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Road Traffic Noise Assessment Greenbank Health Centre 205-219 Teviot Road, Greenbank

TFG Properties Tier 7 Pty Ltd

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Executive Summary

ATP Consulting Engineers (ATP) was engaged by TRG Properties Tier 7 Pty Ltd to prepare a road traffic noise assessment for the proposed Greenbank Health Centre development at 205-219 Teviot Road in Greenbank.

This report is prepared in support of the development approval (DA) application for the medical centre development at 205-219 Teviot Road in Greenbank, and addresses the potential noise impacts on the development from the road traffic on Teviot Road which is a local government controlled road administered by Logan City Council, and is classified as a transport noise corridor.

Site specific noise measurements and detailed traffic noise propagation modelling was carried out to assess noise impact from the local government controlled Teviot Road considering the future road traffic up to a 10-year planning horizon (year 2033).

The results of the road traffic noise impact assessment indicate exceedances of the façade and outdoor open space criteria for the majority of the proposed medical/commercial tenancies, as well as the proposed residential units.

Review of the results for the ground level medical/commercial tenancies indicates an exceedance of the façade road traffic noise criteria as much as +11dB for the tenancies most exposed to traffic noise from Teviot Road. Introduction of a noise barrier is unlikely to achieve this level of noise mitigation, therefore acoustic upgrades will be required to the building envelope.

Likewise, the road traffic noise levels on the most exposed façades of the first floor medical/commercial tenancies and the second floor residential units exceed the relevant façade road traffic noise criteria.

The only locations where the façade criteria are met are at the most sheltered receivers on the western side of the development (Tenancy 10 and Unit 1), which have no frontage towards Teviot Road.

The majority of the residential units have balconies with frontages towards Teviot Road. As a result, the road traffic noise levels at the majority of these balconies exceed the private open space criteria.

Recommendations

Units will need to comply with QDC MP4.4. Commercial tenancies will need to meet own specific requirements

Following are the requirements in order to mitigate road traffic noise impacts on the proposed development:

- The balconies for Units 2 to 12, as well as the communal terrace, must have minimum 1.0m high continuous solid gap-free balustrades (other than gaps for drainage to comply with the Building Code of Australia). This is required because the balconies are directly exposed to traffic noise from Teviot Road.

It should be noted that toughened glass balustrades are acceptable if there are no gaps between the posts and no gaps to the concrete slab, except for drainage.

- All commercial/medical tenancies barring Tenancy 2 and Tenancy 10, as well as all residential units barring Unit 1 will require architectural treatment in order to protect the internal noise amenity.

Floor plan specific acoustic design as per the requirements of AS3671:1989 is required in order to comply with the internal noise criteria as per AS/NZS2107:2016.

- ATP Consulting have conducted preliminary acoustic design calculations for the proposed development, as detailed floor plans featuring window sizes are not available at the time of this report. These acoustic design calculations and the recommendations for architectural treatment, are only indicative. Once detailed floor plans, elevations and window schedule for the proposed development are finalised, at the building approval stage, ATP Consulting will conduct detailed floor plan specific acoustic calculations to determine the design requirements.

The preliminary acoustic design specifications to achieve acceptable internal noise levels at the proposed development are presented in Table 6.1 of this report.

Provided the recommended planning and design noise control measures are implemented in the construction of the proposed development, road traffic noise will not impose any further constraints on the establishment of the development.

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1. Introduction

1.1 Project background

ATP Consulting Engineers (ATP) was engaged by TRG Properties Tier 7 Pty Ltd to prepare a road traffic noise assessment for the proposed Greenbank Health Centre development at 205-219 Teviot Road in Greenbank.

This report is prepared in support of the development approval (DA) application for the medical centre development at 205-219 Teviot Road in Greenbank, and addresses the potential noise impacts on the development from the road traffic on Teviot Road which is a local government controlled road administered by Logan City Council, and is classified as a transport noise corridor.

1.2 Study Objectives

Study objectives are as follows:

- Site specific noise measurements near Teviot Road to obtain information about the existing noise levels. The measured traffic noise levels will be used for validation of the SoundPLAN noise propagation model.
- Development of a 3D model (using SoundPLAN software) of the proposed development and the immediate surroundings with consideration of the existing and future (within a 10-year planning horizon) traffic on Teviot Road.
- Assessment of traffic noise levels ($L_{10,18hr}$) from Teviot Road, within a 10-year planning horizon (2033), considering the traffic noise impact on the façades and the private open spaces of the future dwellings, as well as the façades of the commercial uses.
- Based on the calculated traffic noise levels ATP Consulting will provide recommendations for noise control measures (i.e. architectural treatments to the building façades and solid balustrades to balconies) to ensure compliance with the relevant external and internal noise criteria.
- Provision of a detailed acoustic report (road traffic noise assessment) in a format required by EDQ and Logan City Council (LCC). The report will present the traffic noise assessment methodology, tabulated measured noise levels, calculated traffic noise levels, and recommendations for noise control measures.

1.3 Development Plan

The proposed development is located at Lot 10 on RP184067, No. 205-219 Teviot Road in Greenbank. The subject site has a total area of 20,010 m². The site is located within the Greater Flagstone priority development area (PDA).

The location of the subject site is presented in Figure 1.1.



Figure 1.1 Site location

1.4 Proposed Development

The proposed development consists of the following:

- Site access from Leanne Court;
- Six (6) medical tenancies and one (1) commercial tenancy (café) on the ground floor, as well as four (4) medical tenancies and one (1) commercial tenancy (management) on the first floor;
- Twelve (12) residential units with private balconies on the second floor, as well as a communal terrace; and
- At grade car park with fifty-four (54) car spaces, and basement car park with ninety-three (93) car spaces.

Development layout is presented in Appendix A.

2. Existing Noise Amenity

2.1 Site-specific Noise Measurements

Noise monitoring was carried out at the eastern boundary of the subject site, to obtain information about the existing traffic and background noise levels.

The noise measurement methodology is summarised in Table 2.1.

Table 2.1 Noise measurements

Relevant legislation, standards and guidelines	The noise measurements were carried out in accordance with: - Australian Standard AS 1055:2018 (<i>Acoustics – Description and measurement of environmental noise</i>); and - Australian Standard AS 2702-1984 (<i>Acoustics – Methods for measurement of road traffic noise</i>).
Measurement location	The noise monitoring was carried out at the eastern boundary of the subject site at 205-219 Teviot Road. The measurement location was approximately 8m setback from the edge of Teviot Road. The noise measurement location is presented in Figure 2.1, as well as the photos presented in Appendix B.
Measurement period	Continuous noise monitoring was carried out 24 hours a day from 23 November 2020 to 2 December 2020.
Measurement equipment	The following noise measurement equipment was used: - Environmental noise logger – ARL EL-316 (serial no. 16-707-017); and - Calibration – RION NC-74 Sound Level Calibrator (serial no. 34615224). The noise measurement instruments conform to Australian Standard AS IEC61672.1-2019. Calibration was performed during set up and download of the data from the noise logger. The calibration drift was <0.1 dB(A).
Meteorological conditions	No periods of inclement weather were encountered during the unattended background noise monitoring period. Full meteorological data for the monitoring period is presented in Appendix C.
Analysis of data	The noise measurement data was analysed to determine the following noise descriptor: L_{10,18hr}: L₁₀ is the level of noise exceeded for 10% of any time period; L_{10,18hr} is the typical traffic noise descriptor, and is the arithmetic average of 18 hourly L_{10,1hr} levels over consecutive hours between 6am and 12am.

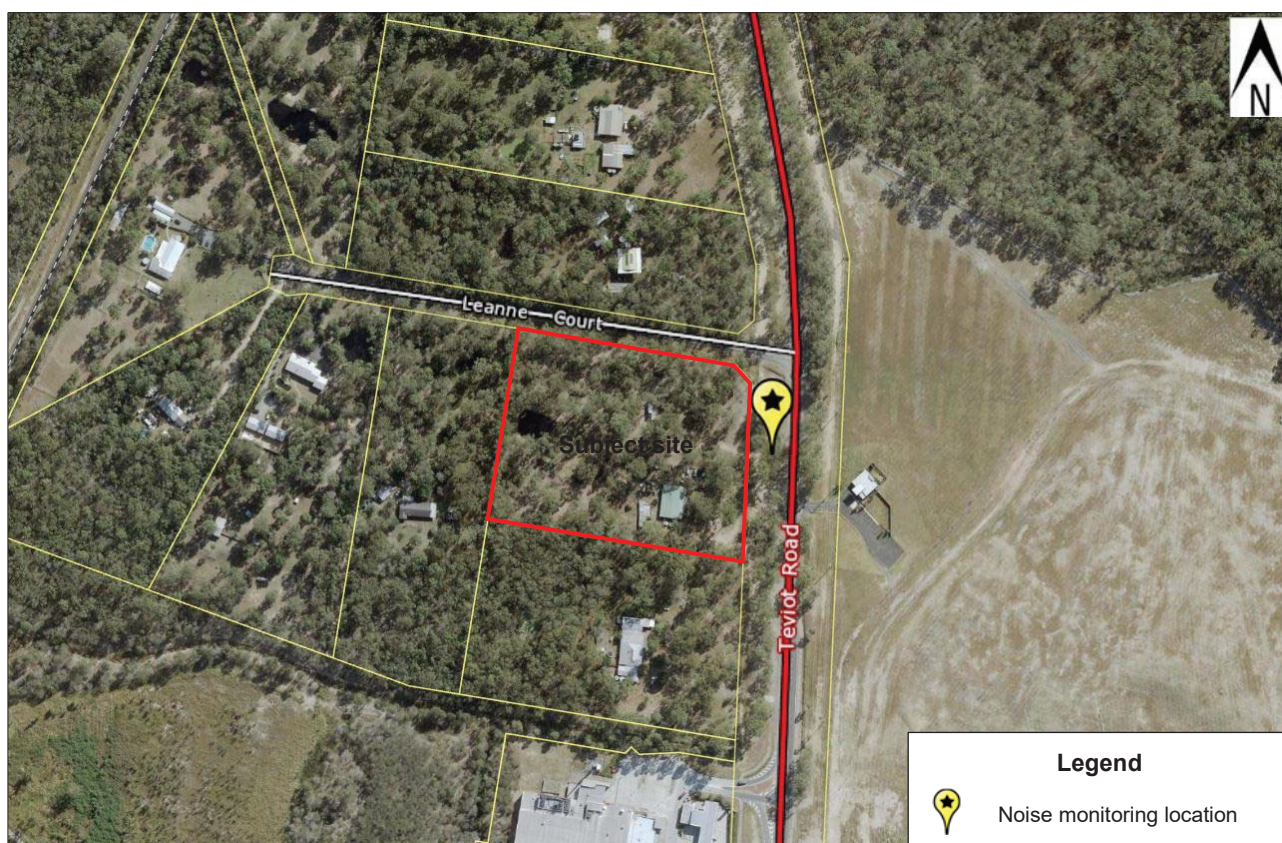


Figure 2.1 Noise monitoring location

2.2 Measurement Results

The results of the noise measurements undertaken from 5 to 18 March 2020 are presented in Table 2.2 and Appendix D.

Table 2.2 Noise measurement results

Date	Traffic noise levels		Background noise levels	
	L ₁₀ ,18hr (6am-12am)	L ₁₀ ,1hr max (6am-12am)	L ₉₀ ,18hr (6am-12am)	L ₉₀ ,8hr (10pm-6am)
23 Nov 2020 (Mon)	—	—	—	37
24 Nov 2020 (Tue)	71	74	55	36
25 Nov 2020 (Wed)	72	74	55	37
26 Nov 2020 (Thu)	72	74	55	37
27 Nov 2020 (Fri)	72	74	57	39
28 Nov 2020 (Sat)	72	73	54	36
29 Nov 2020 (Sun)	70	72	49	36
30 Nov 2020 (Mon)	71	74	54	35
1 Dec 2020 (Tue)	71	74	55	37
Arithmetic Mean	71	74	54	37
Weekdays Only	72	74	55	37

3. Traffic Noise Criteria

3.1 External Noise Criteria

The development site is located within the Greater Flagstone PDA, a priority development area designated by Economic Development Queensland (EDQ).

There are no traffic noise criteria specific to the Greater Flagstone PDA. Road traffic noise assessment for the Everleigh development should be carried out in accordance with the Department of Transport and Main Roads (TMR) *Road Traffic Noise Management: Code of Practice*.

The relevant traffic noise criteria are provided in the following documents:

- Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP), *State Development Assessment Provisions (SDAP) version 2.6 (February 2020), State code 1: Development in state-controlled road environment*; and
- Department of Transport and Main Roads (TMR), *Policy for Development on Land Affected by Environmental Emissions from Transport and Transport Infrastructure Version 4 (October 2017)*.

The applicable criteria from the TMR Policy and the SDAP are presented in Table 3.1.

Table 3.1 External noise criteria for new residential development

Transport infrastructure	Development type	Location within development	Environmental criteria
State-controlled Road	Accommodation activities ¹	All façades	≤60dB(A) L _{10,18hr} facade corrected (measured L _{90,8hr} free field between 10pm and 6am ≤ 40dB(A))
			≤63dB(A) L _{10,18hr} facade corrected (measured L _{90,8hr} free field between 10pm and 6am > 40dB(A))
		Outdoor spaces for passive recreation	≤57dB(A) L _{10,18hr} free field (measured L _{90,18hr} free field between 6am and 10pm ≤ 45dB(A))
			≤60dB(A) L _{10,18hr} free field (measured L _{90,18hr} free field between 6am and 10pm > 45dB(A))
	Health care services and offices	All façades	≤58dB(A) L _{10,1hr} facade corrected (maximum hour during normal opening hours)

For the proposed residential units on the second floor, the relevant façade adjusted² road traffic noise criterion for the building facades is 63dB(A) L_{10,18hr}³. The designated private open spaces (outdoor living areas) have to comply with the free-field traffic noise criterion of 60dB(A) L_{10,18hr}.

¹ Includes caretaker's accommodation, community residence, dual occupancy, dwelling house, dwelling unit, multiple dwelling, relocatable home park, residential care facility, resort complex, retirement facility, rooming accommodation, short-term accommodation and tourist park.

² The façade adjusted noise criteria contains +2.5dB(A) adjustment factor for the sound energy that is result of the reflection of the sound wave from the hard surface of typical buildings. This adjustment is applicable for areas within 3m from a hard reflective vertical surface.

³ Within a 10 year planning horizon, as the development is established, background noise levels in the vicinity of Teviot Road and Greenbank Road are expected to be greater than 40dB(A) L_{90,8hr} between 10pm and 6am.

For the proposed medical and management tenancies on the ground and first floors, the relevant façade adjusted road traffic noise criterion for the building facades is 58dB(A) $L_{10,1hr}$.

The proposed café tenancy is not subject to assessment for traffic noise impacts.

In case of exceedance of the external traffic noise criteria, architectural treatment has to be applied to the external facade of the building to protect the internal noise amenity of the residential dwellings.

3.2 Internal Noise Criteria

Where the external noise criteria cannot be met, the residential units as well as the medical and management tenancies, must be designed to mitigate intrusion of traffic noise into habitable rooms. At the building approval stage these spaces should be designed and constructed as per AS3671-1989 (floor-plan specific acoustic design). Alternatively, the residential units may be designed and constructed as per the acceptable forms of construction from QDC MP4.4.

When carrying out acoustic design as per AS3671, it is recommended to adopt the internal noise criteria specified in AS/NZS 2107:2016 as presented in Table 3.2.

Table 3.2 Internal noise criteria

Type of occupancy	Maximum L_{Aeq}
Residential unit – Living areas	45 dB(A)
Residential unit – Sleeping areas	40 dB(A)
Medical tenancy	40 dB(A)
Management tenancy (office)	40 dB(A)

4. Traffic Noise Calculation Methodology

Traffic noise levels at the proposed development, within a planning horizon of 10 years (year 2033), were calculated using SoundPLAN noise propagation modelling software.

SoundPLAN calculates traffic noise as per the procedure specified in the UK Department of Transport Welsh Office *Method of Calculation of Road Traffic Noise* (CoRTN). This traffic noise calculation procedure is widely adopted in Australia⁴.

4.1 Modelling Assumptions

The assumptions and data used in development of the traffic noise propagation model are presented in Table 4.1.

