

# Environmental Noise Assessment - Liquor Store

**Lot 500 Safety Bay Road, Safety Bay**

**Reference: 23037938-04**

Prepared for:  
BB Holdings (WA) Pty Ltd

## Reference: 23037938-04

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## 1. INTRODUCTION

Lloyd George Acoustics (LGA) has previously completed a noise assessment<sup>1</sup> for a proposed mixed-use site that included a tavern, childcare centre and two commercial buildings to be located at Lot 500 Safety Bay Road, Safety Bay as located in *Figure 1-1*. Follow up noise assessments were also completed that included a redesign of the tavern<sup>2</sup> and the inclusion of a gym<sup>3</sup>.

Since then, a drive-through liquor store has been proposed on the site and therefore LGA has been engaged by BB Holdings (WA) Pty Ltd to undertake an environmental noise assessment specifically for this proposed liquor store. The site plan of the liquor store is shown in *Figure 1-2* and *Appendix A*.



**Figure 1-1: Subject Site Location (Source: DPLH PlanWA)**

The proposed liquor store will be open between:

- 9.00am to 9.00pm, Monday to Saturday; and
- 10.00am to 8.00pm on Sunday.

With regard to noise emissions, consideration is given to noise at neighbouring properties from vehicles idling in the drive-through and mechanical plant, against the prescribed standards of the *Environmental Protection (Noise) Regulations 1997*.

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<sup>1</sup> *Environmental Noise Assessment - Lot 100 Safety Bay Road, Safety Bay*; Reference: 23037938-01B, 8-Feb-24

<sup>2</sup> *Environmental Noise Assessment - Lot 100 Safety Bay Road, Safety Bay - Tavern*; Reference: 23037938-02B, 4-Dec-25

<sup>3</sup> *Environmental Noise Assessment - Lot 100 Safety Bay Road, Safety Bay - Gym*; Reference: 23037938-03, 11-Sep-25

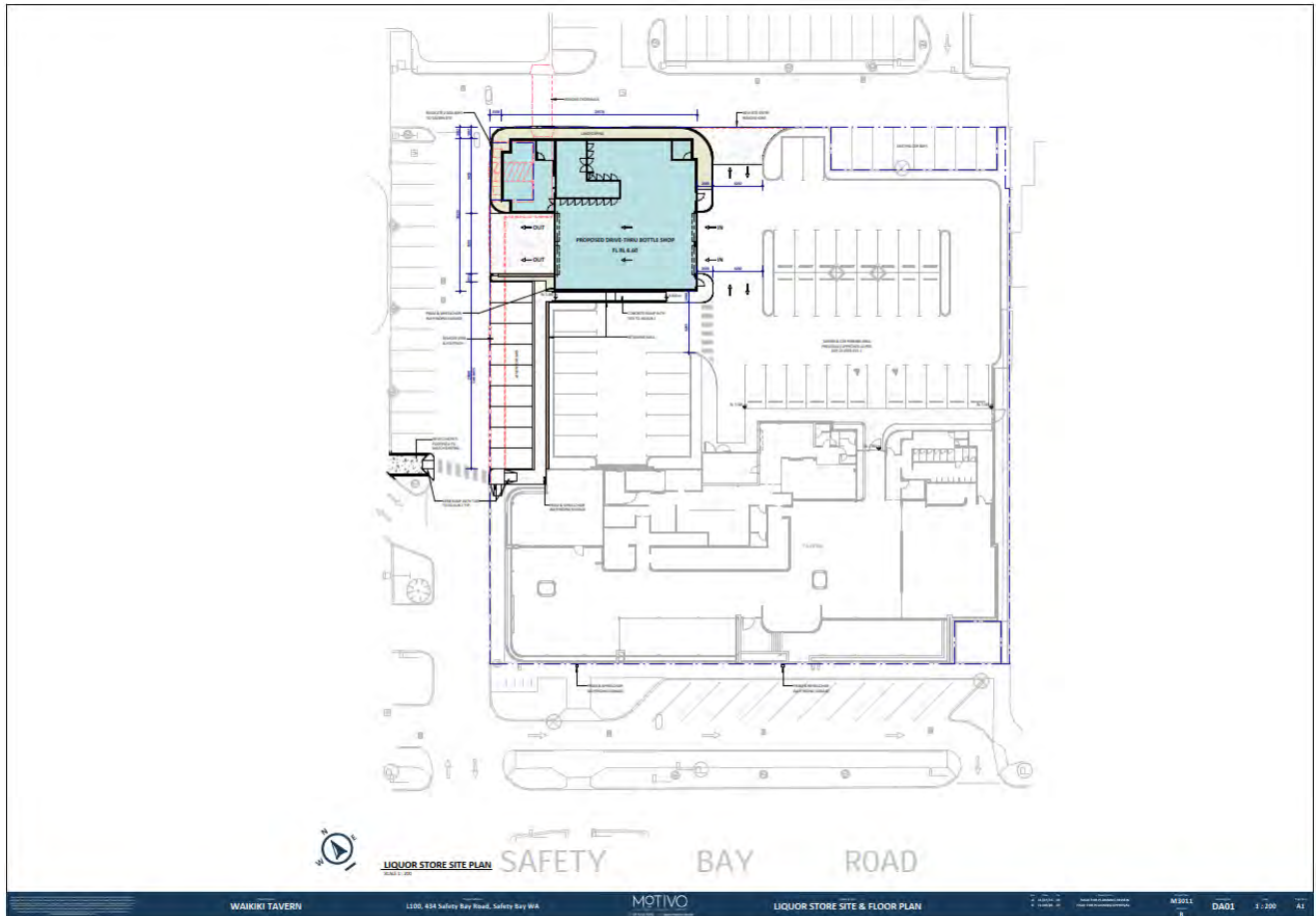


**Figure 1-2: Proposed Site Plan**

## 2. CRITERIA

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

### 2.1. Regulations 7, 8 & 9

This group of regulations provide the prescribed standard for noise as follows:

***“7. Prescribed standard for noise emissions***

- (1) Noise emitted from any premises or public place when received at other premises –*
  - (a) must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and*
  - (b) must be free of –*
    - (i) tonality; and*
    - (ii) impulsiveness; and*
    - (iii) modulation,**when assessed under regulation 9.*
- (2) For the purposes of subregulation (1)(a), a noise emission is taken to significantly contribute to a level of noise if the noise emission ... exceeds a value which is 5 dB below the assigned level at the point of reception.”*

Tonality, impulsiveness and modulation are defined in regulation 9 (refer *Appendix C*). Under regulation 9(3), “Noise is taken to be free of the characteristics of tonality, impulsiveness and modulation if -

- (a) the characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and*
- (b) the noise emission complies with the standard prescribed under regulation 7(1)(a) after the adjustments in the table [Table 2-1] ... are made to the noise emission as measured at the point of reception.”*

**Table 2-1 Adjustments Where Characteristics Cannot Be Removed**

| Where Noise Emission is Not Music* |            |               | Where Noise Emission is Music |               |
|------------------------------------|------------|---------------|-------------------------------|---------------|
| Tonality                           | Modulation | Impulsiveness | No Impulsiveness              | Impulsiveness |
| + 5 dB                             | + 5 dB     | + 10 dB       | + 10 dB                       | + 15 dB       |

\* These adjustments are cumulative to a maximum of 15 dB.

The assigned levels (prescribed standards) for all premises are specified in regulation 8(3) and are shown in *Table 2-2*. The  $L_{A10}$  assigned level is applicable to noises present for more than 10% of a representative assessment period, generally applicable to “steady-state” noise sources. The  $L_{A1}$  is for short-term noise sources present for less than 10% and more than 1% of the time. The  $L_{Amax}$  assigned level is applicable for incidental noise sources, present for less than 1% of the time.

**Table 2-2 Baseline Assigned Levels**

| Premises Receiving Noise                                            | Time Of Day                                                                                              | Assigned Level (dB)     |                         |                         |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|-------------------------|
|                                                                     |                                                                                                          | $L_{A10}$               | $L_{A1}$                | $L_{Amax}$              |
| Noise sensitive premises: highly sensitive area <sup>1</sup>        | 0700 to 1900 hours Monday to Saturday (Day)                                                              | 45 + influencing factor | 55 + influencing factor | 65 + influencing factor |
|                                                                     | 0900 to 1900 hours Sunday and public holidays (Sunday)                                                   | 40 + influencing factor | 50 + influencing factor | 65 + influencing factor |
|                                                                     | 1900 to 2200 hours all days (Evening)                                                                    | 40 + influencing factor | 50 + influencing factor | 55 + influencing factor |
|                                                                     | 2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night) | 35 + influencing factor | 45 + influencing factor | 55 + influencing factor |
| Noise sensitive premises: any area other than highly sensitive area | All hours                                                                                                | 60                      | 75                      | 80                      |
| Commercial Premises                                                 | All hours                                                                                                | 60                      | 75                      | 80                      |
| Industrial and Utility Premises                                     | All hours                                                                                                | 65                      | 80                      | 90                      |

1. *highly sensitive area* means that area (if any) of noise sensitive premises comprising —

- (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
- (b) any other part of the premises within 15 metres of that building or that part of the building.

The influencing factor (IF), in relation to noise received at noise sensitive premises, has been calculated as between 2-5 dB, as determined in *Appendix B*. *Table 2-3* shows the assigned levels including the influencing factor at the groups of receiving locations.

