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Proposed Mixed-Use Development
17-23 Hope Street
Penrith

ACOUSTIC REPORT




Client:
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C/- Urban Link Pty Ltd

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1. Introduction

This report is in response to a request by Adib Obeid c/- Urban Link Pty Ltd for an environmental and road traffic noise assessment for a proposed mixed-use development located at 17-23 Hope Street, Penrith. The noise assessment was conducted in accordance with Penrith City Council planning policies, the NSW Development Near Rail Corridors and Busy Roads – Interim Guideline and the NSW Noise Policy for Industry 2017. To facilitate the assessment, attended and unattended noise monitoring was conducted to determine road traffic impacts to the proposed development and to establish the criteria for onsite activities to sensitive receivers. Based on the outcomes of the assessment, recommendations for acoustic treatments are specified.

2. Site Description

2.1 Site Location

The site is described by the following:

17-23 Hope Street, Penrith
Lots 10-13 on DP31239

Refer to Figure 1 for site location.

Figure 1: Site Location (not to scale)

A comprehensive site survey was conducted on the 23rd July 2021 and identified the following:

a) Four single storey dwellings currently occupy the site and will be demolished to make way for the proposed development.
b) The site is located in an R4 High Density Residential zone as defined in the Penrith Local Environmental Plan 2010.
c) The surrounding area consists of residential land uses.

2.2 Proposal

The proposal is to construct a six storey mixed-use building comprised of the following:

- 50 residential apartments from ground to level 5.
- Ground and level 5 communal outdoor areas.
- 68 car spaces over two levels of basement carpark.
- Ground floor medical suite and retail space.
- Site access via Hope Street.

Refer to the Appendices for development plans.

2.3 Acoustic Environment

The surrounding area is primarily affected by traffic noise from the surrounding road network.

3. Equipment

The following equipment was used to record noise levels:

- Rion NL42 Environmental Noise Monitor (SN# 00345935)
- Norsonic 140 Sound Level Meter (SN# 1405576)
- Pulsar Model 105 Ltd Sound Calibrator (SN# 57417)

The Environmental Noise Monitor and sound level meter hold current NATA Laboratory Certification and were field calibrated before and after the monitoring period, with no significant drift from the reference signal recorded.

4. Noise Monitoring and Receiver Locations

4.1 Receiver Locations

The nearest residential receiver locations were identified as follows:

1. Six storey apartments are located adjacent the western site boundary at 25-31 Hope Street.
2. Residential dwellings, townhouses and land use are located adjacent the northern site boundary at 16-20 Lethbridge Street.
3. A single storey residential dwelling is located adjacent the eastern site boundary at 15 Hope Street.
4. Hope Street separates the site from single storey residential dwellings located to the south at 16-24 Hope Street.

Refer to Figure 2 for these locations.

Figure 2: Noise Monitoring Location

4.2 Unattended Noise Monitoring

A Rion NL42 environmental noise monitor was placed onsite at 17 Hope Street to measure ambient noise levels. This location was selected as it was considered being representative of the nearest residential receivers. The monitor was located in a free field position with the microphone approximately 1.4 metres above ground surface level. The noise monitor was set to record noise levels between the 23rd and 30th July 2021.

The environmental noise monitor was set to record noise levels in "A" Weighting, Fast response using 15 minute statistical intervals. Ambient noise monitoring was conducted generally in accordance with Australian Standard AS1055:2018 *Acoustics – Description and measurement of environmental noise*.

Refer to Figure 2 for noise monitoring location.

4.3 Attended Measurement Procedure

Attended measurements were conducted on the 30th July 2021 to measure road traffic noise levels from Parker Street.

A Norsonic NOR140 sound level meter was used to measure road traffic noise levels in "A" Weighting, Fast response using 15-minute statistical intervals. The measurements were conducted in accordance with Australian Standard AS2702:1984 'Acoustics - Methods for the measurement of road traffic noise'.

5. Existing Ambient Noise Levels

The following tables present the measured ambient noise levels from the unattended noise survey and meteorological conditions. Any periods of inclement weather or extraneous noise are omitted from the measured data prior to determining the overall results.

5.1 Meteorological Conditions

Meteorological observations during the unattended noise monitoring survey were obtained from the Bureau of Meteorology website (http://www.bom.gov.au/climate/data), shown in Table 1 below.

Table 1: Meteorological Conditions – Penrith

Day	Date	Rainfall (mm)	Wind			
			9am		3pm	
			Speed (km/h)	Direction	Speed (km/h)	Direction
Friday	23/07/21	0	7	NNE	7	SW
Saturday	24/07/21	0.4	Calm	-	20	WNW
Sunday	25/07/21	0	11	WNW	28	W
Monday	26/07/21	0	11	WNW	19	W
Tuesday	27/07/21	0	6	N	9	NNE
Wednesday	28/07/21	0	6	SSW	28	WNW
Thursday	29/07/21	0.2	4	NW	13	SSW
Friday	30/07/21	0	Calm	-	4	WSW

5.2 Ambient Background Noise Levels

The measured rating background noise levels (RBL) in accordance with the NSW Noise Policy for Industry 2017, are as follows:

Table 2: Measured L90 Noise Levels

Day	Date	Background L90 dBA		
		Day	Evening	Night
Friday	23/07/21	x	41	39
Saturday	24/07/21	42	42	37
Sunday	25/07/21	39	39	38
Monday	26/07/21	41	40	39
Tuesday	27/07/21	41	42	40
Wednesday	28/07/21	42	40	38
Thursday	29/07/21	40	40	39
RBL		41	40	39

Note rainfall on the 24th and 29th July and periods of high windspeeds did not have a significant impact on the measured results, therefore the data for these time periods were utilised.

Graphical presentation of the measured noise levels is presented in the Appendices.

5.3 Road Traffic Noise Levels

The measured road traffic noise levels are as follows:

Table 3: Measured L90 Noise Levels

Day	Date	LA10 (18h)	LAeq(15h)	LAeq(9h)
		6am-12am	7am-10pm	10pm-7am
Friday	23/07/21	x	x	47.1
Saturday	24/07/21	49.3	50.1	47.5
Sunday	25/07/21	48.3	50.8	45.3
Monday	26/07/21	49.2	50.8	*51.6
Tuesday	27/07/21	50.5	51.8	48.4
Wednesday	28/07/21	51.0	52.5	46.6
Thursday	29/07/21	49.0	51.5	47.6
Overall		49.9	51.7	47.4

*Note extraneous noise was found to affect the measurements on the 26th of July, therefore the data was omitted. Data for the weekends was not used as it was not considered relevant to the assessment.

Refer to the appendix for a graphical representation of the measured noise levels.

5.4 Attended Measurements

To assess the noise levels associated with Parker Street, attended measurements were undertaken on Friday the 30th of July 2021 at the location shown in Figure 2.

Table 4: Measured Noise Levels

Location	Distance	Measurement Duration, T	Measured Noise Levels dBA	
			$L_{Aeq,\ T}$	$L_{A10,\ T}$
Parker Street	1m from nearest lane	15m	73.3	77.3
		15m	72.4	77.3

6. Noise Criteria

To determine the appropriate noise criteria to be applied, a review of Penrith City Council's planning policies, the State Environmental Planning Policy (Infrastructure) 2007 and the NSW Noise Policy for Industry 2017 was conducted.

6.1 Penrith City Council

Section 2.2.19 of the Penrith Development Control Plan (DCP) 2014 outlines the following requirements for residential development:

> *"2.2.19 Visual and Acoustic Privacy and Outlook*
> *A. Objective*
> *a. Provide an outlook from dwellings and their private open space, and achieve levels of acoustic and visual privacy that are reasonable for a residential neighbourhood.*
> *b. The recommended night-time internal noise levels in living and sleeping areas is 35- 40 dB(A). – WHO.*
> *c. To provide a high level of visual and acoustic privacy for residents and neighbours in dwellings and private open space.*
> *d. To ensure that building design minimises overlooking problems"*

Furthermore, section 12.1 of the Penrith DCP outlines the following requirements in regards to road traffic noise:

> *"Noise Impact Statements - Specific Requirements*
> *a) Where a site is likely to be affected by unacceptable levels of road traffic noise, the applicant is required to provide a Noise Impact Statement prepared by a qualified acoustic consultant in accordance with the requirements set out in the DA Submission Requirements Appendix of this DCP.*
>
> *b) The Noise Impact Statement should demonstrate acoustic protection measures necessary to achieve an indoor environment meeting residential standards, in accordance with EPA and Department of Planning Criteria, as well as relevant Australian Standards."*

6.2 SEPP

The NSW Department of Planning document "*State Environmental Planning Policy (Infrastructure) 2007*" (SEPP) April 2021 includes noise criteria specific to road traffic. The relevant criteria are contained in Clause 102 Part (3) of the policy as follows:

Table 5: SEPP Clause 102

Location	Noise Level LAeq dBA
Any bedroom in the residential building (from 10pm to 7am)	≤35
Anywhere else in the residential building (other than a garage, kitchen, bathroom or hallway)	≤40

It should be noted that for any criteria based on Leq descriptor, a time duration for the Leq must be specified otherwise a variety of outcomes could be possible. The policy does not state the duration for the assessment, therefore a LAeq (15 hour) descriptor was utilised for day time and a LAeq (9 hour) descriptor was utilised for night time.

6.3 Noise Policy for Industry

Assessment of noise in accordance with NSW EPA Noise Policy for Industry (2017) has two main components: intrusiveness and amenity criteria. These are compared to each other (after conversion of amenity noise level to LAeq,15min equivalent level) to determine the overall project noise trigger level.

6.3.1 Intrusiveness Noise Level

The intrusiveness noise level is based on the $L_{Aeq\ (15\ min)}$ associated with commercial activity being less than or equal to the measured L_{A90} Rating Background Level + 5dB as per section 2.3 of the policy. A modifying factor should also be added where appropriate to allow for tonality, impulsiveness, and intermittency or low frequency effects.

6.3.2 Amenity Noise Level

The amenity noise level is determined in accordance with Section 2.4 of the policy based on the land use and relevant noise criteria specified in Tables 2.2 and 2.3.

The Noise Policy for Industry sets out acceptable noise levels for various locations. Determination of which residential receiver category applies is described in Table 2.3 of the policy.

Table 6: Receiver Category (Table 2.3 of the Noise Policy for Industry)

Receiver category	**Typical planning zoning – standard instrument**	**Typical existing background noise levels**	**Description**
Rural residential	RU1 – primary production RU2 – rural landscape RU4 – primary production small lots R5 – large lot residential E4 – environmental living	Daytime RBL <40 dB(A) Evening RBL <35 dB(A) Night RBL <30 dB(A)	**Rural** – an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse. Note: Where background noise levels are higher than those presented in column 3 due to existing industry or intensive agricultural activities, the selection of a higher noise amenity area should be considered.
Suburban residential	RU5 – village RU6 – transition R2 – low density residential R3 – medium density residential E2 – environmental conservation E3 – environmental management	Daytime RBL<45 dB(A) Evening RBL<40 dB(A) Night RBL <35dB(A)	**Suburban** – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristic: evening ambient noise levels defined by the natural environment and human activity.
Urban residential	R1 – general residential R4 – high density residential B1 – neighbourhood centre (boarding houses and shop-top housing) B2 – local centre (boarding houses) B4 – mixed use	Daytime RBL> 45 dB(A) Evening RBL> 40 dB(A) Night RBL >35 dB(A)	**Urban** – an area with an acoustical environment that: • is dominated by 'urban hum' or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources • has through-traffic with characteristically heavy and continuous traffic flows during peak periods • is near commercial districts or industrial districts • has any combination of the above.

Project amenity noise level for industrial developments = recommended amenity noise level minus 5dB(A).

To determine the appropriate receiver category, the following observations were made:

- The nearby residential receivers are zoned R4 – High Density Residential which corresponds with typical planning zoning of the urban category.
- The measured RBL values presented in Section 5.2 corresponds with the typical existing background noise levels of the suburban and urban categories.
- The acoustic environment of the surrounding area has an acoustical environment that near a commercial district and has through-traffic with heavy and continuous traffic flows during peak periods.

Therefore, the nearest sensitive receivers would be assessed against the urban residential criteria.

6.3.3 Modifying Factors

The Noise Policy for Industry includes correction factors such as tonal noise, low-frequency noise, intermittent noise and duration. Where two or more modifying factors are present, the maximum adjustment to a noise source level is 10dB(A) (excluding duration correction).

6.4 Project Noise Trigger Level

To determine the project trigger noise level, the amenity noise level must first be standardised to an equivalent LAeq 15min in order to compare to the intrusiveness noise level. This is done in accordance with sections 2.2 and 2.4 of the policy as follows;

$$L_{Aeq,15min} = L_{Aeq,\ period} + 3dB$$

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise.

