



35-43 Belgrave Street, Manly

Noise and Vibration Impact Assessment

Project No.	P00567
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Client	Time and Place

E-LAB Consulting

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Document QA and Revisions

ISSUE	DATE	COMMENTS	ENGINEER	REVIEWER
1	27/06/2023	Draft Issue	Artie Rattananikom	Tom Candalepas
2	11/07/2023	For Development Application	Artie Rattananikom	Tom Candalepas
3				
4				

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Acoustics & Vibration



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1 INTRODUCTION

1.1 DOCUMENT PURPOSE

This report has been prepared to accompany a Development Application (DA) for a mixed-use development to be located at 35-43 Belgrave Street, Manly. The development is expected to be 5 storeys high and comprises of retail (food and beverage, and specialty shops) on ground floor, residential apartments from Level 01 to Level 04, and two levels of basement.

In summary, the purpose of this report is to:

- Identify surrounding noise-sensitive receivers;
- Identify relevant standards and guidelines and to establish noise and vibration project requirements for the construction and operation of the site;
- Provide a noise and vibration assessment for the operation of the site, which discusses both noise emissions from the proposed development, and noise intruding into the development from external road noise sources; and
- Outline mitigation measures and recommendations to ensure project noise and vibration requirements are satisfied.

1.2 RELEVANT DOCUMENTS

The following standards, guidelines and drawings have been used to establish the project specific acoustic design requirements for the development.

- Architectural drawings prepared by SJB Architects dated 20th June 2023 (DA Drawings);
- Northern Beaches Council “Manly Development Control Plan 2013” (DCP);
- Northern Beaches Council “Manly Local Environmental Plan 2013” (DCP);
- AS/NZS 2107:2016 “Acoustics - Recommended design sound levels and reverberation times for building interiors”; and
- NSW EPA’s Noise Policy for Industry 2017 (NPI).

2 PROJECT OVERVIEW

2.1 SITE DESCRIPTION

The location of the proposal, noise monitoring and measurement positions, and the surrounding noise-sensitive receivers are shown in Figure 1. The noise-sensitive receivers have been delineated into receiver catchments (RCs) as noted in Figure 1. Receiver catchments have been identified with a detailed description in Table 1 below.

Figure 1: Acoustic site plan identifying the surrounding noise-sensitive receivers and noise monitoring locations



Table 1: Description of nearby noise sensitive receiver catchments

RECEIVER CATCHMENT	DESCRIPTION
RC1 - Residential	Future mixed-use development approved under DA2018/1669 situated along the south-eastern common boundaries, expected to be equal in height to the proposed development at the subject site.
RC2 – Residential	Existing multi-storey residential flat building situated south-east across Whistler Street.
RC3 – Residential	Existing multi-storey residential flat buildings situated north across Raglan Street.
RC4 - Commercial	Existing multi-storey commercial building situated along the southern common boundary.
RC5 - Commercial	Existing multi-storey commercial building situated east across Whistler Street.

2.2 DEVELOPMENT PROPOSAL

The development application at 35-43 Belgrave Street, Manly seeks approval for:

- Demolition of the existing buildings and structures on site;
- Construction of a mixed-use project consisting of:
 - Two levels of basement with 45 total car spaces.
 - Four retail spaces on ground floor (for the purpose of noise emissions from mechanical plant, we have assumed only half of the retail spaces will be operating between 6pm-10pm, and none operating past 10pm or before 7am).
 - 25 residential apartments across Level 01 to Level 04, with private residential terraces on roof level.
 - Rooftop plant areas for equipment including residential and retail AC condensers.

3 NOISE SURVEYS

3.1 INSTRUMENTATION

The equipment used for the noise survey was the following:

- NSRT_mk3 Type 1 Sound Level Meter Dataloggers
- B&K 2250 Class 1 Sound Level Meter, S/N: 3031115
- B&K 4231 Class 1 Sound Level Calibrator, S/N: 3334640

All equipment was calibrated before and after the measurements and no significant drift was found. All equipment carries current traceable calibration certificates that can be provided upon request.

