bed | 39 | 21 | L12 Type E M.Bed | 40 | 34 |

| Location | Scenario 1 – Current (2021) | Scenario 2 – Future (Elevated 2041) | Location | Scenario 1 – Current (2021) | Scenario 2 – Future (Elevated 2041) |
|---|---|---|---|---|---|
| L7 Type A Bed 2 | 57 | 50 | L14 Type A Bed 2 | 57 | 61 |
| L7 Type A Living | 38 | -2 | L14 Type A Living | 38 | 9 |
| L7 Type A M.Bed | 39 | -1 | L14 Type A M.Bed | 39 | 14 |
| L7 Type B Bed 2 | 58 | 51 | L14 Type B Bed 2 | 57 | 61 |
| L7 Type B Bed / Living | 54 | 48 | L14 Type B Bed / Living | 54 | 52 |
| L7 Type B Living | 58 | 57 | L14 Type B Living | 57 | 62 |
| L7 Type C Bed 2 | 59 | 60 | L14 Type C Bed 2 | 58 | 63 |
| L7 Type C Living | 56 | 57 | L14 Type C Living | 47 | 36 |
| L7 Type C M.Bed | 62 | 63 | L14 Type C M.Bed | 60 | 58 |
| L7 Type D Bed 2 | 61 | 62 | L14 Type D Bed 2 | 54 | 45 |
| L7 Type D Living | 62 | 62 | L14 Type D Living | 56 | 49 |
| L7 Type D M.Bed | 60 | 60 | L14 Type D Living | 55 | 59 |
| L7 Type E Living | 61 | 61 | L14 Type D M.Bed | 55 | 52 |
| L7 Type E M.Bed | 59 | 59 | L14 Type E Living | 38 | 7 |
| L7 Type F Living | 39 | 4 | L14 Type E M.Bed | 39 | 34 |
| L7 Type F M.Bed | 39 | 3 | L15 Type A Bed 2 | 57 | 61 |
| L7 Type G Living | 39 | -3 | L15 Type A Living | 38 | 18 |
| L7 Type G M.Bed | 40 | 22 | L15 Type A M.Bed | 39 | 20 |
| L8 Type A Bed 2 | 57 | 56 | L15 Type B Bed 2 | 57 | 61 |
| L8 Type A Living | 38 | -3 | L15 Type B Bed / Living | 53 | 52 |
| L8 Type A M.Bed | 39 | -1 | L15 Type B Living | 57 | 62 |
| L8 Type B Bed 2 | 58 | 59 | L15 Type C Bed 2 | 58 | 62 |
| L8 Type B Bed / Living | 55 | 48 | L15 Type C Living | 46 | 35 |
| L8 Type B Living | 58 | 59 | L15 Type C M.Bed | 59 | 58 |
| L8 Type C Bed 2 | 59 | 60 | L15 Type D Bed 2 | 53 | 42 |
| L8 Type C Living | 55 | 54 | L15 Type D Living | 56 | 59 |
| L8 Type C M.Bed | 62 | 63 | L15 Type D Living | 55 | 46 |
| L8 Type D Bed 2 | 61 | 62 | L15 Type D M.Bed | 54 | 47 |
| L8 Type D Living | 61 | 61 | L15 Type E Living | 37 | 14 |
| L8 Type D M.Bed | 59 | 60 | L15 Type E M.Bed | 38 | 35 |
| L8 Type E Living | 60 | 61 | | | |
| L8 Type E M.Bed | 58 | 58 | | | |
| L8 Type F Living | 39 | 6 | | | |
| L8 Type F M.Bed | 39 | 5 | | | |
| L8 Type G Living | 39 | -3 | | | |
| L8 Type G M.Bed | 40 | 23 | | | |

For each location and corresponding noise level, the acoustic ameliorations, in the form of window glazing has been listed to meet the internal criteria. The noise requirements based on the above have been listed in Appendix B.

It is noted that these requirements pertain to acoustic requirements only, with regard to *State Planning Policy 5.4,* and may be superseded by other requirements (BAL, Thermal, etc).