6.4.1 Sleep Disturbance Noise Level

Sleep disturbance is based on the maximum noise level of events from premises during the night-time period. The Noise Policy for Industry defines sleep disturbance as a noise from a premise at a residential location that exceeds:

- LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

6.4.2 Intrusive Noise Impacts

Based on the measured data, the intrusive noise limits are as follows:

Table 7: Intrusive Noise Criteria

Time period	Criteria $L_{eq\ (15min)}$ dB(A)
Day (7am-6pm Mon-Sat; 8am-6pm Sun)	46
Evening (6pm-10pm)	45
Night (10pm-7am Mon-Sat; 10pm-8am Sun)	44

6.4.3 Amenity Criteria

Based on the measured data, the amenity noise limits are as follows:

Table 8: Amenity Criteria

Time period	Criteria $L_{eq(period)}$ dB(A)
Day	58
Evening	48
Night	43

6.4.4 Project Specific Noise Criteria

The project noise trigger level is the lower (that is, the most stringent) value of the intrusiveness and amenity noise levels. Therefore, the project noise trigger levels are as follows:

Table 9: Project Criteria

Time period	Criteria $L_{eq\ (15min)}$ dB(A)
Day	46
Evening	45
Night	43

6.4.5 Sleep Disturbance

The sleep disturbance noise levels are as follows:

Table 10: Sleep Disturbance Noise Levels

Time period	Criteria $L_{eq(15min)}$ dBA	Criteria L_{AFmax} dBA
Night	44	54

7. Road Traffic Assessment

7.1 Traffic Volumes

Traffic volumes for Parker Street were obtained from Roads and Maritime Services (Traffic Volume Viewer http://www.rms.nsw.gov.au). The 2017 AADT was used for predictions of future traffic volumes as this was considered to be representative of typical traffic volumes for the area.

Table 11: Traffic Volumes

Location	2017 AADT	2021 Predicted AADT	2031 Predicted AADT	Percentage of Heavy Vehicles	Predicted Annual Growth Rate
Parker Street (Station ID 86036)	42,241	43,956	48,555	10%	1%

The traffic data did not show a considerable increase or decrease in traffic volumes between years therefore, a 1% annual traffic volume growth factor was applied for the 10 year planning horizon. Using this procedure, the relative increase in traffic noise levels over 10 years is calculated to be approximately 0.4dBA, which is taken into account for the future traffic noise predictions.

7.2 Road Traffic Noise Verification

To ensure the CoRTN noise model is accurate, a verification model of the predicted $L_{A10(18hr)}$ was created and compared to the measured noise level. The CoRTN method allows a 2dBA variation from the predicted and measured level, if the variation exceeds 2dBA a correction to the predicted level is required.

Table 12: Comparison of Measured and Predicted Noise Levels

Location	Measured $L_{A10(18hr)}$ dBA	Predicted $L_{A10(18hr)}$ dBA	Correction
Parker Street (Sound Level Meter)	77.3	77.2	0
17 Hope Street (Logger)	49.9	49.9	0

7.3 Predicted Road Traffic Noise Levels - 2031

Road traffic noise modelling for the proposed development was based on the following information:

- Proposed layout, floor plans, unit numbering and elevations provided by Urban Link Pty Ltd, Project no. 2021-011, drawings DA-002, DA-101 to DA-108, DA-201 to DA-203, DA-301 to DA-304, DA-1401 to DA-1405 dated 03/06/21.
- Parker Street speed limit of 70km/h.
- +2.5dB(A) Façade correction.
- Receiver heights 1.5m above finished floor level.

Table 13 presents the predicted external road traffic noise levels for the worst affected rooms of the development.

Table 13: Predicted Road Traffic Noise Impacts

Unit	Level	Room	LAeq (15hr)	LAeq (9hr)
L1.09	1	Bed 1	50	46
		Bed 2	50	46
		Living/Dining	48	-
L1.10	1	Bed 1	48	45
		Living/Dining	50	-
L1.11	1	Bed 1	48	44
		Bed 2	50	47
		Living/Dining	50	-
L2.09	2	Bed 1	52	48
		Bed 2	52	48
		Living/Dining	49	-
L2.10	2	Bed 1	50	47
		Living/Dining	52	-
L2.11	2	Bed 1	50	46
		Bed 2	52	49
		Living/Dining	52	-
L3.09	3	Bed 1	62	59
		Bed 2	62	59
		Living/Dining	60	-
L3.10	3	Bed 1	61	57
		Living/Dining	62	-
L3.11	3	Bed 1	59	55
		Bed 2	62	59
		Living/Dining	62	-
L4.06	4	Living/Dining	62	-
L4.07	4	Bed 1	62	59
		Bed 2	62	59
		Bed 3	62	59
		Living	62	-
L5.01	5	Living/Dining	64	-

Based on the predicted noise levels, additional façade treatments would be required. Refer to Section 9 for recommendations.

8. Environmental Assessment

8.1 Onsite Activities

Noise associated with the development was assessed based on previous assessments of similar activities. The calculations assume that the nominated activities are located at the closest representative point within the development site to the receiver location. Any relevant shielding or building transmission loss is taken into account for these activities.

8.2 Project Specific Criteria

The noise source levels at the receiver locations are shown in Table 14. LAeq results are not shown where the calculated total is less than 0dBA.

Table 14: Project Specific Noise Levels

Receiver	Description	Source Leq@1m dB(A)	Correction dB(A)*	Corrected Leq@1m dB(A)	LAeq adj, T ext. dB(A) Day	LAeq adj, T ext. dB(A) Eve	LAeq adj, T ext. dB(A) Night	LAeq 15 min Compliance Day	LAeq 15 min Compliance Eve	LAeq 15 min Compliance Night
	Receivers: 1. 25-31 Hope Street (W); 2. 16-20 Lethbridge Street (N); 3. 15 Hope Street (E); 4. 16-24 Hope Street (S)									
	Criteria							46	45	43
	Car passby	69		69	23	20	16	Yes	Yes	Yes
1	Car door closure	75	2	77	20	17	13	Yes	Yes	Yes
	Car start	74	2	76	19	16	12	Yes	Yes	Yes
	Voice conversation ground communal area	71		71	38	38		Yes	Yes	n/a
	Voice conversation level 5 communal area	77		77	42	42	42	Yes	Yes	Yes
	Voice conversation neighbourhood shop	70		70	26	26	26	Yes	Yes	Yes
	Background music neighbourhood shop	70		70	26	26	26	Yes	Yes	Yes
	Voice conversation medical suite	70		70	32	32	32	Yes	Yes	Yes
	Delivery van	78		78	21			Yes	n/a	n/a
	Total				44	44	43	**Yes**	**Yes**	**Yes**
	Criteria							46	45	43
	Car passby	69		69	30	27	23	Yes	Yes	Yes
2	Car door closure	75	2	77	27	24	20	Yes	Yes	Yes
	Car start	74	2	76	26	23	19	Yes	Yes	Yes
	Voice conversation ground communal area	71		71	44	44		Yes	Yes	n/a
	Voice conversation level 5 communal area	77		77	36	36	36	Yes	Yes	Yes
	Voice conversation neighbourhood shop	70		70	17	17	17	Yes	Yes	Yes
	Background music neighbourhood shop	70		70	17	17	17	Yes	Yes	Yes
	Voice conversation medical suite	70		70	18	18	18	Yes	Yes	Yes
	Delivery van	78		78	29			Yes	n/a	n/a
	Total				45	45	37	**Yes**	**Yes**	**Yes**
	Criteria							46	45	43
	Car passby	69		69	38	35	31	Yes	Yes	Yes
3	Car door closure	75	2	77	23	20	16	Yes	Yes	Yes
	Car start	74	2	76	22	19	15	Yes	Yes	Yes
	Voice conversation ground communal area	71		71	37	37		Yes	Yes	n/a
	Voice conversation level 5 communal area	77		77	37	37	37	Yes	Yes	Yes
	Voice conversation neighbourhood shop	70		70	19	19	19	Yes	Yes	Yes
	Background music neighbourhood shop	70		70	19	19	19	Yes	Yes	Yes
	Voice conversation medical suite	70		70	19	19	19	Yes	Yes	Yes
	Delivery van	78		78	28			Yes	n/a	n/a
	Total				42	41	38	**Yes**	**Yes**	**Yes**
	Criteria							46	45	43
	Car passby	69		69	32	29	25	Yes	Yes	Yes
4	Car door closure	75	2	77	27	24	20	Yes	Yes	Yes
	Car start	74	2	76	26	23	19	Yes	Yes	Yes
	Voice conversation ground communal area	71		71	35	35		Yes	Yes	n/a
	Voice conversation level 5 communal area	77		77	42	42	42	Yes	Yes	Yes
	Voice conversation neighbourhood shop	70		70	29	29	29	Yes	Yes	Yes
	Background music neighbourhood shop	70		70	29	29	29	Yes	Yes	Yes
	Voice conversation medical suite	70		70	27	27	27	Yes	Yes	Yes
	Delivery van	78		78	22			Yes	n/a	n/a
	Total				44	44	43	**Yes**	**Yes**	**Yes**

*Correction due to tonality and impulsiveness as per AS1055:2018.

Compliance is predicted for onsite activities on the condition the recommendations detailed in Section 9 are implemented.

8.3 Noise Impacts – Sleep Disturbance

The noise source levels and predicted levels of noise at the receiver locations are shown in Table 15.

Table 15: Predicted Noise Impacts – Sleep Disturbance

	Receivers					
Receiver	1. 25-31 Hope Street (W) 2. 16-20 Lethbridge Street (N) 3. 15 Hope Street (E) 4. 16-24 Hope Street (S) Description	Source @1m dB(A)	Correction dB(A)*	Corrected dB(A)	LAmax adj,T ext.. dB(A)	Complies Lmax dB(A)
	Criteria					54
	Car passby	74		74	36	Yes
1	Car door closure	81	2	83	43	Yes
	Car start	80	2	82	42	Yes
	Voice conversation level 5 communal area	84		84	49	Yes
	Voice conversation neighbourhood shop	77		77	33	Yes
	Background music neighbourhood shop	75		75	31	Yes
	Voice conversation medical suite	77		77	39	Yes
	Criteria					54
	Car passby	74		74	43	Yes
2	Car door closure	81	2	83	50	Yes
	Car start	80	2	82	49	Yes
	Voice conversation level 5 communal area	84		84	43	Yes
	Voice conversation neighbourhood shop	77		77	24	Yes
	Background music neighbourhood shop	75		75	22	Yes
	Voice conversation medical suite	77		77	25	Yes
	Criteria					54
	Car passby	74		74	51	Yes
3	Car door closure	81	2	83	46	Yes
	Car start	80	2	82	45	Yes
	Voice conversation level 5 communal area	84		84	44	Yes
	Voice conversation neighbourhood shop	77		77	26	Yes
	Background music neighbourhood shop	75		75	24	Yes
	Voice conversation medical suite	77		77	26	Yes
	Criteria					54
	Car passby	74		74	45	Yes
4	Car door closure	81	2	83	50	Yes
	Car start	80	2	82	49	Yes
	Voice conversation level 5 communal area	84		84	49	Yes
	Voice conversation neighbourhood shop	77		77	36	Yes
	Background music neighbourhood shop	75		75	34	Yes
	Voice conversation medical suite	77		77	34	Yes

*Correction due to tonality and impulsiveness as per AS1055:2018.

Compliance is predicted for onsite activities on the condition the recommendations detailed in Section 9 are implemented.

9. Recommendations

9.1 Road Traffic Noise

All building treatments for road traffic noise were calculated in accordance with Australian Standard *AS3671:1989 'Road Traffic Noise Intrusion – Building Siting and Construction'* and *"Development Near Rail Corridors and Busy Road Interim Guideline 2008"*.

9.1.1 Glazing

The minimum glazing treatments presented in Table 16 are required to comply with the following:

- The minimum glass thickness specified shall not be reduced regardless of the R_w performance of the glass unless the glazier can provide a specific (non generic) NATA Test report proving the proposed glazing system complies (the test report must be based on the same configuration proposed for the development). Note an estimation or calculated performance will not accepted.
- If compliance cannot be achieved with the minimum R_w ratings for the glass thickness nominated, then glazing system shall be upgraded until compliance is achieved.
- Glazing specified with acoustic seals requires a seal that has been tested with a glazing system or door to achieve an Rw in accordance with AS/NZS ISO 717.1, mohair seals are not acceptable.
- The glazier shall provide NATA test reports on request to verify compliance with the minimum R_w ratings. Generic reports are not acceptable.