3.2 LONG-TERM NOISE MONITORING

Long term noise monitoring has been undertaken for the project site at locations shown in Figure 1 to measure the background and ambient noise that is representative of the surrounding noise and vibration sensitive receivers.

3.2.1 Background Noise

Background noise levels and subsequent Rating Background Noise Level (RBL) have been established in accordance with the Noise Policy for Industry 2017 using the results of the noise monitoring at locations LT1, LT2 and LT3 (as indicated in Figure 1). The local ambient noise environment is typical of an Urban residential environment (as described by the NPI).

Table 2: Unattended noise monitoring results

LOCATION	MEASURED EQUIVALENT CONTINUOUS NOISE LEVEL – L_{EQ} dB(A)			MEASURED RATING BACKGROUND NOISE LEVELS – L_{90} dB(A)		
	DAY	EVENING	NIGHT	DAY	EVENING	NIGHT
LT1	67	66	63	57	53	39
LT2	67	63	62	56	50	45
LT3	62	60	59	52	49	42

General Note: Noise Policy for Industry (NPfI) assessment periods – Daytime: 7:00 am to 6:00 pm Monday to Saturday, 8:00 am to 6:00 pm Sundays and Public Holidays; Evening: 6:00 pm to 10:00 pm; Night: 10:00 pm to 8:00 am Monday to Saturday, 10:00 pm to 8:00 am Sundays and Public Holidays.

3.2.2 Traffic Noise

In addition to background noise, long-term noise monitoring was also conducted at the project site to establish traffic noise levels respectively for the site and have been summarised in Table 3. The locations in Figure 1 were chosen to be suitable as there was an unshielded and direct line of sight to traffic along adjacent streets.

Table 3: Long-term traffic noise monitoring results

LOCATION	MEASURED TRAFFIC NOISE LEVELS, $L_{Aeq,period}$ dB(A)	
	DAY (7AM – 10PM)	NIGHT (10PM – 7AM)
LT1	67	62
LT2	66	62



LOCATION	MEASURED TRAFFIC NOISE LEVELS, $L_{Aeq,period}$ dB(A)	
	DAY (7AM – 10PM)	NIGHT (10PM – 7AM)
LT3	62	59

3.3 SHORT-TERM (ATTENDED) NOISE MONITORING

Short-term noise measurements were conducted at the subject site to determine the environmental noise characteristics on Thursday 1st June 2023 between the hours of 3pm to 4pm. The results of the measurements are presented in Table 4.

Table 4: Short-term noise measurement summary

MEASUREMENT LOCATION	MEASUREMENT TIME	L_{Aeq} dB(A)	L_{A90} dB(A)	L_{A10} dB(A)	COMMENTS
ST1	Thursday 1 st June, 2023 3:00pm – 4:00pm	68	56	71	Belgrave Street ▪ Dominated by continuous traffic along Belgrave Street
ST2		63	56	66	Raglan Street ▪ Dominated by continuous traffic along Belgrave Street ▪ Also noise from intermittent traffic on Raglan Street, and environmental noise from Manly Beach.
ST3		58	49	60	Whistler Street ▪ Noise from intermittent traffic and commercial activity on Whistler Street. ▪ Also noise from continuous traffic along Belgrave Street.

4 PROJECT NOISE AND VIBRATION CRITERIA

4.1 INTERNAL NOISE LEVELS

4.1.1 Northern Beaches Council DCP

The Manly DCP 2013 does not provide specific internal noise targets for residential development impacted by road noise. Suitable noise criteria have been adopted from other applicable guidelines and standards, discussed below.