**Table 2-3 Assigned Levels**

| Premises Receiving Noise                                                             | Time Of Day                                                                                              | Assigned Level (dB) |                 |                   |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------|-----------------|-------------------|
|                                                                                      |                                                                                                          | L <sub>A10</sub>    | L <sub>A1</sub> | L <sub>Amax</sub> |
| +5 dB IF (Northwest)<br>Noise sensitive premises: highly sensitive area <sup>1</sup> | 0700 to 1900 hours Monday to Saturday (Day)                                                              | 50                  | 60              | 70                |
|                                                                                      | 0900 to 1900 hours Sunday and public holidays (Sunday)                                                   | 45                  | 55              | 70                |
|                                                                                      | 1900 to 2200 hours all days (Evening)                                                                    | 45                  | 55              | 60                |
|                                                                                      | 2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night) | 40                  | 50              | 60                |
| +4 dB IF (North)<br>Noise sensitive premises: highly sensitive area <sup>1</sup>     | 0700 to 1900 hours Monday to Saturday (Day)                                                              | 49                  | 59              | 69                |
|                                                                                      | 0900 to 1900 hours Sunday and public holidays (Sunday)                                                   | 44                  | 54              | 69                |
|                                                                                      | 1900 to 2200 hours all days (Evening)                                                                    | 44                  | 54              | 59                |
|                                                                                      | 2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night) | 39                  | 49              | 59                |
| +2 dB IF (Northeast)<br>Noise sensitive premises: highly sensitive area <sup>1</sup> | 0700 to 1900 hours Monday to Saturday (Day)                                                              | 47                  | 57              | 67                |
|                                                                                      | 0900 to 1900 hours Sunday and public holidays (Sunday)                                                   | 42                  | 52              | 67                |
|                                                                                      | 1900 to 2200 hours all days (Evening)                                                                    | 42                  | 52              | 57                |
|                                                                                      | 2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night) | 37                  | 47              | 57                |
| +4 dB IF (Southeast)<br>Noise sensitive premises: highly sensitive area <sup>1</sup> | 0700 to 1900 hours Monday to Saturday (Day)                                                              | 49                  | 59              | 69                |
|                                                                                      | 0900 to 1900 hours Sunday and public holidays (Sunday)                                                   | 44                  | 54              | 69                |
|                                                                                      | 1900 to 2200 hours all days (Evening)                                                                    | 44                  | 54              | 59                |
|                                                                                      | 2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night) | 39                  | 49              | 59                |
| Commercial Premises                                                                  | All hours                                                                                                | 60                  | 75              | 80                |

It must be noted the assigned levels above apply outside the receiving premises and at a point at least 3 metres away from any substantial reflecting surfaces.

The assigned levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as *“a period of time of not less than 15 minutes, and not exceeding 4 hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission”*. An inspector or authorised person is a person appointed under Sections 87 & 88 of the *Environmental Protection Act 1986* and include Local Government Environmental Health Officers and Officers from the Department of Water Environmental Regulation. Acoustic consultants or other environmental consultants are not appointed as an inspector or authorised person. Therefore, whilst this assessment is based on a 4-hour RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

## 2.2. Regulation 3

### ***“3. Regulations do not apply to certain noise emissions***

- (1) Nothing in these regulations applies to the following noise emissions –*
  - (a) Noise emissions from the propulsion and braking systems of motor vehicles operating on a road;”*

The car park is considered a road and therefore vehicle noise (propulsion and braking) is not assessed. However, vehicle noise in the drive-through area has been considered assessable in this report due to the lanes being used solely for ordering purposes and not road access. Noise from the delivery truck condensing units are also considered assessable.

### 3. METHODOLOGY

Computer modelling has been used to predict the noise emissions from the development to all nearby receivers. The software used was *SoundPLAN 9.0* with the ISO 9613 algorithms (ISO 17534-3 improved method) selected, as they include the influence of wind and are considered appropriate given the relatively short source to receiver distances. Input data required in the model are listed below and discussed in *Section 3.1* to *Section 3.4*:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

#### 3.1. Meteorological Conditions

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

**Table 3-1: Modelling Meteorological Conditions**

| Parameter        | Day (7.00am to 7.00pm) | Night (7.00pm to 7.00am) |
|------------------|------------------------|--------------------------|
| Temperature (°C) | 20                     | 15                       |
| Humidity (%)     | 50                     | 50                       |
| Wind Speed (m/s) | Up to 5                | Up to 5                  |
| Wind Direction*  | All                    | All                      |

\* The modelling package allows for all wind directions to be modelled simultaneously.

Alternatives to the above default conditions can be used where one year of weather data is available and the analysis considers the worst 2% of the day and night for the month of the year in which the worst-case weather conditions prevail (source: *Draft Guideline on Environmental Noise for Prescribed Premises*, May 2016). In most cases, the default conditions occur for more than 2% of the time and therefore must be satisfied.

#### 3.2. Topographical Data

Topographical data was adapted from publicly available information (e.g. *Google*) in the form of spot heights and combined with the site plan.

Surrounding existing buildings were also incorporated in the noise model, as these can provide noise shielding as well as reflection paths. Single storey buildings are modelled with a height of 3.5-metres, while double storey and triple storey buildings are assumed to be 7 and 10 metres in height. Future buildings from previous assessments have also been incorporated within the model. Receivers are modelled 1.4-metres above floor level.

The north boundary fence heights used in the model are provided in *Figure 3-2*, noting this is the same as used in the previous LGA reports. A boundary wall 1.8 metres above the tavern floor level has also been included on the east side of the tavern, which was included in the updated tavern assessment.

*Figure 3-1* shows a 2D overview of the noise model with the location of all relevant receivers identified.



**Figure 3-1: Overview of Noise Model**

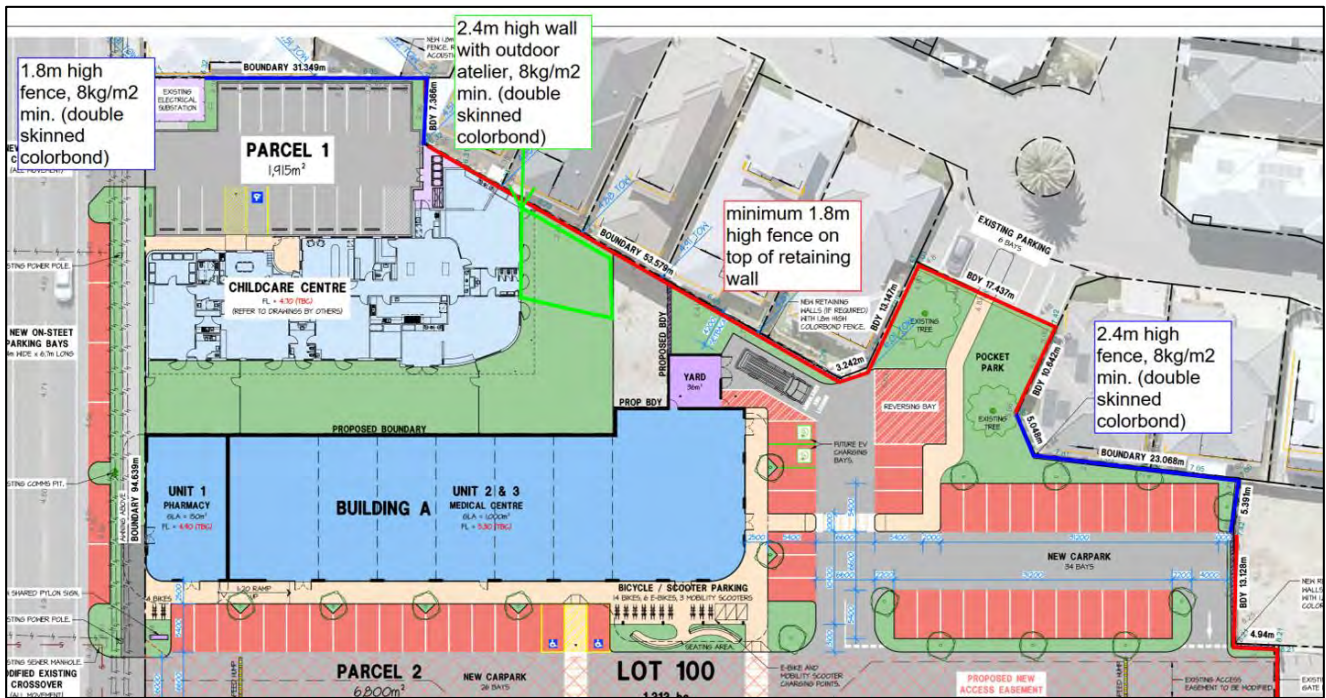


**Figure 3-2: Overview of North Boundary Fencing**

### 3.3. Ground Absorption

The ground absorption has been assumed to be 0.0 (0%) for the roads and 0.5 (50%) outside of the roads, noting that 0.0 represents hard reflective surfaces such as water and 1.0 represents absorptive surfaces such as grass.

### 3.4. Source Sound Levels

The source sound power levels used in the modelling are provided in *Table 3-2*.