Table 16: Required façade acoustic ratings

Unit	Floor	Location	Rw Ratings				Glazing		Acoustic seals
			Wall	Roof	Windows	Sliding Doors	Windows	Sliding Doors	
L1.09	1	Bed 1	40	-	22	-	4mm float	-	no
		Bed 2	40	-	22	22	4mm float	4mm tough	no
		Living/Dining	40	-	22	22	4mm float	4mm tough	no
L1.10	1	Bed 1	40	-	22	22	4mm float	4mm tough	no
		Living/Dining	40	-	22	22	4mm float	4mm tough	no
L1.11	1	Bed 1	40	-	22	22	4mm float	4mm tough	no
		Bed 2	40	-	22	-	4mm float	-	no
		Living/Dining	40	-	22	22	4mm float	4mm tough	no
L2.09	2	Bed 1	40	-	22	-	4mm float	-	no
		Bed 2	40	-	22	22	4mm float	4mm tough	no
		Living/Dining	40	-	22	22	4mm float	4mm tough	no
L2.10	2	Bed 1	40	-	22	22	4mm float	4mm tough	no
		Living/Dining	40	-	22	22	4mm float	4mm tough	no
L2.11	2	Bed 1	40	-	22	22	4mm float	4mm tough	no
		Bed 2	40	-	22	-	4mm float	-	no
		Living/Dining	40	-	22	22	4mm float	4mm tough	no
L3.09	3	Bed 1	40	-	27	-	4mm float	-	yes
		Bed 2	40	-	31	31	6.38 lam	6.38 lam	yes
		Living/Dining	40	-	27	27	4mm float	4mm tough	yes

Unit	Floor	Location	Rw Ratings				Glazing		Acoustic seals
			Wall	Roof	Windows	Sliding Doors	Windows	Sliding Doors	
L3.10	3	Bed 1	40	-	27	27	4mm float	4mm tough	yes
		Living/Dining	40	-	27	27	4mm float	4mm tough	yes
L3.11	3	Bed 1	40	-	27	27	4mm float	4mm tough	yes
		Bed 2	40	-	27	-	4mm float	-	yes
		Living/Dining	40	-	30	27	6mm float	4mm tough	yes
L4.06	4	Living/Dining	40	-	30	27	6mm float	4mm tough	yes
L4.07	4	Bed 1	40	-	27	-	4mm float	-	yes
		Bed 2	40	-	27	-	4mm float	-	yes
		Bed 3	40	-	27	-	4mm float	-	yes
		Living	40	-	30	27	6mm float	4mm tough	yes
L5.01	5	Living/Dining	40	40	30	31	6mm float	6.38 lam	yes

Any locations not identified in Table 16 would require 4mm float for windows (minimum R_w 22) and 4mm toughened for sliding doors (minimum R_w 22)

9.1.2 Wall Construction

The minimum required wall acoustic rating is Rw 40 with brick veneer or double brick complying. For lightweight wall systems the following construction would be required:

Table 17: Typical lightweight wall constructions

Description	Cavity insulation	R_W Rating
Minimum 9mm fibre cement sheeting external, 90mm timber studs, 13mm plasterboard internal	75mm glasswool batts (11 kg/m^3)	40

Note that the construction system listed in the table is not the only possible type of construction. Other similar systems achieving at least minimum Rw 40 would also be suitable.

More detailed information for external wall systems may be provided on request.

9.1.3 Roofing Construction

The required roof/ceiling acoustic rating is Rw 40, with a 150mm slab complying with the minimum requirements. For metal roofs, the following typical construction would be required:

Table 18: Typical roof constructions

Description	Cavity insulation	R_W Rating
Low pitched metal roof with 60mm Anticon, cavity infill, furring channel at 600mm max centres, 13mm thick plasterboard	Minimum 140mm glasswool batts (11kg/m^3)	40

Note that the construction system listed in the table is not the only possible type of construction. Other similar systems achieving at least minimum Rw 40 would also be suitable.

More detailed information for roof/ceiling systems may be provided on request.

9.1.4 Alternative ventilation

To achieve the required internal noise levels for the development, all bedrooms and living spaces requiring acoustic seals would require the provision for an alternative ventilation system (in accordance with National Construction Code 2016 requirements) similar to air-conditioning or mechanical ventilation to allow doors and windows to be closed.

9.2 Onsite Activities

Based on the predicted noise levels and subjective assessment of the site and surrounds, noise impacts at all receiver locations are predicted to comply with the assessment criteria on the following conditions:

- Acoustic barriers shall be constructed to the height and extent shown in Figure 3. The acoustic barriers should be constructed using either 16mm thick lapped timber (minimum 40% overlap), masonry, 9mm fibre cement sheet, Hebel, Perspex, plywood, or other materials with a minimum surface density of 9kg/m^2 and shall be free of gaps and holes.
- A solid balustrade is recommended to be constructed around the level 5 communal open space to the height and extent shown in Figure 4. The balustrade shall be constructed using materials that achieve a minimum surface density of 9kg/m^2. Suitable materials may include, 6.38mm laminate glazing, masonry, 9mm fibre cement sheeting, Hebel, or other material which satisfy the minimum surface density requirement. The balustrade shall be free of gaps and holes.
- The ground floor communal open space shall be limited to the day and evening (7am-10pm) periods only.
- Deliveries shall be limited to the day period (7am-6pm) only.
- Waste collection shall be conducted in accordance with the surrounding residential properties.

Figure 3: Recommended Acoustic Barrier

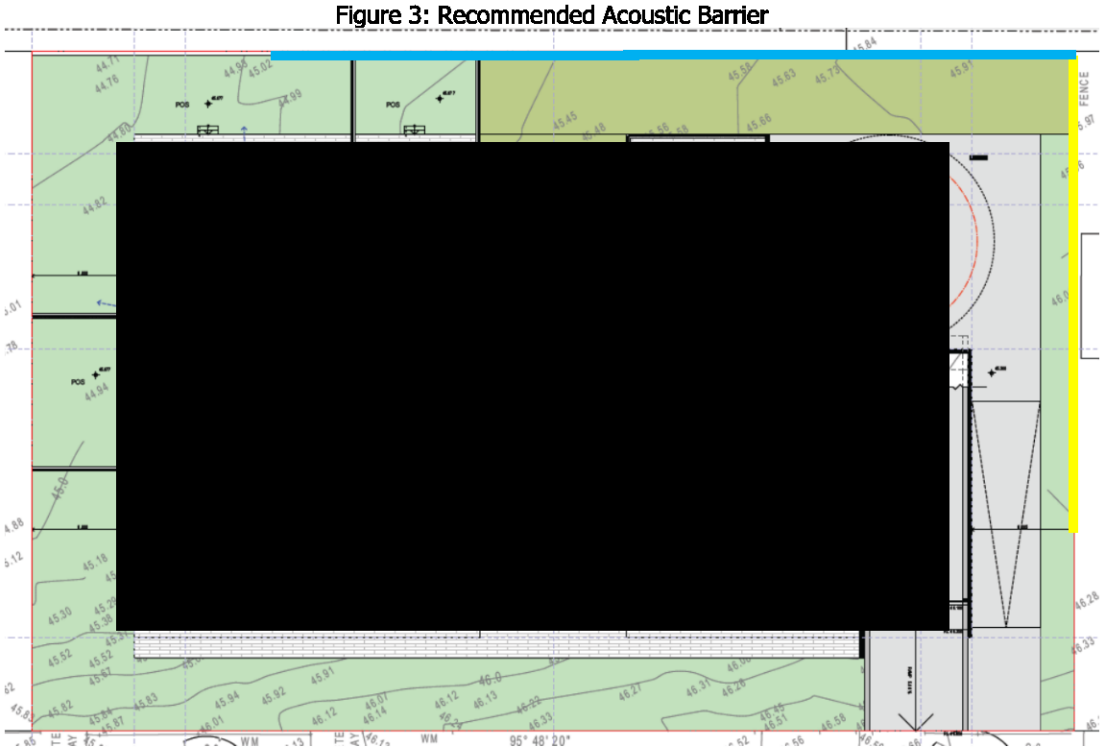
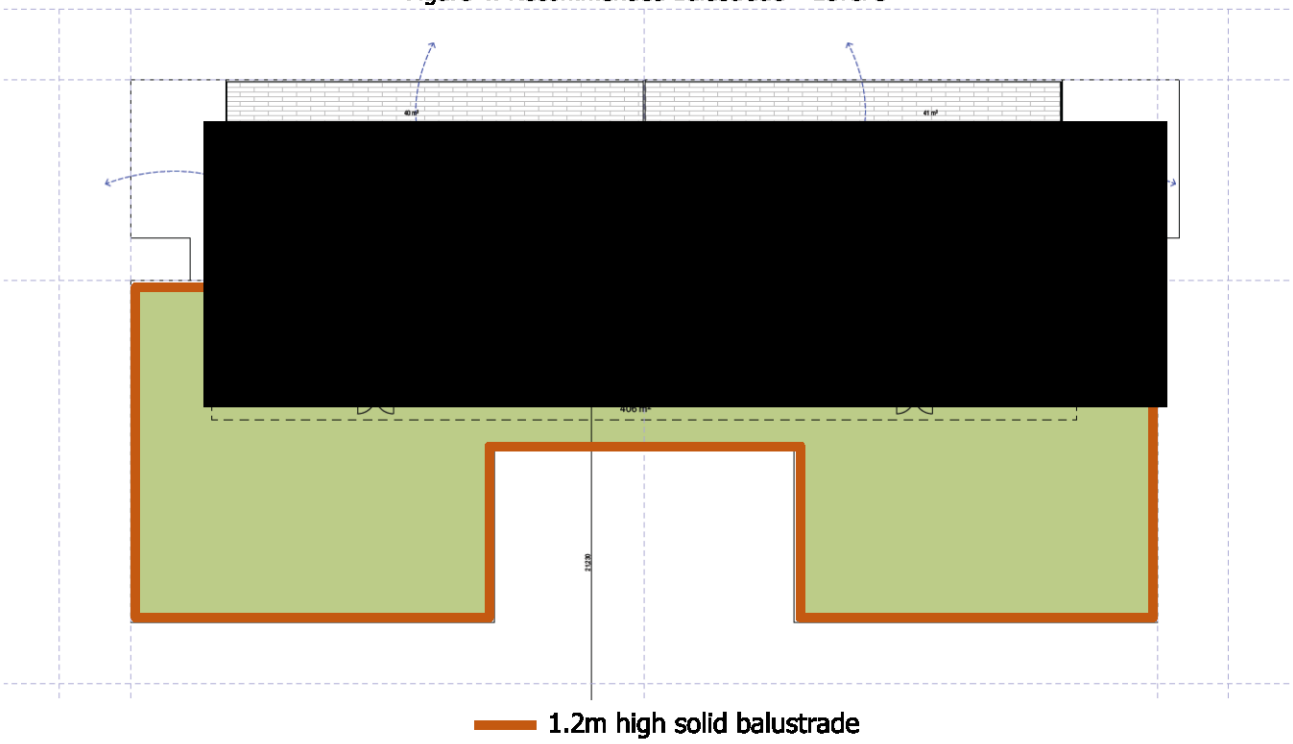


Figure 4: Recommended Balustrade – Level 5



9.3 Onsite Mechanical Plant

No information regarding mechanical services was available at the time of the assessment. We recommend that any new mechanical plant is designed to comply with the criteria stated in Section 6.4.4 with an assessment undertaken by qualified acoustic consultant to be conducted prior to installation.

10. Conclusion

An environmental and road traffic noise assessment was conducted for the proposed mixed-use development located at 17-23 Hope Street, Penrith. On the condition the recommendations detailed in Section 9 are implemented, compliance is predicted with the assessment criteria.

Should you have any queries, please do not hesitate to contact us.