Table 4.1 Data and assumptions – Traffic noise model

Road Traffic	- Traffic volumes for Teviot Road were sourced from the traffic survey by Logan City Council in the year 2016, as detailed below: - Traffic survey location 430, for Teviot Road, located 50m north of Wharburton Bridge in South Maclean. - Future traffic volumes were calculated allowing for 6% annual traffic growth, based on population data published by the Queensland Government Statisticians Office which indicates a growth rate of approximately 6% within the Greenbank Statistical Area 2. - Teviot Road is currently a dual carriageway, featuring one northbound lane, and one southbound lane as it passes the development. - Teviot Road is to be upgraded within the 10-year planning horizon, to feature two northbound lanes and two southbound lanes as it passes the development. - The speed limit along Teviot Road is 70km/h as it passes the development. - Heavy vehicle percentage for Teviot Road conservatively estimated as 5.0%. - Road surface for Teviot Road is dense graded asphalt which requires a pavement surface correction factor of 0dB, as per the procedure of the TMR Code of Practice Volume 1. - The CoRTN procedure requires traffic volume data input for 18 hours. Traffic volume for 18-hour period (6:00am to midnight) was considered as 94% of the 24 hour AADT, as per the procedure of the TMR Code of Practice Volume 1. - CoRTN Calibration Factors for free field and façade noise levels have been considered in this assessment, as per the procedure from the TMR Code of Practice Volume 1.
Terrain	- Department of Natural Resources and Mines Airborne Laser Scanning (LiDAR) 1 metre data was used to determine the elevation of the development relative to the surroundings. - Ground surface absorption factors of 0 were applied to all paved surfaces and 1 for all grassed areas.
Development Layout	The proposed development layout, as per the DA issue drawings prepared by Verve Building Design Co. (Job Number: 19021, Revision A, dated November 2020) was considered in the SoundPLAN model.
Receivers & Noise Contour Maps	- Building façades: Receivers were attached to all the facades of the proposed buildings. Receivers are placed at a height of 1.5m above the finished floor level of each floor. - Private open spaces: Receivers were placed at a height of 1.5m above the second floor level balconies of the proposed residential units, as well as in the communal terrace.

⁴ CoRTN (Calculation of Road Traffic Noise) is a widely accepted procedure in Australia for calculation of traffic noise and it is specifically recommended in QLD TMR's Code of Practice Volume 1, Section 4.3.2, Page 29.

	- Noise contour maps were generated for the ground floor and first floor at a height of 1.5m above each floor level. 5m grid spacing was used for calculation of the noise contour maps. - Grid noise maps were generated for ground, first and second floor façades (façade adjusted), second floor outdoor open spaces (free field), and QDC MP4.4 Noise Category (façade adjusted) assessments.
Noise Mitigation Measures	The recommended traffic noise control measures are discussed in Section 6 of this report.

4.2 Road Traffic Volumes

Traffic flow data, as considered in the SoundPLAN model, is presented in Table 4.2.

Table 4.2 Traffic flow data

Road	Traffic volumes			Heavy vehicles (%)
	2016 Traffic Flow AADT ⁵	2020 Traffic Flow AADT ⁶	2033 AADT (10 year planning horizon)	
Kingston Road, Southbound (Brisbane – Beenleigh Road)	6,750	8,522	18,176	5.0

4.3 Road Traffic Noise Model Validation

The noise data collected during the monitoring period (as presented in Table 2.2) was used to validate the accuracy of the SoundPLAN model prior to undertaking calculations of the future road traffic noise levels within a 10-year planning horizon.

The results of the SoundPLAN model validation are presented in Table 4.3 and in Appendix E.

Table 4.3 SoundPLAN validation results

Receiver	Traffic noise level L _{10,18hr} dB(A)*		Difference dB	Traffic noise level L _{10,18hr} dB(A)*		Difference dB	Validation factor
	Measured	Calculated		Measured	Calculated		
TNIA Validation	72	71	-1	74	74	0	n/a

*Free field

The free field calculated road traffic noise level is within the acceptable tolerance of ± 2 dB(A), thus there is no need for the addition of a validation factor to the road traffic noise levels within the planning horizon (year 2033).

Excerpt from the 3D SoundPLAN noise propagation model is presented in Figure 4.1.

⁵ Most recent traffic data available for Teviot Road and Greenbank Road was from a 2006/2007 study by the Department for Transport and Main Roads (TMR, 2010).

⁶ Traffic flow growth rates of 6.0% per annum from 2006 to 2020, and from 2020 to 2033, based on population data published by the Queensland Government Statisticians Office which indicates a growth rate of approximately 6% within the Greenbank Statistical Area 2.

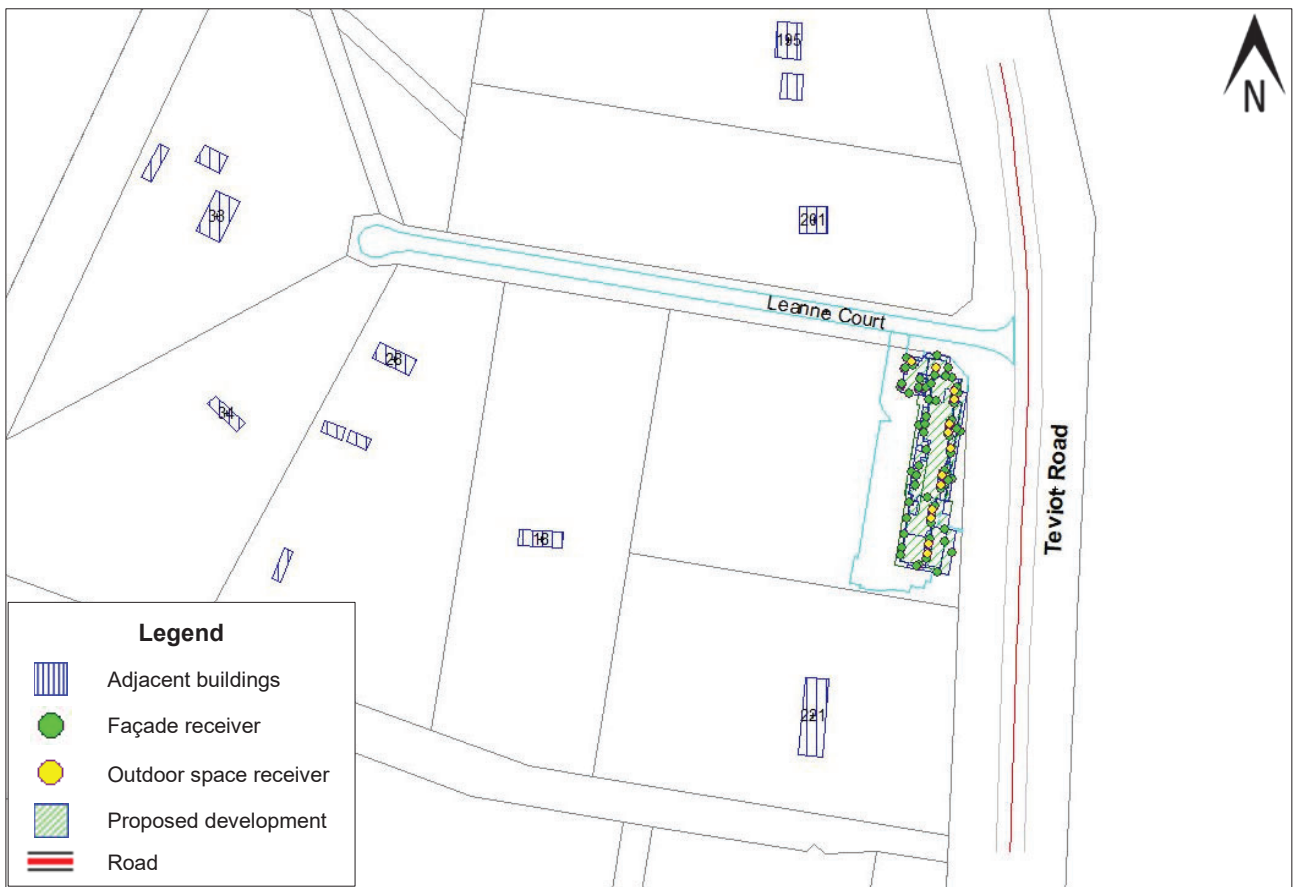


Figure 4.1 3D traffic noise model – SoundPLAN excerpt

5. Calculated Traffic Noise Levels

The road traffic noise levels were calculated at the ground, first and second floor facades, as well as the second floor private and communal open spaces at the proposed development.

For the proposed residential units on the second floor, the calculated noise levels were assessed against both the facade and private open space criteria of 63dB(A) $L_{10,18hr}$ and 60dB(A) $L_{10,18hr}$, respectively.

For the proposed medical and management tenancies on the ground and first floors, the calculated noise levels were assessed against the facade criteria of 58dB(A) $L_{10,1hr}$.

The calculated facade traffic noise levels at the proposed development are presented in Table 5.1.

Table 5.1 Calculated traffic noise levels – Building facades

Receiver			Traffic noise levels		Compliance with criteria?
Description	Floor	Façade	$L_{10,18hr}$ dB(A) facade-adjusted	$L_{10,1hr}$ dB(A) facade-adjusted	
<i>Façade traffic noise criteria for health care services and offices:</i>			–	58	
Tenancy 1 (Proposed dentist)	GF	E	65	68	No
		N	62	65	No
		S	56	59	No
Tenancy 2 (Proposed optometrist)	GF	E	55	59	No
		N	55	58	Yes
		W	40	44	Yes
Tenancy 3 (Proposed pathology)	GF	E	56	59	No
		S	41	45	Yes
		W	38	42	Yes
Tenancy 5 (Proposed pharmacy)	GF	E	66	69	No
		N	54	58	Yes
		W	41	44	Yes
Tenancy 6 (Proposed medical centre)	GF	E	65	68	No
		S	58	62	No
		W	40	44	Yes
Tenancy 7 (Proposed day surgery)	F 1	E	67	71	No
		N	65	68	No
		W	35	38	Yes
Tenancy 8 (Proposed specialist)	F 1	E	68	71	No
		W	42	46	Yes
Tenancy 9 (Proposed radiology)	F 1	E	67	71	No
		W	42	45	Yes
Tenancy 10 (Proposed management)	F 1	E	37	40	Yes
		N	48	51	Yes
		S	45	48	Yes
		W	42	45	Yes

Receiver			Traffic noise levels		Compliance with criteria?
Description	Floor	Façade	L _{10,18hr} dB(A) facade-adjusted	L _{10,1hr} dB(A) facade-adjusted	
Façade traffic noise criteria for health care services and offices:			–	58	
Tenancy 11 (Proposed commercial / medical)	GF	E	64	68	No
		N	62	65	No
		S	59	63	No
		W	39	43	Yes
Tenancy 12 (Proposed commercial / medical)	F 1	E	67	71	No
		S	62	65	No
		W	42	46	Yes
Façade traffic noise criteria for dwellings:			63	–	
Unit 1	F 2	E	57	60	Yes
		N	59	62	Yes
		S	49	53	Yes
		W	47	51	Yes
Unit 2	F 2	E	68	71	No
		N	65	68	No
		W	49	52	Yes
Unit 3	F 2	E	67	70	No
		W	48	52	Yes
Unit 4	F 2	E	67	70	No
		W	48	52	Yes
Unit 5	F 2	E	66	69	No
		W	48	52	Yes
Unit 6	F 2	E	67	71	No
		W	48	52	Yes
Unit 7	F 2	E	67	70	No
		W	48	51	Yes
Unit 8	F 2	E	66	70	No
		W	48	51	Yes
Unit 9	F 2	E	65	69	No
		W	48	51	Yes
Unit 10	F 2	E	65	68	No
		W	48	51	Yes
Unit 11	F 2	E	65	68	No
		W	47	51	Yes
Unit 12	F 2	E	65	68	No
		S	62	66	Yes
		W	47	51	Yes

Table 5.2 Calculated traffic noise levels – Building façades

Receiver			Traffic noise levels		Compliance with criteria?
Description	Floor	Façade	L _{10,18hr} dB(A) free-field	L _{10,1hr} dB(A) free-field	
<i>Private open space traffic noise criteria for dwellings:</i>			60	–	
Unit 1	F 2	–	59	62	Yes
Unit 2	F 2	–	60	64	Yes
Unit 3	F 2	–	61	65	No
Unit 4	F 2	–	60	64	Yes
Unit 5	F 2	–	61	64	No
Unit 6	F 2	–	63	66	No
Unit 7	F 2	–	60	64	Yes
Unit 8	F 2	–	61	65	No
Unit 9	F 2	–	60	63	Yes
Unit 10	F 2	–	61	64	No
Unit 11	F 2	–	61	64	No
Unit 12	F 2	–	61	65	No
Communal terrace	F 2	–	62	66	No

Full tabulated results of the calculated traffic noise levels, as well as noise contour maps showing the traffic noise levels at the proposed development are presented in Appendix F.

6. Discussion and Recommendations

Site specific noise measurements and detailed traffic noise propagation modelling was carried out to assess noise impact from the local government controlled Teviot Road considering the future road traffic up to a 10-year planning horizon (year 2033).

The results of the road traffic noise impact assessment indicate exceedances of the façade and outdoor open space criteria for the majority of the proposed medical/commercial tenancies, as well as the proposed residential units.

Review of the results for the ground level medical/commercial tenancies indicates an exceedance of the façade road traffic noise criteria as much as +11dB for the tenancies most exposed to traffic noise from Teviot Road. Introduction of a noise barrier is unlikely to achieve this level of noise mitigation, therefore acoustic upgrades will be required to the building envelope.

Likewise, the road traffic noise levels on the most exposed façades of the first floor medical/commercial tenancies and the second floor residential units exceed the relevant façade road traffic noise criteria.

The only locations where the façade criteria are met are at the most sheltered receivers on the western side of the development (Tenancy 10 and Unit 1), which have no frontage towards Teviot Road.

The majority of the residential units have balconies with frontages towards Teviot Road. As a result, the road traffic noise levels at the majority of these balconies exceed the private open space criteria.

Recommendations

Following are the requirements in order to mitigate road traffic noise impacts on the proposed development:

- The balconies for Units 2 to 12, as well as the communal terrace, must have minimum 1.0m high continuous solid gap-free balustrades (other than gaps for drainage to comply with the Building Code of Australia). This is required because the balconies are directly exposed to traffic noise from Teviot Road.

It should be noted that toughened glass balustrades are acceptable if there are no gaps between the posts and no gaps to the concrete slab, except for drainage.

- All commercial/medical tenancies barring Tenancy 2 and Tenancy 10, as well as all residential units barring Unit 1 will require architectural treatment in order to protect the internal noise amenity.

Floor plan specific acoustic design as per the requirements of AS3671-1989 is required in order to comply with the internal noise criteria as per AS/NZS2107:2016.

- ATP Consulting have conducted preliminary acoustic design calculations for the proposed development, as detailed floor plans featuring window sizes are not available at the time of this report. These acoustic design calculations and the recommendations for architectural treatment,

are only indicative. Once detailed floor plans, elevations and window schedule for the proposed development are finalised, at the building approval stage, ATP Consulting will conduct detailed floor plan specific acoustic calculations to determine the design requirements.

The preliminary acoustic design specifications to achieve acceptable internal noise levels at the proposed development are presented in Table 6.1.

Table 6.1 Preliminary acoustic design specifications

External walls				
For the external walls, the proposed masonry construction will provide the required sound attenuation without a need for additional acoustic insulation.				
Windows/sliding doors				
Required R_w ratings for windows within the proposed development are summarised below.				
Receiver	Floor	Facade	Recommended construction	
Medical / commercial tenancy	G F	East	6.38mm thick laminated safety glass in an acoustically sealed frame (Note 2)	
		North/south	Standard 4mm thick float glass in an acoustically sealed frame	
		West	Standard 4mm thick float glass with standard weather seals	
	F 1	East	6.38mm thick laminated safety glass in an acoustically sealed frame (Note 2)	
		North/south	Standard 4mm thick float glass in an acoustically sealed frame	
		West	Standard 4mm thick float glass with standard weather seals	
Residential unit	F 2	East	6.38mm thick laminated safety glass in an acoustically sealed frame (Note 2)	
		North/south	Standard 4mm thick float glass in an acoustically sealed frame	
		West	Standard 4mm thick float glass with standard weather seals	
Note 1. The R_w rating required for each window will generally vary from room to room. For ease of construction however the same type of system can be incorporated into similar locations provided the system that satisfies the most stringent acoustic requirement is utilized. Recommendations for windows also applies to any glazing in doors and any other item of glazing located on the external façade of a habitable room unless stated otherwise. Note 2. For sliding systems requiring R_w ratings over 27 it is difficult to predict the performance of sliding window/door systems due to the variances in frame design and construction. It is recommended to contact the manufacturers of proprietary sliding window/door systems that have been either tested for acoustic performance or have a guaranteed acoustic performance rating.				
Roof/ceiling				
The roof/ceiling above the residential units should as a minimum comprise of:				
- Selected metal roof sheeting over steel or timber purlins; - Single layer of 10mm thick gypsum plasterboard internally.				
Ventilation				
Under AS3671:1989 it is recommended to provide air-conditioning or alternative mechanical ventilation system to habitable rooms with upgraded glazing.				
The mechanical ventilation system should be appropriately sized to ensure sufficient air circulation as per the requirements of AS 1668.2-2012. The ventilation should be designed so that the acoustic performance of the building envelope is not compromised.				