## 6. CONCLUSION

**NOISE**

In accordance with the WAPC Planning Policy 5.4, an assessment of the noise that would be received within the development of Lots 2 and 3 Bank Street, Victoria Park, from future passenger rail travelling on the Perth to Armadale Train Line has been undertaken.

In accordance with the Policy, the following would be the acoustic criteria applicable to this project:

**External**

| | |
|---|---|
| Day | 55 dB(A) $L_{Aeq}$ |
| Night | 50 dB(A) $L_{Aeq}$ |

**Internal**

| | |
|---|---|
| Sleeping Areas | 35 dB(A) $L_{Aeq(night)}$ |
| Living Areas | 40 dB(A) $L_{Aeq(day)}$ |

It is noted that walls of the development would be required to be constructed of either masonry or concrete. If a lightweight construction or similar is desirable, investigation into constructions that would meet the requirement of State Planning Policy 5.4 would have to be undertaken.

The results of the acoustic assessment indicate that noise received at the development from future traffic, exceed external noise level criteria. Therefore, noise amelioration in the form of quiet house design (glazing Upgrades) listed in Appendix B, as well as notifications on the title is required.

**VIBRATION**

Given the distance of the development in regard to the freight line, i.e. greater than 40m from the nearest rail line, the vibration levels would be below any criteria required.

Measurements conducted onsite resulted in no discernible vibration level being recorded. This was confirmed when vibration levels were referenced for the same time period as the noise levels for the known train event.

Therefore, no vibration control to the proposed development is recommended and standards construction would be suitable.

# APPENDIX A

PLANS

TOWN OF VICTORIA PARK
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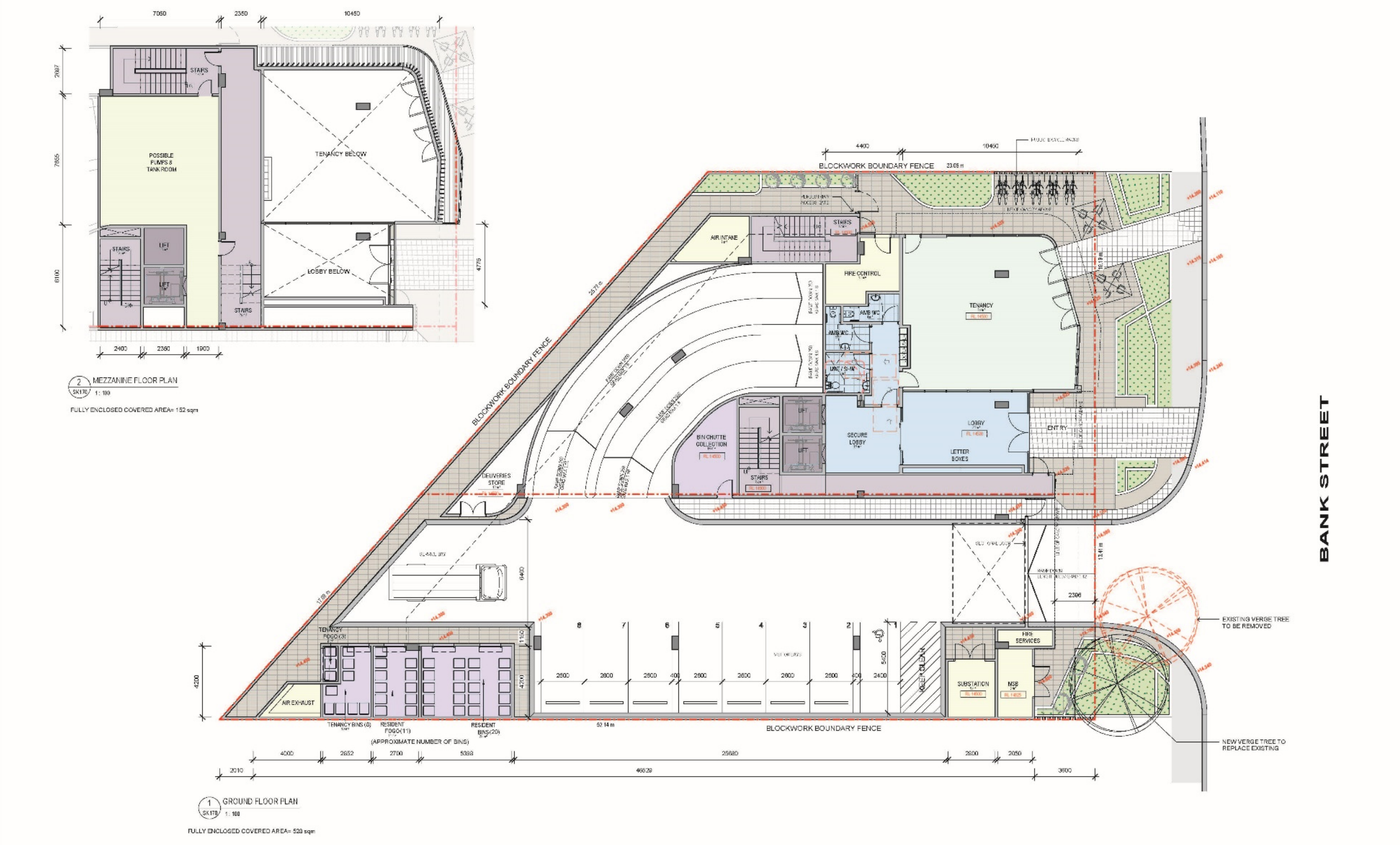