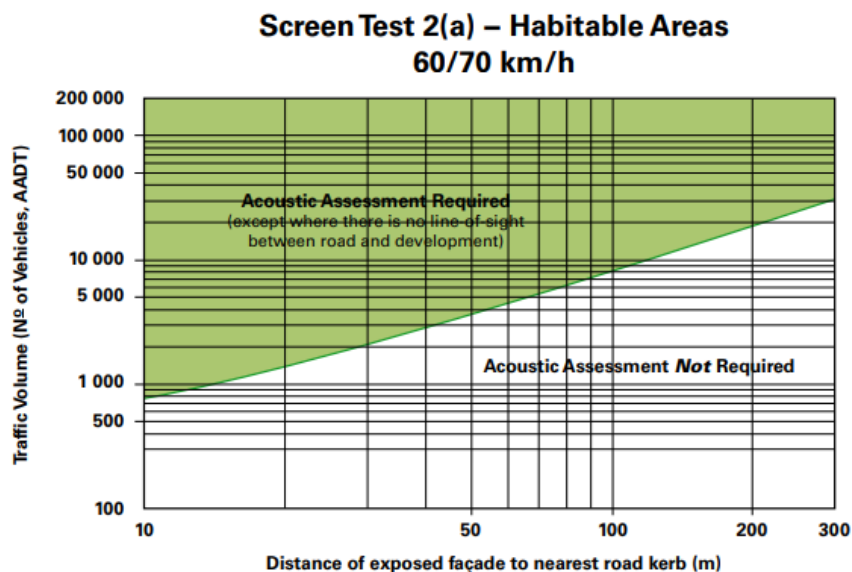
4.1.2 Development Near Rail Corridors and Busy Roads – Interim Guideline

Road Noise

Figure 2 has been extracted from the Interim Guideline, and provides a screening test for noise sensitive developments that takes into account the volume of traffic and the distance between the proposed development and the busy road. Clause 2.120 of the State Environmental Planning Policy (Transport and Infrastructure) 2021, through which the Interim Guideline road noise criteria applies through, only applies for roads with an annual average daily traffic volume of more than 20,000 vehicles, or if the road is a freeway, tollway or transitway. The screen test has been conducted to establish whether or not an acoustic assessment is required.

In this case, Map 13A of the Transport for NSW traffic volume maps for Transport and Infrastructure SEPP indicates roads adjoining the site (Belgrave Street, Raglan Street, Whistler Street) are not classified as roads requiring mandatory assessment under Clause 2.120 of SEPP (Transport and Infrastructure) 2021.

Figure 2: Screen tests for habitable areas of multiple dwellings (noting that any exposed facade is direct line-of-sight)



4.1.3 Australian/New Zealand Standard AS/NZS 2107:2016

AS/NZS 2107:2016 “Acoustics - Recommended design sound levels and reverberation times for building interiors” provides recommended design sound levels within occupied spaces for various building types and usages. Table 5 below provides design sound levels applicable to the development.

Table 5: AS/NZS 2107:2016 design sound levels

TYPE OF OCCUPANCY / ACTIVITY	DESIGN SOUND LEVEL - L_{Aeq} dB(A)
Apartment common areas	45 - 50
Living areas	30 - 40
Sleeping areas	30 - 35
Commercial areas	40 - 45
Retail spaces	< 50

4.2 EXTERNAL NOISE EMISSIONS

NSW EPA Noise Policy for Industry (NPI) 2017 – Industrial Noise (Plant and Equipment)

The NSW EPA’s Noise Policy for Industry (NPI) 2017 has been implemented to assess the noise impacts of mechanical plant and equipment, as well as other industrial noise sources on the surrounding receiver catchments.

The NPI sets out a framework for the derivation of project noise trigger levels that are used to assess the potential impacts of noise from industry (and industrial noise sources) and indicate the noise level at which feasible and reasonable noise management measures should be considered.

This policy applies to noise sources from activities listed in Schedule 1 of the POEO Act and those regulated by the EPA. This includes noise sources from mechanical plant and equipment within the proposed redevelopment, for which this policy will be applied.

The project noise trigger level provides a benchmark for assessing a proposal, where if exceeded, indicates a potential noise impact on the community and so triggers a management response such as additional mitigation measures. The project noise trigger level is the lower (the more stringent) value of the project intrusiveness noise level and project amenity noise level determined in Sections 2.3 and 2.4 of the NPI, respectively.