Provided the recommended planning and design noise control measures are implemented in the construction of the proposed development, road traffic noise will not impose any further constraints on the establishment of the development.

7. References

- Australian Standard AS 1055-2018 (*Acoustics – Description and Measurement of Environmental Noise*)
- Australian Standard AS/NZS 2107:2016 (*Acoustics – Recommended design sound levels and reverberation times for building interiors*)
- Australian Standard AS/NZSIEC61672.1-2019 (*Electroacoustics – Sound level meters – Specifications*)
- Australian Standard AS 3671-1989 (*Acoustics – Road Traffic Noise Intrusion – Building siting and construction*)
- Department of State Development Infrastructure and Planning, *State Development Assessment Provisions* (Version 2.6), February 2020
- Department of Transport and Main Roads, 2013, *Transport Noise Management: Code of Practice, Volume 1 – Road Traffic Noise*
- Department of Transport and Main Roads, *Development on land affected by environmental emissions*, Version 4, October 2017
- Logan City Council, 2015, *Logan Planning Scheme 2015 Version 8*

Appendices

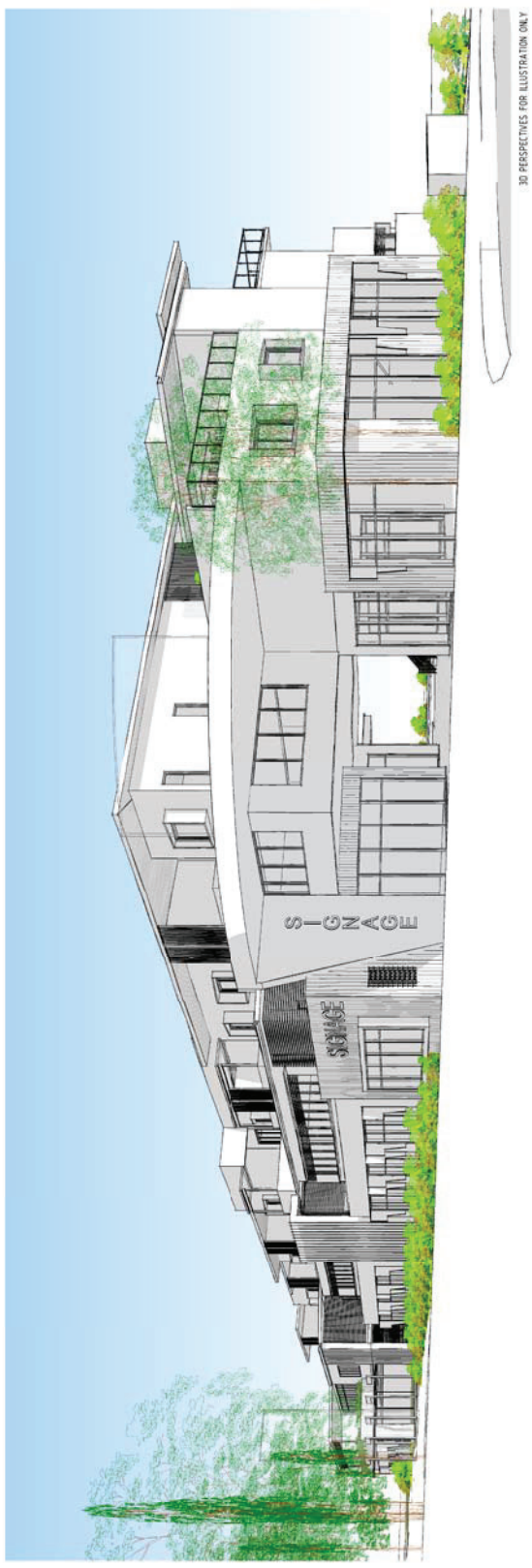
- Appendix A – Development Layout
- Appendix B – Site Photos
- Appendix C – Meteorological Data
- Appendix D – Noise Measurement Results
- Appendix E – Traffic Noise Model Validation Results
- Appendix G – Traffic Noise Levels (Year 2033)

Appendix A – Development Layout

ARCHITECTURAL DA DRAWINGS

PROPOSED MIXED USE DEVELOPMENT

205-219 TEVIOT ROAD, GREENBANK



3D PERSPECTIVES FOR ILLUSTRATION ONLY

DWG NO.	COVER PAGE	DRAWING TITLE
DA00	COVER PAGE	ARCHITECTURAL DA DRAWINGS
DA01	BASEMENT LEVEL - STAGE 1	
DA02	GROUND FLOOR - STAGE 1	
DA03	FIRST FLOOR - STAGE 1	
DA04	SECOND FLOOR - STAGE 1	
DA05	BASEMENT LEVEL - STAGE 1 & STAGE 4	
DA06	GROUND FLOOR - STAGE 1 & STAGE 4	

DWG NO.	COVER PAGE	DRAWING TITLE
DA07	FIRST FLOOR - STAGE 1 & STAGE 4	
DA08	SECOND FLOOR - STAGE 1 & STAGE 4	
DA09	PROP BUILDING ELEVATIONS & PERSPECTIVES - STAGE 1	
DA10	PROP BUILDING ELEVATIONS & PERSPECTIVES - STAGE 1	
DA11	PROP BUILDING ELEVATIONS & PERSPECTIVES - S1 + S4	
DA12	PROP BUILDING ELEVATIONS & PERSPECTIVES - S1 + S4	
DA13	PROP BUILDING SECTIONS	

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Project Description

PROPOSED MIXED USE DEVELOPMENT

205-219 TEVIOT ROAD, GREENBANK

Scale: 1:50

Drawn: 19021

Approved By: 55

Revision: A

Revision and Approvals

Rev: A

Date: 05/12/2021

By: [Signature]

Description: AUTHORITY OF RESPONSE

Project Description

PROPOSED MIXED USE DEVELOPMENT

205-219 TEVIOT ROAD, GREENBANK

Scale: 1:50

Drawn: 19021

Approved By: 55

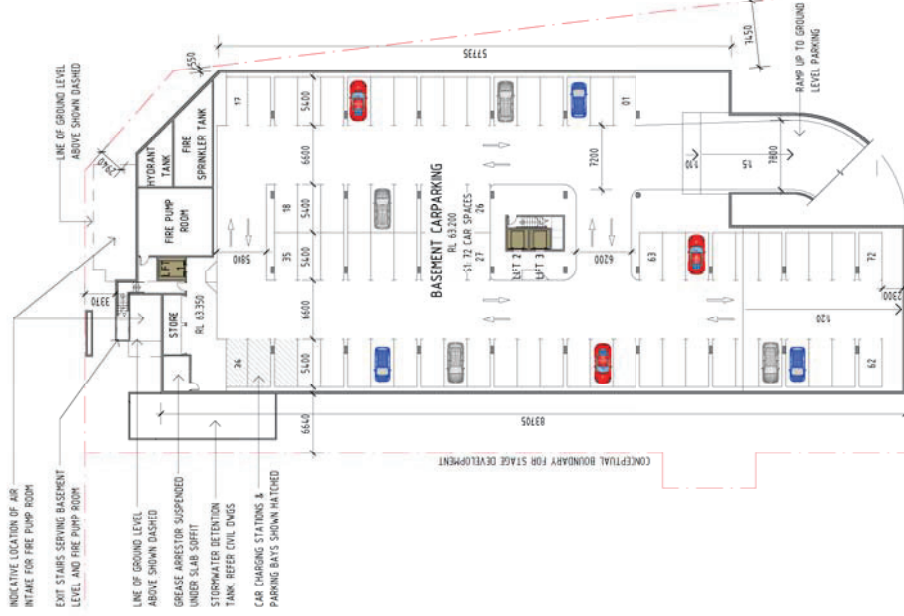
Revision: A



DA ISSUE
THIS DRAWING IS NOT
FOR CONSTRUCTION

PROPERTY DESCRIPTION

LOT 10 on RP18467
PARISH: PERRY
COUNTY: STANLEY
COUNCIL: LOGAN CITY COUNCIL



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- ☐ commercial / industrial / retail
- ☐ fast food restaurant design
- ☐ travel centre / service stations
- ☐ project concept to completion

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Revision	Appr.	Description
A	18/12/2021	DR: JSA 5506
P1	02/12/2021	TD: ISSUED FOR REVIEW
B	18/12/2021	TC: AUTHORITY NOT RESPONDED

Project Description:
PROPOSED MIXED USE DEVELOPMENT
205-219 TEVIOT ROAD, GREENBANK
Scale: 1:500
Drawn: JSA
Approved By: SS

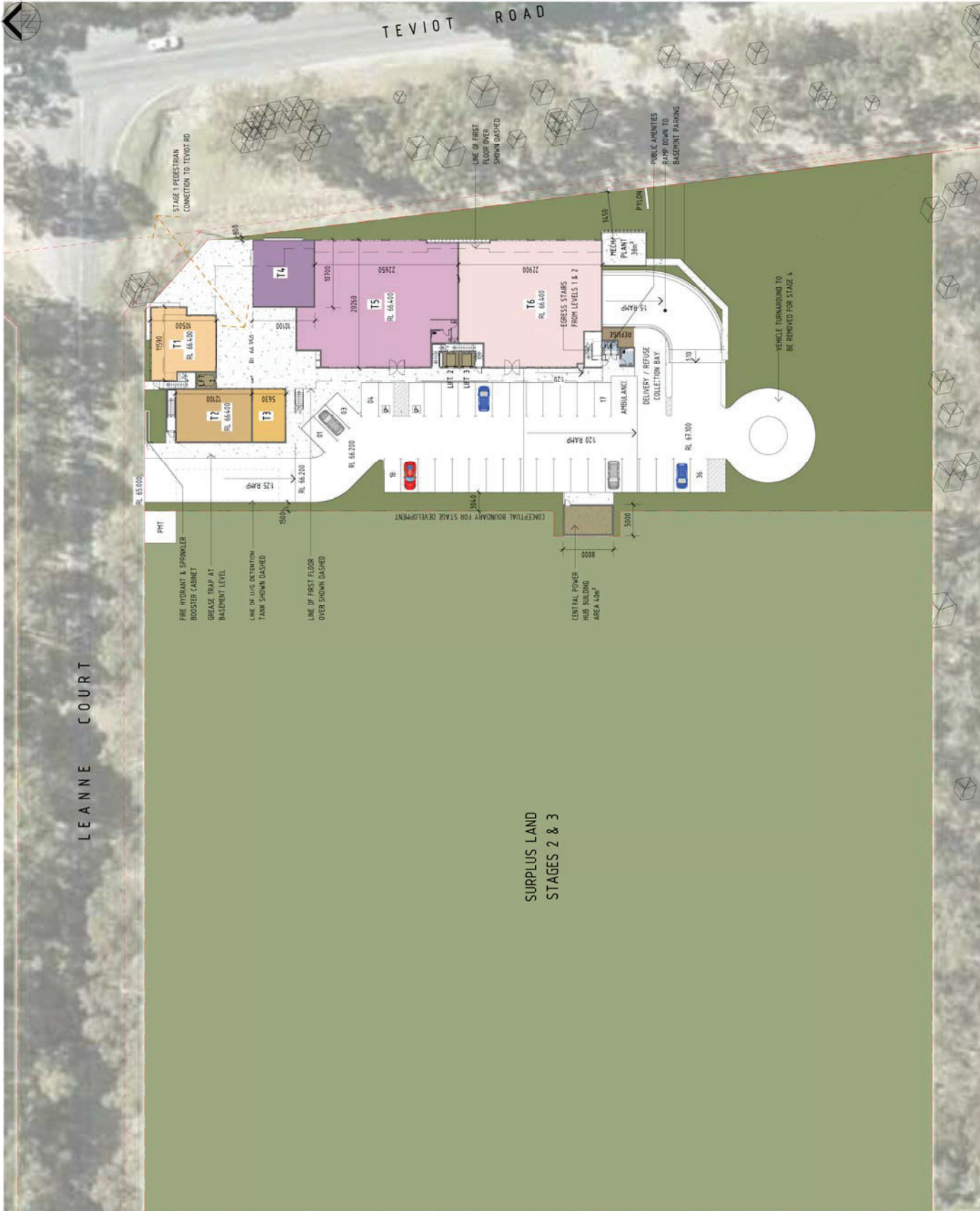
Drawing Title:
BASEMENT LEVEL - STAGE 1
Job Number - Drawing Number:
19021 DA01 B
Revision:

DA ISSUE
THIS DRAWING IS NOT
FOR CONSTRUCTION

PROPERTY DESCRIPTION
LOT 10 on RP184067
PARISH: PERRY
COUNTY: STANLEY
COUNCIL: LOGAN CITY COUNCIL
DEVELOPMENT ASSESSMENT
TOTAL SITE AREA 2.001 ha
STAGE 1 - BUILDING 1 (3 STOREY)
DEVELOPMENT SITE AREA 6,150m²
(INCLUDES STAGE 4 SITE AREA)

- BUILDING AREAS (NLA)
- GROUND LEVEL
 - T1 - DENTIST 186m²
 - T2 - OPTOMETRIST 174m²
 - T3 - NAIL SALON 146m²
 - T4 - CAFE / HEALTH FOODS 146m²
 - T5 - CHEFEST 170m²
 - T6 - MEDICAL CONSULT 142m²
 - PUBLIC AMENITIES 142m²
 - GROUND LEVEL NLA 1,357m²
- OVERALL BLDG FOOTPRINT 1,357m²
(INCLUDES ENCLOSED STAIRS/LIFTS
EXCLUDES OPEN AIR BREZZENWAYS, REFUSE
AND MECHANICAL SERVICES ENCLOSURES)

- PARKING
- CARBAYS REQUIRED (Includes 2x ODA Bays) 16 Bays
 - CARBAYS PROVIDED (Includes 2x ODA Bays) 108 Bays
 - BEYCLE PARKING REQUIRED 15 Bikes
 - BEYCLE PARKING PROVIDED 15 Bikes



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Project Description

PROPOSED MIXED USE DEVELOPMENT

205-219 TEVIOT ROAD, GREENBANK

Scale: 1:500

Drawn: 10/07/2023

Approved By: 15/07/2023

Revision: 19021

DA02

D

Revision and Approvals

Rev	Date	Description	Appr
A	10/11/2023	DA 5000	
B	05/08/2023	DA 5000	
C	05/08/2023	DA 5000	
D	05/08/2023	DA 5000	
E	05/08/2023	DA 5000	
F	05/08/2023	DA 5000	
G	05/08/2023	DA 5000	
H	05/08/2023	DA 5000	
I	05/08/2023	DA 5000	
J	05/08/2023	DA 5000	
K	05/08/2023	DA 5000	
L	05/08/2023	DA 5000	
M	05/08/2023	DA 5000	
N	05/08/2023	DA 5000	
O	05/08/2023	DA 5000	
P	05/08/2023	DA 5000	
Q	05/08/2023	DA 5000	
R	05/08/2023	DA 5000	
S	05/08/2023	DA 5000	
T	05/08/2023	DA 5000	
U	05/08/2023	DA 5000	
V	05/08/2023	DA 5000	
W	05/08/2023	DA 5000	
X	05/08/2023	DA 5000	
Y	05/08/2023	DA 5000	
Z	05/08/2023	DA 5000	

Project Description

commercial / industrial / retail

fast food restaurant design

travel centre / service station

project concept to completion

DA ISSUE
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PROPERTY DESCRIPTION