**Table 3-2: Source Sound Power Levels, dB**

| Description                                                      | Octave Band Centre Frequency (Hz) |     |     |     |    |    |    |    | Overall dB(A) |
|------------------------------------------------------------------|-----------------------------------|-----|-----|-----|----|----|----|----|---------------|
|                                                                  | 63                                | 125 | 250 | 500 | 1k | 2k | 4k | 8k |               |
| Cool Room Refrigeration – L <sub>10</sub> , L <sub>1</sub>       | 87                                | 86  | 89  | 85  | 81 | 77 | 73 | -  | <b>87</b>     |
| AC Plant x 2 (each) – L <sub>10</sub> , L <sub>1</sub>           | -                                 | 82  | 79  | 79  | 76 | 71 | 64 | -  | <b>80</b>     |
| Toilet Exhaust Fan x 2 (each) – L <sub>10</sub> , L <sub>1</sub> | 60                                | 65  | 62  | 63  | 60 | 61 | 56 | 53 | <b>67</b>     |
| Car Idling/moving slowly – L <sub>10</sub> , L <sub>1</sub>      | 81                                | 78  | 74  | 72  | 74 | 74 | 67 | 67 | <b>79</b>     |
| Small Refrigerated Truck delivery – L <sub>1</sub>               | 100                               | 91  | 87  | 88  | 83 | 81 | 79 | 75 | <b>90</b>     |

The following is noted in relation to *Table 3-2*:

- Mechanical plant sound levels are estimated from previous projects and are located at 1.0m above roof level.
- 4 to 6 cars idling in the drive-through were modelled as point sources located 0.5 metres above ground, depending on the calculation scenario.
- The refrigerated delivery truck condenser unit is modelled at 2.3m above ground level in the drive-through lane.

## 4. RESULTS AND ASSESSMENT

Noise modelling was undertaken for the following scenarios:

- Evening/Sunday Day  $L_{A10}$  Operations – Includes four cars idling in the drive-through and all mechanical plant operating. Four cars were included to represent the traffic volumes expected for more than 10 percent of the assessment period during these periods.
- Night  $L_{A10}$  Operations – Includes the cool room refrigeration operating only.
- Evening/Sunday Day  $L_{A1}$  Operations – Includes six cars idling and a small delivery truck in the drive-through. Six cars were included to represent the traffic volumes expected for less than 10 percent of the assessment period, representing the maximum possible drive-through capacity.

These scenarios are considered to represent the most critical operating conditions with respect to noise compliance.

### 4.1. Evening/Sunday Day $L_{A10}$ Operations

The results from the evening/Sunday day  $L_{A10}$  operations are provided in *Table 4-1*. The noise from vehicles alone would not be considered tonal due to the number of vehicles and variation in engine sounds over a representative period, or when combined with mechanical plant noise, therefore no adjustments have been applied. A noise contour plot is also provided in *Figure 4-1* showing noise levels at ground floor.

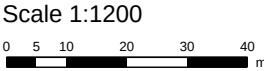
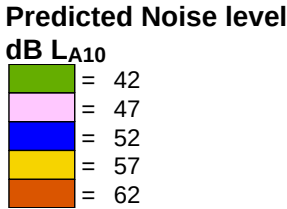
**Table 4-1: Evening/Sunday Day Predicted Levels and Assessment, dB  $L_{A10}$**

| Receiver                | Cars Idling | Mechanical Plant | Predicted Total | Evening/Sunday Day Assigned Level | Assessment |
|-------------------------|-------------|------------------|-----------------|-----------------------------------|------------|
| 29/19 Malibu Rd         | 15          | 34               | 34              | 42                                | Complies   |
| 29/19 Malibu Rd Level 1 | 10          | 37               | 37              | 42                                | Complies   |
| 28/19 Malibu Rd         | 25          | 36               | 36              | 42                                | Complies   |
| 27/19 Malibu Rd         | 32          | 40               | 40              | 42                                | Complies   |
| 27/19 Malibu Rd Level 1 | 34          | 41               | 42              | 42                                | Complies   |
| 26/19 Malibu Rd         | 32          | 41               | 41              | 42                                | Complies   |
| 36/19 Malibu Rd         | 11          | 30               | 30              | 44                                | Complies   |
| 35/19 Malibu Rd         | 12          | 30               | 30              | 44                                | Complies   |
| 35/19 Malibu Rd Level 1 | 13          | 34               | 34              | 44                                | Complies   |
| 34/19 Malibu Rd         | 10          | 24               | 24              | 44                                | Complies   |
| 33/19 Malibu Rd         | 10          | 27               | 27              | 44                                | Complies   |
| 32/19 Malibu Rd         | 10          | 26               | 26              | 44                                | Complies   |

| Receiver                  | Cars Idling | Mechanical Plant | Predicted Total | Evening/Sunday Day Assigned Level | Assessment |
|---------------------------|-------------|------------------|-----------------|-----------------------------------|------------|
| 32/19 Malibu Rd Level 1   | 17          | 36               | 36              | 44                                | Complies   |
| 31/19 Malibu Rd           | 0           | 39               | 39              | 44                                | Complies   |
| 31/19 Malibu Rd Level 1   | 7           | 42               | 42              | 44                                | Complies   |
| 30/19 Malibu Rd           | 0           | 42               | 42              | 44                                | Complies   |
| 10 Malibu Rd              | 16          | 31               | 31              | 44                                | Complies   |
| 10 Malibu Rd Level 1      | 17          | 35               | 35              | 44                                | Complies   |
| 25/19 Malibu Rd           | 25          | 30               | 31              | 44                                | Complies   |
| 25/19 Malibu Rd Level 1   | 35          | 40               | 41              | 44                                | Complies   |
| 12 Malibu Rd              | 21          | 31               | 31              | 44                                | Complies   |
| 14 Malibu Rd              | 9           | 27               | 27              | 44                                | Complies   |
| 14 Malibu Rd Level 1      | 11          | 31               | 31              | 44                                | Complies   |
| 436 Safety Bay Rd         | 26          | 35               | 36              | 44                                | Complies   |
| 436 Safety Bay Rd Level 1 | 32          | 39               | 40              | 44                                | Complies   |
| 436 Safety Bay Rd Level 2 | 35          | 41               | 42              | 44                                | Complies   |
| 4 Malibu Rd               | 28          | 32               | 34              | 45                                | Complies   |
| 6 Malibu Rd               | 27          | 36               | 36              | 45                                | Complies   |
| 8 Malibu Rd               | 33          | 37               | 38              | 45                                | Complies   |
| 8 Malibu Rd Level 1       | 32          | 39               | 39              | 45                                | Complies   |
| 428 Safety Bay Rd         | 31          | 33               | 36              | 45                                | Complies   |
| BP Petrol Station         | 36          | 42               | 43              | 60                                | Complies   |

Noise from all  $L_{A10}$  sources is predicted to comply at all nearest receivers during the evening/Sunday day period. However, it is recommended that the predicted levels are at least 5 dB below the assigned levels at all receivers to ensure they do not significantly contribute to the noise levels from the overall site, noting this will also ensure compliance should a tonal penalty apply when the mechanical plant is operating in isolation. Noise mitigation options are discussed in *Section 5*.

Figure 4-1: Evening/Sunday Day Noise Contour Plot (1.4m AGL)



Project No: 23037938  
Consultant: MN  
Date: 22/07/2026  
Algorithm: ISO 9613  
SoundPLAN Version: 9.0



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## 4.2. Night $L_{A10}$ Operations

The results from the cool room refrigeration operating in isolation during the night period are provided in *Table 4-2*. As the liquor store will not operate during the night period, vehicles and other mechanical plant have not been included in this scenario. An adjustment of + 5 dB is included for tonality, since this may be present during this period when background noise levels are lower. A noise contour plot is also provided in *Figure 4-2* showing noise levels at ground floor.