Yours faithfully,

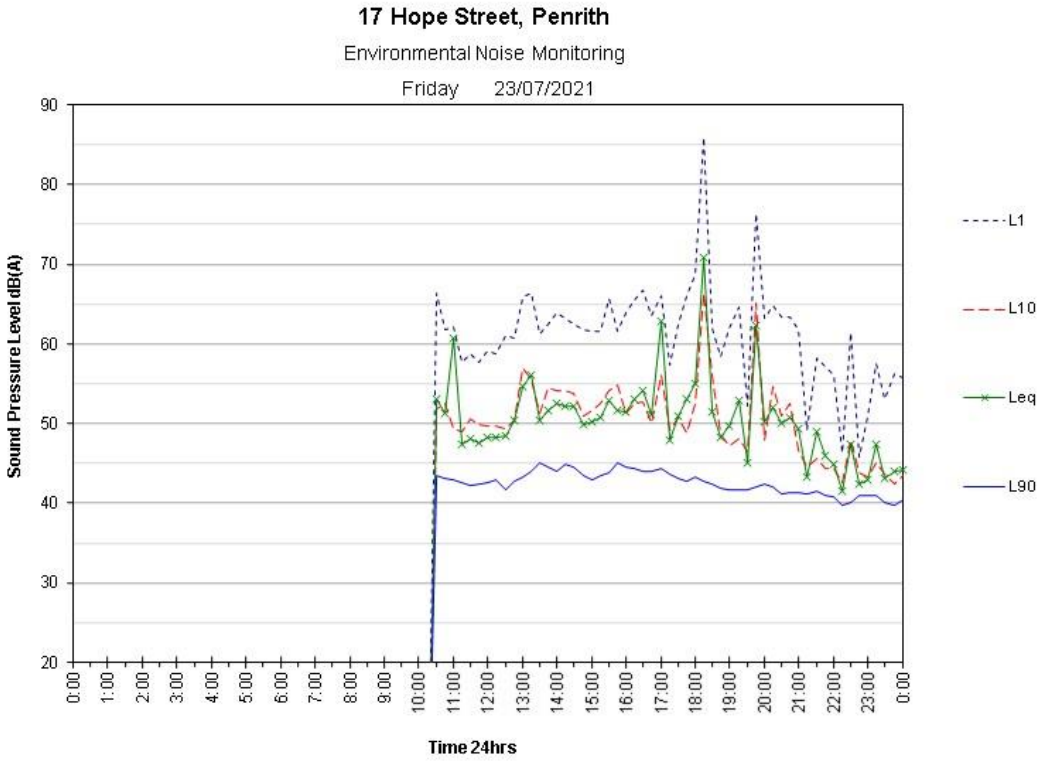
[redacted]

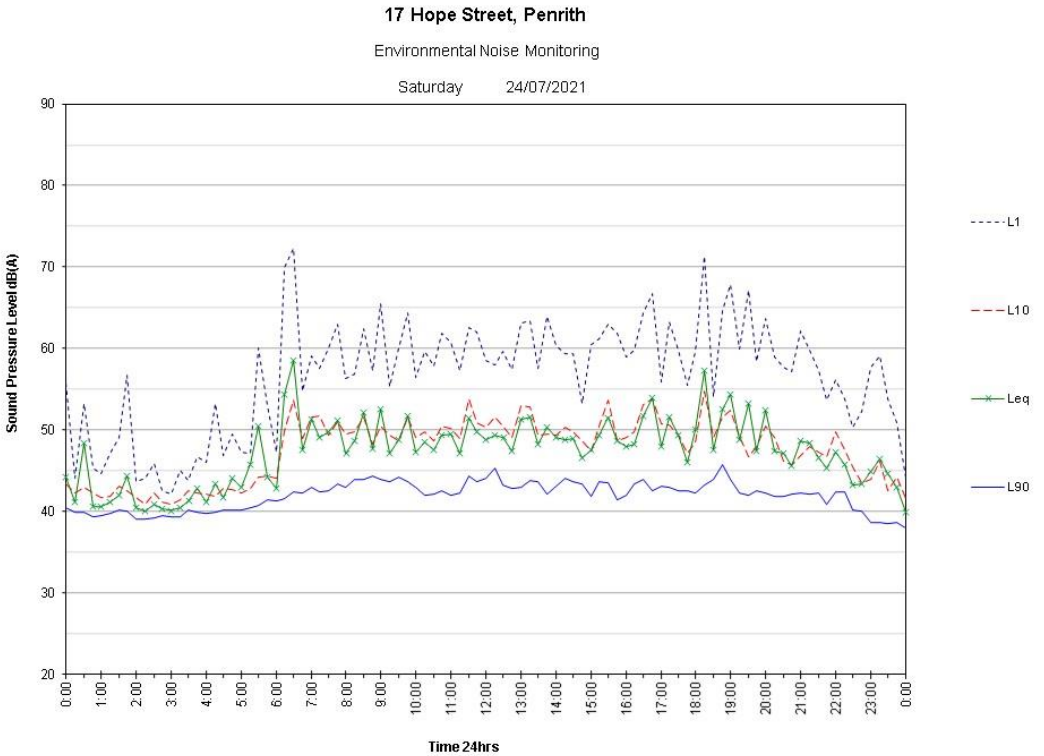
Andrew Hiscox
Acoustic Consultant

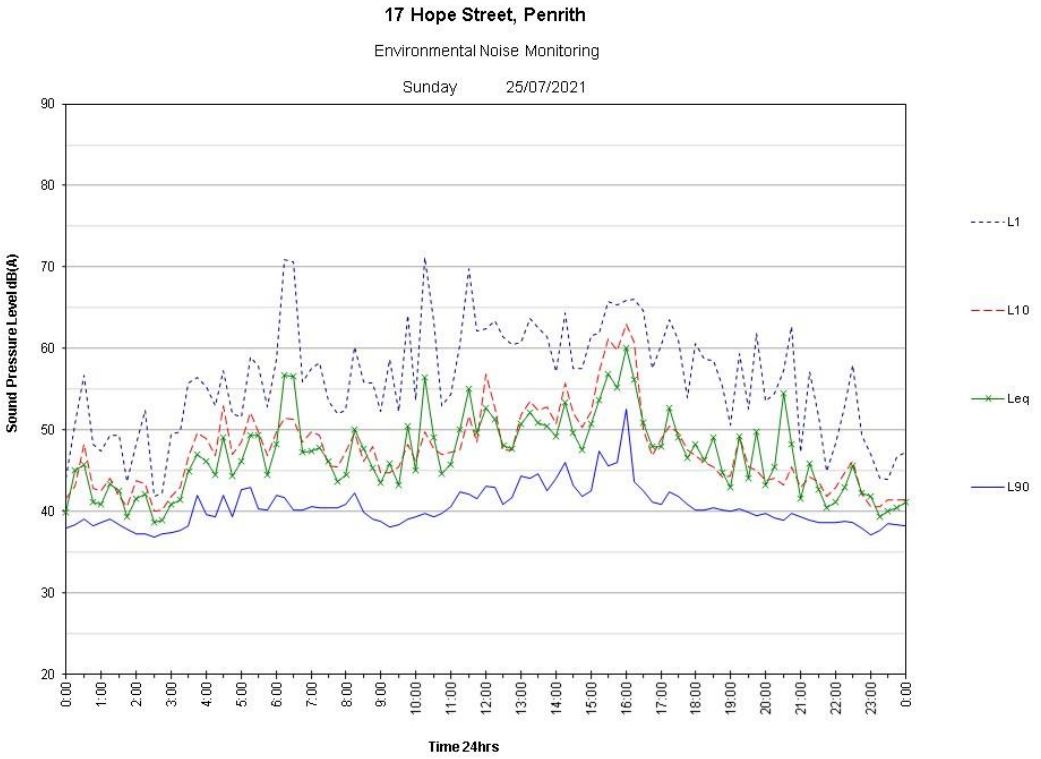
acousticworks)))