Project Intrusiveness Noise Level

The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (in terms of L_{Aeq}) measured over a 15-minute period does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. The project intrusiveness noise level is only applicable to surrounding residential receivers.

To account for the temporal variation of background noise levels, the method outlined in Fact Sheet A of the NPI establishes a method in determining the Rating Background Noise Level (RBL) to be used in the assessment.

The intrusiveness noise level is determined as follows:

$$L_{Aeq,15min} \text{ (Intrusiveness Criteria)} = \text{Rating Background Noise Level (RBL)} + 5 \text{ dB(A)}$$

Table 6 provides the project intrusiveness noise levels applicable to each of the surrounding residential noise-sensitive receivers. Receiver catchments are provided in Figure 1.

Table 6: Project intrusiveness noise level criteria for each residential receiver catchment

RECEIVER CATCHMENT	TIME OF DAY	MEASURED RBL - dB(A) ¹	PROJECT INTRUSIVENESS NOISE LEVELS - L _{Aeq,15min} dB(A)
RC1 & RC2 ¹	Day	52	57
	Evening	49	54
	Night	42	47
RC3 ²	Day	56	61
	Evening	50	55
	Night	45	50

Note: 1 – Based on the results of long-term unattended noise monitoring at monitoring position LT3. 2 – Based on the results of long-term unattended noise monitoring at monitoring position LT2.

Project Amenity Noise Level

The recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

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 as follows:

Project Amenity Noise Level = Recommended Amenity Noise Level (see Table 7) – 5 dB(A)

The following exceptions to the above method to derive the project amenity noise level apply:

- In areas with high traffic noise levels. Where the level of transport noise, road traffic noise in particular is high enough to make noise from an industrial source inaudible, the project amenity noise level shall be set at 15 dB(A) below the measured L_{Aeq,period(traffic)} for the particular assessment period
- In proposed developments in major industrial clusters
- Where the resultant project amenity noise level is 10 dB(A) or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10 dB(A) below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time
- Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future. In such cases the relevant amenity noise level is assigned as the project amenity noise level for the development

The recommended amenity noise level, project amenity noise level, and converted project amenity noise level for comparison with the intrusiveness criteria (from time-of-day period to 15-minute) is provided for each surrounding receiver catchment in Table 7.

Table 7: Project amenity noise level criteria for each receiver catchment

RECEIVER CATCHMENT	RECEIVER TYPE	TIME OF DAY	RECOMMENDED AMENITY NOISE LEVEL - $L_{Aeq,period}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,period}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,15min}$ dB(A)
RC1 – RC3	Residential – Urban ¹	Day	60	55	58
		Evening	50	45	48
		Night	45	40	43
RC4 & RC5	Commercial	When in use	65	60	63

Note 1: Urban residential as classified in Table 2.3 of the Noise Policy for Industry (NPI) 2017.

Sleep Disturbance and Maximum Noise Level Assessment

Where the proposed redevelopment night-time noise levels generated at a residential location exceed either:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB(A), whichever is greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB(A), whichever is greater,

a detailed maximum noise level event assessment should be undertaken.

Corrections for Annoying Noise Characteristics – Noise Policy for Industry Fact Sheet C

Fact Sheet C contained within the Noise Policy for Industry outlines the correction factors to be applied to the source noise level at the receiver before comparison with the project noise trigger levels established within this report, to account for the additional annoyance caused by these modifying factors.

The modifying factor corrections should be applied having regard to:

- The contribution noise level from the premises when assessed/measured at a receiver location, and
- The nature of the noise source and its characteristics (as set out in Fact Sheet C)

Table C1 within Fact Sheet C sets out the corrections to be applied for any assessment in-line with the NPI. The corrections specified for tonal, intermittent and low-frequency noise are to be added to the measured or predicted levels at the receiver before comparison with the project noise trigger levels. The adjustments for duration are to be applied to the criterion.

Project Noise Trigger Levels

Table 8 presents the project intrusiveness and project amenity noise levels for each period, and each receiver catchment, as well as the resultant project noise trigger levels (PNTLs) that shall be applied for any assessment of impacts of mechanical plant and equipment noise on the surrounding receiver catchments.