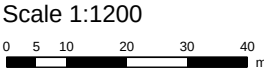
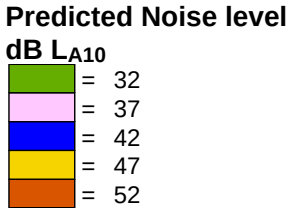
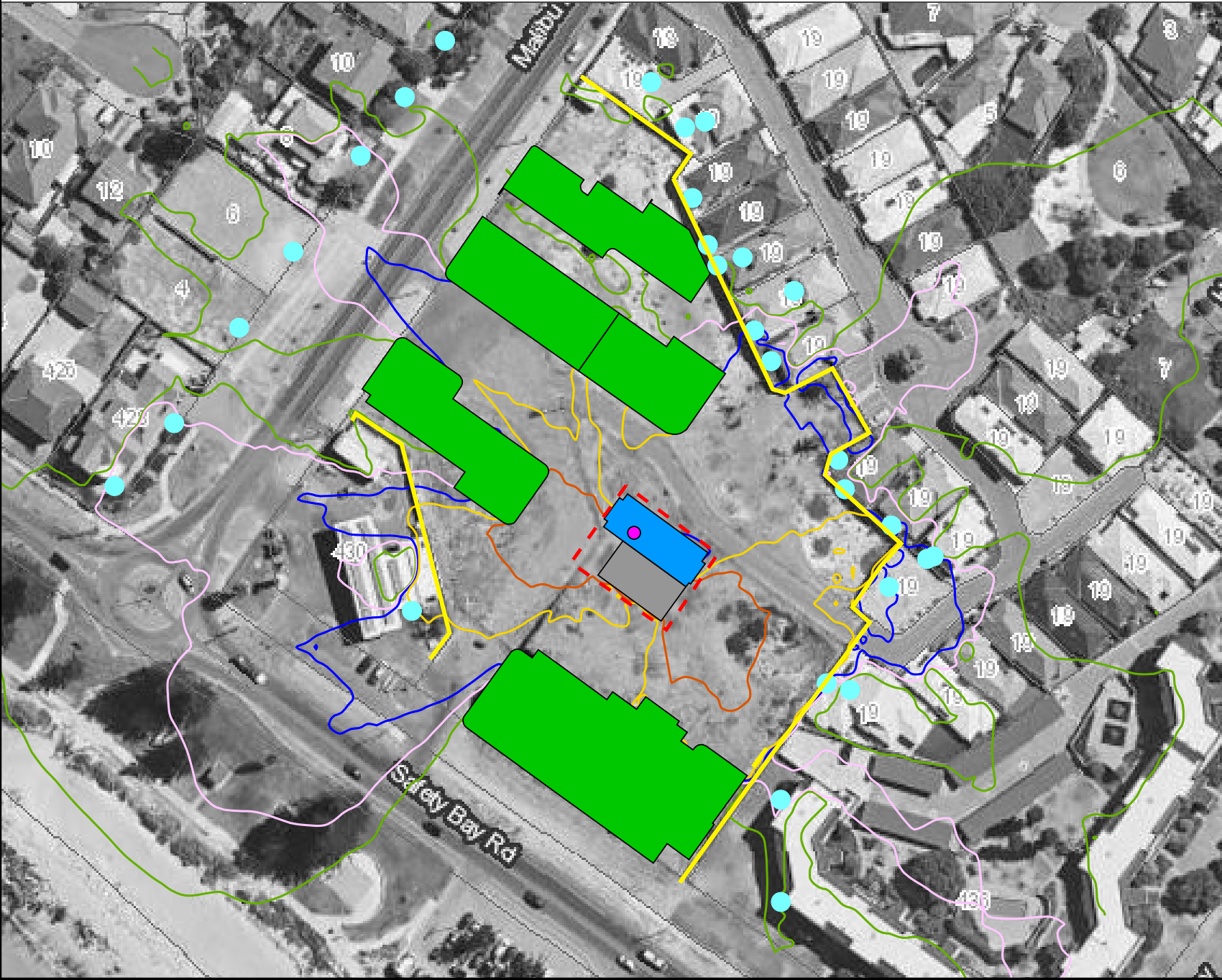
**Table 4-2: Night Predicted Levels and Assessment, dB  $L_{A10}$**

| Receiver                | Predicted Total | Predicted Total Adjusted | Night Assigned Level | Assessment |
|-------------------------|-----------------|--------------------------|----------------------|------------|
| 29/19 Malibu Rd         | 32              | 37                       | 37                   | Complies   |
| 29/19 Malibu Rd Level 1 | 35              | 40                       | 37                   | +3 dB      |
| 28/19 Malibu Rd         | 34              | 39                       | 37                   | +2 dB      |
| 27/19 Malibu Rd         | 37              | 42                       | 37                   | +5 dB      |
| 27/19 Malibu Rd Level 1 | 39              | 44                       | 37                   | +7 dB      |
| 26/19 Malibu Rd         | 39              | 44                       | 37                   | +7 dB      |
| 36/19 Malibu Rd         | 28              | 33                       | 39                   | Complies   |
| 35/19 Malibu Rd         | 29              | 34                       | 39                   | Complies   |
| 35/19 Malibu Rd Level 1 | 32              | 37                       | 39                   | Complies   |
| 34/19 Malibu Rd         | 22              | 27                       | 39                   | Complies   |
| 33/19 Malibu Rd         | 26              | 31                       | 39                   | Complies   |
| 32/19 Malibu Rd         | 25              | 30                       | 39                   | Complies   |
| 32/19 Malibu Rd Level 1 | 34              | 39                       | 39                   | Complies   |
| 31/19 Malibu Rd         | 37              | 42                       | 39                   | +3 dB      |
| 31/19 Malibu Rd Level 1 | 40              | 45                       | 39                   | +6 dB      |
| 30/19 Malibu Rd         | 40              | 45                       | 39                   | +6 dB      |
| 10 Malibu Rd            | 29              | 34                       | 39                   | Complies   |
| 10 Malibu Rd Level 1    | 33              | 38                       | 39                   | Complies   |
| 25/19 Malibu Rd         | 27              | 32                       | 39                   | Complies   |
| 25/19 Malibu Rd Level 1 | 37              | 42                       | 39                   | +3 dB      |
| 12 Malibu Rd            | 30              | 35                       | 39                   | Complies   |

| Receiver                  | Predicted Total | Predicted Total Adjusted | Night Assigned Level | Assessment |
|---------------------------|-----------------|--------------------------|----------------------|------------|
| 14 Malibu Rd              | 26              | 31                       | 39                   | Complies   |
| 14 Malibu Rd Level 1      | 29              | 34                       | 39                   | Complies   |
| 436 Safety Bay Rd         | 33              | 38                       | 39                   | Complies   |
| 436 Safety Bay Rd Level 1 | 37              | 42                       | 39                   | +3 dB      |
| 436 Safety Bay Rd Level 2 | 39              | 44                       | 39                   | +5 dB      |
| 4 Malibu Rd               | 31              | 36                       | 40                   | Complies   |
| 6 Malibu Rd               | 34              | 39                       | 40                   | Complies   |
| 8 Malibu Rd               | 36              | 41                       | 40                   | +1 dB      |
| 8 Malibu Rd Level 1       | 37              | 42                       | 40                   | +2 dB      |
| 428 Safety Bay Rd         | 31              | 36                       | 40                   | Complies   |
| BP Petrol Station         | 41              | 46                       | 60                   | Complies   |

The calculations show exceedances at multiple receiver locations due to the cool room refrigeration operating in isolation during the night period, with the inclusion of the tonal penalty. Noise mitigation options are discussed in *Section 5*.

Figure 4-2: Night Noise Contour Plot (1.4m AGL)



Project No: 23037938  
Consultant: MN  
Date: 22/07/2026  
Algorithm: ISO 9613  
SoundPLAN Version: 9.0



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### 4.3. Evening/Sunday Day $L_{A1}$ Operations

The results from the evening/Sunday day  $L_{A1}$  operations are provided in *Table 4-3* which includes noise from idling cars, mechanical plant and a small delivery truck. It is assessed against the  $L_{A1}$  assigned level due to the shorter duration. Given the short duration and variation in engine sounds over a representative period, no adjustments have been applied. A noise contour plot is also provided in *Figure 4-3* showing noise levels at ground floor.

**Table 4-3: Evening/Sunday Day Predicted Levels and Assessment, dB  $L_{A1}$**

| Receiver                | Delivery Truck | Cars Idling | Mechanical Plant | Predicted Total | Evening/Sunday Day Assigned Level | Assessment |
|-------------------------|----------------|-------------|------------------|-----------------|-----------------------------------|------------|
| 29/19 Malibu Rd         | 27             | 21          | 34               | 35              | 52                                | Complies   |
| 29/19 Malibu Rd Level 1 | 11             | 23          | 37               | 38              | 52                                | Complies   |
| 28/19 Malibu Rd         | 31             | 27          | 36               | 38              | 52                                | Complies   |
| 27/19 Malibu Rd         | 38             | 35          | 40               | 43              | 52                                | Complies   |
| 27/19 Malibu Rd Level 1 | 42             | 38          | 41               | 45              | 52                                | Complies   |
| 26/19 Malibu Rd         | 38             | 34          | 41               | 43              | 52                                | Complies   |
| 36/19 Malibu Rd         | 19             | 12          | 30               | 30              | 54                                | Complies   |
| 35/19 Malibu Rd         | 16             | 13          | 30               | 31              | 54                                | Complies   |
| 35/19 Malibu Rd Level 1 | 21             | 14          | 34               | 34              | 54                                | Complies   |
| 34/19 Malibu Rd         | 15             | 10          | 24               | 24              | 54                                | Complies   |
| 33/19 Malibu Rd         | 12             | 10          | 27               | 27              | 54                                | Complies   |
| 32/19 Malibu Rd         | 12             | 10          | 26               | 27              | 54                                | Complies   |
| 32/19 Malibu Rd Level 1 | 17             | 17          | 36               | 36              | 54                                | Complies   |
| 31/19 Malibu Rd         | 7              | -3          | 39               | 39              | 54                                | Complies   |
| 31/19 Malibu Rd Level 1 | 17             | 11          | 42               | 42              | 54                                | Complies   |
| 30/19 Malibu Rd         | 8              | -3          | 42               | 42              | 54                                | Complies   |
| 10 Malibu Rd            | 16             | 18          | 31               | 31              | 54                                | Complies   |
| 10 Malibu Rd Level 1    | 16             | 19          | 35               | 35              | 54                                | Complies   |
| 25/19 Malibu Rd         | 33             | 27          | 30               | 36              | 54                                | Complies   |
| 25/19 Malibu Rd Level 1 | 41             | 37          | 40               | 45              | 54                                | Complies   |
| 12 Malibu Rd            | 11             | 22          | 31               | 31              | 54                                | Complies   |