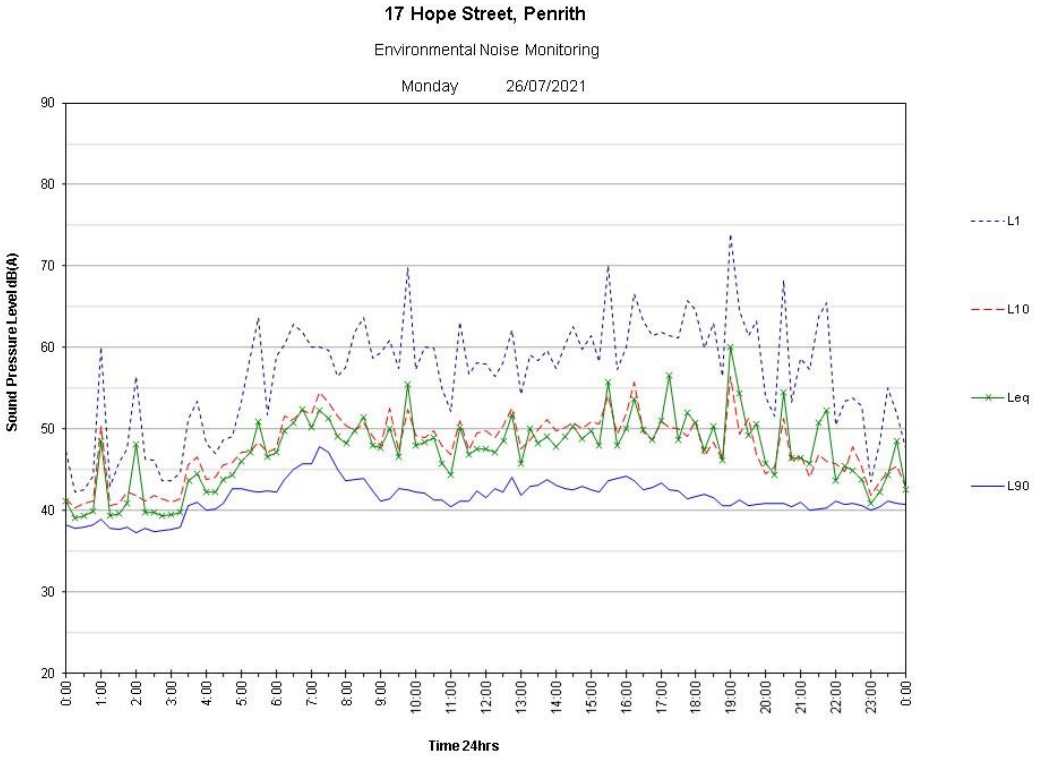
11. Appendices

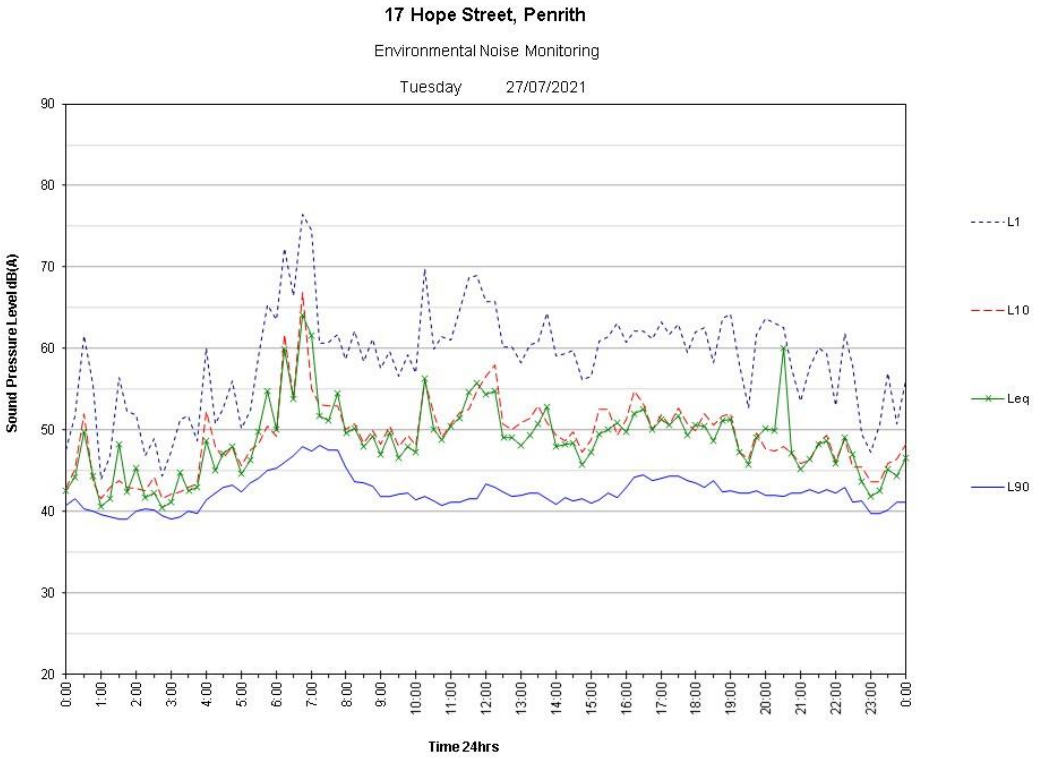
11.1 Noise Monitoring Charts

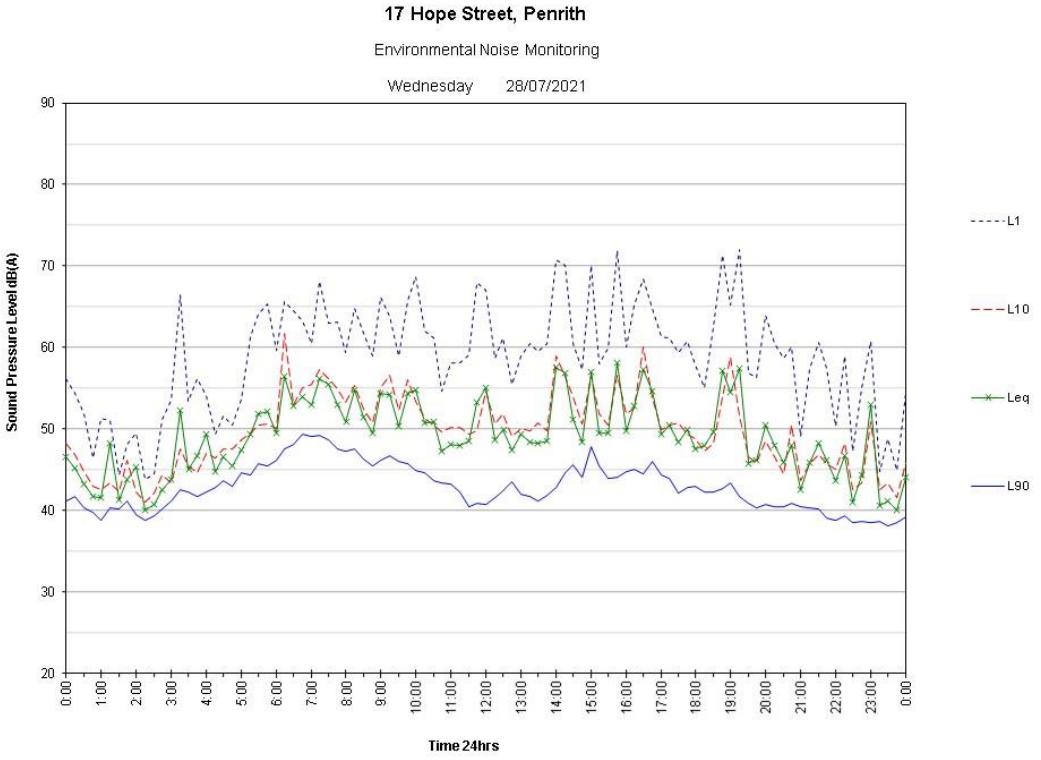


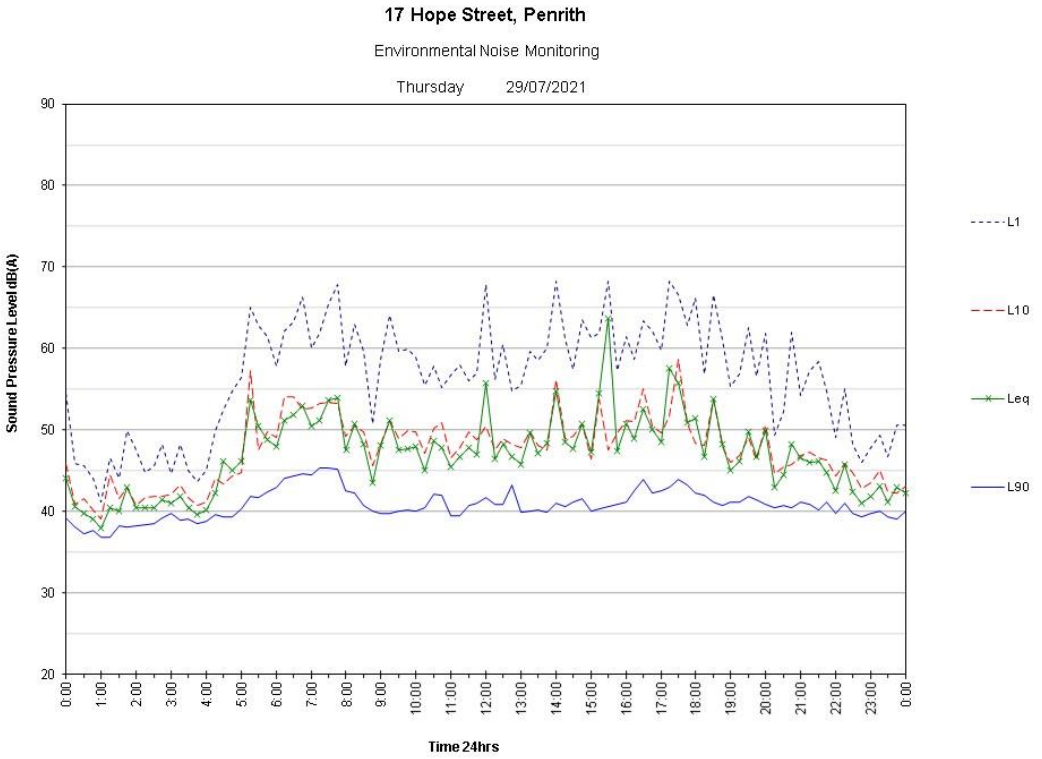


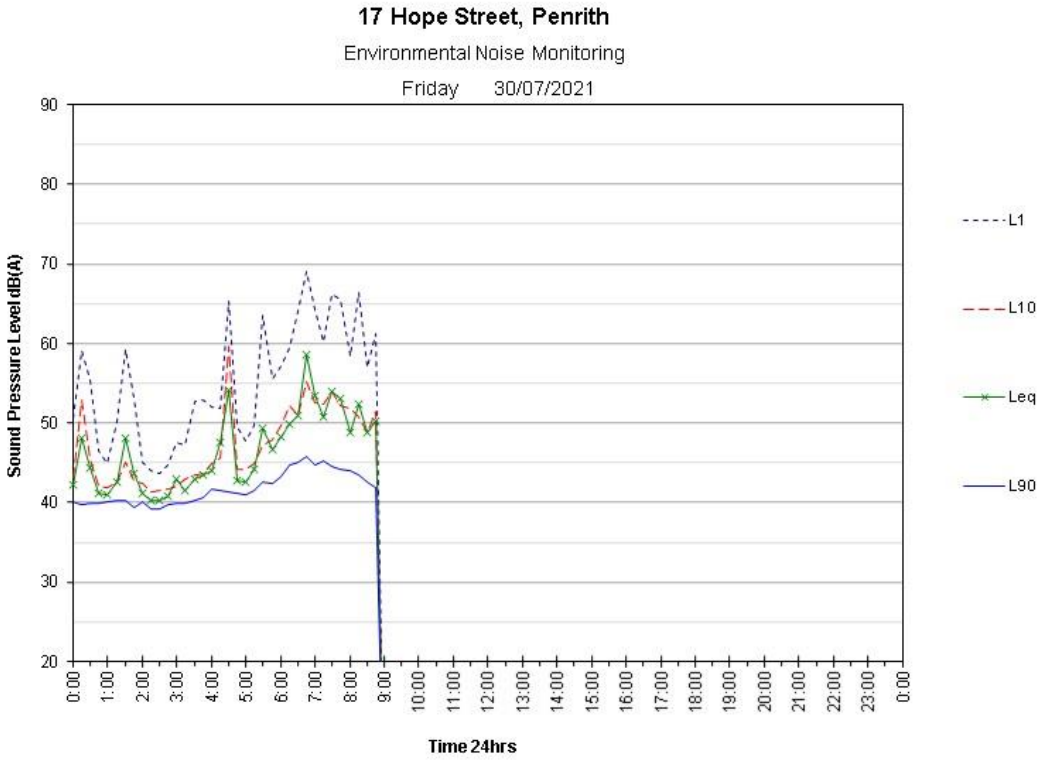












11.2 Development Plans

Summary

SITE AREA
2,440 m²

GFA
4,767 m²

FSR
1.95 : 1

MEDICAL GROSS FLOOR AREA
180 m²

Medical		180.00 m²

RESIDENTIAL UNITS
50

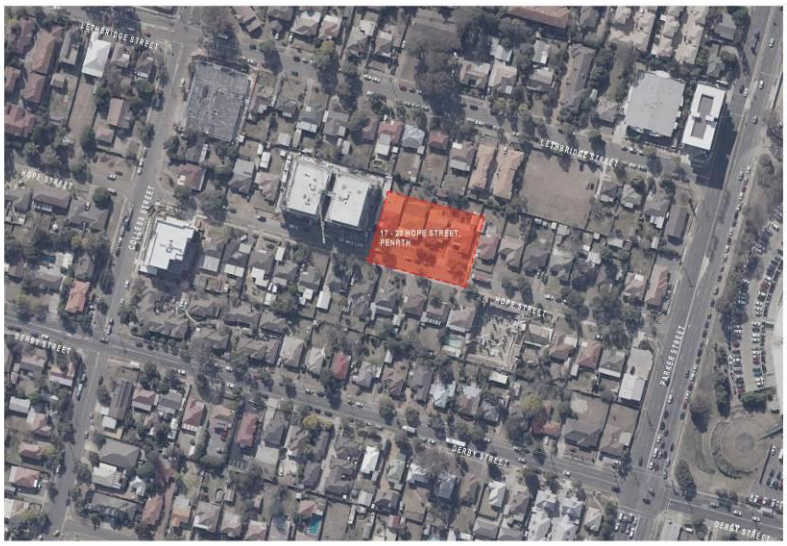
1bed	9	18%
2bed	37	74%
3bed	4	8%

TOTAL CARPARKING
68

Residential	54 (0.7 cars/unit)
Residential Visitor	10.0
Medical	1.0
Medical Visitor	3.0

Compliance

CONTROL		REQUIREMENT	PROPOSED	COMPLIES
Floor Space Ratio		N/A MAX	1.95 : 1	
Gross Floor Area		N/A MAX	4,767.0 m²	
Building Height		18.00 m MAX	19.75 m	✗
Carparking				
	Residential	54.0 MIN	54.0	✓
	Residential Visitor	10.0 MIN	10.0	✓
	Medical staff	1.0 MIN	1.0	✓
	Medical visitor	3.0 MIN	3.0	✓
	Total	66 MIN	68.0	✓
Motorcycle Parking (1/15units)		3.33 MIN	4.0	✓
Bicycle Parking		13.94 MIN	15.0	✓
Solar Access (> 2hours)		70% MIN	35 70%	✓
No Solar Access (< 15 mins)		15% MAX	7 14%	✓
Cross Ventilation (First 10 storeys)		60% MIN	36 72%	✓
Adaptable Units				
	Adaptable	10% MIN	6 12%	✓
	Livable Housing Silver Level	20% MIN	11 22%	✓
Communal Open Space (DCP)		25% MIN	668 m2 27.4%	✓
Deep Soil		7% MIN	240 m2 10%	✓
Unit Storage	1Bed	6 m3 MIN	6 m3	✓
(min. half in unit, remaining	2Bed 8 m3	MIN	8 m3	✓
in basement)	3Bed+ 10 m3	MIN	10 m3	✓



GROSS FLOOR AREA

	MEDICAL	MEDICAL (excluding Waste and Circulation)	RETAIL	RETAIL (excluding Waste and Circulation)	Residential
Basement 2					
Basement 1					
Ground	180.0 m²		103.0 m²		401.0 m²
Level 1					1,029.0 m²
Level 2					1,029.0 m²
Level 3					1,029.0 m²
Level 4					747.0 m²
Level 5					249.0 m²
	180.0 m²	0.0 m²	103.0 m²	0.0 m²	4,484.0 m²
				Total	4,767.0 m²

UNITS QTY

Studio	1Bed	1Bed + Study	2Bed	2 Bed + Study	3Bed	3 Bed + Study	4 Bed +	TOTAL Units per Floor
	3	1						4
	2		10					12
	2		10					12
	2		10					12
			6		2			8
					2			2
0	9	0	37	0	4	0	0	
	9		37		4		Total	50