Table 8: Project noise trigger levels (PNTL) to be applied to each surrounding receiver catchment

RECEIVER CATCHMENT	RECEIVER TYPE	TIME OF DAY	PROJECT INTRUSIVENESS NOISE LEVEL - $L_{Aeq,15min}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,15min}$ dB(A)	SLEEP DISTURBANCE NOISE LEVEL - dB(A)	PROJECT NOISE TRIGGER LEVEL - $L_{Aeq,15min}$ dB(A)
RC1 & RC2	Residential – Urban	Day	57	58	N/A	57
		Evening	54	48	N/A	48
		Night	47	43	47dB(A) L_{eq} and 57dB(A) L_{max}	43dB(A) L_{eq} and 57dB(A) L_{max}
RC3	Residential – Urban	Day	61	58	N/A	58
		Evening	55	48	N/A	48
		Night	50	43	50dB(A) L_{eq} and 60dB(A) L_{max}	43dB(A) L_{eq} and 60dB(A) L_{max}
RC4 & RC5	Commercial	When in use	N/A	63	N/A	63

5 OPERATIONAL NOISE AND VIBRATION ASSESSMENT

5.1 CARPARK USAGE

It is proposed that all carparking be situated underground, through basement carpark levels. As such, it can be reasonably expected that the use of the carparking will not have noise impact on the nearest noise sensitive receivers and noise level criteria in Section 4.2 will be met.

5.2 RETAIL NOISE EMISSIONS

It is noted that the currently proposed development comprises of four retail shops on ground floor. At this stage, the tenants for the retail spaces have not been determined and therefore the usage / type of activities for these spaces are unknown.

Future usage of the retail and commercial spaces may be subject to their own separate development application and detailed assessment of their expected operation and activities may be required by Northern Beaches Council. The selected tenants may be required by Council to submit a separate Development Application based on use.

5.3 MECHANICAL PLANT AND EQUIPMENT NOISE EMISSION

This assessment has considered the noise emissions from indicative major mechanical plant items proposed to serve the proposal. These noise sources have been used to predict the worst- case scenario noise impact of the proposed use of the site to the nearby sensitive receivers. The assessment has been conducted to achieve noise levels as per the NSW NPI and have been assessed at the most affected external point at the surrounding receivers.

Indicative major mechanical plant items which have been assessed as part of this report includes rooftop outdoor AC condenser units for retail and residential used as per the Integrated Group Services (IGS) drawing MD-SK-08 dated 26 June 2023.

While exact equipment selections may change during the detailed design stage, the following equipment sound power levels have been adopted in this assessment:

Table 9: Preliminary mechanical plant and equipment selections

MECHANICAL PLANT ITEM	MAKE/MODEL	QUANTITY	EQUIPMENT SOUND POWER LEVEL – dB(A) _{LEQ(15MIN)}
Residential AC Condensers ¹	Daikin RSUYQ7AYM	13	71
	Daikin RSUYQ8AYM	13	74
Retail AC Condensers	-	4	80

The noise generated by rooftop outdoor AC condensers has been assessed to surrounding noise sensitive receivers, with consideration of the following assumptions:

- For residential AC condensers, 50% of condensers operating during the Day, 60% of condensers operating during the Evening, and 20% of condensers operate during the Night (Day, Evening, and Night in line with NSW EPA NPfI defined periods).
- For retail AC condensers, 100% of condensers operating during the Day, 50% of condensers operating during the Evening, and no condensers operating during the Night.

Predicted noise levels are summarised in the Table 10 at the most affected points at surrounding external noise sensitive receivers. We note that noise levels at less sensitive commercial receivers will inherently achieve compliance provided noise levels at residences are compliant.