PRELIMINARY ISSUE

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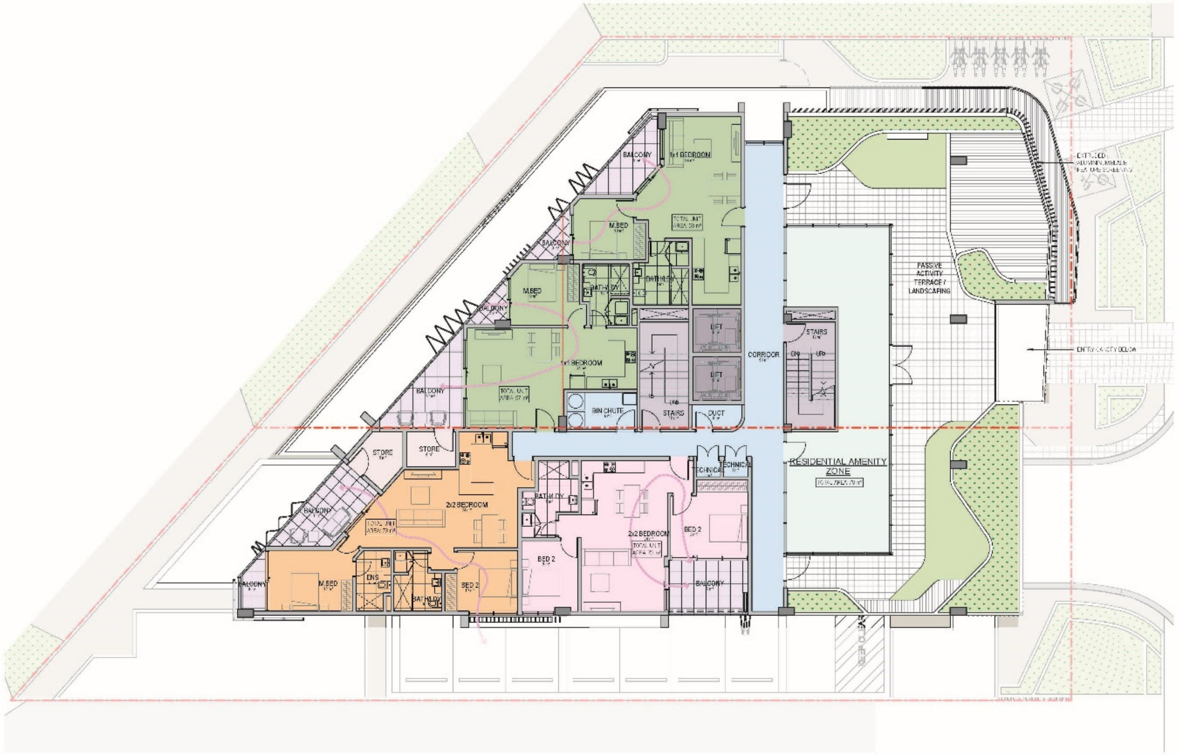
GOLDBLAZE NOMINEES PTY LTD