CARPARKING PROVIDED

42.00
26.00
68.00

URBAN LINK

17 - 23 Hope St Penrith MIXED USE MULTI RESIDENTIAL

17 - 23 Hope St Penrith MIXED USE MULTI RESIDENTIAL

URBAN LINK

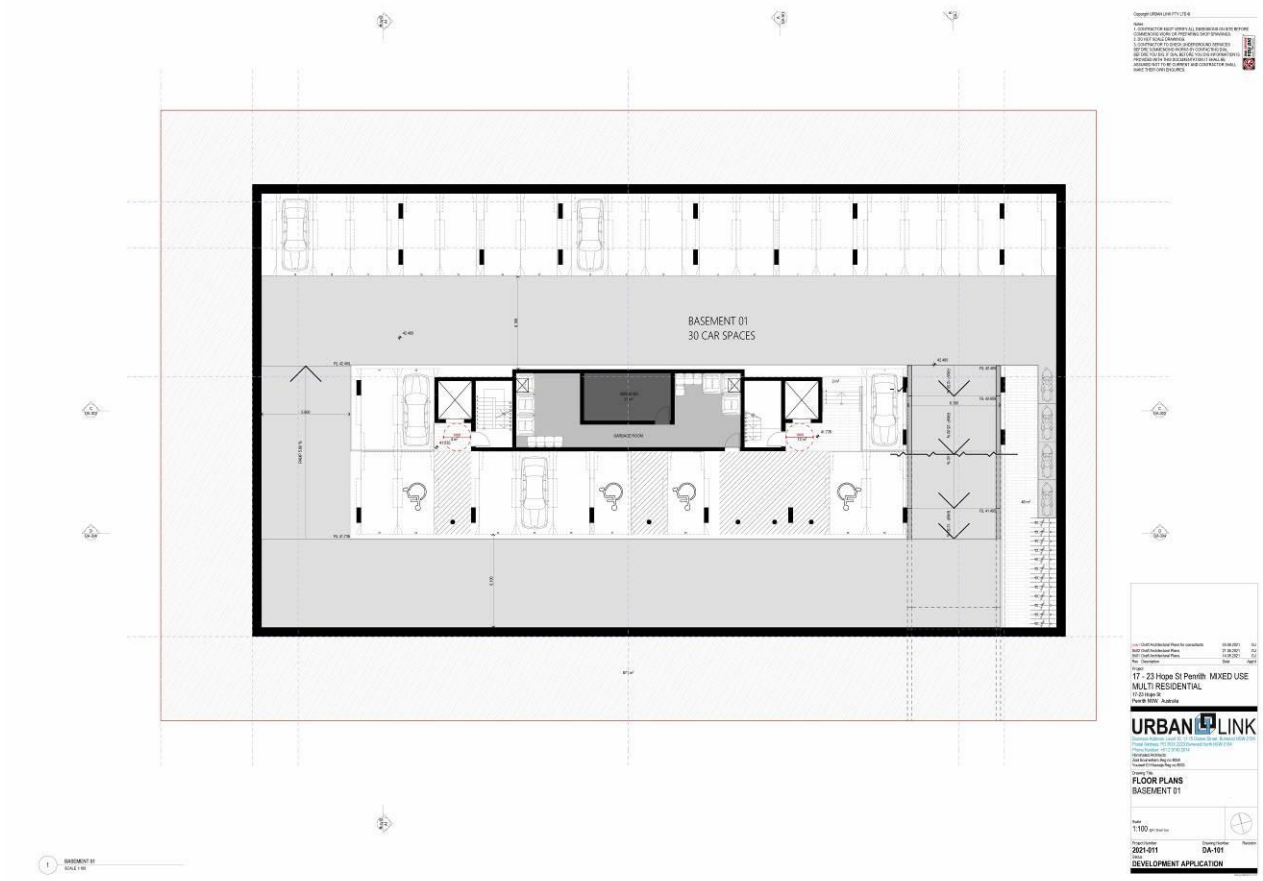
SITE
SITE PLAN

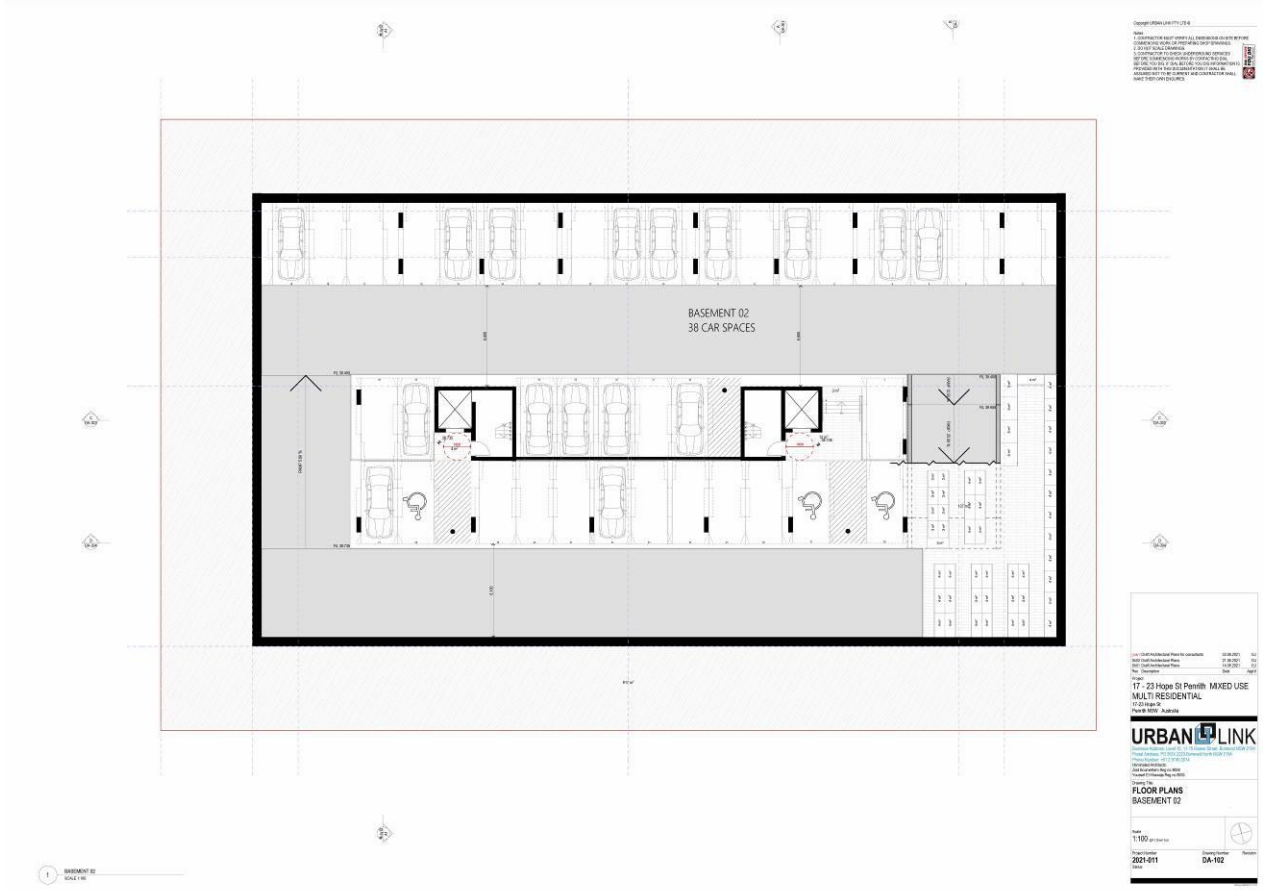
1:200

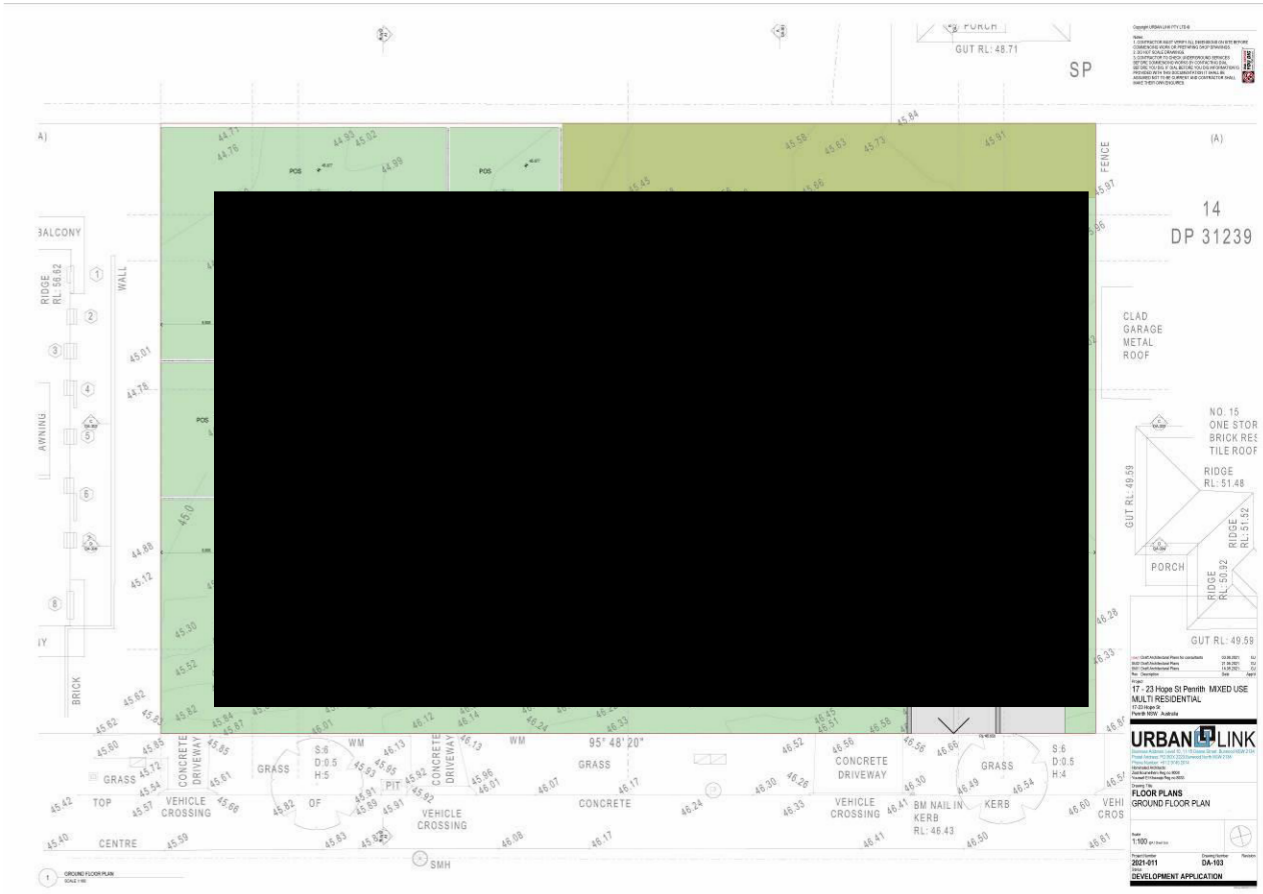
2021-011

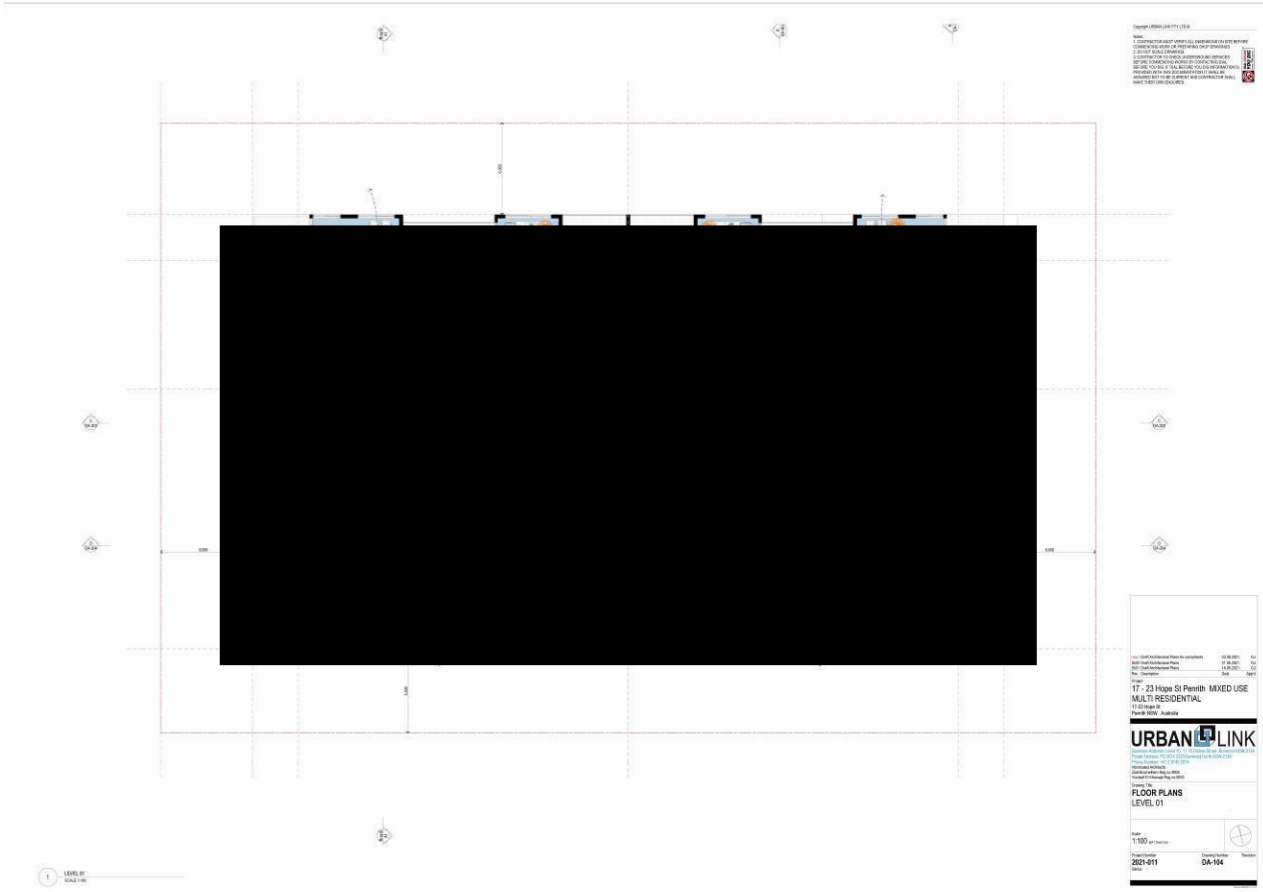
DA-002

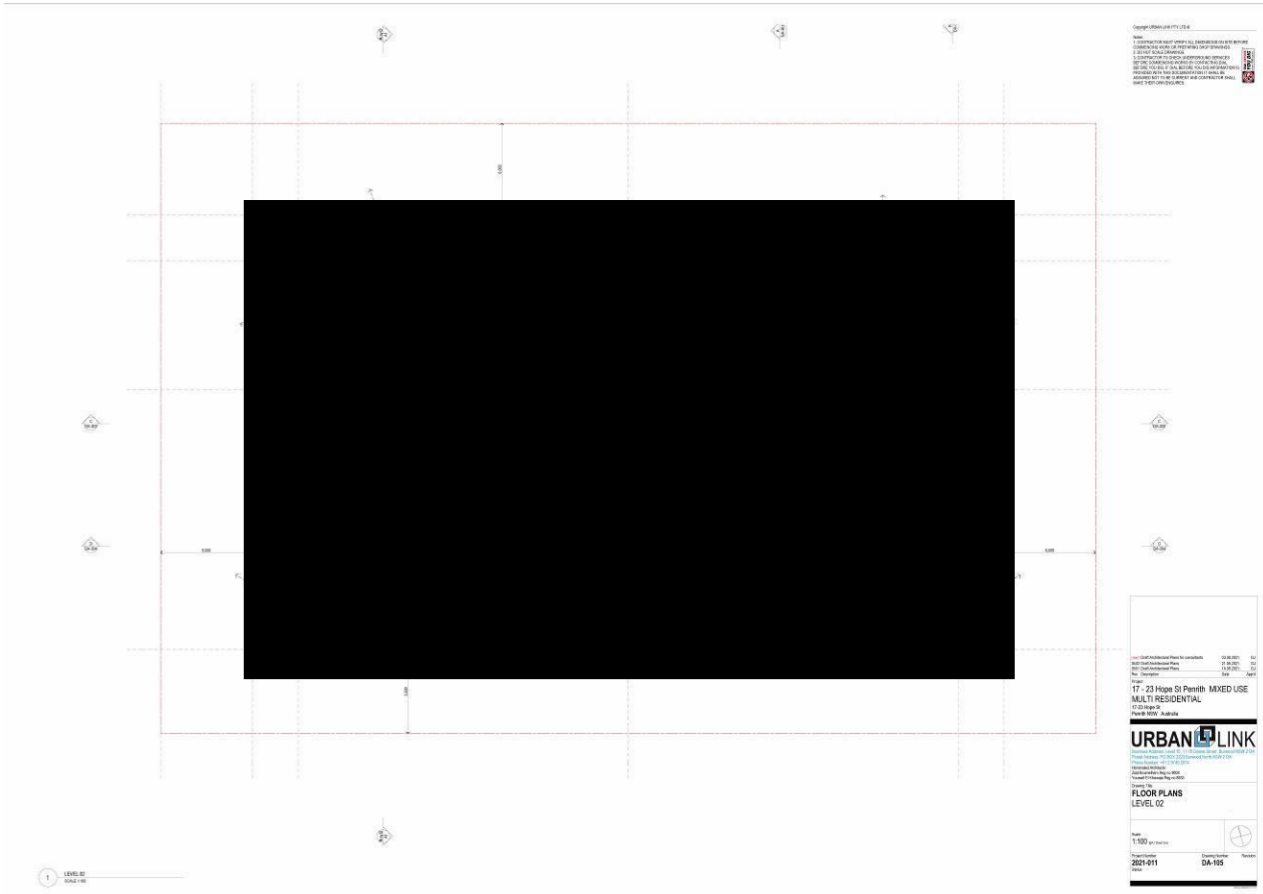
DEVELOPMENT APPLICATION

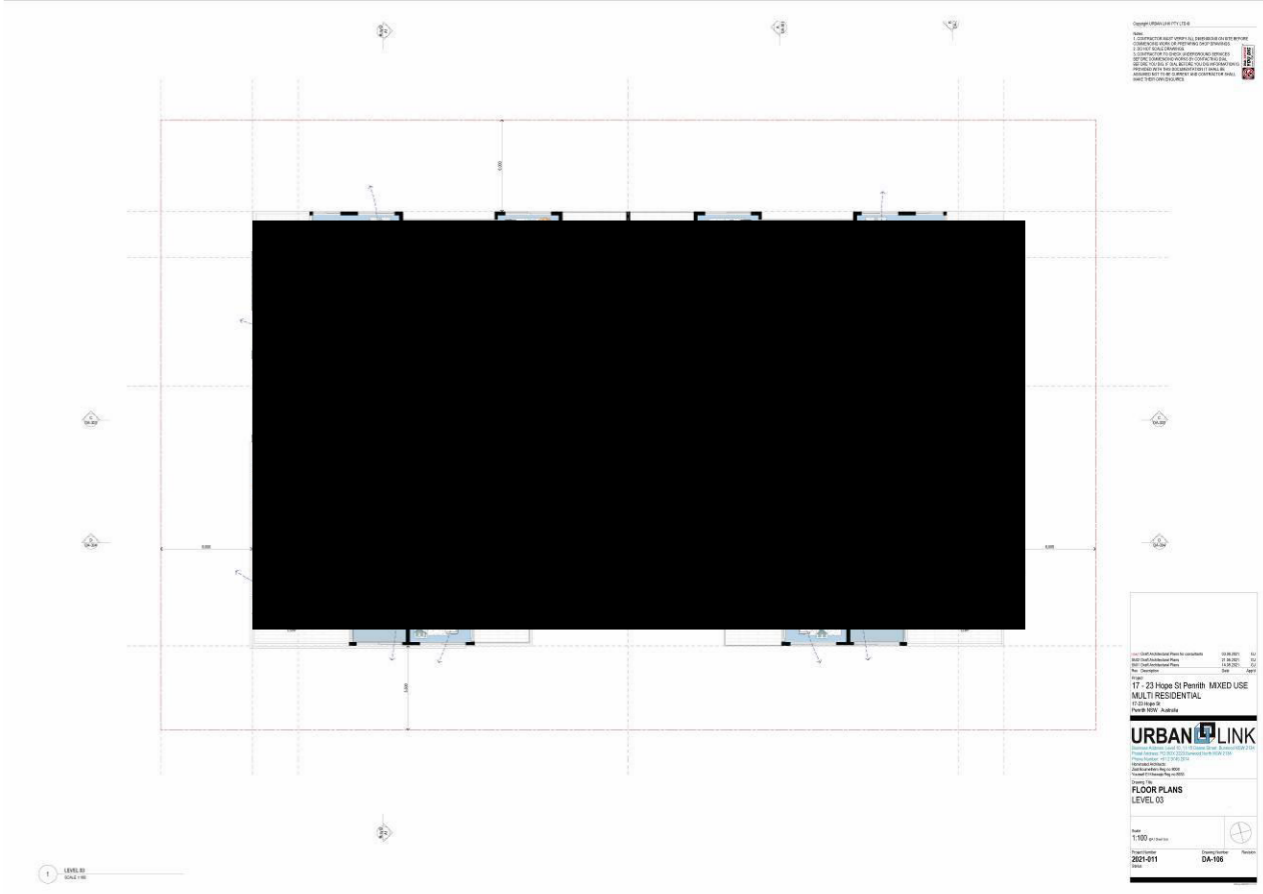


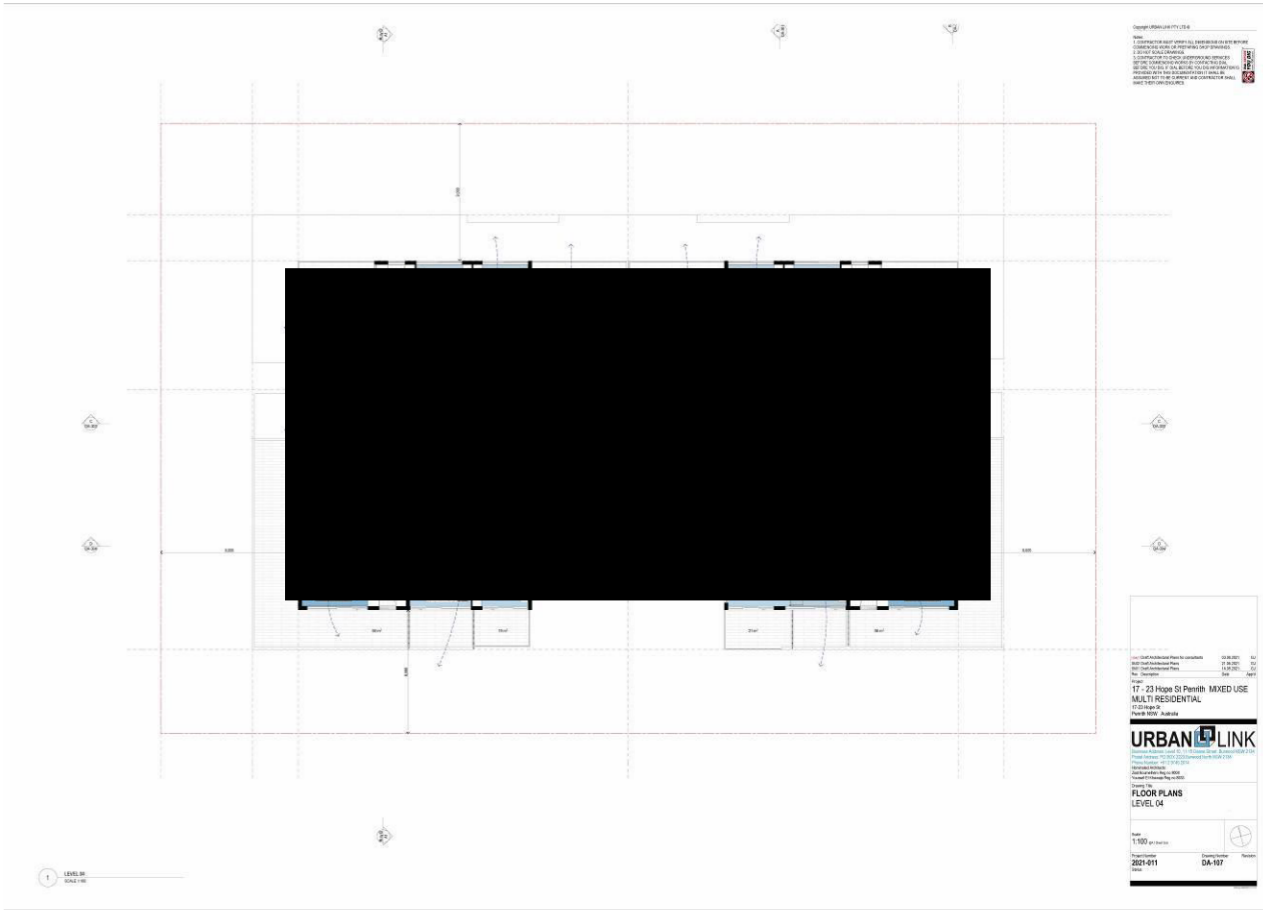


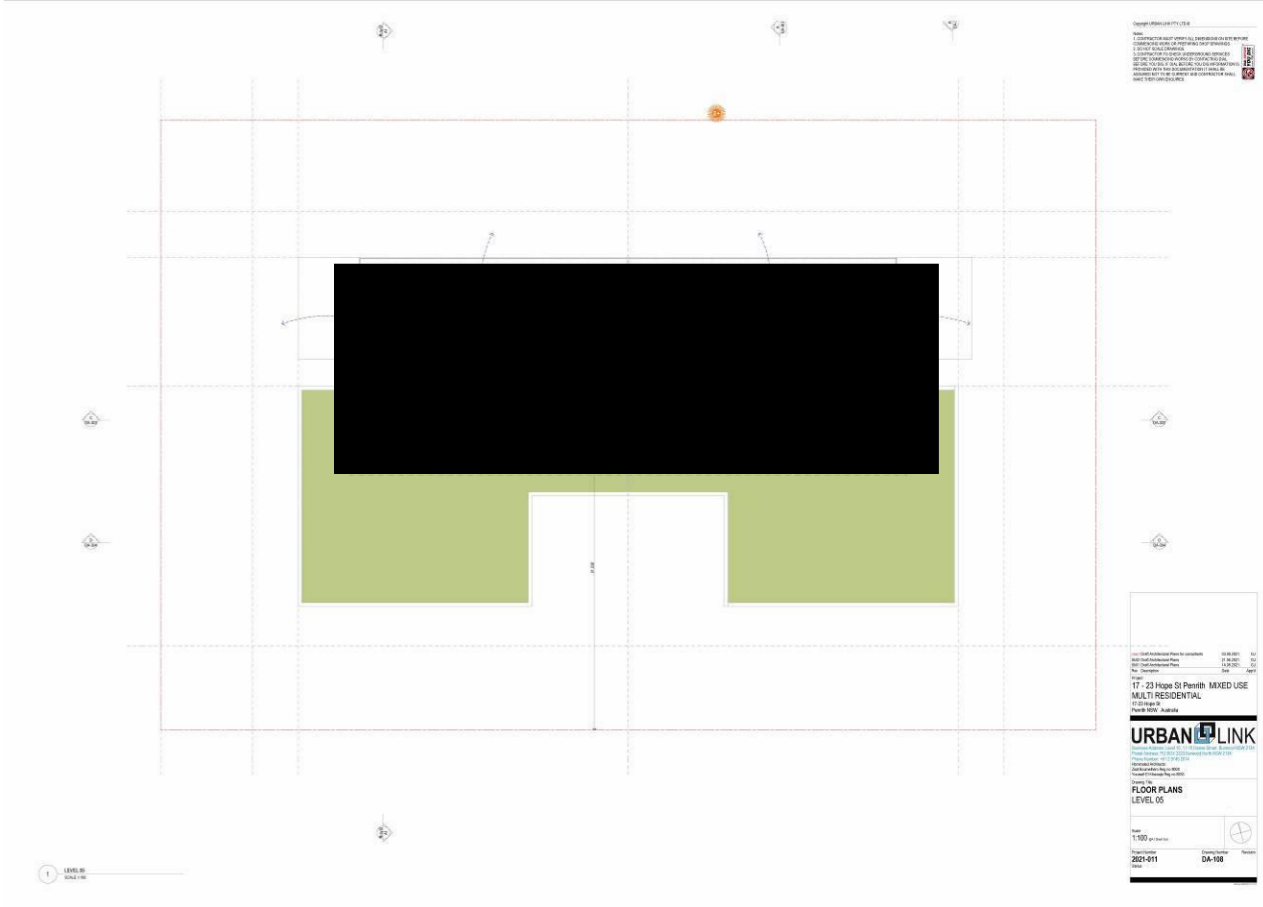




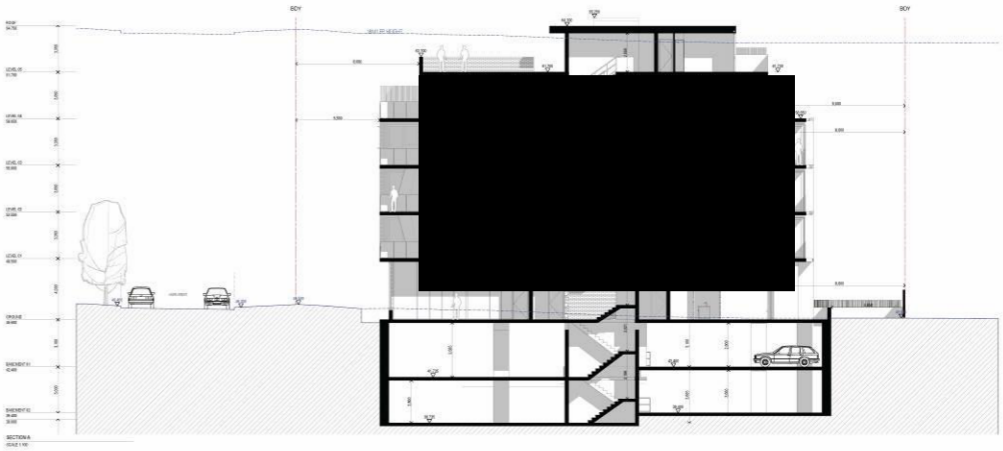








17 - 23 Hope St Penrith MIXED USE
MULTI RESIDENTIAL
URBAN LINK
ELEVATIONS
STREETSCAPE
1:200
2021-011
DA-203



17 - 23 Hope St Penrith MIXED USE
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SECTIONS
