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Acoustic Report

For Proposed Boarding House at

No. 51 Jamison Road, Kingswood

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1.0 SCOPE OF THIS REPORT

The aim of this report is to examine the potential environmental noise impacts from the proposed boarding house at No. 51 Jamison Road, Kingswood on the nearest potential noise receivers as per EPA criteria, NSW State legislation, NSW Industrial Noise Policy and Penrith Council requirements.

The site is located on the corner of Jamison St and Somerset Street in the suburb of Kingswood (Figure 1 – Site Location). As per architectural plans by Liquid Design dated the 22nd February, 2019, the proposed two (2) storey boarding house will include one (1) level of basement parking, sixteen (16) boarding rooms, one (1) managers room, one (1) communal room and outdoor communal space adjacent to the communal room.

The proposed site is located in a predominately residential area (Figure 2 – Surrounding Environment) with the nearest residential receivers that have the potential to be affected by the proposed boarding house located directly east of the site at No. 49 Jamison Road, Kingswood and north of the site at 52 Somerset Street, Kingswood (Figure 3 – Nearest Residential Receivers).

2.0 NOISE SURVEY & INSTRUMENTATION

On the 24th January, 2018, an engineer from this office went to the above address to carry out acoustic measurements at the eastern boundary of the site, adjacent to the nearest receiver at No. 49 Jamison Rd, Kingswood (Figure 4 – Noise Reading Location). The unattended noise monitoring was conducted for seven (7) days between Wednesday 24th January, 2018 and Wednesday 31st January, 2018.

The noise survey was conducted to determine a conservative reading of the existing day, evening and night noise levels $L_{(A90, 15 \text{ minutes [1hr]}}$ and $L_{(Aeq, 15 \text{ minutes [1 hr]}}$. All sound pressure levels are rounded to the nearest whole decibel. All measurements were taken in accordance with the Australian Standards AS 1055 “*Acoustics- Description and Measurements of Environmental Noise*”.

All sound level measurements and analysis carried throughout this report are carried with Svantek 957 Noise and vibration level meter which has the following features:

- Type 1 sound level measurements meeting IEC 61672:2002
- General vibration measurements (acceleration, velocity and displacement) and HVM meeting ISO 8041:2005 standard
- Three parallel independent profiles

- 1/1 and 1/3 octave real time analysis
- Acoustic dose meter function
- FFT real time analysis (1920 lines in up to 22.4 kHz band)
- Reverberation Time measurements (RT 60)
- Advanced Data Logger including spectra logging
- USB Memory Stick providing almost unlimited logging capacity
- Time domain signal recording
- Advanced trigger and alarm functions
- USB 1.1 Host & Client interfaces (real time PC “front end” application supported)
- RS 232 and IrDA interfaces
- Modbus protocol

Machine was calibrated prior to reading, and any readings affected by strong wind or rain have been disregarded. The Full Average Statistical Noise Parameters $L_{(Aeq, 15 \text{ minutes})}$, $L_{(A90, 15 \text{ minutes})}$, $L_{(A10, 15 \text{ minutes})}$, $L_{(A1, 15 \text{ minutes})}$ are presented in Figure 5 – Noise Survey. A Summary of those readings is presented in the table below.

Table 2.0 - Summary of Existing Noise Survey for the Assessment of Impact Noise from the Proposed Boarding House

Point A - 24th January – 31st January, 2018	L_{Aeq} dB(A)	L_{A90} dB(A)
Day Time (7:00am-6:00pm)	60	44
Evening Time (6:00pm-10:00pm)	56	43
Night & Early Morning (10:00pm – 7:00am)	48	37

3.0 EXISTING ACOUSTIC ENVIRONMENT

The proposed boarding house is located on the corner of Jamison St and Somerset St in the suburb of Kingswood in a predominately residential area. The proposed boarding house will include one (1) level of basement parking, sixteen (16) boarding rooms, one (1) manager’s room, one (1) communal room and outdoor communal space adjacent to the communal room (Figure 6 – Proposed Site Plan). The proposed basement parking will include seven (7) car spaces, four (4) motorbike spaces and a bicycle rack for four (4) bicycles (Figure 7 – Proposed Basement Car Park).

The nearest residential receivers that have the potential to be affected by the proposed boarding house are located directly east of the site at No. 49 Jamison Road, Kingswood and north of the site at No. 52 Somerset Street (Figure 3 – Nearest Residential Receivers).

The property north of the site at No. 52 Somerset St will be mainly affected by the proposed site's rear outdoor communal area while the property at No. 49 Jamison Rd will be affected by the site's basement entry.

Noise producing activities from the proposed boarding house at No. 51 Jamison Road, Kingswood are categorised into major and minor as follows:

Table 3.0 – Noise producing activities from proposed Boarding House

Aspects	Noise sources
Entertainment	• Entertainment in Communal Areas (major)
Car Park	• Noise from Vehicles (major)
Equipment and systems	• Mechanical Plant & Air conditioning Units (major) • Washing and machine operation in laundry (minor) • Dishwashing, cleaning and cooking in kitchens (minor) • Lawnmowers and saws in gardening (minor) • Vacuum cleaners in housekeeping (minor)
Guest rooms	• Music & TV (major) • Conversation (minor) • Door closing (minor)

4.0 ACCEPTABLE NOISE LEVEL

4.1 NOISE GUIDE FOR LOCAL GOVERNMENT

The Department of Environment and Conservation (NSW) published the amended *Noise Guide for Local Government* in October 2010. The policy is specifically aimed at assessing noise from light industry, shops, entertainment, public buildings, air conditioners, pool pumps and other noise sources in residential areas.