LOT 10 on RP184067
PARISH: PERRY
COUNTY: STANLEY

COUNCIL: LOGAN CITY COUNCIL

DEVELOPMENT ASSESSMENT

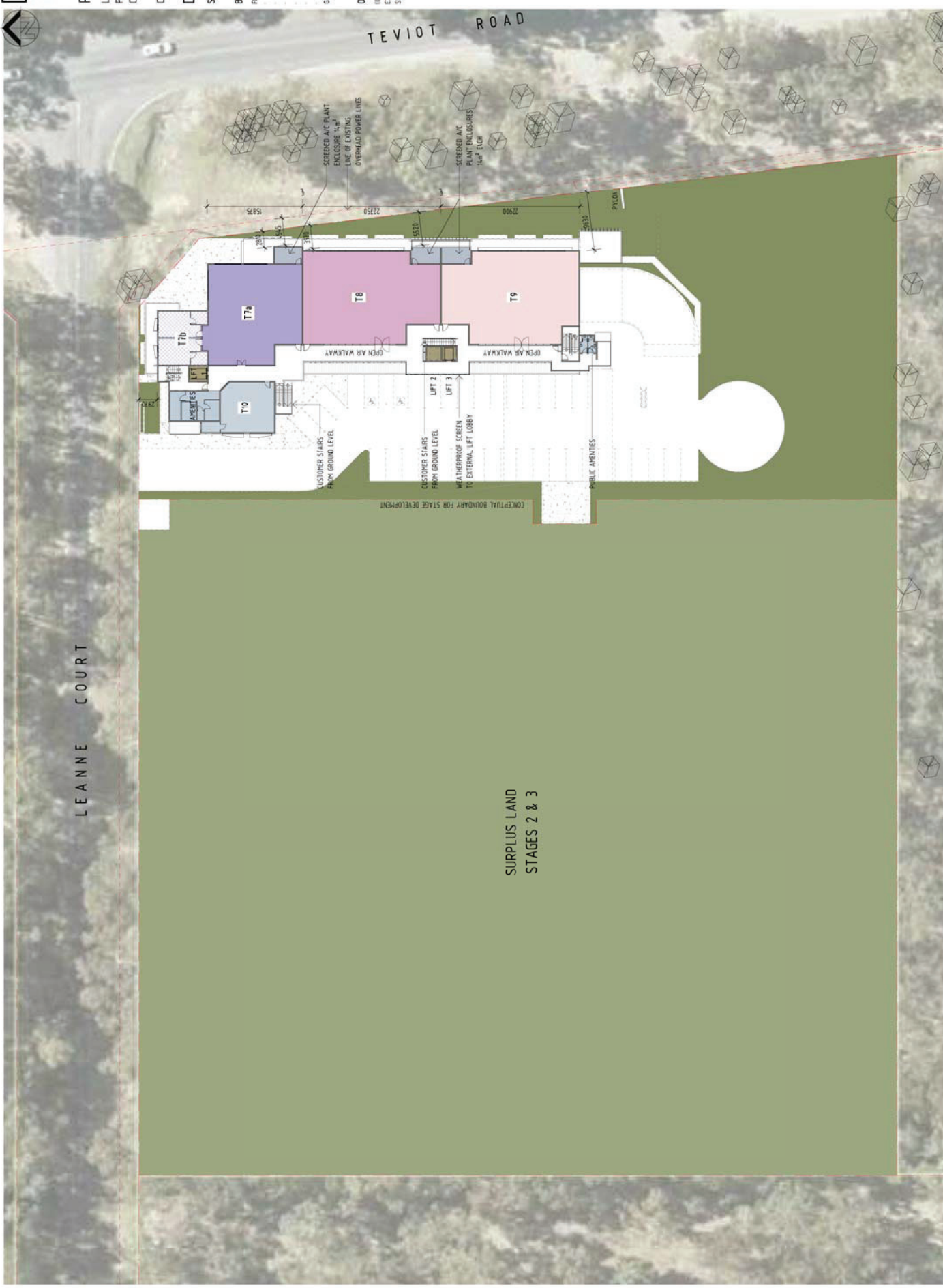
STAGE 1 - BUILDING 1 (3 STOREY)

BUILDING AREAS (N.A)

- FIRST LEVEL
- T7a - DAY SURGERY SUITES 744m²
- T7b - SURGERY REC ROOMS 70m²
- T8 - SPECIALIST CENTRE 310m²
- T9 - RADIOLOGY 310m²
- TN - MANAGEMENT OFFICE 78m²
- PUBLIC AMENITIES 14m²
- GROUND LEVEL N.A. 1,058m²

OVERALL LEVEL 1 FOOTPRINT 1,180m²

(INCLUDES ENCLOSED STAIRS/LIFTS
EXCLUDES OPEN AIR BRIDGESWAYS, AND MECHANICAL
SERVICES ENCLOSURES)



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Project Description

PROPOSED MIXED USE DEVELOPMENT
205-219 TEVIOT ROAD, GREENBANK

Scale: 1:500
Drawn: JSM
Checked: JTB

Revision

19021 DA03 B

Revision and Approval

Rev	Date	Description	Appr
A	18/11/2023	DA 5000	
P1	07/12/2023	ISSUED FOR REVIEW	
B	15/12/2023	APPROVED FOR REVIEW	

Approved By: JTB

Project Description

commercial / industrial / retail
fast food restaurant design
travel centre / service station
project concept to completion

DA ISSUE
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PROPERTY DESCRIPTION

LOT 10 on RP180467
PARISH: PERRY
COUNTY: STANLEY

COUNCIL: LOGAN CITY COUNCIL

DEVELOPMENT ASSESSMENT

TOTAL SITE AREA: 2.001 ha

STAGE 1 - BUILDING 1 (3 STOREY)

BUILDING AREAS (GFA)

SECOND LEVEL	193m ²
U1 - 3 BED UNIT	17m ²
BALCONY	17m ²
U2-4B - 2 BED UNITS	16m ²
BALCONY	16m ²
U7 - 3 BED UNIT (approx)	17m ²
BALCONY	17m ²
U8 - 1 BED UNIT + STUDY (approx)	16m ²
BALCONY	17m ²
U9-10 - 2 BED UNITS	95m ²
BALCONY	16m ²
U11 - 2 BED UNIT	100m ²
BALCONY	17m ²
U12 - 3 BED UNIT	15m ²
BALCONY	17m ²
TOTAL SECOND LEVEL GFA (EXCLUDES BALCONY AREAS)	1,239m ²

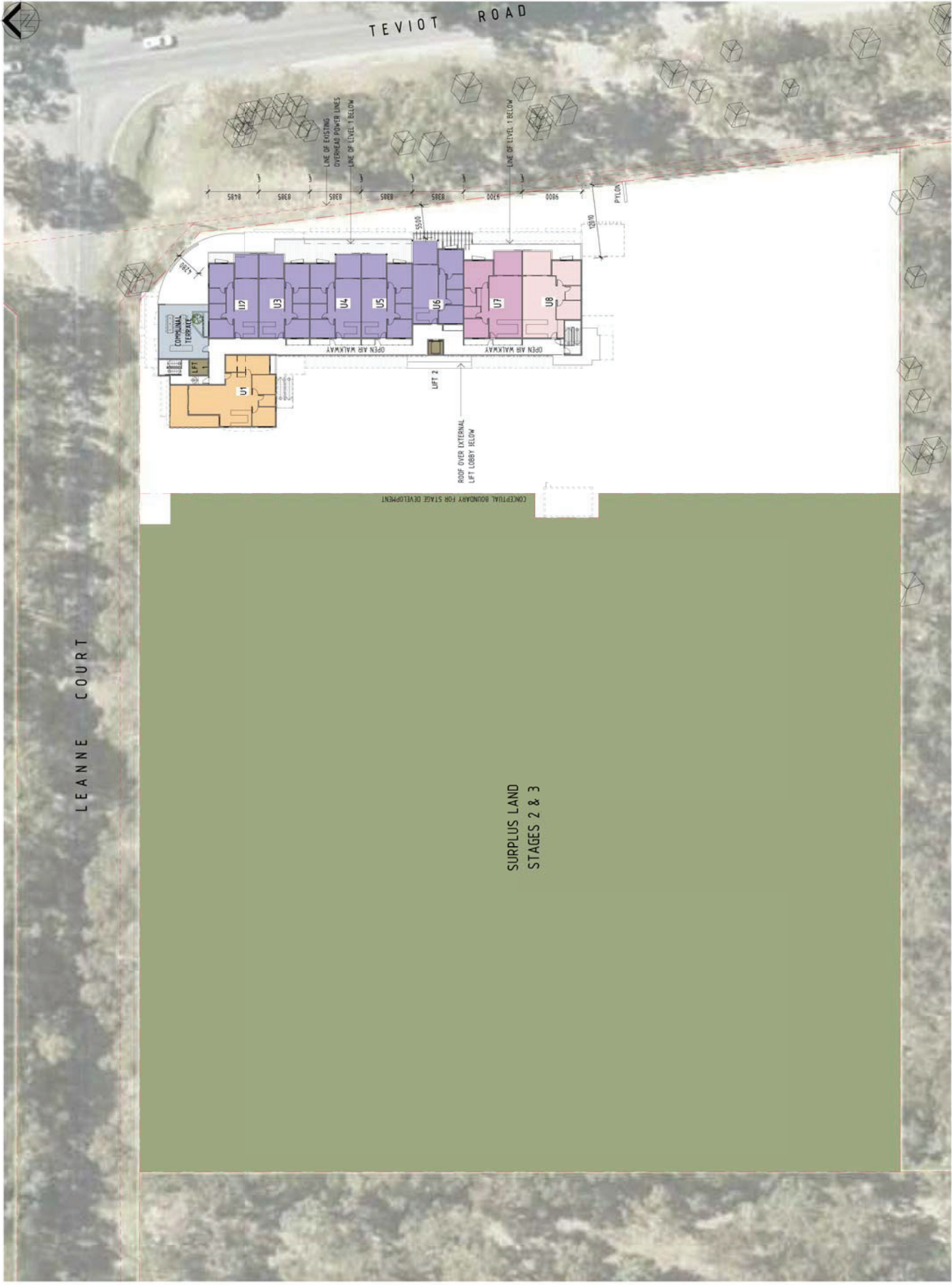
COMMUNAL TERRACE

15m²

OVERALL BLDG FOOTPRINT

1,115m²

(INCLUDES ENCLOSED STAIRWELLS AND BALCONES,
EXCLUDES OPEN AIR WALKWAYS)



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Project Description

PROPOSED MIXED USE DEVELOPMENT

205-219 TEVIOT ROAD, GREENBANK

Scale: 1:500

Drawn: [Name]

Check: [Name]

Approved By: [Name]

Approved Date: 10/07/2023

Revision No.

SECOND FLOOR - STAGE 1

Revision

19021

DA04

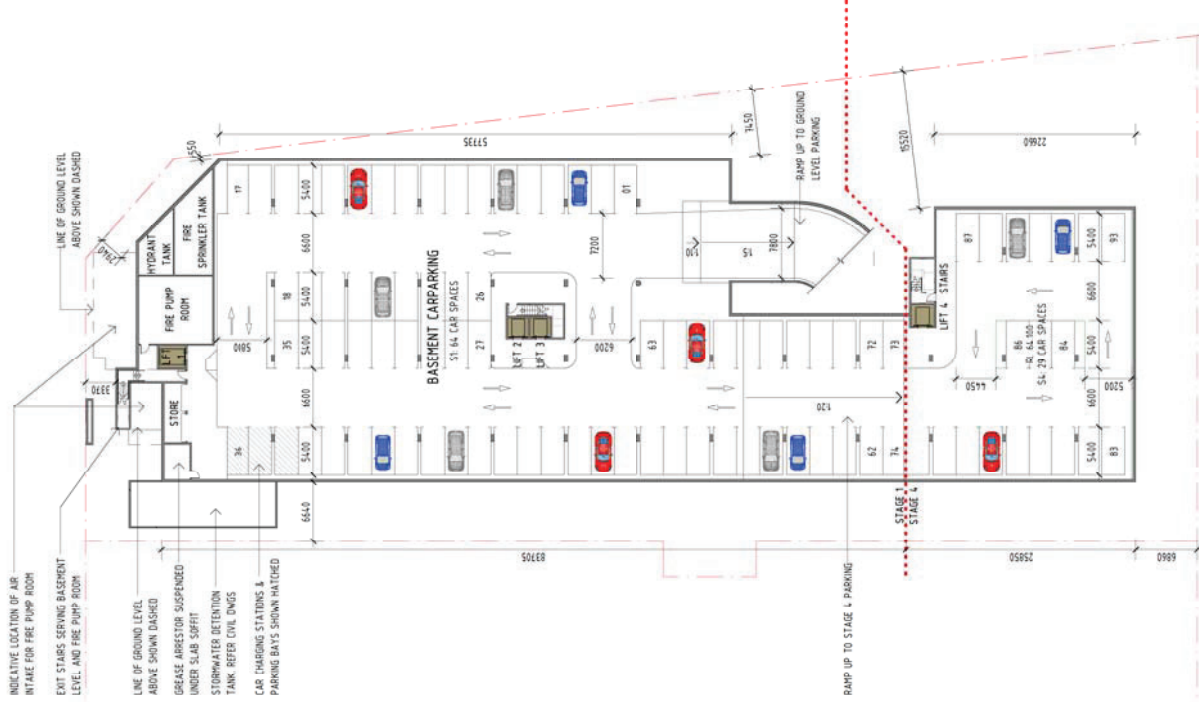
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PROPERTY DESCRIPTION

LOT 10 on RP184067
PARISH: PERRY
COUNTY: STANLEY
COUNCIL: LOGAN CITY COUNCIL



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☐ fast food restaurant design
☐ travel centre / service station
☐ project concept to completion

Revision	Author	Date	Description
A	18/12/2020	DR	ISSUE
P1	18/12/2020	TD	ISSUED FOR REVIEW
B	18/12/2021	TD	AUTHORITY OF RESPONSE

Project Description
**PROPOSED MIXED USE DEVELOPMENT
& STAGE 4**
205-29 TEVIOT ROAD, GREENBANK
Scale: 1:500
Drawn: JSA
Approved By: SS

Drawing Title
BASEMENT LEVEL - STAGE 1
Job Number - Drawing Number
19021
Revision
DA05 B

Drawing Title GROUND FLOOR - STAGE 1 & STAGE 4	Job Number - Drawing Number 19021	Revision DA06
		D

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PROPERTY DESCRIPTION

LOT 10 on RP184067
PARISH: PERRY
COUNTY: STANLEY

COUNCIL: LOGAN CITY COUNCIL

DEVELOPMENT ASSESSMENT

STAGES 1 & 4 - BUILDING 1 & 2 (3 STOREY)

BUILDING AREAS (NLA)

- FIRST LEVEL
 - T7a - DAY SURGERY SUITES 744m²
 - T7b - SURGERY REC ROOMS 70m²
 - T8 - SPECIALIST CENTRE 310m²
 - T9 - RADIOLOGY 310m²
 - T10 - MANAGEMENT OFFICE 78m²
 - T11 - MEDICAL / COMMERCIAL 150m²
 - PUBLIC AMENITIES 14m²
 - GROUND LEVEL NLA 1,668m²

OVERALL LEVEL 1 FOOTPRINT 1820m²
(INCLUDES ENCLOSED STAIRS/LIFTS AND STAGE 1 BUILDINGS,
EXCLUDES OPEN AIR BREZZEWAYS, AND MECHANICAL
SERVICES ENCLOSURES)



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Project Description

Appr

205-210 TEVIOT ROAD, GREENBANK

Scale: 1:500

Drawn: M. J. J. J.

Check: M. J. J. J.

Approved By: M. J. J. J.

Rev: 1

Rev: 2

Rev: 3

Rev: 4

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Rev: 1026

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DA ISSUE
THIS DRAWING IS NOT
FOR CONSTRUCTION

PROPERTY DESCRIPTION

LOT 10 on RP184067
PARISH: PERRY
COUNTY: STANLEY

COUNCIL: LOGAN CITY COUNCIL

DEVELOPMENT ASSESSMENT

TOTAL SITE AREA: 2.001 ha

STAGES 1 & 4 - BUILDING 1 & 2 (3 STOREY)

BUILDING AREAS (GFA)

SECOND LEVEL	152m ²
U1 - 3 BED UNIT	114m ²
BALCONY	114m ²
U2 - 3 BED UNIT	114m ²
BALCONY	114m ²
U3 - 3 BED UNIT	114m ²
BALCONY	114m ²
U4 - 3 BED UNIT	114m ²
BALCONY	114m ²
U5 - 3 BED UNIT	114m ²
BALCONY	114m ²
U6 - 3 BED UNIT	114m ²
BALCONY	114m ²
U7 - 3 BED UNIT	114m ²
BALCONY	114m ²
U8 - 3 BED UNIT	114m ²
BALCONY	114m ²
U9 - 3 BED UNIT	114m ²
BALCONY	114m ²
U10 - 3 BED UNIT	114m ²
BALCONY	114m ²
U11 - 3 BED UNIT	114m ²
BALCONY	114m ²
U12 - 3 BED UNIT	114m ²
BALCONY	114m ²
TOTAL SECOND LEVEL GFA (EXCLUDES BALCONY AREAS)	1,220m ²

COMMUNAL TERRACE

75m²

OVERALL BLDG FOOTPRINT

1,590m²

(INCLUDES ENCLOSED STAIRS/LIFTS AND BALCONIES AND STAGE 1 BUILDINGS EXCLUDES OPEN AIR WALKWAYS)



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3. ANY DISCREPANCIES IN SCHEDULES SHOULD BE IDENTIFIED TO THE AUTHOR

4. ALL AREAS ARE GROSS AREAS, UNLESS NOTED OTHERWISE

CONSULTING ENGINEER

VERVE
ENGINEERING & DESIGN
100-110 LEANNE COURT, LOGAN CITY, QUEENSLAND 4042
TEL: 07 555 1234 | FAX: 07 555 1235 | EMAIL: INFO@VERVEENGINEERING.COM.AU
WWW.VERVEENGINEERING.COM.AU

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Project Description

APPR

205-29 TEVIOT ROAD, GREENBANK

Scale: 1:500

Drawn: JSM

Check: JSM

Approved By: JSM

Approved Date: 10/10/2023

Revision No.