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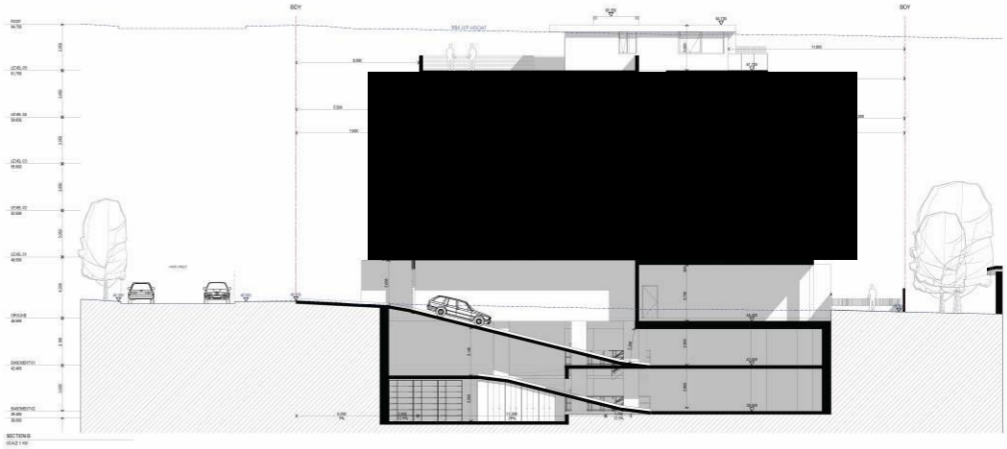


17 - 23 Hope St Penrith MIXED USE
MULTI RESIDENTIAL
17-23 Hope St
Penrith NSW Australia

URBAN LINK

SECTIONS
SECTION B

1:100

2021-011

DA-302

17 - 23 Hope St Penrith MIXED USE
MULTI RESIDENTIAL
17-23 Hope St
Penrith NSW Australia

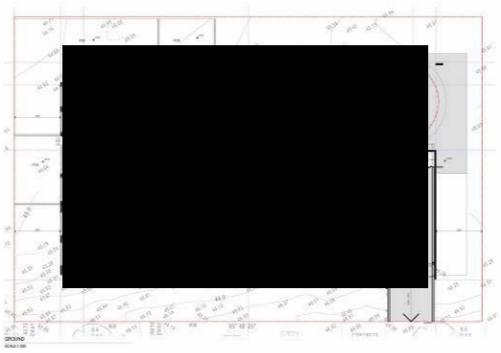
URBAN LINK

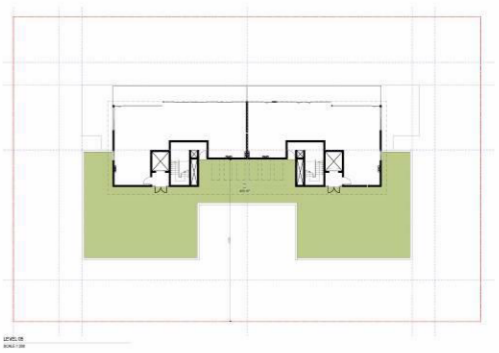
SECTIONS
SECTION C

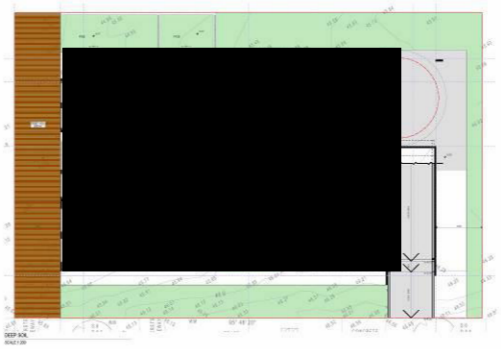
1:100

2021-011

DA-303

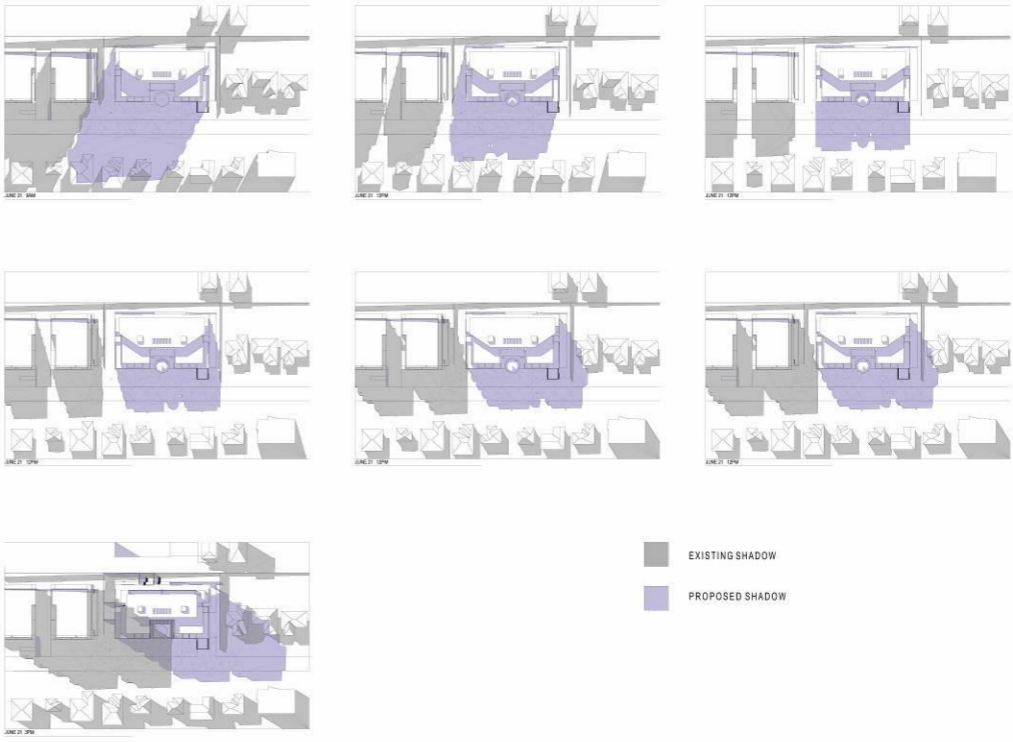






Compliance

CONTROL	REQUIREMENT	PROPOSED		COMPLIES
Communal Open Space (DCP)	25% MIN	668 m2	27.4%	✓
Deep Soil	7% MIN	240 m2	10%	✓



EXISTING SHADOW

PROPOSED SHADOW







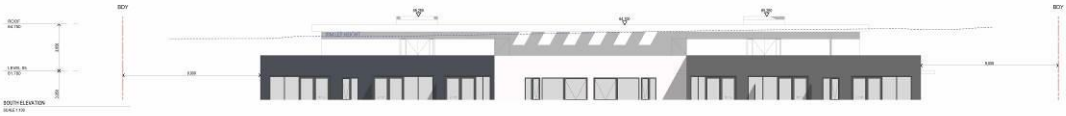
Compliance

CONTROL	REQUIREMENT	PROPOSED		COMPLIES