The appropriate regulatory authority (Local Council) may, by notice in writing given to such a person, prohibit the person from causing, permitting or allowing:

1. any specified activity to be carried on at the premises, or
 2. any specified article to be used or operated at the premises.
- or both, in such a manner as to cause the emission from the premises, at all times or on specified days, or between specified times on all days or on specified days, of noise that, when measured at any specified point (whether within or outside the premises,) is in excess of a specified level.

It is an offence to contravene a noise control notice. Prior to being issued with a noise control notice, no offence has been committed.

The Protection of the Environment Operations Act 1997 defines “Offensive Noise” as noise:

1. (a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:
2. (i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or
3. (ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or
2. (b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances prescribed by the regulation.

4.2 NSW INDUSTRIAL NOISE POLICY (2000)

The NSW Industrial Noise Policy that came into force in January 2000 replaced chapters 19, 20, 21 & 82 of the ENCM (Environmental Noise Control Manual). The new policy seeks to promote environmental well-being through preventing and minimizing noise by providing a frame work and process for deriving noise limits conditions for consent and licenses.

The Industrial Noise Policy recommends two separate noise criteria’s to be considered for the assessment of the proposed development, the Intrusive Noise Criteria and the Amenity Noise Criteria, which are further explained below.

4.2.1 AMENITY NOISE CRITERIA

In the Industrial Noise Policy it is stated that “To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed acceptable noise levels for the area”.

Relevant parts of the recommended noise levels from industrial noise sources shown in Table 5.2a of the “NSW Industrial Noise Policy”, are shown below:

Table 4.2.1.1- Recommended Noise Levels from Industrial Noise Sources

TYPE OF RECIEVER	AREA	TIME PERIOD	RECOMMENDED Leq NOISE LEVEL, dB(A)
Residence	Suburban	Day	55
		Evening	45
		Night	40

Where a noise source contains certain characteristics such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, a correction is to be applied which is to be added to the measured or predicted noise levels at the receiver, before comparison with the criteria. Shown below are the correction factors that are to be applied:

Table 4.2.1.2 – Modifying Factor Corrections

FACTOR	CORRECTION
Tonal Noise	+ 5 dB
Low Frequency Noise	+ 5 dB
Impulsive Noise	Apply difference in measured fast and impulse response levels, as the correction, up to a maximum of 5 dB.
Intermittent Noise	+ 5 dB

A maximum correction of 10 dB is applied where two or more modifying factors are indicated.

4.2.2 INTRUSIVENESS NOISE CRITERIA

Section 2.2.1 of the Noise Guide for Local Government states that a noise source is generally considered to be intrusive if the noise from the source when measured over a 15 minute period exceeds the background noise by more than 5 dB(A). Similarly The Industrial Noise Policy in Section 2.1 summarizes the intrusive criteria as below:

$$L_{Aeq, 15 \text{ minute}} \leq \text{rating background level plus 5}$$

According to Section 2.1 of the NSW Industrial Noise Policy (2000) states that ‘the intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the L_{Aeq} descriptor) measured over a 15 minute period, does not exceed the Rating Background Level (RBL) measured in the absence of the source by more than 5 dB.’

Section 3.1 of the above policy defines the background level as $L_{A90,15 \text{ minutes}}$ which is the Noise exceeded 90% percent of a time period over which annoyance reactions may occur (taken to be 15 minutes). The RBL is defined as the overall single-figure $L_{A90,15 \text{ minutes}}$ background level representing each assessment period (day/evening/night) over the whole monitoring period.

The noise from the source is measured as $L_{Aeq,15 \text{ min}}$ at the most affected point within the residential property boundary and ideally should be measured at the point where the impact occurs.

Therefore the acceptable L_{eq} noise intrusiveness criterion for **broadband noise** in this area during the day, evening & night is as follows:

- **44 + 5 = 49 dB (A)** during the day and
- **43 + 5 = 48 dB (A)** during the evening
- **37 + 5 = 42 dB (A)** during the night.

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. Correction factors may be applied to the noise annoyance criteria to determine the project specific criteria.

The proposed boarding house and its activity will not exceed the background noise level by more than 5 dB(A) at the boundary of the most affected noise sensitive locations (No. 49 Jamison Road & 52 Somerset St), provided all noise control recommendations in Section 6 are adhered to.