SECOND FLOOR - STAGE 1 & STAGE 4

JOB Number - Drawing Number

19021

Revision

DA08

C



1. STAGE 1 SITE ENTRY

2. BUILDING ELEVATION NORTH S1

1:200



3. BUILDING ELEVATION EAST S1

1:200



4. STAGE 1 TEVIOT RD PERSPECTIVE

NOTES:

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- ☐ commercial / industrial / retail
- ☐ fast food restaurant design
- ☐ travel centre / service stations
- ☐ project concept to completion

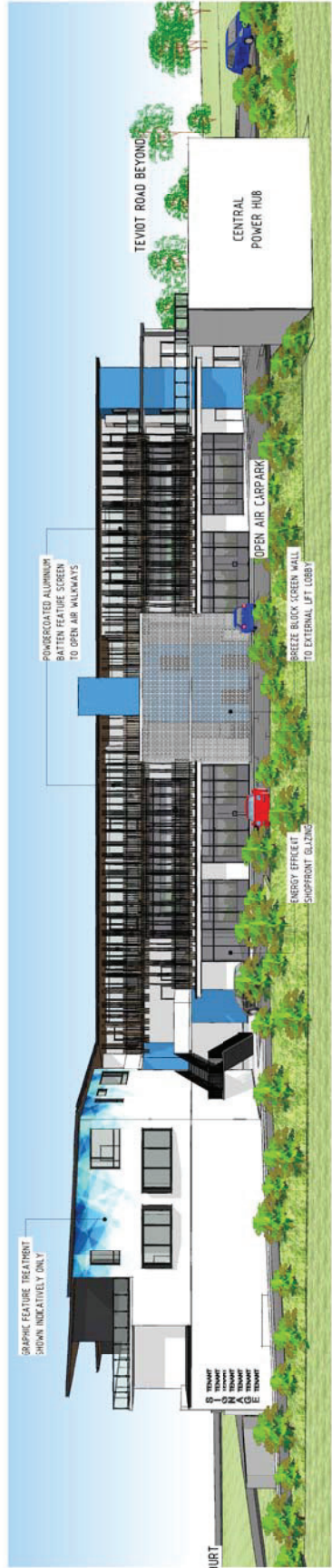
Revision	Appr.	Description
P1	15.12.2020	1. PRELIMINARY ISSUE FOR CLIENT REVIEW
A	03.03.2021	2. AUTHORITY RFI RESPONSE

Project Description

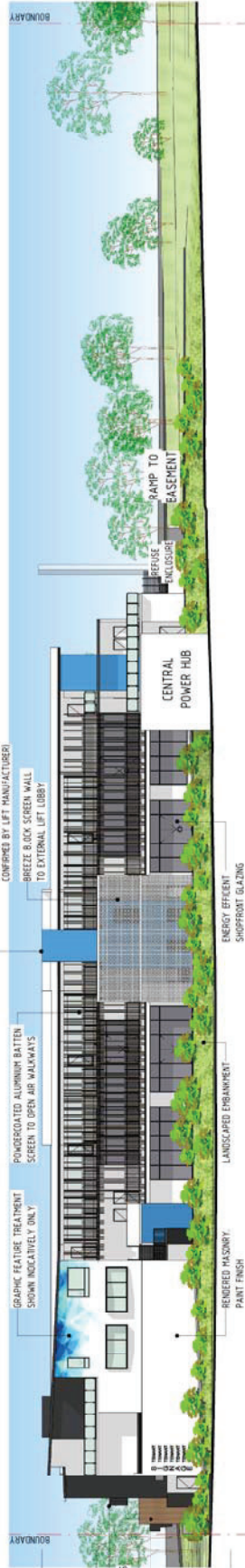
PROPOSED MIXED USE DEVELOPMENT
205-210 TEVIOT ROAD, GREENBANK
Scale: 1:500
Date: 03.03.2021
Drawn: [Name]
Checked: [Name]
Approved By: [Name]

19021
DA09
A

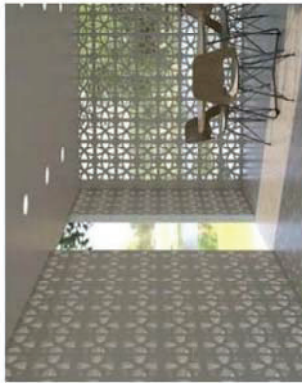
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1 STAGE 1 WESTERN FACADE PERSPECTIVE



2 BUILDING ELEVATION WEST S1



3 LIFT LOBBY



4 BUILDING ELEVATION SOUTH S1



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ENGINEERING SERVICES CO.
100-110 LINDSEY AVE, LINDSEY PARK, LINDSEY PARK, LINDSEY PARK, LINDSEY PARK
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Project Description: **PROPOSED MIXED USE DEVELOPMENT**

Appr: **205-29 TEVOT ROAD, GREENBANK**

Scale: 1:200

Drawn: **19021**

DA10 A

Revision: **19021**

Job Number: **19021**

Drawn By: **DA10**

Approved By: **A**

Project Description: **PROPOSED MIXED USE DEVELOPMENT**

Appr: **205-29 TEVOT ROAD, GREENBANK**

Scale: 1:200

Drawn: **19021**

DA10 A

Revision: **19021**

Job Number: **19021**

Drawn By: **DA10**

Approved By: **A**

DA ISSUE
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NOTES:

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1 STAGE 4 SITE ENTRY



2 BUILDING ELEVATION EAST S1+S4
1:200
EXISTING STREET TREES SHOWN FOR CLARITY



3 STAGE 1 & 4 TEVIOT RD PERSPECTIVE

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- ☐ commercial / industrial / retail
☐ fast food restaurant design
☐ travel centre / service station
☐ project concept to completion

Project Description

PROPOSED MIXED USE DEVELOPMENT
205-219 TEVIOT ROAD, GREENBANK
Scale: 1:500
Date: 10/07/2023
Approved By: [Signature]
Drawn: [Signature]

Drawing Title

PROP. BUILDING ELEVATIONS
& PERSPECTIVES - S1 + S4
19021
DA11
A

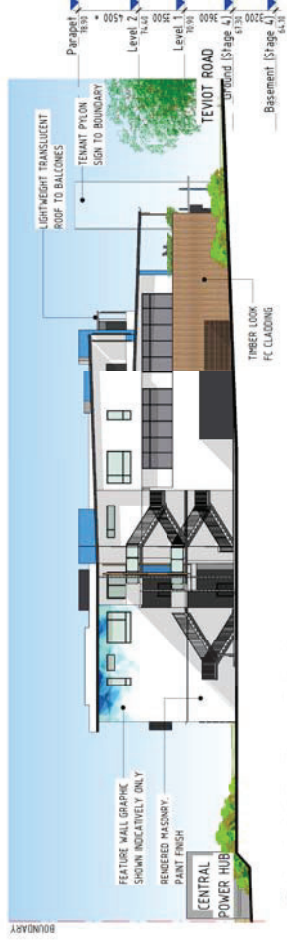
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1. STAGE 1 & 4. VIEW FROM SOUTH WEST



2. BUILDING ELEVATION WEST S1-S4



3. BUILDING ELEVATION SOUTH S1-S4

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CONSULTING ENGINEER

VERVE

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Project Description

PROPOSED MIXED USE DEVELOPMENT

205-29 TEVIOT ROAD, GREENBANK

Scale 1:200

Drawn: [Name]

Approved By: [Name]

Date: 10/07/2023

Job Number - Drawing Number

19021

DA12

A

Revision No.

PROP. BUILDING ELEVATIONS

& PERSPECTIVES - S1 + S4

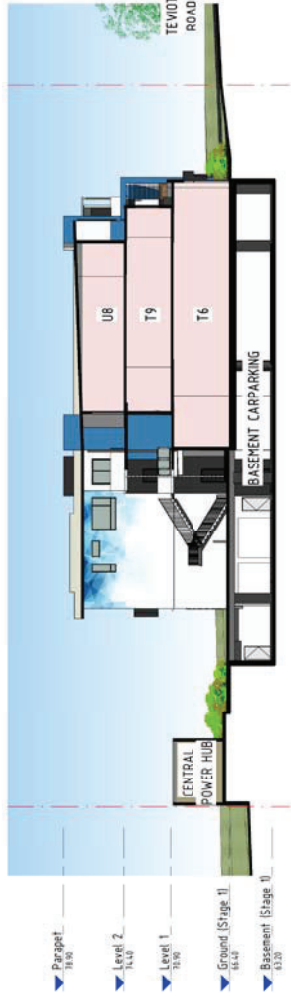
Revision

19021

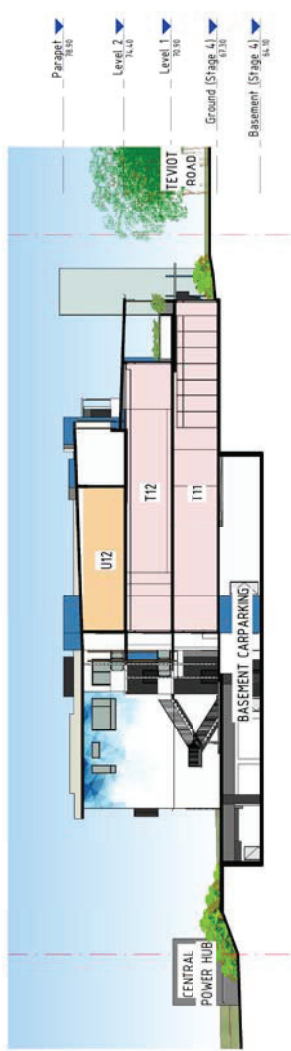
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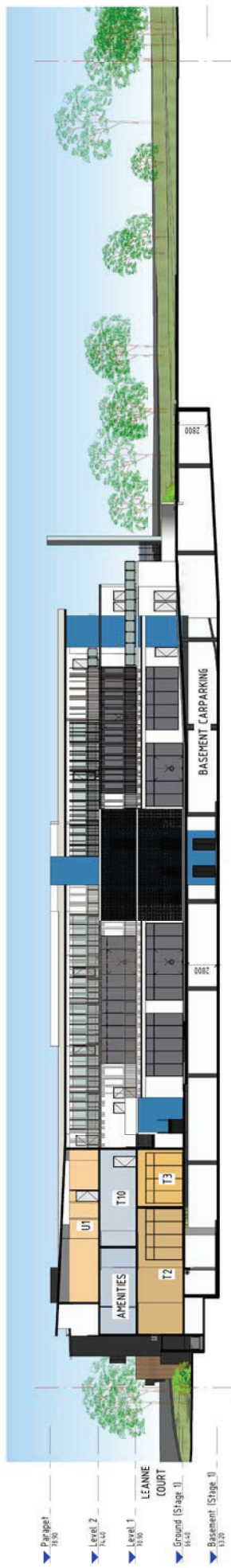
DA ISSUE
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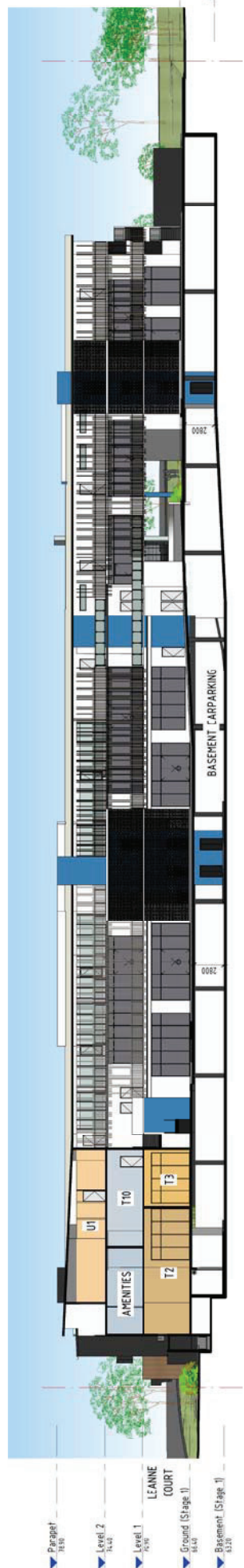
1 SECTION A - STAGE 1
1:200



2 SECTION C - STAGE 4
1:200



3 SECTION B - STAGE 1
1:200



4 SECTION B - STAGE 1 & 4
1:200

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CONSULTING ENGINEER



☐ commercial / industrial / retail
☐ fast food restaurant design
☐ travel centre / service station
☐ project concept to completion

☐ project concept to completion
☐ project concept to completion
☐ project concept to completion

Revision and Approval	Rev	Date	Description
1	01/12/2023	10	ISSUED FOR REVIEW
2	01/12/2023	10	ISSUED FOR REVIEW
3	01/12/2023	10	ISSUED FOR REVIEW
4	01/12/2023	10	ISSUED FOR REVIEW
5	01/12/2023	10	ISSUED FOR REVIEW
6	01/12/2023	10	ISSUED FOR REVIEW
7	01/12/2023	10	ISSUED FOR REVIEW
8	01/12/2023	10	ISSUED FOR REVIEW
9	01/12/2023	10	ISSUED FOR REVIEW
10	01/12/2023	10	ISSUED FOR REVIEW

Project Description:
PROPOSED MIXED USE DEVELOPMENT
205-219 TEVIOT ROAD, GREENBANK
Scale: 1:200
Date: 01/12/2023
Approved By: SS

Project Title:
PROP. BUILDING SECTIONS
Job Number - Drawing Number:
19021
DA13
Revision:
A

Appendix B – Site Photos



Photo 1 – Noise monitoring location, looking east



Photo 2 – Noise monitoring location, looking south



Photo 3 – Noise monitoring location, looking north



Photo 4 – Noise monitoring location, looking west

Appendix C – Meteorological Data

Greenbank (Defence), Queensland
November 2020 Daily Weather Observations

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am				3pm							
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
1	Su	12.3	31.8	15.6			NW	31	13:52	24.9	38		W	11		20		W	13		
2	Mo	13.8	28.4	0			SSW	31	10:59	24.7	49		SSW	9		54		E	11		
3	Tu	14.1	27.7	0			NE	28	14:35	22.6	48		S	9		48		ENE	11		
4	We	11.5	29.7	0			NE	30	14:39	22.8	50		SSW	7		42		NE	15		
5	Th	13.2	34.0	0			NNE	48	15:36	25.6	56		NNW	9		50		NNE	20		
6	Fr	10.4	28.1	12.4			ENE	28	14:18	22.1	34		ESE	7		43		ENE	9		
7	Sa	14.1	27.0	0			NE	31	15:54	23.2	50		N	6		53		ENE	13		
8	Su	14.9	22.5	0			SSE	26	12:06	20.9	61		SE	7		55		ESE	9		
9	Mo	10.2	25.4	0			NNE	30	14:08	22.2	49		E	9		45		E	11		
10	Tu	10.1	26.3	0			NNE	31	15:28	23.9	50		ESE	7		46		ENE	13		
11	We	10.2	29.0	0			ENE	30	15:57	24.0	47		N	6		44		NE	13		
12	Th	14.4	28.9	0			NNE	37	16:19	24.5	52		N	7		46		NE	15		
13	Fr	15.1	28.3	0			NNE	31	15:29	23.8	57		W	7		48		NNE	20		
14	Sa	14.6	34.8	0.8			NNE	33	16:49	26.9	57		NW	11		44		NNE	20		
15	Su	15.1	34.0	0			E	31	13:24	28.4	60		N	6		54		NE	11		
16	Mo	19.6	33.6	0			N	35	15:06	28.4	64		ENE	4		52		NNE	20		
17	Tu	19.4	36.6	0			NE	31	16:06	30.4	47		N	9		62		NE	11		
18	We	19.9	30.1	0			ENE	31	12:40	26.5	49		SE	11		49		E	13		
19	Th	14.6	29.0	0			ENE	33	13:52	26.0	48		E	9		47		ENE	13		
20	Fr	12.5	32.0	0			N	31	13:36	26.0	46		E	6		38		N	19		
21	Sa	13.4	33.0	0			NNE	35	14:44	27.0	48		NE	9		39		NE	13		
22	Su	14.5	32.8	0			N	31	14:53	25.4	53		NNW	6		33		NNE	15		
23	Mo	13.4	35.3	0			NNE	35	14:53	26.9	50		WNW	11		39		NNE	22		
24	Tu	20.0	33.3	0			E	48	15:30	28.6	50		S	7		60		E	15		
25	We	21.3	27.3	0			NE	28	13:30	25.6	50		E	9		56		ESE	7		
26	Th	16.5	32.0	0			N	31	14:42	26.1	53		NW	6		46		NNE	15		
27	Fr	15.7	30.7	0			ESE	30	15:48	26.4	54		SSE	4		47		E	13		
28	Sa	12.8	32.8	0			NNE	31	17:46	26.4	50		N	11		35		NNE	15		
29	Su	15.6	36.0	0			NNE	39	15:32	27.7	48		NNE	7		39		NNE	19		
30	Mo	17.4	32.6	0			ENE	35	14:13	27.5	57		ESE	7		52		ENE	15		
Statistics for November 2020																					
Mean		14.7	30.8							25.5	50			7		28.2	46			14	
Lowest		10.1	22.5							20.9	34		#	4		21.4	20		ESE	7	
Highest		21.3	36.6	15.6			#	48		30.4	64		#	11		33.5	62		NNE	22	
Total				28.8																	