Solar Access (> 2hours)	70% MIN	35	70%	✓
No Solar Access (< 15 mins)	15% MAX	7	14%	✓
Cross Ventilation (first 10 storeys)	60% MIN	36	72%	✓

ADG CALCULATIONS

	Solar Access (>2 hrs)	Cross Ventilated (first 10 storeys)
Ground	4	2
Level 1	7	8
Level 2	8	8
Level 3	8	8
Level 4	6	8
Level 5	2	2
	35	36
	70%	72%


17 - 23 Hope St Penrith MIXED USE MULTI RESIDENTIAL
URBAN LINK
COMPLIANCE
VIEWS FROM THE SUN
1:333.33, 2:1
2021-011
DA-1404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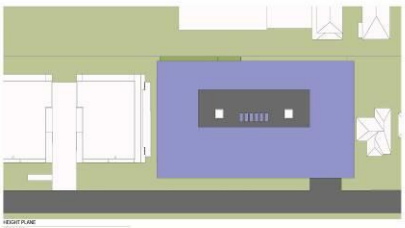
HEIGHT PLANE

Compliance

CONTROL	REQUIREMENT	PROPOSED	COMPLIES
Building Height	18.00 m MAX	19.75 m	✗


HEIGHT PLANE


17 - 23 Hope St Penrith MIXED USE MULTI RESIDENTIAL
URBAN LINK
COMPLIANCE
HEIGHT PLANE
1:125, 1:500, 1:100, 2:1
2021-011
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