| Receiver                  | Delivery Truck | Cars Idling | Mechanical Plant | Predicted Total | Evening/Sunday Day Assigned Level | Assessment      |
|---------------------------|----------------|-------------|------------------|-----------------|-----------------------------------|-----------------|
| 14 Malibu Rd              | 9              | 12          | 27               | <b>27</b>       | <b>54</b>                         | <i>Complies</i> |
| 14 Malibu Rd Level 1      | 9              | 13          | 31               | <b>31</b>       | <b>54</b>                         | <i>Complies</i> |
| 436 Safety Bay Rd         | 36             | 29          | 35               | <b>39</b>       | <b>54</b>                         | <i>Complies</i> |
| 436 Safety Bay Rd Level 1 | 40             | 35          | 39               | <b>43</b>       | <b>54</b>                         | <i>Complies</i> |
| 436 Safety Bay Rd Level 2 | 43             | 38          | 41               | <b>46</b>       | <b>54</b>                         | <i>Complies</i> |
| 4 Malibu Rd               | 26             | 29          | 32               | <b>35</b>       | <b>55</b>                         | <i>Complies</i> |
| 6 Malibu Rd               | 27             | 27          | 36               | <b>37</b>       | <b>55</b>                         | <i>Complies</i> |
| 8 Malibu Rd               | 31             | 33          | 37               | <b>39</b>       | <b>55</b>                         | <i>Complies</i> |
| 8 Malibu Rd Level 1       | 32             | 32          | 39               | <b>40</b>       | <b>55</b>                         | <i>Complies</i> |
| 428 Safety Bay Rd         | 38             | 32          | 33               | <b>40</b>       | <b>55</b>                         | <i>Complies</i> |
| BP Petrol Station         | 40             | 37          | 42               | <b>45</b>       | <b>75</b>                         | <i>Complies</i> |

Noise from all  $L_{A1}$  sources is predicted to comply at all nearest receivers during the evening/Sunday day period and not significantly contribute to an exceedance.

**Figure 4-3: Evening/Sunday Day Noise Contour Plot (1.4m AGL)**

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## 5. SUMMARY

The proposed liquor store was predicted to exceed the assigned noise levels due to noise from the assumed mechanical plant, as determined in accordance with the *Environmental Protection (Noise) Regulations 1997*. Therefore, noise mitigation will likely be required to ensure the mechanical plant complies with the assigned levels.

In addition, given there will be other noise sources from the mixed-use site (gym, tavern and childcare centre), it is recommended that noise from the liquor store mechanical plant be reduced to at least 5 dB below the assigned levels at all receivers. This will ensure that the mechanical plant does not significantly contribute to the overall noise levels from the subject site and provides a margin of compliance should a tonal penalty apply when the mechanical plant is operating in isolation.

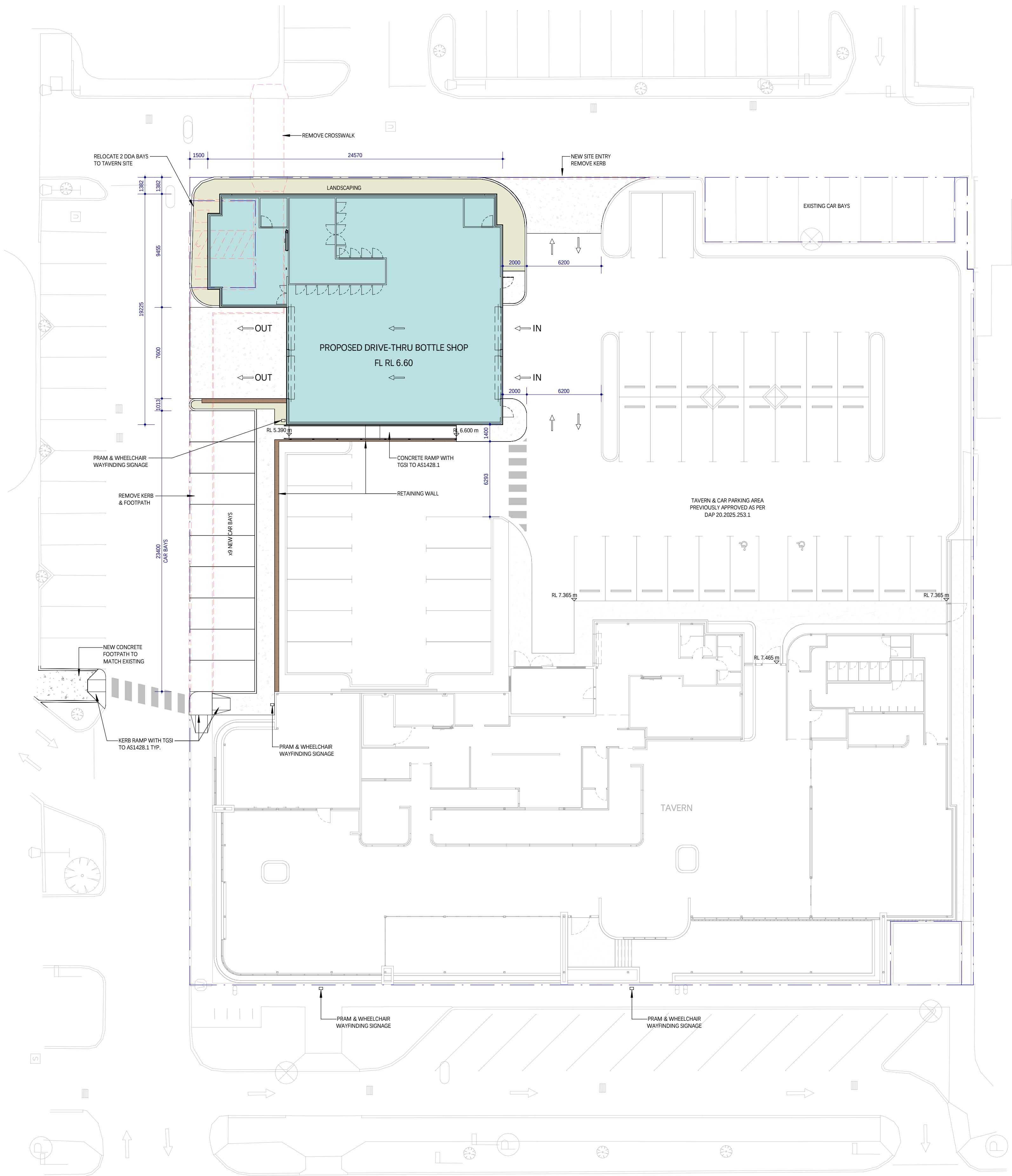
This is considered practicably achievable by implementing one or more of the following noise mitigation options for the cool room refrigeration and AC:

- Select quieter units and/or those with quiet/night mode settings;
- Relocate onto the ground level (currently modelled on the roof within the assessment), either on the south or west side of the liquor store building;
- Install acoustic screens around plant.

It must be noted that the assessment is based on assumptions in relation to the number, location, size and type of mechanical plant. Therefore, once the mechanical plant has been designed and selected, noise is to be reviewed by a suitably qualified acoustical consultant.

Deliveries to the liquor store shall be limited to day and evening times only.