METRO APARTMENTS
167 & 169 BANK STREET, EAST VIC PARK WA 6101
Project No 23-16

GROUND FLOOR PLAN
SCALE 1: 100

SK110 rev. D
scale 1:100 @ A1 size




1 SK170 LEVEL 2 FLOOR PLAN
1 : 100

TOTAL FLOOR AREA : 520 m2
PLOT RATIO AREA (EXCLUDING UNENCLOSABLE BALCONIES) : 271 m2
UNENCLOSABLE BALCONIES: 53 m2

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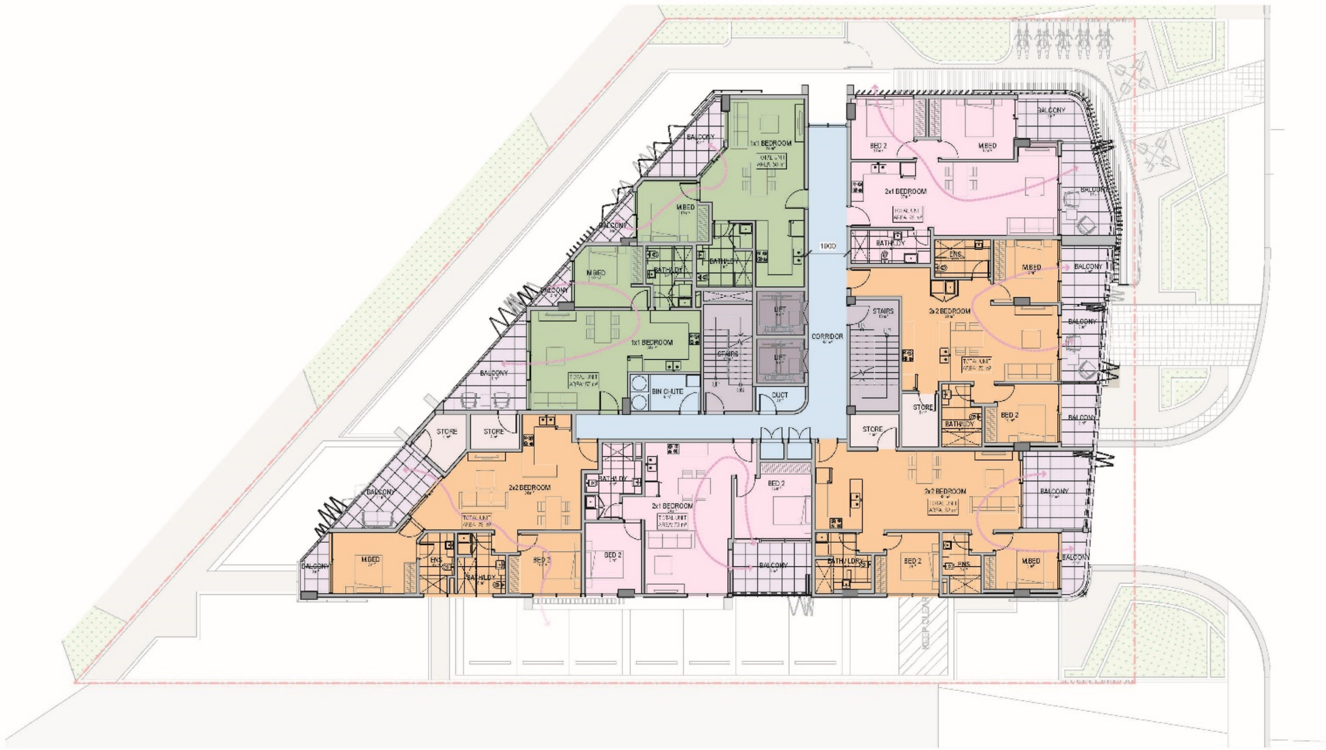
LEVEL 2 FLOOR PLAN
SCALE 1: 100