Greenbank (Defence), Queensland
December 2020 Daily Weather Observations

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am					3pm						
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
1	Tu	22.8	35.7	0			N	30	16:03	28.1	56		ESE	2		34.7	41		N	13	
2	We	20.8	34.7	0			NNE	35	14:05	30.3	54		ENE	6		32.9	48		NNE	20	
3	Th	23.1	30.8	0.6			E	22	16:35	23.6	96		E	4		29.8	52		E	7	
4	Fr	20.4	37.3	0.6			NNE	33	17:16	28.1	61		NW	7		36.1	38		N	19	
5	Sa	19.5	36.4	0.2			NNE	39	15:18	30.3	55		ENE	7		33.1	38		NE	19	
6	Su	21.7	38.1	0			NNE	35	14:17	30.2	44		NNW	9		33.2	48		NNE	15	
7	Mo	24.1	32.1	0			NNE	31	17:30	27.1	66		E	2		31.4	46			Calm	
8	Tu	21.4	33.3	10.4			SW	31	12:30	25.1	81		W	7		32.0	16		WSW	13	
9	We	15.7		0.2						25.4	48		ESE	11							
Statistics for the first 9 days of December 2020																					
	Mean	21.1	34.8							27.6	62			6		32.9	40			13	
	Lowest	15.7	30.8							23.6	44		#	2		29.8	16			Calm	
	Highest	24.1	38.1	10.4			NNE	39		30.3	96		ESE	11		36.1	52		NNE	20	
	Total			12.0																	

Appendix D – Noise Measurement Results



**Logger Location - Eastern boundary of
subject site adjacent to Teviot Road**

ARL Environmental Noise Logger
Logger Serial Number 16-707-017
Measurement Title Teviot
Measurement started at 23/11/2020 - 4:32:00
Measurement stopped at 03/12/2020 - 6:46:00
Frequency Weighting A
Time Averaging Fast
Statistical Interval 15 min
Pre-measurement Ref. 94.0
Post-measurement Ref. 94.0
Engineering Units dB SPL

Note

— No noise data available

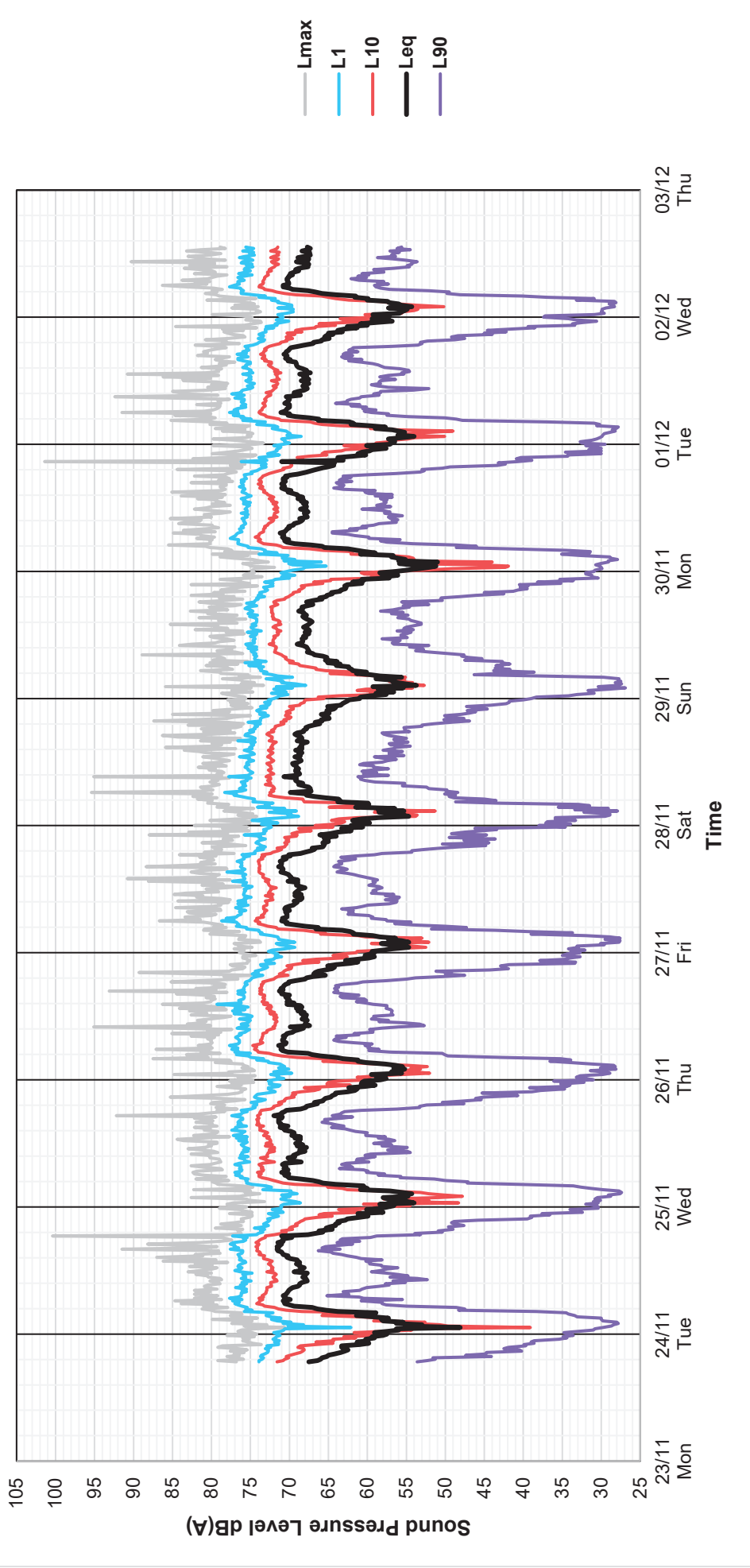
■ Rainfall recorded on this day

**Unattended Noise Measurements
205-219 Teviot Road, Greenbank**

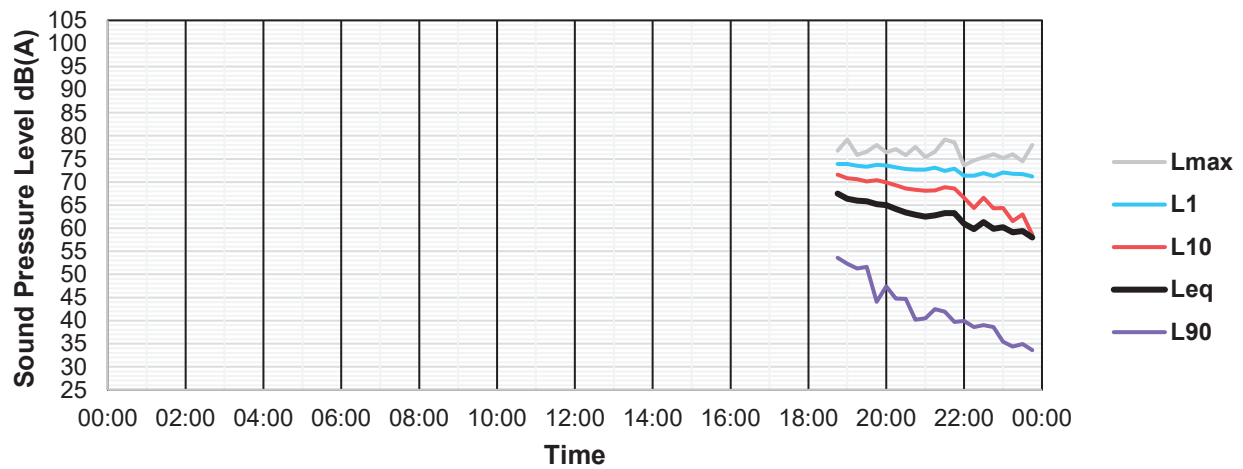
Noise Levels - 18hr Day (Traffic Noise)

Date	Day	L _{A10,T}			L _{Aeq,T}			L _{A90,T}	
		18hr day 6am-12am	1hr max 6am-12am	Time for 1hr max	18hr day 6am-12am	8hr night 10pm-6am	18hr day 6am-12am	8hr night 10pm-6am	
23/11/2020	Monday	—	—	—	—	60	—	—	37
24/11/2020	Tuesday	71	74	16:00	68	60	55	—	36
25/11/2020	Wednesday	72	74	16:00	68	61	55	—	37
26/11/2020	Thursday	72	74	06:00	68	61	55	—	37
27/11/2020	Friday	72	74	06:00	69	61	57	—	39
28/11/2020	Saturday	72	73	11:00	68	60	54	—	36
29/11/2020	Sunday	70	72	16:00	66	59	49	—	36
30/11/2020	Monday	71	74	06:00	68	60	54	—	35
1/12/2020	Tuesday	71	74	06:00	67	60	55	—	37
Average		71	74		68	60	54		37
Average (weekdays only)		72	74		68	61	55		37

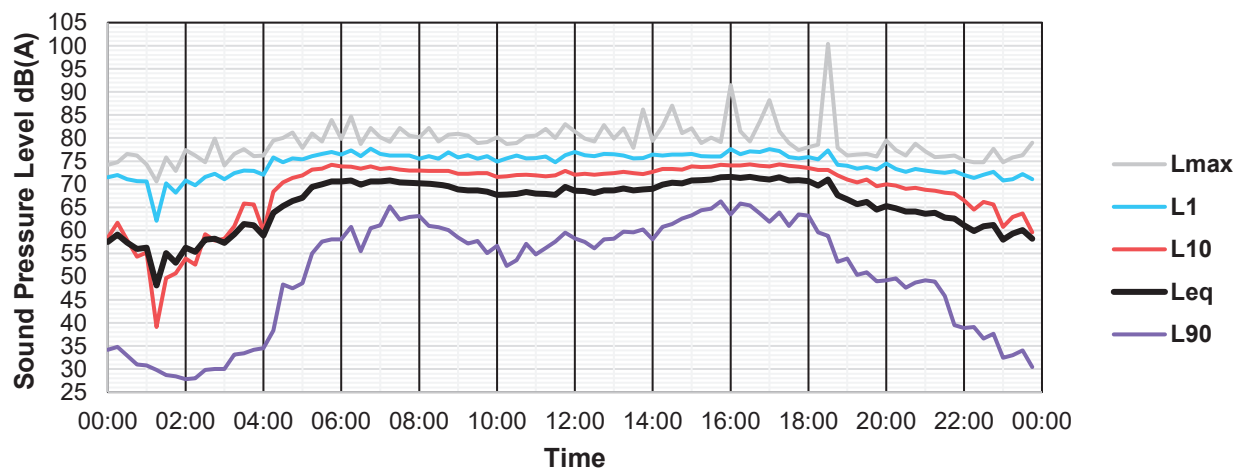
Unattended Noise Measurements
23 November to 2 December 2020



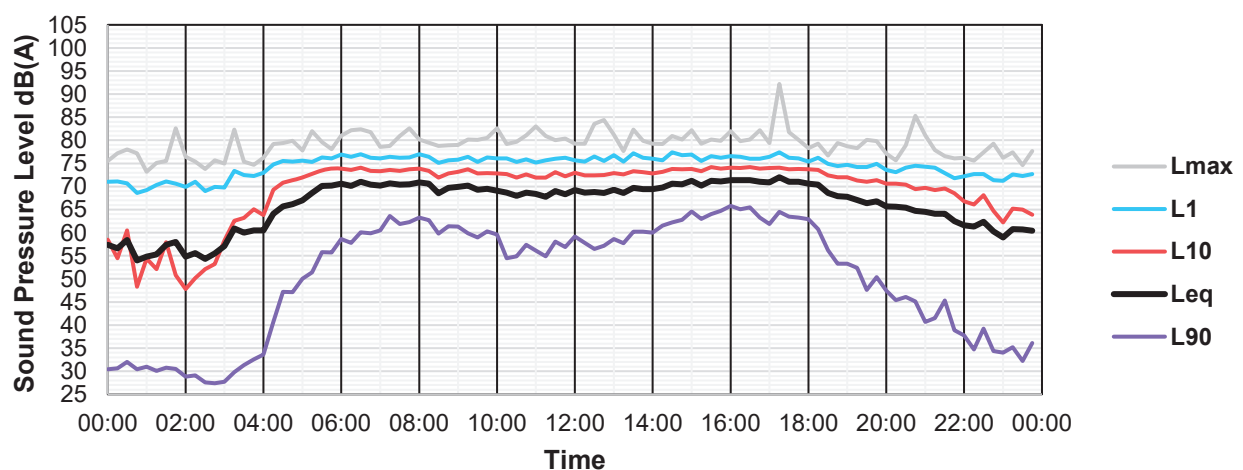
Unattended Noise Measurements Monday 23 November 2020