5.0 PREDICTED NOISE FROM THE BOARDING HOUSE

As stated in Section 3.0 of this report noise levels from the boarding house are classified into major and minor offensive noise sources. The main major noise sources are:

- Noise from Music & TV in Boarding Rooms and Common Room
- Noise from Entertainment in Common Room & Outdoor Communal Space
- Noise from New Air-conditioning Units, Pumps and Compressors
- Noise from Occupants Vehicles in Basement Car Park

5.1 NOISE FROM CARPARK

The proposed basement car park of the boarding house will accommodate for seven (7) car spaces and four (4) motorbike spaces (Figure 7 – Proposed Basement Car Park). It is expected that most tenants will utilise public transport as bus services are readily available along Jamison Road and Kingswood Station is a short 15-minute walk from the boarding house.

However, some residents will utilise the parking available in the basement. Access to the basement will be from Jamison Road, adjacent to the nearest receiver at No. 49 Jamison Rd, Kingswood. Car park noises typically may comprise of people talking, car radios and car doors, with the loudest activity being the noise produced by closing car doors.

Table 5.1.1 – Car Park Noise Source Levels

Car Park Noise Source	Average Sound Power Level, dB(A)
Car Door Closing	91
Car Starting	91
Car Accelerating	91
Car Moving	87

The predicted noise levels at the nearest residential receiver (No. 49 Jamison Road) due to vehicles entering/exiting the car park will comply with the criteria of the NSW Industrial Noise Policy, provided the recommendations in Section 7 of this report are adhered to.

The predicted noise levels due to vehicles arriving and departing the site will be governed by existing background noise levels from Jamison Road and the surrounding residential area. Distance attenuation loss and loss from the underground enclosure of the parking area have been taken into consideration when making our predictions. See results in the table below:

Table 5.1.2 – Predicted Noise from Vehicles Entering/Existing the Car Park

Activity	Expected Leq dB(A) at Boundary of Nearest Receiver	Complies with the NSW Industrial Noise Policy
Cars Entering/Exiting the Basement Carpark	40 dB(A)	Yes ✓ <42-49dB(A)

5.2 NOISE FROM MUSIC & TV IN GUESTS ROOM & COMMUNAL AREAS

The proposed boarding house will include sixteen (16) boarding rooms, one (1) managers room, one (1) common room and one (1) outdoor communal terrace (Figure 6 – Proposed Site Plan)

Lodgers may listen to music or watch TV in their rooms or in the common room. Noise from amplified music can reach 90dB(A) at 1m from the center of source. The public health in a study of social noise in a population sample of representative 18-25 year olds showed that the level of preferred listening was 74 dB(A).

No entertainment is proposed in the common outdoor terrace but lodgers may congregate in common areas during casual social gatherings. The following table lists the sound level of different levels of speech.

Table 5.2.1 - Noise produced in conversation

Descriptor	Mean Sound Level	Standard Deviation
Casual Speech	52 dB(A)	± 5dB
Normal Speech	58 dB(A)	± 5dB
Raised Speech	65 dB(A)	± 7dB
Loud Speech	74 dB(A)	± 9dB
Shouting	82 dB(A)	± 9dB

The following noise transmission loss equation is applied to account for the distance between the boarding house and nearest residential receivers at No. 51 Jamison Road, Kingswood.

$$\text{SPL}_2 = \text{SPL}_1 - 20\log(d_2/d_1) \text{ for a point source}$$

Where:

SPL₂ = SPL at distance 2 from the source in metres

SPL₁ = SPL at distance 1 from the source in metres

d₂ = distance in metres to location 2 from the source

d₁ = distance in metres to location 1 from the source

Calculations carried out for predicted noise levels during social gathering were made assuming that under these conditions the vocal noise will be casual-normal speech.

Due to the stop-start nature of conversation and due to the many different directions that speakers would be facing, the likely LAeq speech noise levels will comply with the criteria set out in Section 4 of this report, provided recommendations in Section 6 are adhered to.

If sound from music and TV are played inside the guest room or common room at a level of or close to 74 dB(A), then the noise transmitted into the most affected residences at No. 49 Jamison Road, Kingswood, will comply with the criteria allowed as per Section 4 of this report, provided noise control recommendations in Section 6 are also adhered to.

5.3 NOISE FROM MECHANICAL PLANT & AIR CONDITIONING UNITS

A range of mechanical plant, equipment and ventilation will be included in the proposed boarding house at No. 51 Jamison Road, Kingswood. Noise emitted by the use of the proposed mechanical plant is assessed by the NSW Industrial Noise Policy and Penrith City Council conditions/requirements.

The proposed level of basement parking is located below ground level and that makes providing natural ventilation not possible and a mechanical extract system should be used. The mechanical ventilation system needs to achieve six air changes per hour for exhaust fume extract and ten air changes per hour for smoke clearance.

A garage roller door may also be located at the entry of the Car Park. Predicted noise levels from the operation of garage roller doors have been estimated according to typical rollers doors installed at other developments. The average time duration for a garage roller door to fully open or close is approximately 30 seconds.

As the proposed development is still in the initial application stage, we recommend that further acoustic assessment is carried out when the development has been approved and Mechanical Services plans have been prepared for our review. However, provided recommendations in Section 6.2 of this report are adhered to, all proposed mechanical plant and equipment is likely to comply with the criteria of the NSW Industrial Noise Policy and Council requirements.