SK120 rev. B
scale 1:100 @ A1 size




1 SK170 TYPICAL FLOOR PLAN LEVEL 3 - 10
1 : 100

TOTAL FLOOR AREA : 730 m2
PLOT RATIO AREA (EXCLUDING UNENCLOSABLE BALCONIES) : 505 m2
UNENCLOSABLE BALCONIES: 102 m2

**GENERAL NOTE:** THE APARTMENT AREAS SHOWN HERE ARE APPROXIMATE AND ARE MEASURED TO:
- THE OUTSIDE FACE OF EXTERNAL WALLS
- THE OUTSIDE FACE OF WALLS BETWEEN APARTMENT & LOBBY
- THE MIDDLE OF PARTY WALLS
- THESE AREA MEASUREMENTS ARE "ARCHITECTURAL MEASUREMENTS" AND ARE DIFFERENT FROM "SURVEY DIMENSIONS"

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TYPICAL FLOOR PLAN LEVEL 3 - 10
2 1 0 2 4 6 Metres
SCALE 1: 100

N

SK130 rev. B
scale 1 : 100 @ A1 size

TOWN OF VICTORIA PARK
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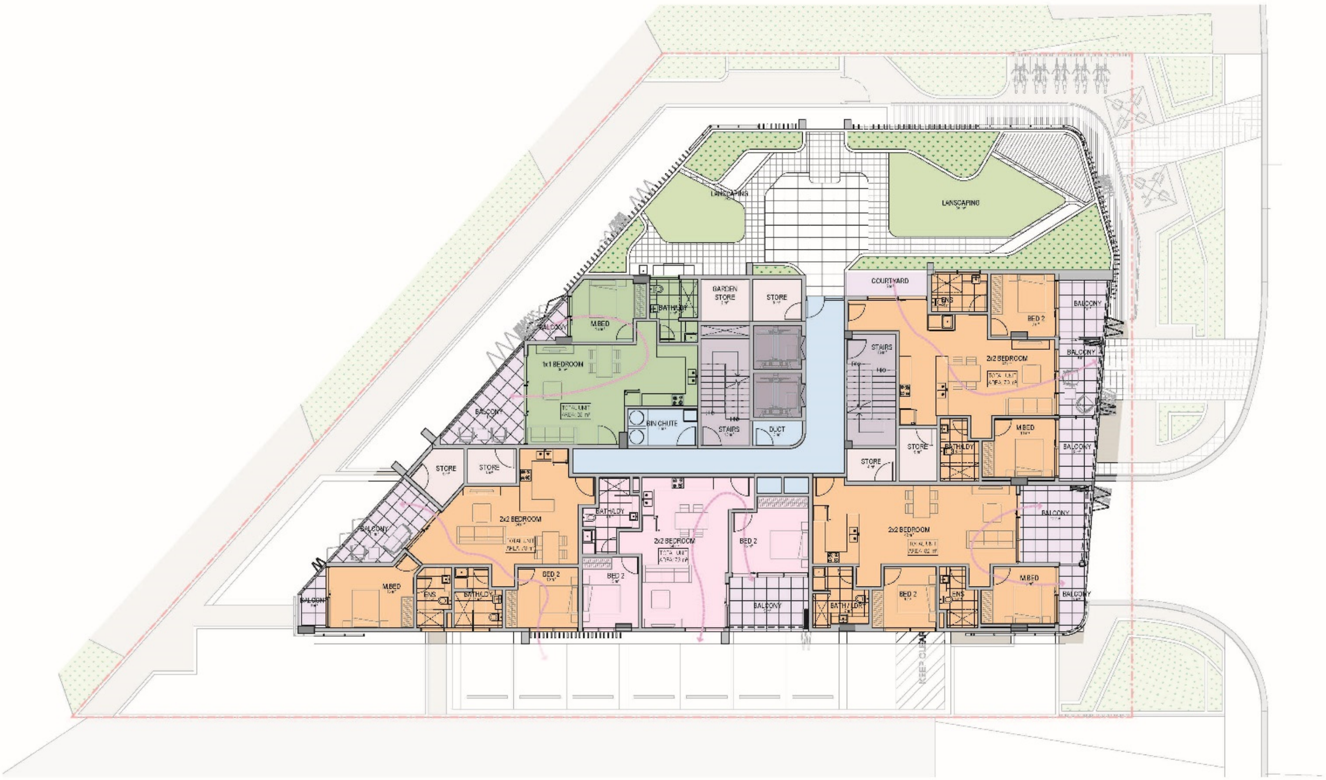