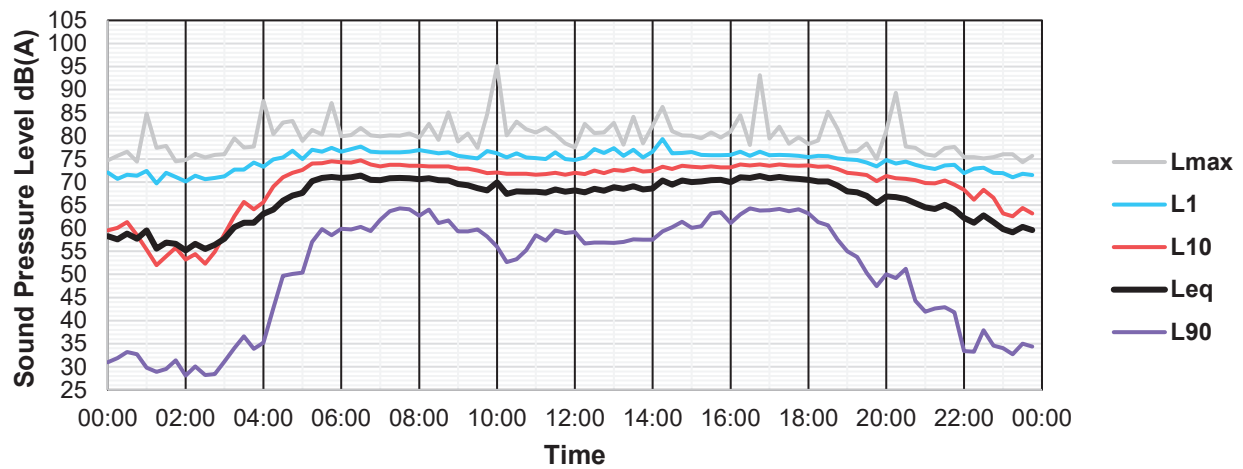
Tuesday 24 November 2020



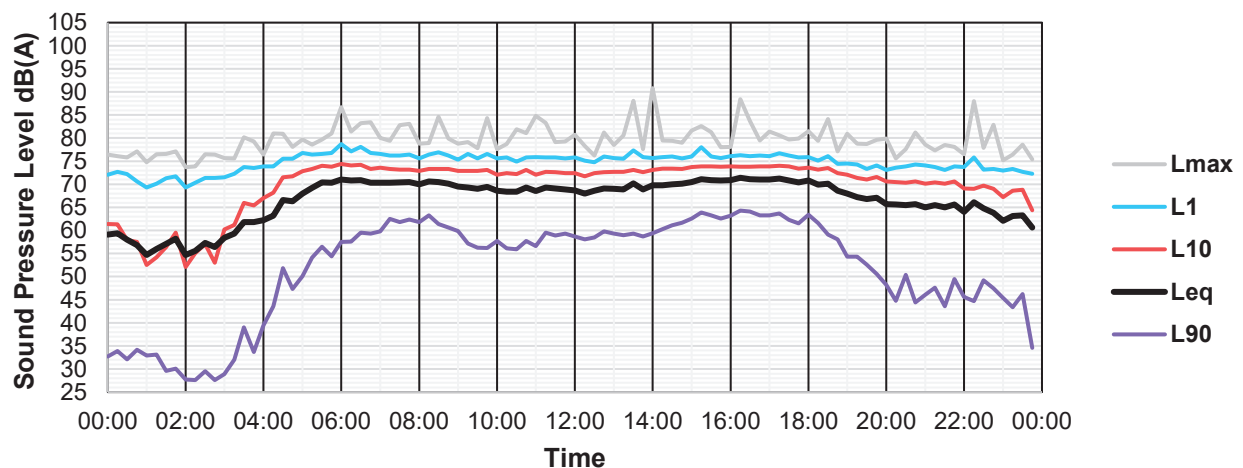
Wednesday 25 November 2020



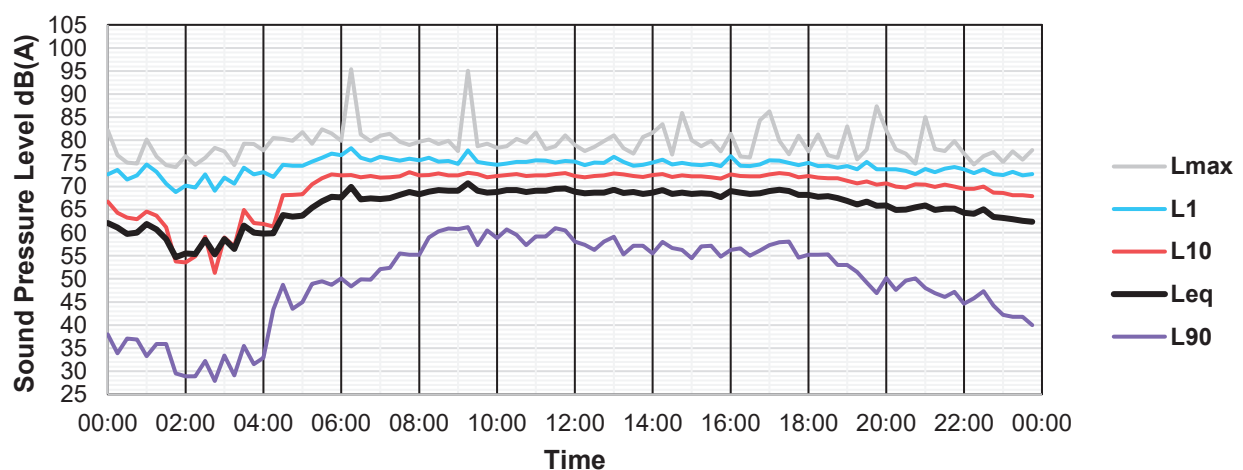
Unattended Noise Measurements Thursday 26 November 2020



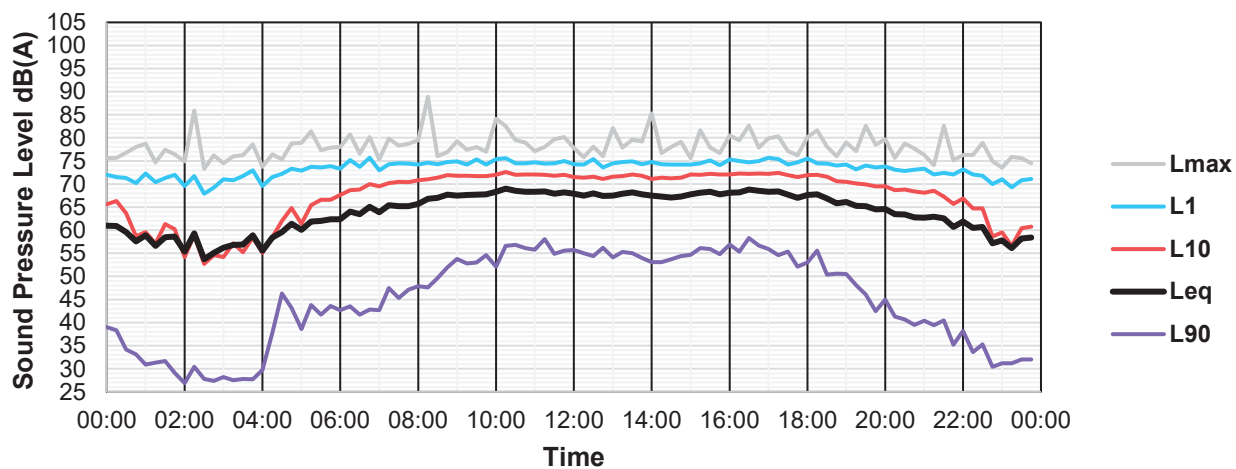
Friday 27 November 2020



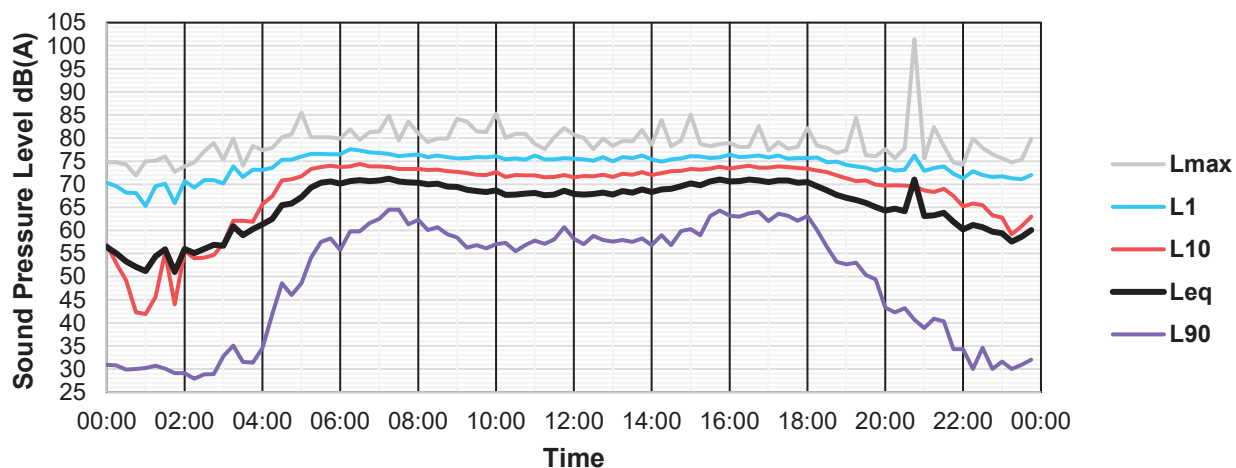
Saturday 28 November 2020



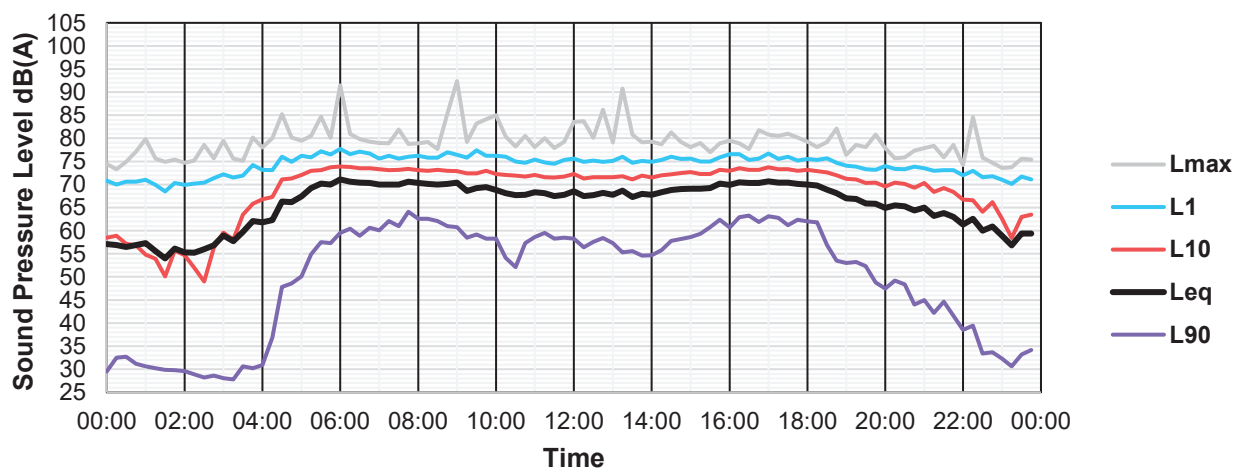
Unattended Noise Measurements Sunday 29 November 2020



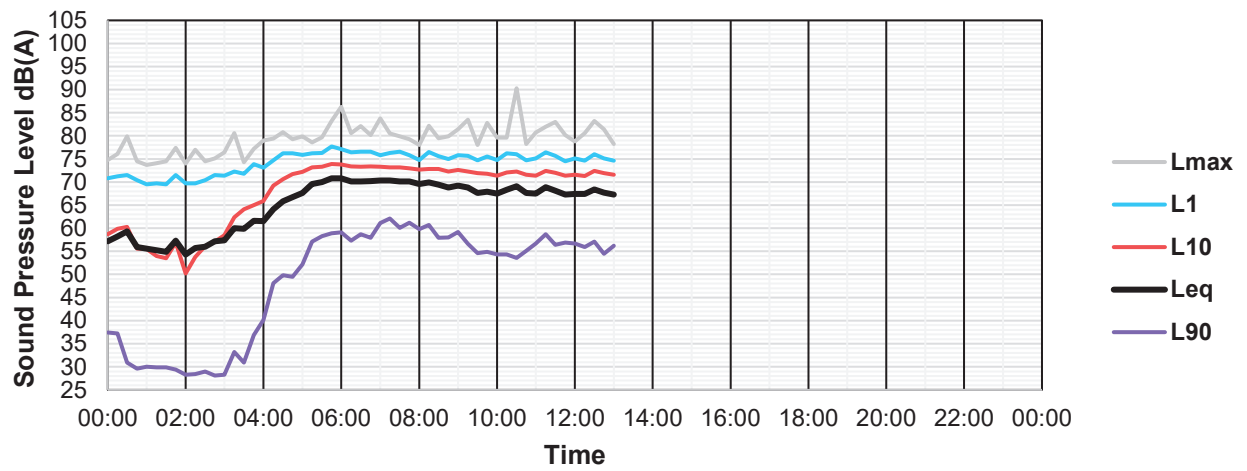
Monday 30 November 2020



Tuesday 1 December 2020



Unattended Noise Measurements Wednesday 2 December 2020



Appendix E – Traffic Noise Model Validation Results

205-219 Teviot Road, Greenbank Calculated Road Traffic Noise Levels RTNA Validation

Receiver	L10(18h) dB(A)	L10(1h) dB(A)
Noise logger	71	74

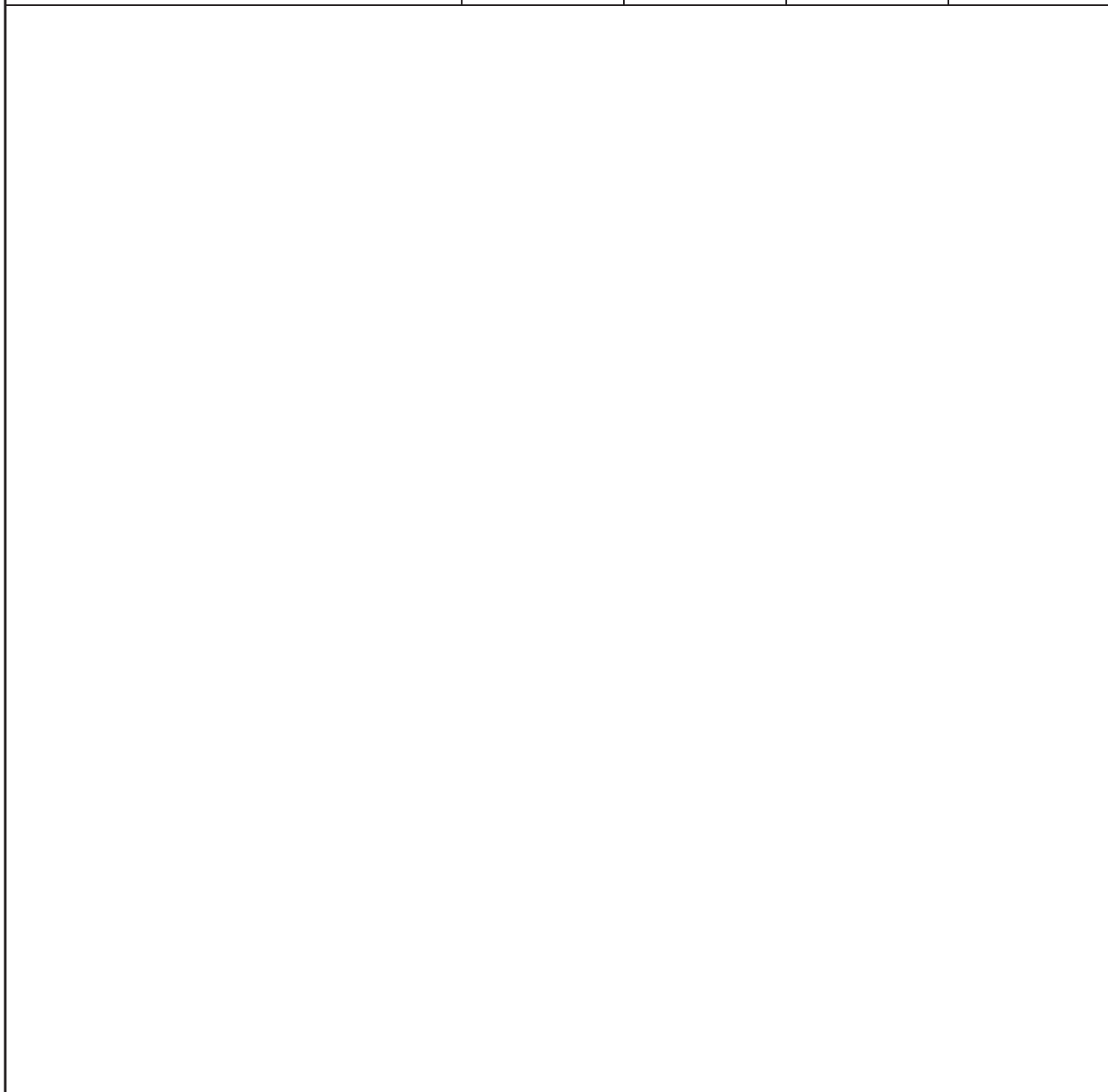
Appendix F – Traffic Noise Levels (Year 2033)

205-219 Teviot Road, Greenbank
Calculated Road Traffic Noise Levels
Predicted 2033 Road Traffic Noise Levels

Receiver	Floor	Facade	L10(18h) dB(A)	L10(1h) dB(A)
Tenancy 01	GF	E	65	68
Tenancy 01	GF	N	62	65
Tenancy 01	GF	S	56	59
Tenancy 02	GF	E	55	59
Tenancy 02	GF	N	55	58
Tenancy 02	GF	W	40	44
Tenancy 03	GF	E	56	59
Tenancy 03	GF	S	41	45
Tenancy 03	GF	W	38	42
Tenancy 05	GF	E	66	69
Tenancy 05	GF	N	54	58
Tenancy 05	GF	W	41	44
Tenancy 06	GF	E	65	68
Tenancy 06	GF	S	58	62
Tenancy 06	GF	W	40	44
Tenancy 07	F 1	E	67	71
Tenancy 07	F 1	N	65	68
Tenancy 07	F 1	W	35	38
Tenancy 08	F 1	E	68	71
Tenancy 08	F 1	W	42	46
Tenancy 09	F 1	E	67	71
Tenancy 09	F 1	W	42	45
Tenancy 10	F 1	E	37	40
Tenancy 10	F 1	N	48	51
Tenancy 10	F 1	S	45	48
Tenancy 10	F 1	W	42	45
Tenancy 11	GF	E	64	68
Tenancy 11	GF	N	62	65
Tenancy 11	GF	S	59	63
Tenancy 11	GF	W	39	43
Tenancy 12	F 1	E	67	71
Tenancy 12	F 1	S	62	65
Tenancy 12	F 1	W	42	46
Unit 01	F 2	E	57	60
Unit 01	F 2	N	59	62
Unit 01	F 2	S	49	53
Unit 01	F 2	W	47	51
Unit 02	F 2	E	68	71
Unit 02	F 2	N	65	68
Unit 02	F 2	W	49	52
Unit 03	F 2	E	67	70
Unit 03	F 2	W	48	52
Unit 04	F 2	E	67	70
Unit 04	F 2	W	48	52
Unit 05	F 2	E	66	69
Unit 05	F 2	W	48	52
Unit 06	F 2	E	67	71
Unit 06	F 2	W	48	52
Unit 07	F 2	E	67	70
Unit 07	F 2	W	48	51
Unit 08	F 2	E	66	70