## Appendix A – Development Plans

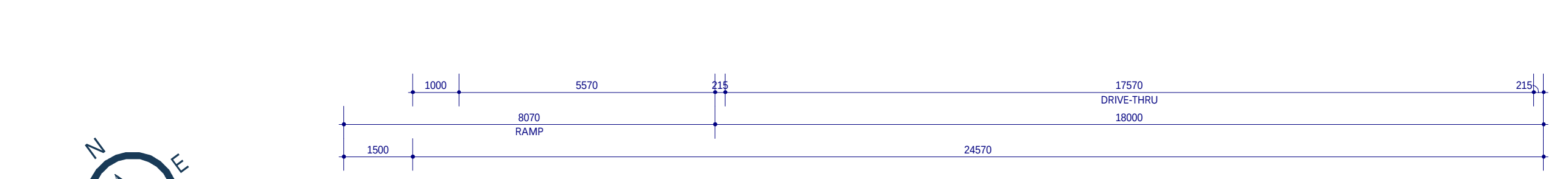
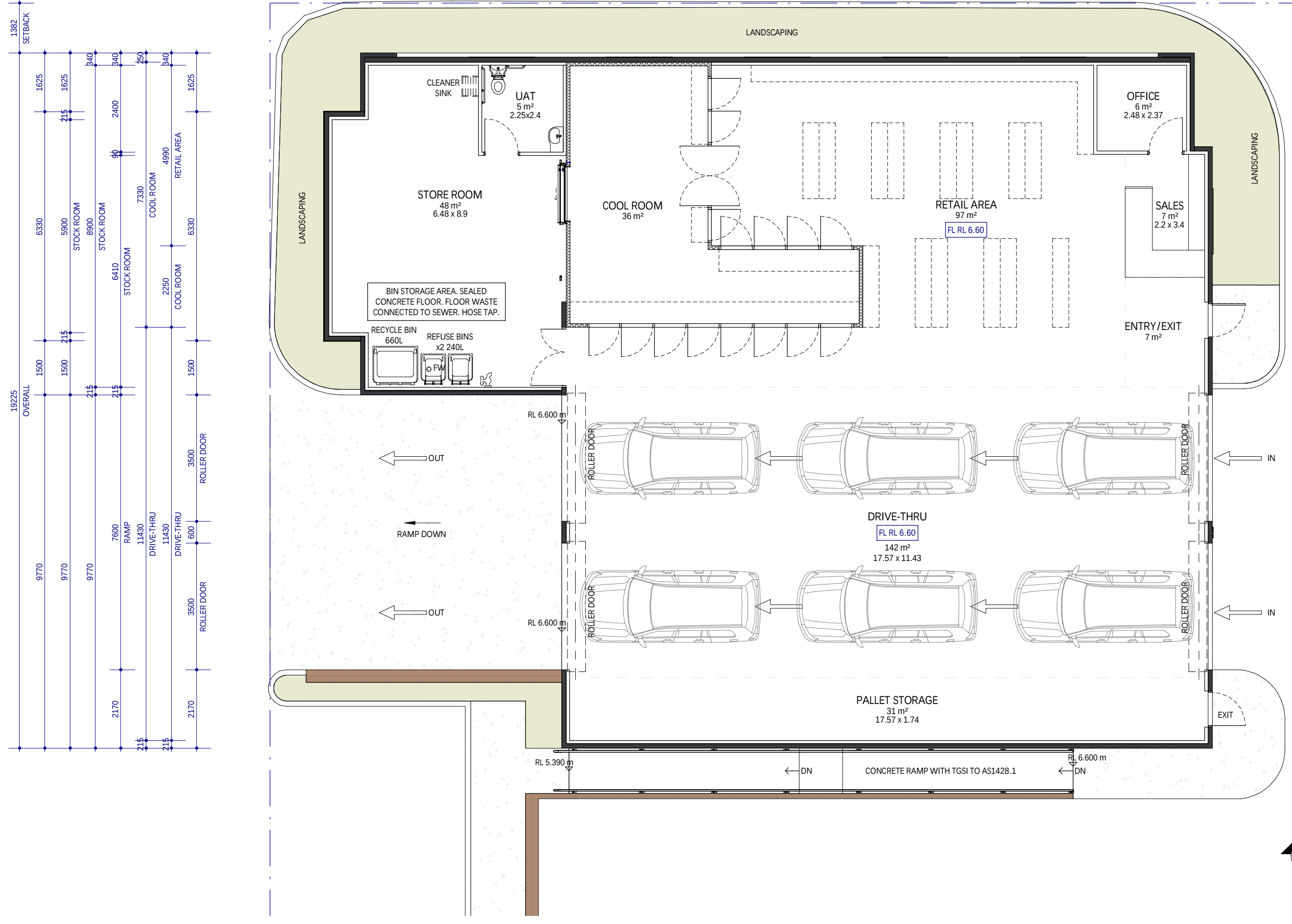
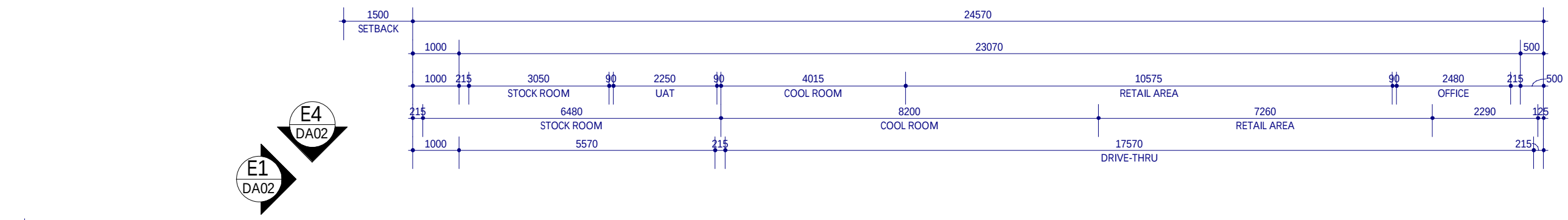