1 / SK170 — LEVEL 11 FLOOR PLAN
1 : 100

TOTAL FLOOR AREA : 720 m2
PLOT RATIO AREA (EXCLUDING UNENCLOSABLE BALCONIES) : 374 m2
UNENCLOSABLE BALCONIES: 73 m2

**GENERAL NOTE**: THE APARTMENT AREAS SHOWN HERE ARE APPROXIMATE AND ARE MEASURED TO:
- THE OUTSIDE FACE OF EXTERNAL WALLS
- THE OUTSIDE FACE OF WALLS BETWEEN APARTMENT & LOBBY
- THE MIDDLE OF PARTY WALLS
- THESE AREA MEASUREMENTS ARE "ARCHITECTURAL MEASUREMENTS" AND ARE DIFFERENT FROM "SURVEY DIMENSIONS"

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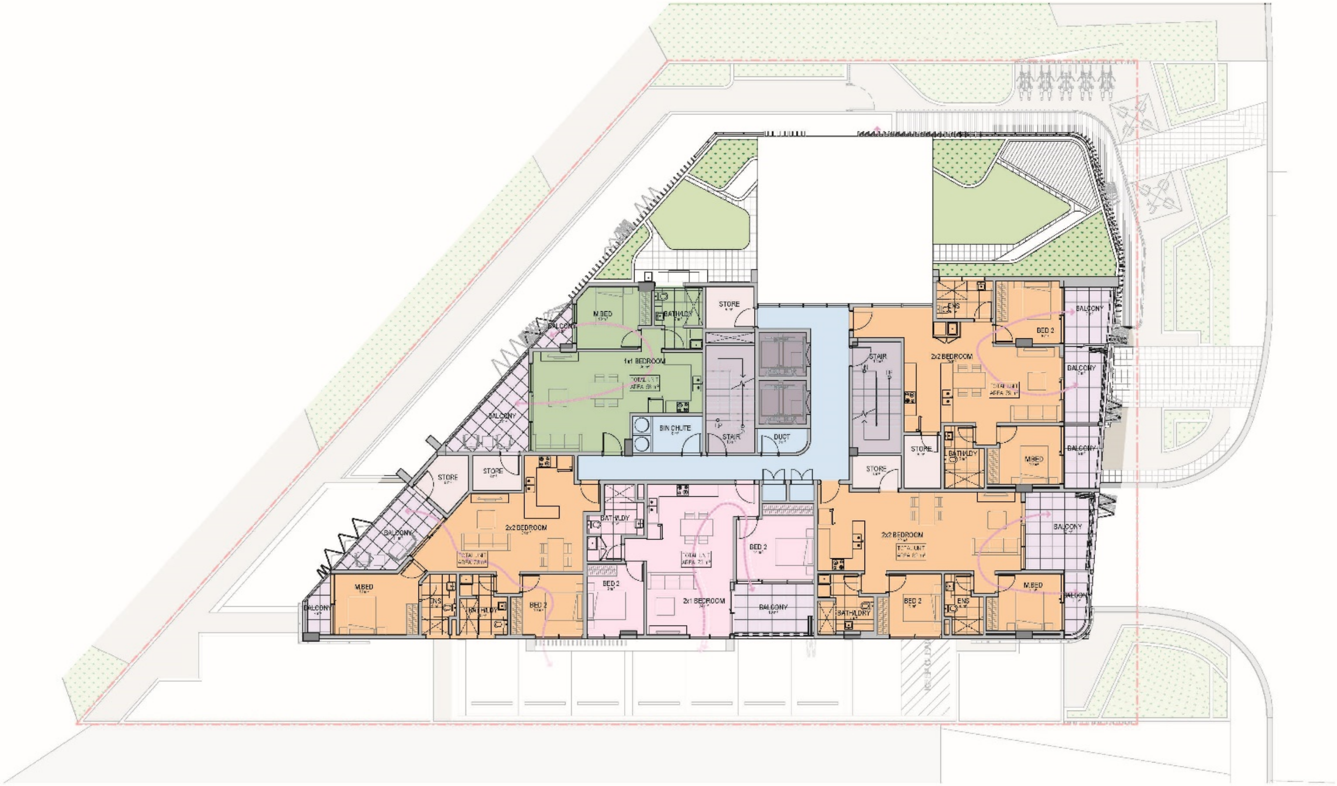
LEVEL 11 FLOOR PLAN
2 1 0 2 4 8 Metres
SCALE 1: 100