205-219 Teviot Road, Greenbank
Calculated Road Traffic Noise Levels
Predicted 2033 Road Traffic Noise Levels

Receiver	Floor	Facade	L10(18h) dB(A)	L10(1h) dB(A)
Unit 08	F 2	W	48	51
Unit 09	F 2	E	65	69
Unit 09	F 2	W	48	51
Unit 10	F 2	E	65	68
Unit 10	F 2	W	48	51
Unit 11	F 2	E	65	68
Unit 11	F 2	W	47	51
Unit 12	F 2	E	65	68
Unit 12	F 2	S	62	66
Unit 12	F 2	W	47	51



205-219 Teviot Road, Greenbank
Calculated Road Traffic Noise Levels
Predicted 2033 Road Traffic Noise Levels

Receiver	Floor	Facade	L10(18h) dB(A)	L10(1h) dB(A)
Communal Terrace	F 2		62	66
Unit 01 POS	F 2		59	62
Unit 02 POS	F 2		60	64
Unit 03 POS	F 2		61	65
Unit 04 POS	F 2		60	64
Unit 05 POS	F 2		61	64
Unit 06 POS	F 2		63	66
Unit 07 POS	F 2		60	64
Unit 08 POS	F 2		61	65
Unit 09 POS	F 2		60	63
Unit 10 POS	F 2		61	64
Unit 11 POS	F 2		61	64
Unit 12 POS	F 2		61	65

**Greenbank Health Centre
205-219 Teviot Road, Greenbank**

**Traffic Noise Modelling
Year 2033**

Ground Floor (1.8m AGL)

Traffic noise level
Facade adjusted
Adjusted for Queensland Conditions¹
L_{10,18hr} dB(A)



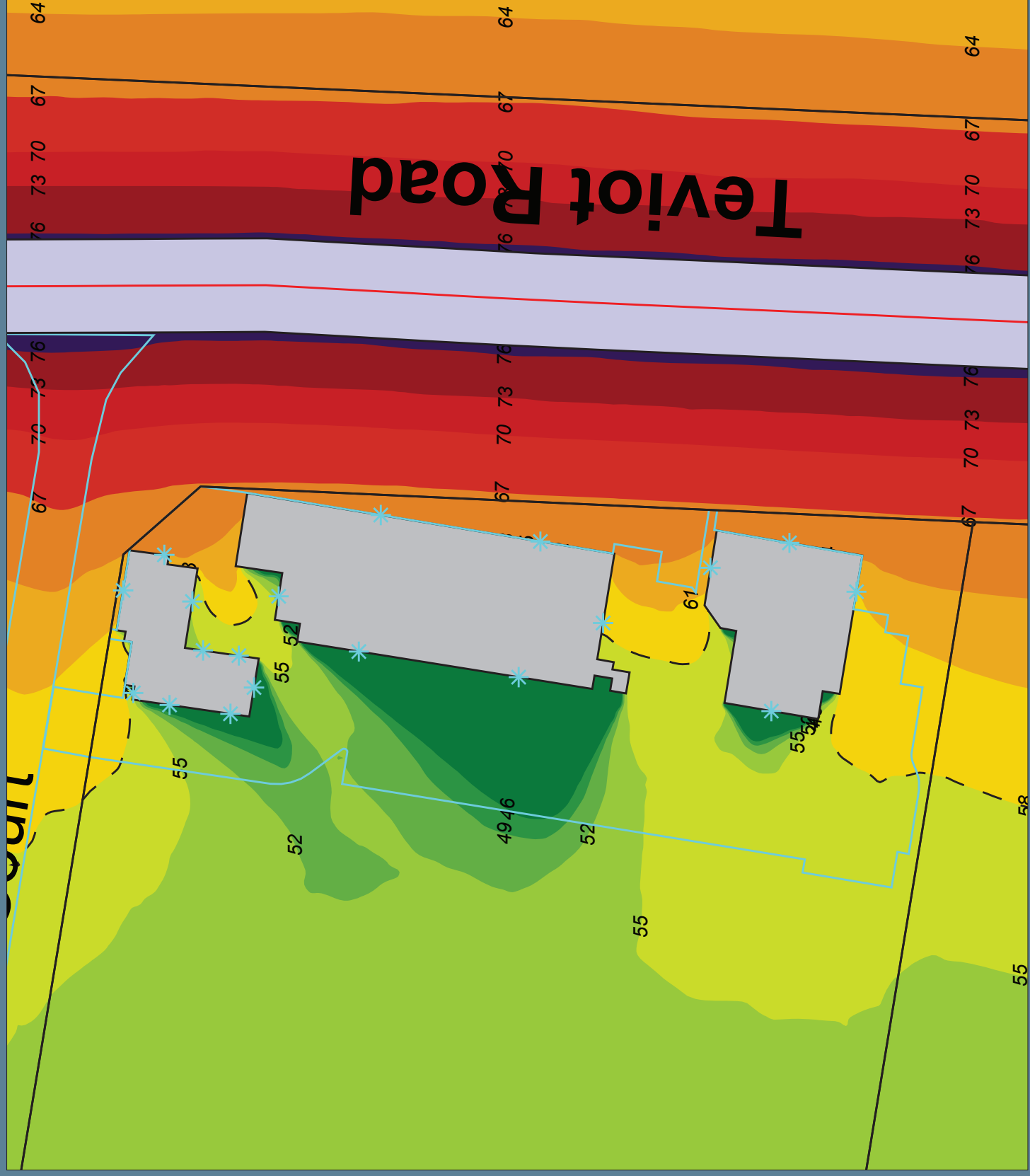
Legend

-  Balcony
-  Limit line - 58dB(A) criteria
-  Lot boundary
-  Paved surface
-  Point receiver
-  Proposed development
-  Road surface

SCALE @ A4 1:800



Grid Spacing: 1m
Project Engineer: Aidan Daniels
Created: 22/01/2021
Processed with SoundPLAN 8.2



**Greenbank Health Centre
205-219 Teviot Road, Greenbank**

**Traffic Noise Modelling
Year 2033**

First Floor (5.1m AGL)

Traffic noise level
Facade adjusted
Adjusted for Queensland Conditions¹
L_{10,18hr} dB(A)



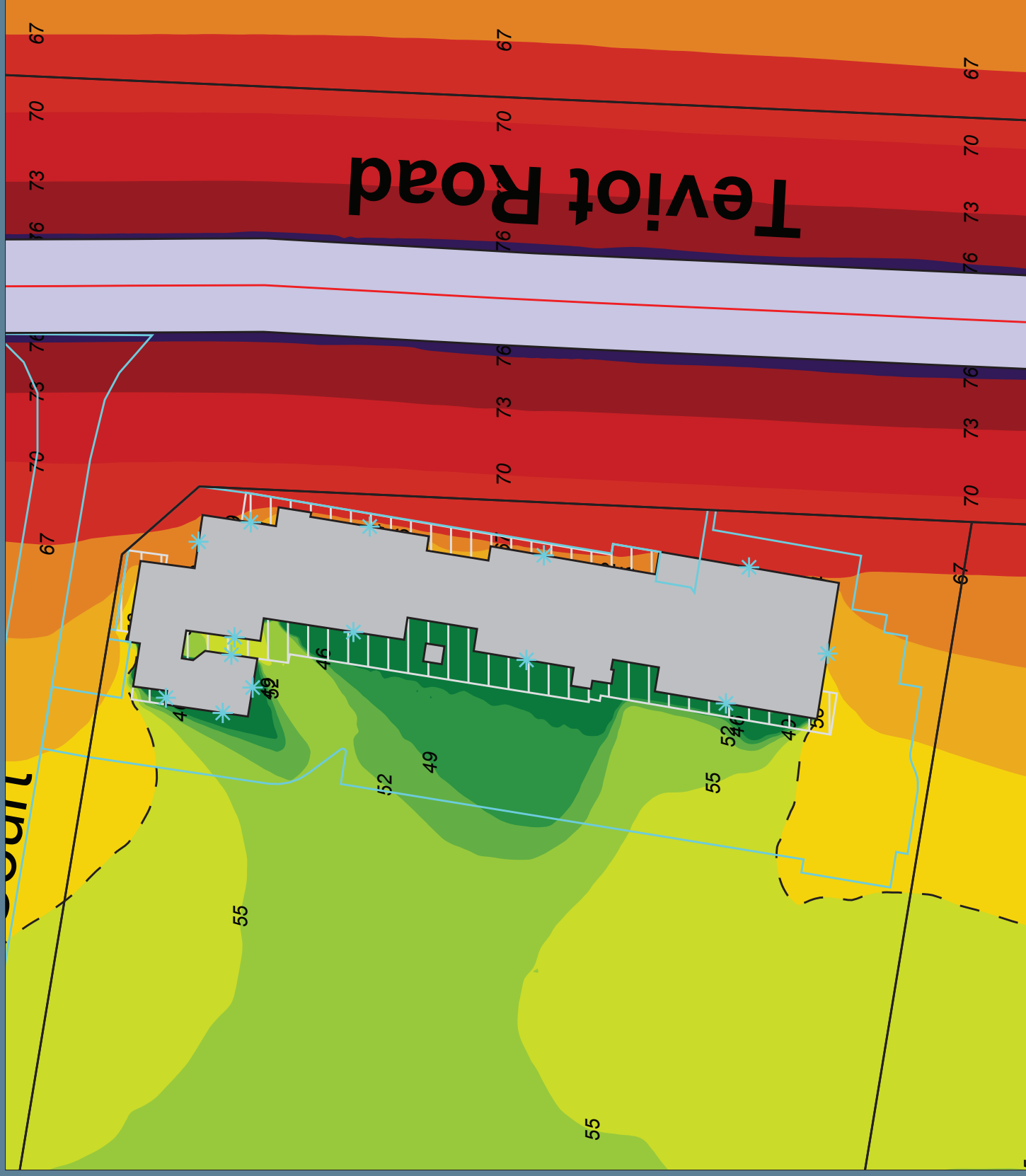
Legend

-  Balcony
-  Limit line - 58dB(A) criteria
-  Lot boundary
-  Paved surface
-  Point receiver
-  Proposed development
-  Road surface

SCALE @ A4 1:800



Grid Spacing: 1m
Project Engineer: Aidan Daniels
Created: 22/01/2021
Processed with SoundPLAN 8.2



**Greenbank Health Centre
205-219 Teviot Road, Greenbank**

**Traffic Noise Modelling
Year 2033**

Second Floor (8.6m AGL)

Traffic noise level
Facade adjusted
Adjusted for Queensland Conditions¹
L_{10,18hr} dB(A)



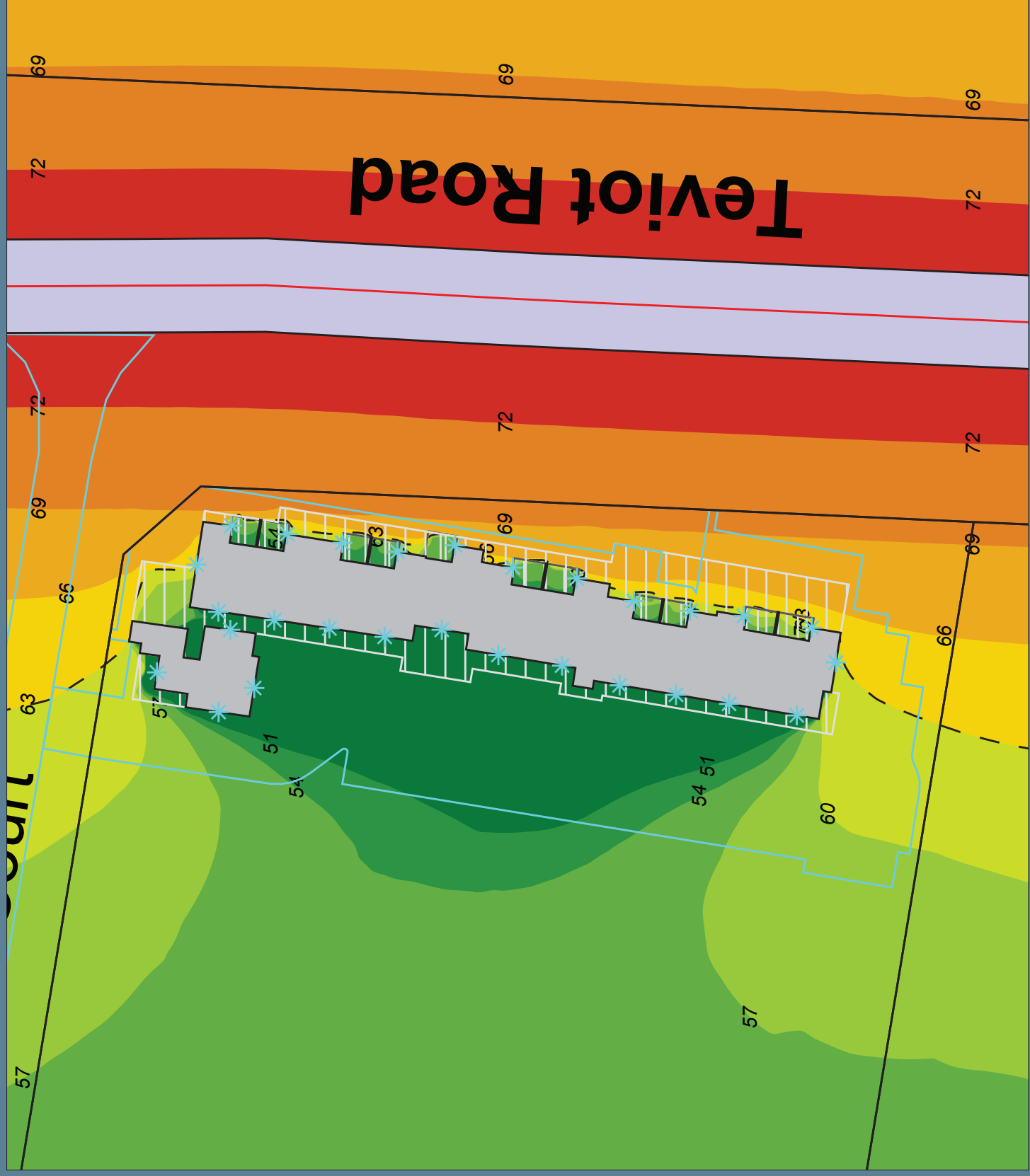
Legend

-  Balcony
-  Limit line - 63dB(A) criteria
-  Lot boundary
-  Paved surface
-  Point receiver
-  Proposed development
-  Road surface

SCALE @ A4 1:800



Grid Spacing: 1m
Project Engineer: Aidan Daniels
Created: 22/01/2021
Processed with SoundPLAN 8.2

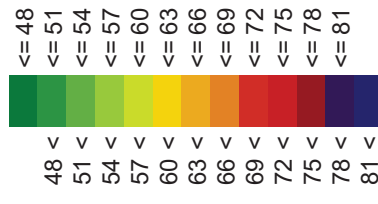


**Greenbank Health Centre
205-219 Teviot Road, Greenbank**

**Traffic Noise Modelling
Year 2033**

Second Floor (8.6m AGL)

Traffic noise level
Free-field
Adjusted for Queensland Conditions¹
L_{10,18hr} dB(A)



Legend

-  Balcony
-  Limit line - 60dB(A) criteria
-  Lot boundary
-  Paved surface
-  Point receiver
-  Proposed development
-  Road surface

SCALE @ A4 1:800



Grid Spacing: 1m
Project Engineer: Aidan Daniels
Created: 22/01/2021
Processed with SoundPLAN 8.2