**LIQUOR STORE SITE PLAN**  
SCALE 1 : 200

SAFETY

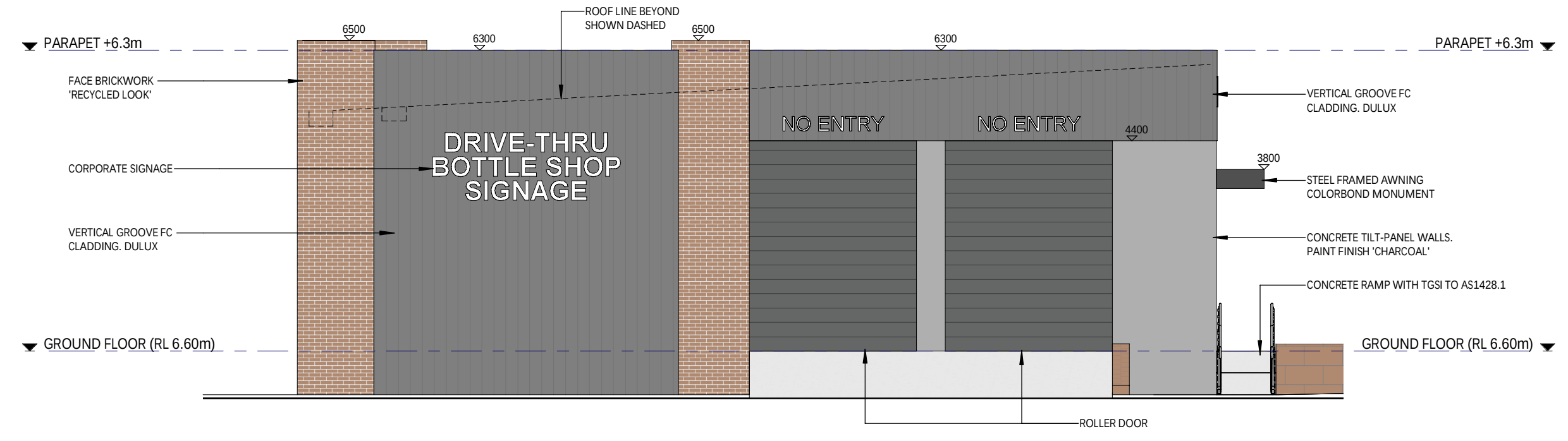
BAY

ROAD

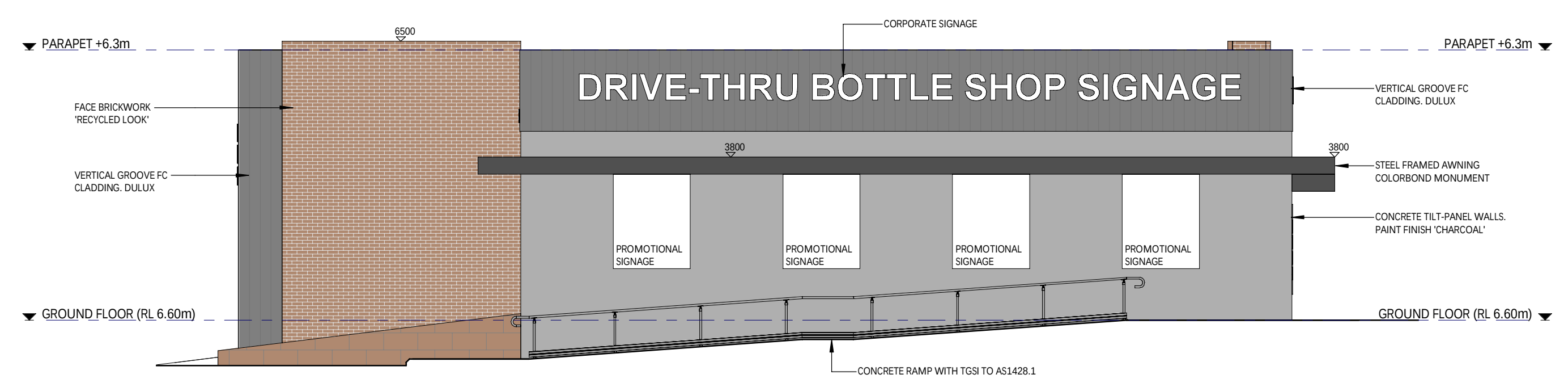


**01 LIQUOR STORE FLOOR PLAN**  
A200 SCALE 1 : 100

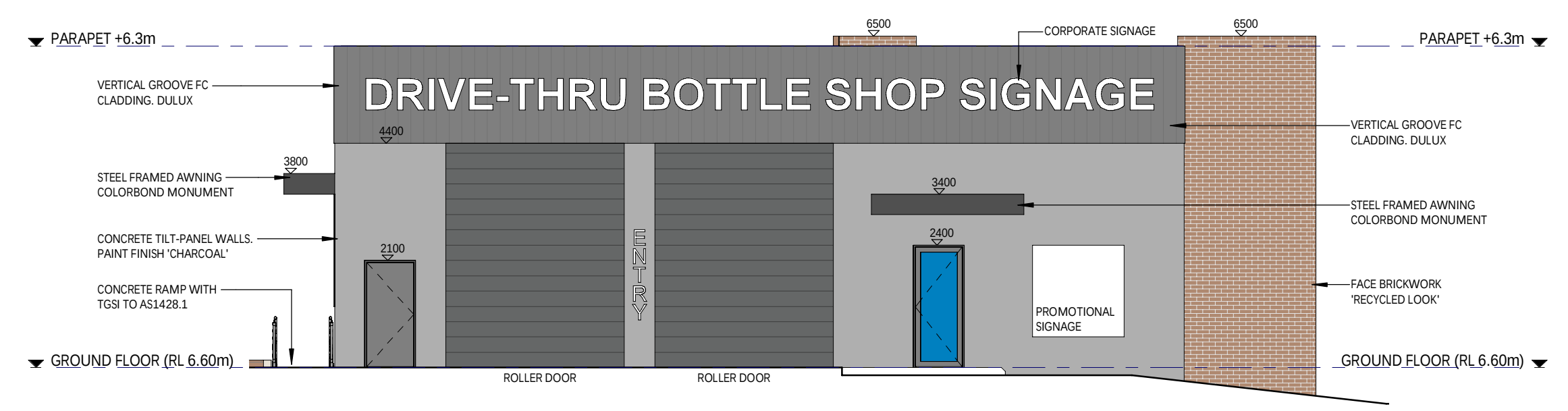
|                       |         |
|-----------------------|---------|
| <b>AREAS</b>          |         |
| BUILDING (OVERALL)    | = 404m² |
| <b>INTERNAL AREAS</b> |         |
| DRIVE-THRU & PALLET   | = 173m² |
| RETAIL                | = 100m² |
| SALES                 | = 7m²   |
| OFFICE                | = 6m²   |
| COOL ROOM             | = 36m²  |
| STORE ROOM            | = 48m²  |



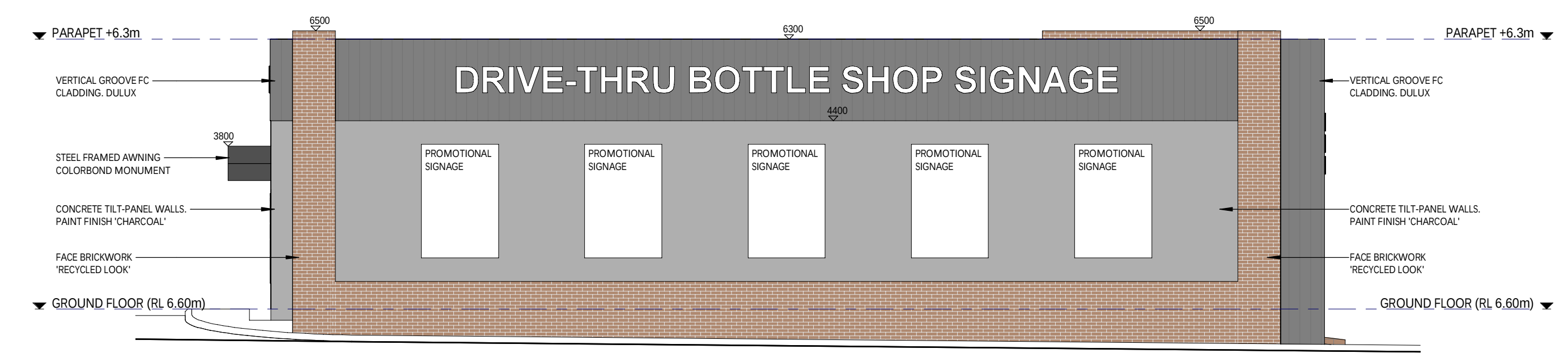
**E1 LIQUOR STORE ELEVATION E1**  
DA02 SCALE 1 : 100



**E2 LIQUOR STORE ELEVATION E2**  
DA02 SCALE 1 : 100



**E3 LIQUOR STORE ELEVATION E3**  
DA02 SCALE 1 : 100



**E4 LIQUOR STORE ELEVATION E4**  
DA02 SCALE 1 : 100

## Appendix B – Influencing Factor Calculation

The assigned levels combine a baseline assigned level with an influencing factor, with the latter increasing the assigned level on the basis of the existence of significant roads and commercial or industrial zoned land within an inner circle (100 metre radius) and an outer circle (450 metre radius) of the noise sensitive premises. The calculation for the influencing factor is:

$$= \frac{1}{10} (\% \text{ Type A}_{100} + \% \text{ Type A}_{450}) + \frac{1}{20} (\% \text{ Type B}_{100} + \% \text{ Type B}_{450})$$

where:

% Type A<sub>100</sub> = the percentage of industrial land within  
a 100m radius of the premises receiving the noise

% Type A<sub>450</sub> = the percentage of industrial land within  
a 450m radius of the premises receiving the noise

% Type B<sub>100</sub> = the percentage of commercial land within  
a 100m radius of the premises receiving the noise

% Type B<sub>450</sub> = the percentage of commercial land within  
a 450m radius of the premises receiving the noise

+ Transport Factor (maximum of 6 dB)

= 2 for each secondary road (6,000 to 15,000 vpd) within 100m

= 2 for each major road (> 15,000 vpd) within 450m

= 6 for each major road within 100m

A representative premise has been used for each of the following noise sensitive premises:

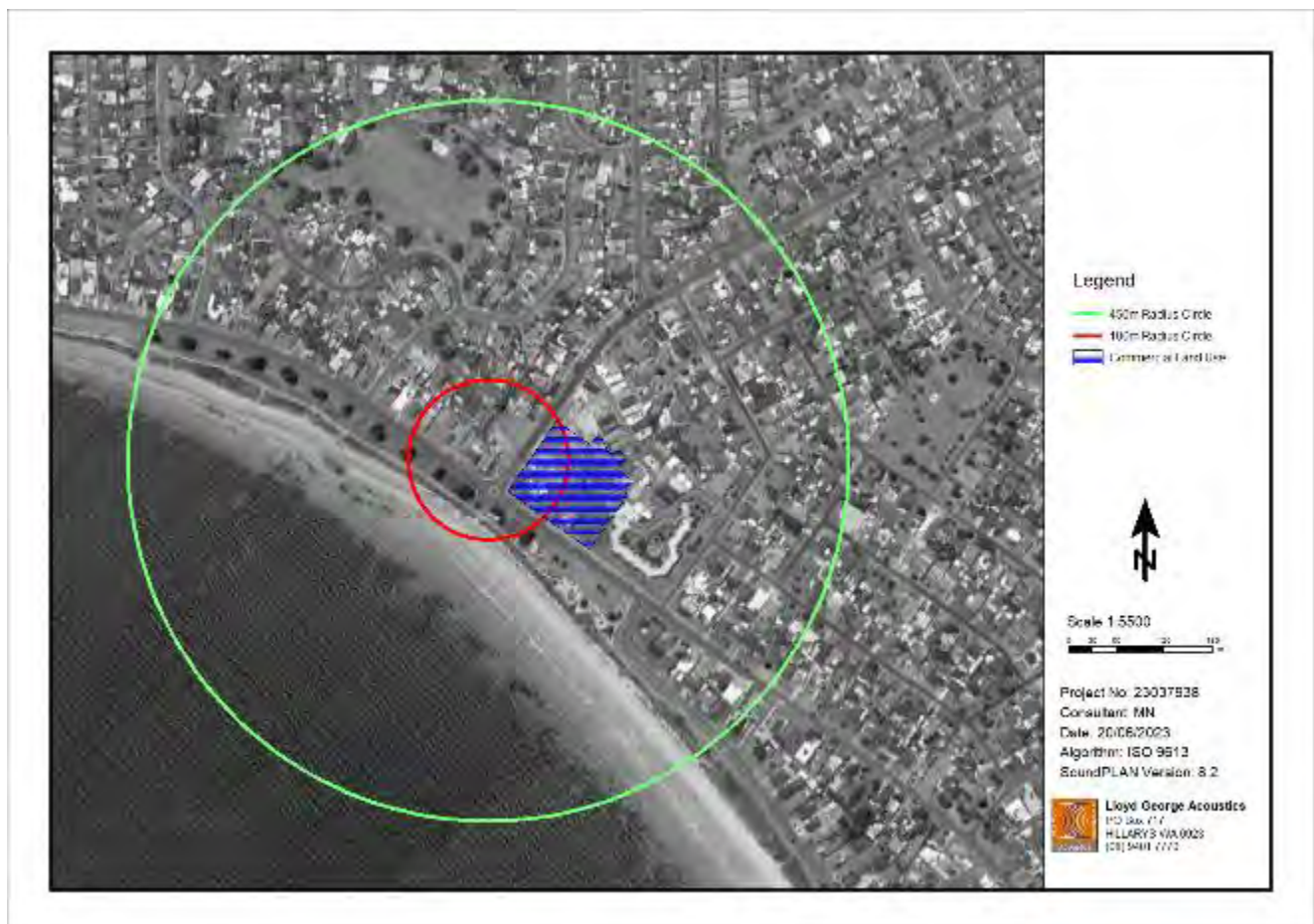
- Northwest – 428 Safety Bay Rd
- North – 7/19 Malibu Rd
- Northeast – 8/19 Malibu Rd
- Southeast – 11/19 Malibu Rd



Table B-2 shows the percentage of industrial and commercial land within the inner (100 metre radius) and outer (450 metre radius) circles of the noise sensitive premises.