6.0 RECOMMENDATIONS

6.1 EXTERNAL BUILDING SPECIFICATIONS (WINDOWS, DOORS, WALLS & ROOF)

To limit the level of noise emission from the proposed boarding house (including all boarding rooms and indoor communal room), we recommend the following materials are used for external windows & doors:

Building Component	Rw Rating to be Achieved
Windows & Sliding Doors in Communal Room & all Boarding Rooms are to be 6mm laminated type with full perimeter Schlegel Q-Lon acoustic seals (Ph: 8707-2000). ⁽¹⁾	30-32
External Doors are to be Solid Core with acoustic seals fitted around the door. A drop seal is required at the base of the external door.	30-33

6.2 AIR-CONDITIONING UNITS AND MECHANICAL VENTILATION

As previously mentioned, we recommend acoustic assessment of all proposed Mechanical Plant & Equipment once the development has been approved and Mechanical Services Plans have been prepared. In general, we recommend that all new external air-conditioning units are to be acoustically enclosed or set away by more than 3.0m from any boundary.

We have assumed that mechanical services plant including the carpark ventilation and security roller door may operate as required up to 24 hours each day. Noise criteria of the exhaust fan, medium condensing unit, and car park security roller door sound power levels are presented in the table below:

Table 6.2.1 – Typical Mechanical Plant Leq Sound Power Levels

FREQUENCY [Hz]	63	125	250	500	1000	2000	4000	8000	dBA
Typical Car park Exhaust fan	80	82	84	87	86	83	78	71	90
Typical Condensing Unit	71	69	67	61	58	54	47	44	64
Leq, 15 mins Car-Park security roller door.	62	57	60	60	68	63	62	57	77

In order for the operation of the car park & building mechanical plant and equipment to meet the noise criteria listed in Section 7 of this report, we recommend the following:

Table 6.2.2 - Mechanical Plant Recommendations

MECHANICAL PLANT	RECOMMENDATIONS
Car Park Supply air	<ul style="list-style-type: none"> Install a silencer Min 2D (E29/90)¹ or Equivalent.
Car Park Exhaust Fan	<ul style="list-style-type: none"> Provide silencer before and after Fan. Silencer Min 2D (E29/90)¹ or Equivalent. Lagged duct with min 38mm 32 kg/m³ acoustic insulation a minimum 10 metres into the car park
Ducting in Commercial Tenancies	<ul style="list-style-type: none"> Lagged duct with min 38mm 32 kg/m³ acoustic insulation

Note* All silencers should be placed 1 to 2 duct diameter distance away from the fans. Specifications of silencers/acoustic louvers are provided in Table below

Table 6.2.3 - Silencer specifications

Insertion Loss of Recommended Silencers [dB]								
FREQUENCY [Hz]	63	125	250	500	1000	2000	4000	8000
Attenuator/Silencer	6	11	18	31	36	27	24	17

Alternative attenuator/silencer or acoustic louvers can be considered provided that the insertion loss values are equal or greater than the values specified in the Table above.

6.3 SOUND BARRIER FENCE

We recommend that a 1.8 metre gap free fence is installed on the ground floor boundaries adjacent to the nearest receivers at No. 49 Jamison Road & No. 52 Somerset Street (Figure 8 – Sound Barrier Location). The fence can be of lapped & capped timber, colourbond steel or masonry construction.

6.4 SUPERVISION & RESTRICTION OF USE OF COMMON AREAS

Management is to ensure that lodgers are supervised at all times and house rules are followed, to minimise noise generated by residences of the boarding house in accordance with a Plan of Management.

No large social gatherings are to occur and no music is to be played in the outdoor common area. We recommend that management restrict the use of the outdoor communal terrace to the day and evening time only (ie between 7:00am – 10:00pm). It is recommended that when TV or music is played in boarding rooms, management is to encourage lodgers to have their windows and doors closed.

6.5 SIGNS

Signs reminding residents of the nearby residential receivers and to minimise noise at all times shall be installed at entry and hallways of the boarding house, the communal room and communal terrace; to ensure that all music, and sounds are restricted within the property and not transmitted into adjoining residences.

A sign is to also be installed in the outdoor communal area, advising residents that access to the area is restricted during the night hours (ie 10:00pm – 7:00am).

6.6 NOISE MANAGEMENT PLAN

A Noise Management Plan should be implemented and should include the following:

- Install a contact number at the front of the Boarding House so that complaints regarding the station operation can be made.
- Implement a complaint handling procedure. If a noise complaint is received the complaint should be recorded on a Complaint Form, containing the following:
 - Name and Address of the Complainant
 - Time and Date the Complaint was received
 - The nature of the complaint and the time/date the noise was heard
 - The name of the employee that received the complaint
 - Actions taken to investigate the complaint and the summary of the results of the investigation
 - Indication of what was occurring at the time the noise was happening (if applicable)
 - Required remedial action (if applicable)
 - Validation of the remedial action
 - Summary of feedback to the complaint

Also a permanent register of complaints should be held on the premises, which shall be reviewed monthly by staff to ensure all complaints are being responded to. All complaints received shall be reported to management with initial action/investigation commencing within 7 days. The complaint should also be notified of the results and actions arising from the investigation.