SK140 rev. B
scale 1:100 @ A1 size




1 / SK170 TYPICAL FLOOR PLAN LEVEL 12 - 15
1 : 100

TOTAL FLOOR AREA : 568 m2
PLOT RATIO AREA (EXCLUDING UNENCLOSABLE BALCONIES) : 374 m2
UNENCLOSABLE BALCONIES: 73 m2

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TYPICAL FLOOR PLAN LEVEL 12 - 15
SCALE 1: 100

SK150 rev. B
scale 1 : 100 @ A1 size

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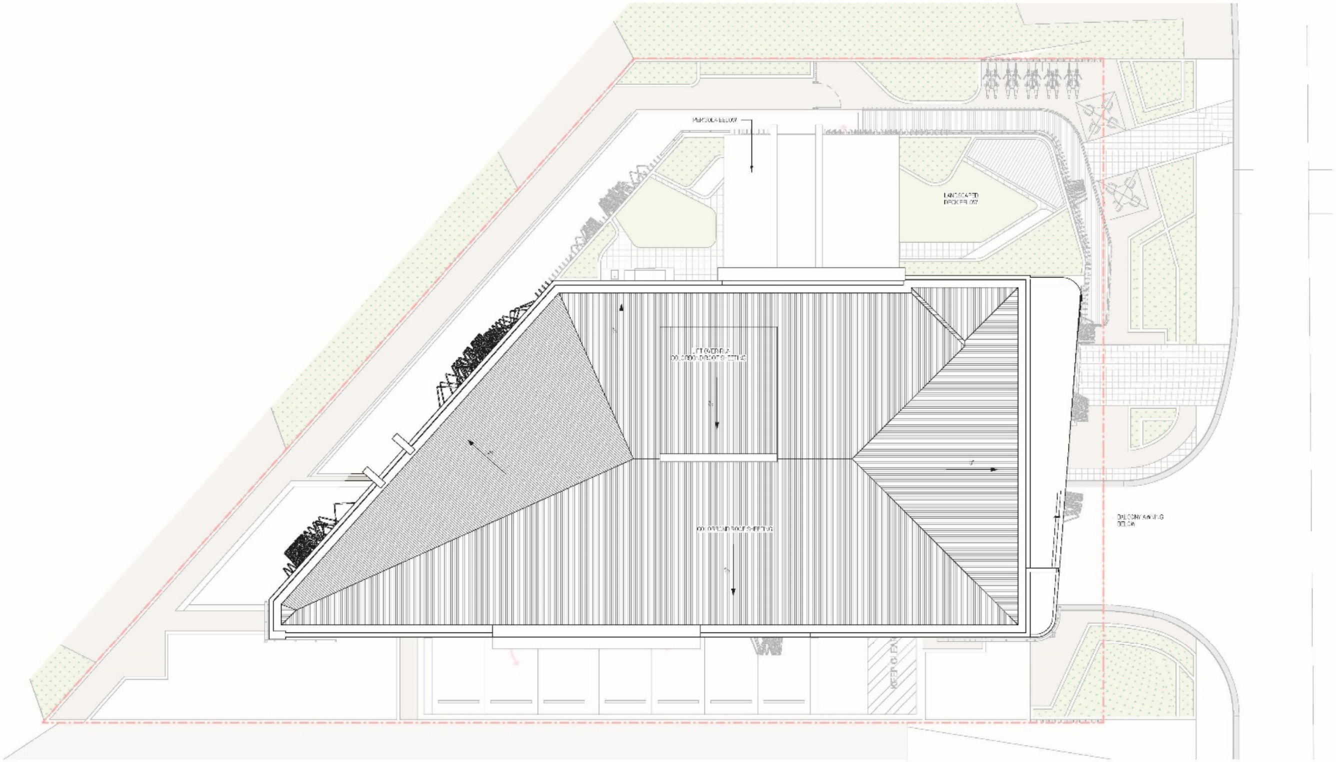