**Table B-1: Percentage of Land Types within 100m and 450m Radii**

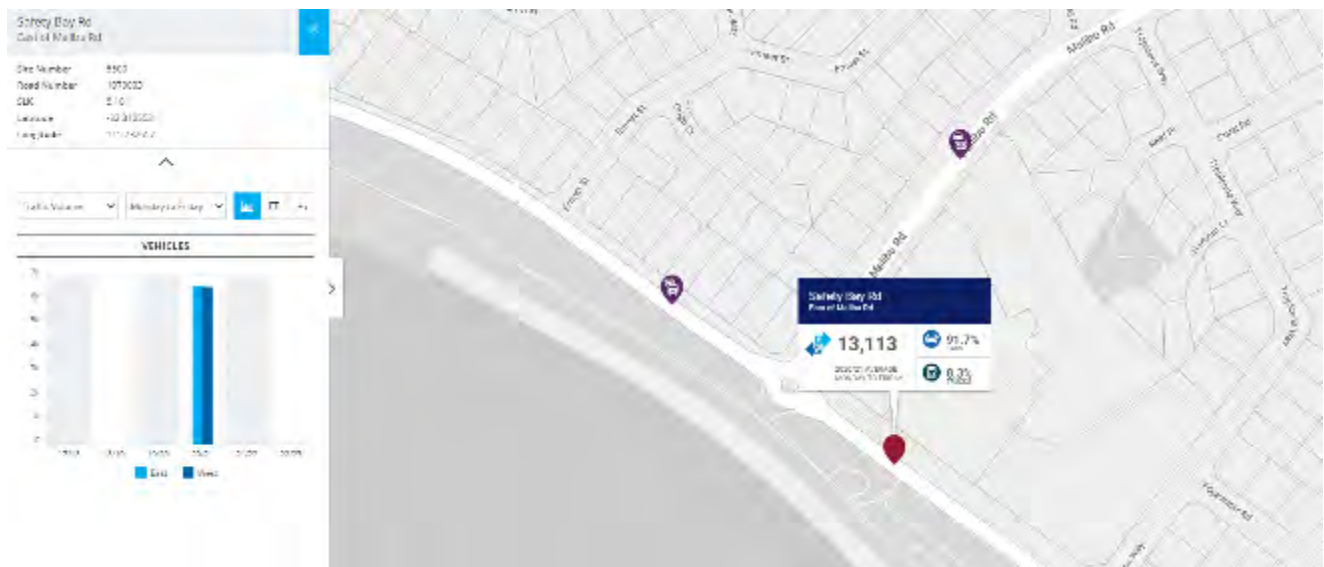
| Receiver  | Land Type                       | Within 100m | Within 450m |
|-----------|---------------------------------|-------------|-------------|
| Northwest | Type A - Industrial and Utility | 0           | 0           |
|           | Type B – Commercial             | 15          | 2           |
| North     | Type A - Industrial and Utility | 0           | 0           |
|           | Type B – Commercial             | 32          | 2           |
| Northeast | Type A - Industrial and Utility | 0           | 0           |
|           | Type B – Commercial             | 32          | 2           |
| Southeast | Type A - Industrial and Utility | 0           | 0           |
|           | Type B – Commercial             | 31          | 2           |

**Figure B-1: Land Types within 100m and 450m Radii of 428 Safety Bay Rd**

From the Main Roads WA Traffic Map (refer *Figure B-2*), *Table B-2* shows the relevant roads and their traffic counts within the inner (100 metre radius) and outer (450 metre radius) circles.

**Table B-2: Relevant Roads within 100m and 450m Radii**

| Receiver  | Within 100m         |                                                                                               | Within 450m                         |
|-----------|---------------------|-----------------------------------------------------------------------------------------------|-------------------------------------|
|           | Major Road (+ 6 dB) | Secondary Road (+ 2 dB)                                                                       | Major Road Not Within 100m (+ 2 dB) |
| Northwest | -                   | Safety Bay Road<br>(13,113 vpd 2020/21 #5500)<br><br>Malibu Road<br>(5,411 vpd 2020/21 #3492) | -                                   |
| North     | -                   | Malibu Road<br>(5,411 vpd 2020/21 #3492)                                                      | -                                   |
| Northeast | -                   | -                                                                                             | -                                   |
| Southeast | -                   | Safety Bay Road<br>(13,113 vpd 2020/21 #5500)                                                 | -                                   |





|    |                 |             |
|----|-----------------|-------------|
| nd | Commercial Land | Transport E |
|----|-----------------|-------------|

---

## Appendix C – Terminology

The following is an explanation of the terminology used throughout this report:

- **Decibel (dB)**

The decibel is the unit that describes the sound pressure levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

- **A-Weighting**

An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as  $L_A$ , dB.

- **Sound Power Level ( $L_w$ )**

Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure level at known distances. Noise modelling incorporates source sound power levels as part of the input data.

- **Sound Pressure Level ( $L_p$ )**

The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc. and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

- **$L_{ASlow}$**

This is the noise level in decibels, obtained using the A-frequency weighting and the S (slow) time weighting. Unless assessing modulation, all measurements use the slow time weighting characteristic.

- **$L_{Afast}$**

This is the noise level in decibels, obtained using the A-frequency weighting and the F (fast) time weighting. This is used when assessing the presence of modulation.

- **$L_{Apeak}$**

This is the greatest absolute instantaneous sound pressure level in decibels using the A-frequency weighting.

- **$L_{Amax}$**

An  $L_{Amax}$  level is the maximum A-weighted noise level during a particular measurement.

- **$L_{A1}$**

The  $L_{A1}$  level is the A-weighted noise level exceeded for 1 percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

- **$L_{A10}$**

The  $L_{A10}$  level is the A-weighted noise level exceeded for 10 percent of the measurement period and is considered to represent the “intrusive” noise level.

- **$L_{A90}$**

The  $L_{A90}$  level is the A-weighted noise level exceeded for 90 percent of the measurement period and is considered to represent the “background” noise level.

- **$L_{Aeq}$**

The equivalent steady state A-weighted sound level (“equal energy”) in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the “average” noise level.

- **One-Third-Octave Band**

Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20000 Hz inclusive.

- **Representative Assessment Period**

Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

- **$L_{Amax}$  assigned level**

Means an assigned level, which, measured as a  $L_{ASlow}$  value, is not to be exceeded at any time.

- **$L_{A1}$  assigned level**

Means an assigned level, which, measured as a  $L_{ASlow}$  value, is not to be exceeded for more than 1 percent of the representative assessment period.

- **$L_{A10}$  assigned level**

Means an assigned level, which, measured as a  $L_{ASlow}$  value, is not to be exceeded for more than 10 percent of the representative assessment period.

### • Tonal Noise

A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

- the presence in the noise emission of tonal characteristics where the difference between -
  - (a) the A-weighted sound pressure level in any one-third octave band; and
  - (b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as  $L_{Aeq,T}$  levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as  $L_{A\ Slow}$  levels.

This is relatively common in most noise sources.

### • Modulating Noise

A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

- a variation in the emission of noise that —
  - (a) is more than 3 dB  $L_{A\ Fast}$  or is more than 3 dB  $L_{A\ Fast}$  in any one-third octave band; and
  - (b) is present for at least 10% of the representative assessment period; and
  - (c) is regular, cyclic and audible.

### • Impulsive Noise

An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness means:

- a variation in the emission of a noise where the difference between  $L_{Apeak}$  and  $L_{Amax}$  is more than 15 dB when determined for a single representative event.

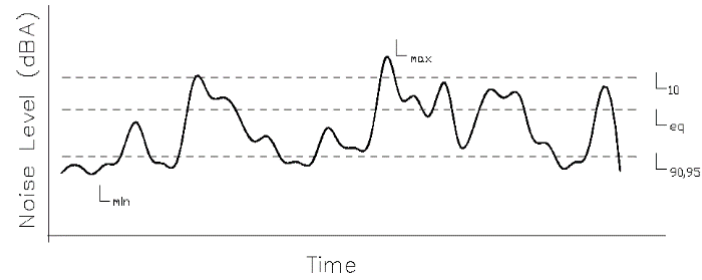
### • Major Road

Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

### • Secondary / Minor Road

Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

- Chart of Noise Level Descriptors



- Austroads Vehicle Class

| VEHICLE CLASSIFICATION SYSTEM<br>AUSTROADS |                |                                                 |
|--------------------------------------------|----------------|-------------------------------------------------|
| CLASS                                      | DESCRIPTION    | VEHICLE TYPE                                    |
| 1                                          | Light Vehicle  | Car, van, motorcycle, scooter, moped, motorbike |
| 2                                          | Medium Vehicle | Light truck, light bus, light trailer           |
| 3                                          | Heavy Vehicle  | Heavy truck, heavy bus, heavy trailer           |
| 4                                          | Tractor Unit   | Tractor unit, tractor trailer                   |
| 5                                          | Tractor Unit   | Tractor unit, tractor trailer                   |
| 6                                          | Tractor Unit   | Tractor unit, tractor trailer                   |
| 7                                          | Tractor Unit   | Tractor unit, tractor trailer                   |
| 8                                          | Tractor Unit   | Tractor unit, tractor trailer                   |
| 9                                          | Tractor Unit   | Tractor unit, tractor trailer                   |
| 10                                         | Tractor Unit   | Tractor unit, tractor trailer                   |
| 11                                         | Tractor Unit   | Tractor unit, tractor trailer                   |
| 12                                         | Tractor Unit   | Tractor unit, tractor trailer                   |

- Typical Noise Levels