7.0 NOISE IMPACT STATEMENT AND CONCLUSION

Acoustic, Vibration & Noise Solutions have taken noise level measurements at the most noise sensitive locations near the proposed boarding house located at No. 51 Jamison Road, Kingswood. The levels of noise emission from the proposed boarding house have been calculated and quantified using reliable test data.

Provided the noise controls as recommended in Section 6 of this report are fully implemented, we are confident that the noise emission levels from the proposed boarding house will be controlled and will not exceed the criteria outlined in the NSW Industrial Noise Policy and Penrith Council Requirements.

We hope this report meets your requirements. Should you require further explanations, please do not hesitate to contact us.

Yours sincerely,



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8.0 APPENDIX

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Figure 1 - Site Location

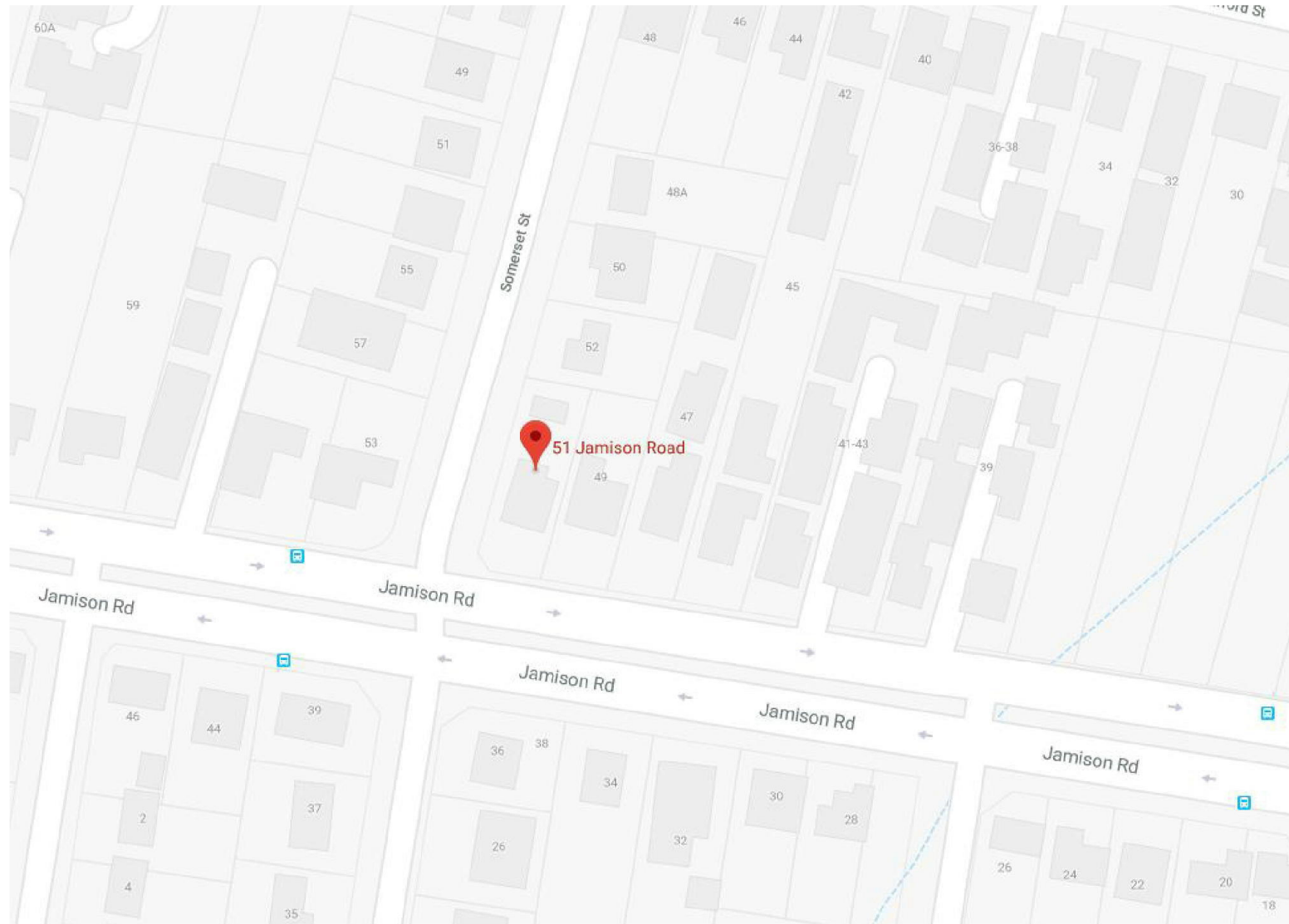


Figure 2 - Surrounding Environment



Figure 3 - Nearest Residential Receivers