1 SK160 ROOF PLAN 1:100

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METRO APARTMENTS
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Project No 23-16

ROOF PLAN
SCALE 1: 100

SK160 rev. B
scale 1:100 @ A1 size

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# APPENDIX B

GLAZING REQUIREMENTS

TOWN OF VICTORIA PARK
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## TABLE B1 – ACOUSTICS REQUIREMENTS

| Calculated Noise Levels and Required $R_w$ and $C_{tr}$ Ratings | | | | |
|---|---|---|---|---|
| **Location** | **Floor** | **Noise Level** | **Bedroom $R_w + C_{tr}$** | **Living Room $R_w + C_{tr}$** |
| West Facing (Opposite Rail Line) | All Floors | < 50 | 23 | 23 |
| East Facing (Facing Rail Line) | Level 4 to 12 | 55 to 62 | 32 | 30 |
| | All Other Floors | <54 | 23 | 23 |
| South Facing (Side on to Rail Line) | Level 4 to 6 | <55 | 23 | 23 |
| | Level 7 to 14 | 60-63 | 32 | 30 |
| North Facing (Side on to Rail Line) | All Floors | <54 | 23 | 23 |

Notes: The required $R_W$ rating can be reduced by reducing the area of glazing.
Requirements pertain to only acoustic advice in regards to *State Planning Policy 5.4* and may be superceded by other requirements (BAL, Thermal, etc).

For information types of glazing that would meet the above requirements are listed in Table B2.

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**TABLE B2 – DEEMED TO SATISFY GLAZING**

| Building Element | Type | Airborne weighted sound reduction rating with traffic correction Rw+Ctr, dB | Building element Type Airborne weighted sound |
|---|---|---|---|
| Window, uPVC, aluminium or timber frame | Sliding or double hung opening | 23 | • 4mm monolithic glass |
| | | 26 | • Single pane glazing to Rw 33dB<br>• 6mm monolithic or laminated glass<br>• 6mm toughened safety glass<br>• '6-12-6' double insulated glass unit (IGU) |
| | | 29 | • Single pane glazing to Rw 36dB<br>• 10mm monolithic (aka float) glass<br>• 10mm laminated or toughened safety glass<br>• 6mm-12mm-10mm double insulating |
| | Fixed sash, awning or casement type opening | 26 | • 4mm monolithic glass |
| | | 31 | • Single pane glazing to Rw 33dB<br>• 6mm monolithic or laminated glass<br>• 6mm toughened safety glass<br>• '6-12-6' double insulated glass unit (IGU) |
| | | 34 | • Single pane glazing to Rw 36dB<br>• 10mm monolithic (a.k.a. float) glass<br>• 10mm laminated or toughened safety glass<br>• 6mm-12mm-10mm double insulated glass unit (IGU) |
| Single external door, aluminium uPVC or timber frame | Fully glazed sliding door | 24 | • 6mm monolithic or laminated<br>• 5 or 6mm toughened safety glass |
| | | 27 | • 10mm monolithic or laminated<br>• 10mm toughened safety glass |
| | Fully glazed hinged door | 28 | • Certified Rw 31dB acoustically rated door and frame including seals<br>• 6mm monolithic or laminated<br>• 5 or 6mm toughened safety glass |
| | | 31 | • Certified Rw 34dB acoustically rated door and frame including seals<br>• 10mm monolithic or laminated<br>• 10mm toughened safety glass |
| | Solid core timber frame, side hinged | 26 | • Certified Rw 28dB acoustically rated door and frame system including seals<br>• 35mm solid core timber |
| | | 30 | • Certified Rw 32dB acoustically rated door and frame system including seals<br>• 40mm solid core timber without glass insert<br>• 40mm solid core timber with not less than 6mm |