Figure 4- Noise Reading Location

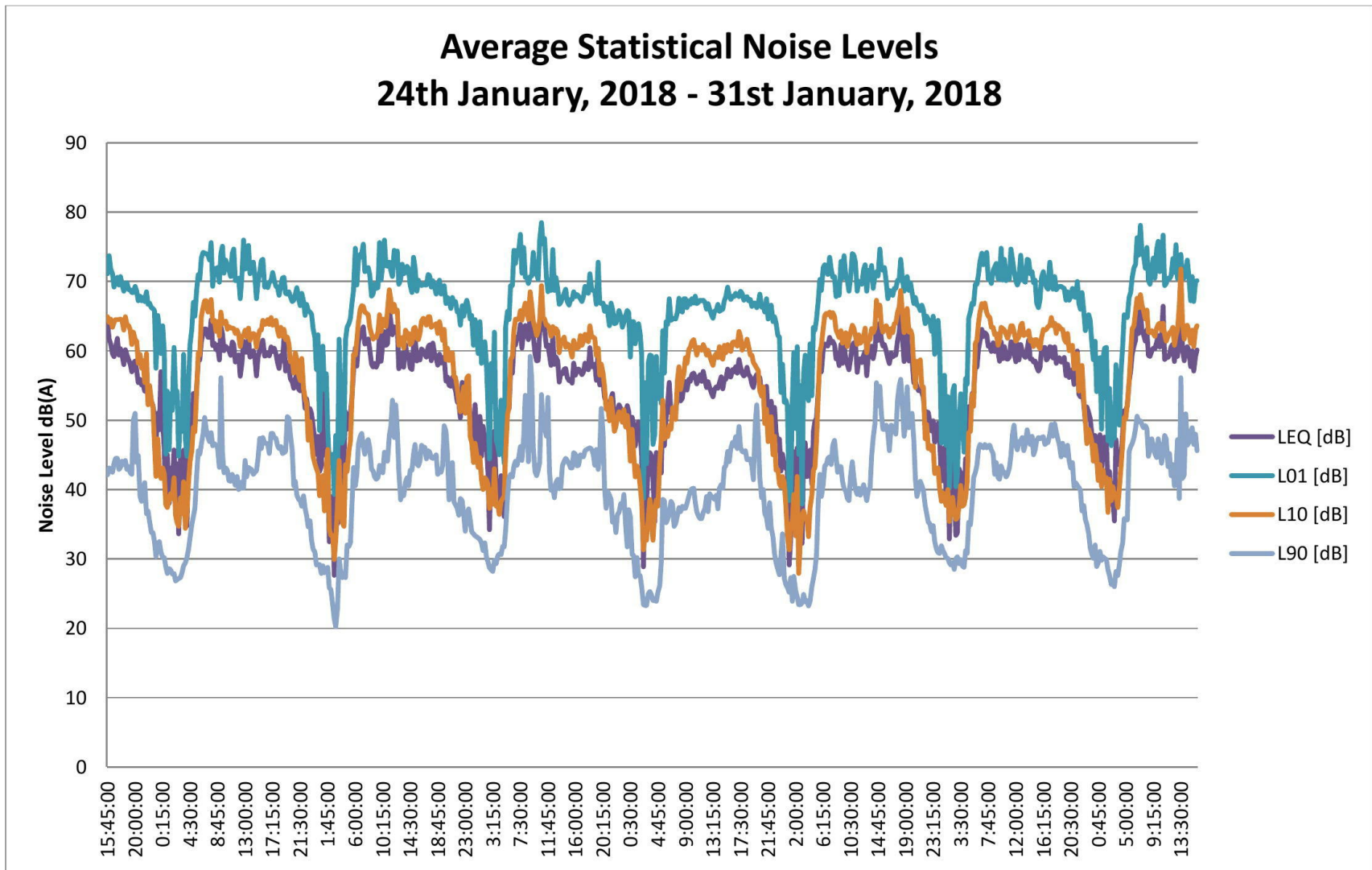


Figure 5 - Noise Survey

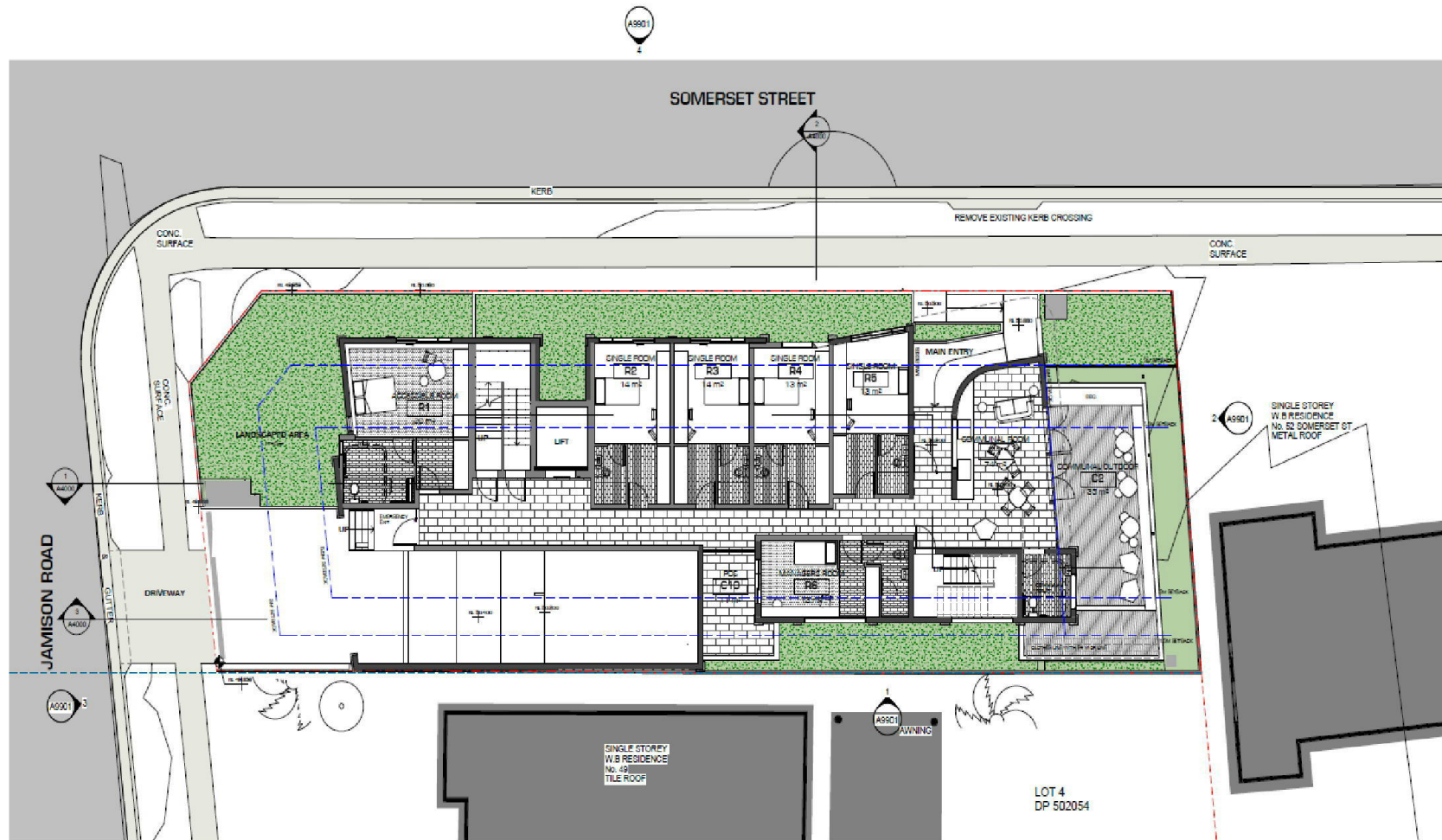


Figure 6 - Proposed Site Plan

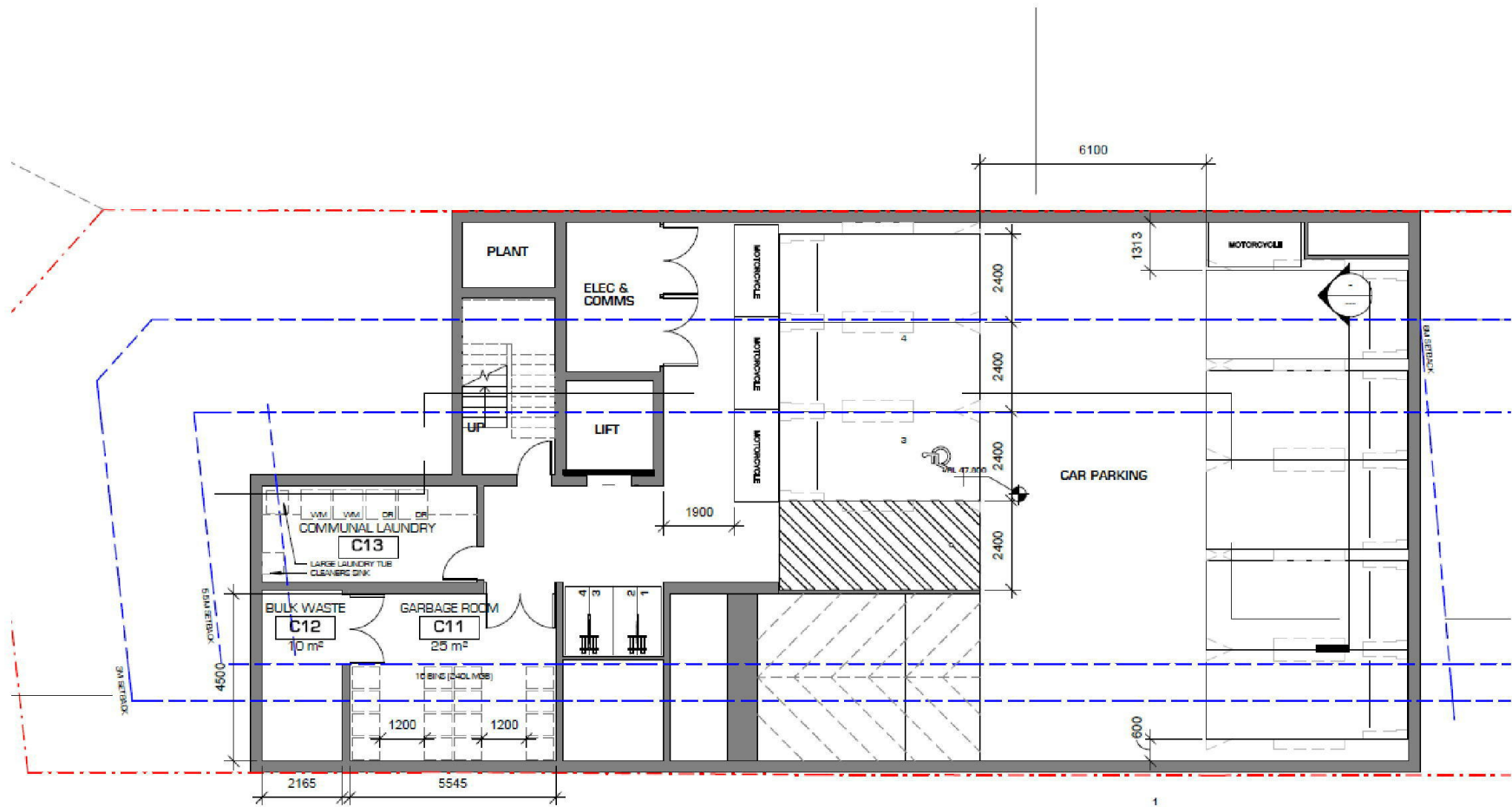


Figure 7- Proposed Basement Plan

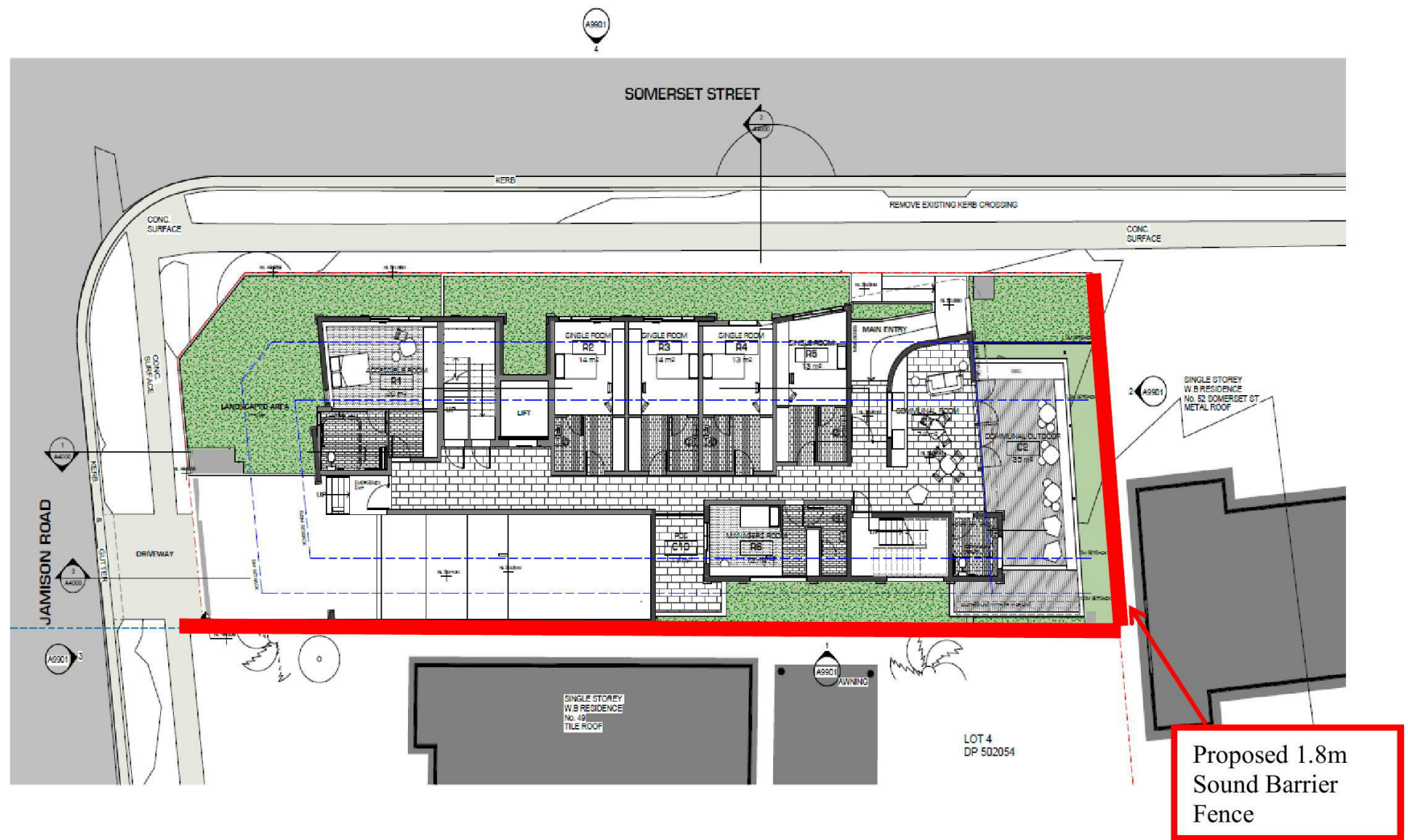


Figure 8 – Proposed Sound Barrier Location