Table 10: Predicted noise levels at surrounding receiver catchments from mechanical plant and equipment

RECEIVER	TIME OF DAY	PREDICTED NOISE LEVEL L _{Aeq,15min} dB(A)	NOISE CRITERIA L _{Aeq,15min} dB(A)	COMPLIES (YES/NO)
RC1	Day	50	57	Yes
	Evening	48	48	Yes
	Night	42	43	Yes
RC2	Day	48	57	Yes
	Evening	46	48	Yes
	Night	40	43	Yes
RC3	Day	39	58	Yes
	Evening	37	48	Yes
	Night	32	43	Yes

5.4 TRAFFIC NOISE INTRUSION

A preliminary façade noise model of the development to predict the road noise incident on the facades of the development.

Appendix A provides façade noise maps to present road noise on each of the facades of the proposal development. The modelling takes into account building shielding, directivity and calculations for road noise.

Mitigation measures are detailed in Section 6.2.

6 MITIGATION MEASURES

6.1 MECHANICAL SERVICES

Mitigation measures for the mechanical plant should be considered during the Design Development stage so as to comply with the noise emission criteria established in Section 4.2. and internal noise levels in Section 4.1. These amelioration measures could include, but are not limited to the following:

- Positioning mechanical plant away from nearby noise sensitive receivers;
- Acoustic attenuators fitted to duct work;
- Screening around mechanical plant;
- Acoustic insulation within duct work;
- Acoustically insulated bends fitted to duct work; and
- Reselection of mechanical plant.

6.2 EXTERNAL SOUND ISOLATION – BUILDING ENVELOPE

Appendix A provides façade noise maps to present road noise on each of the facades of the proposal development. The modelling takes into account building shielding, directivity and calculations for road noise sources. A markup of the AFT's on architectural general arrangement plans is provided in Appendix B.

To simplify the acoustic façade requirements across the entire precinct, an acoustic facade type (AFT) has been assigned to typical glazing arrangements in Table 11.

Detailed design of the building façade glazing and non-glazed elements should be undertaken during the subsequent development applications to identify specific requirements to spaces located with direct line of sight to the surrounding roads.

Table 11: Acoustic Facade Categories & Glazing Arrangements

ACOUSTIC FAÇADE TYPE	REQUIRED ACOUSTIC RATING (R_w , C_{tr})	TYPICAL EQUIVALENT GLASS
1	32, -3	6.38mm laminated glass
	34, -5	6mm monolithic / 12mm Airgap / 6mm monolithic
2	35, -2	10.38mm laminated glass
	37, -4	6mm monolithic / 12mm Airgap / 6.38mm laminated glass

7 CONCLUSION

This noise and vibration report has been prepared by E-LAB Consulting to accompany a development application for the proposed mixed-use development at 35-43 Belgrave Street, Manly.

The following operational noise and vibration impacts were conducted as part of this noise and vibration impact assessment:

- Noise impact from road traffic noise on the proposed development;
- Noise impacts from the operation of the development; and
- Noise and vibration impact of mechanical plant and equipment serving the proposed development on surrounding noise and vibration sensitive receivers.

To assess each of the acoustic considerations for the proposed redevelopment, noise and vibration criteria has been established in Section 4 in accordance with the following documents:

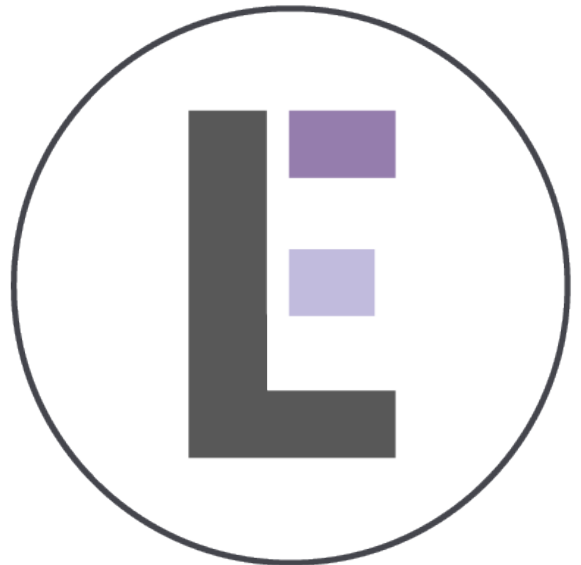
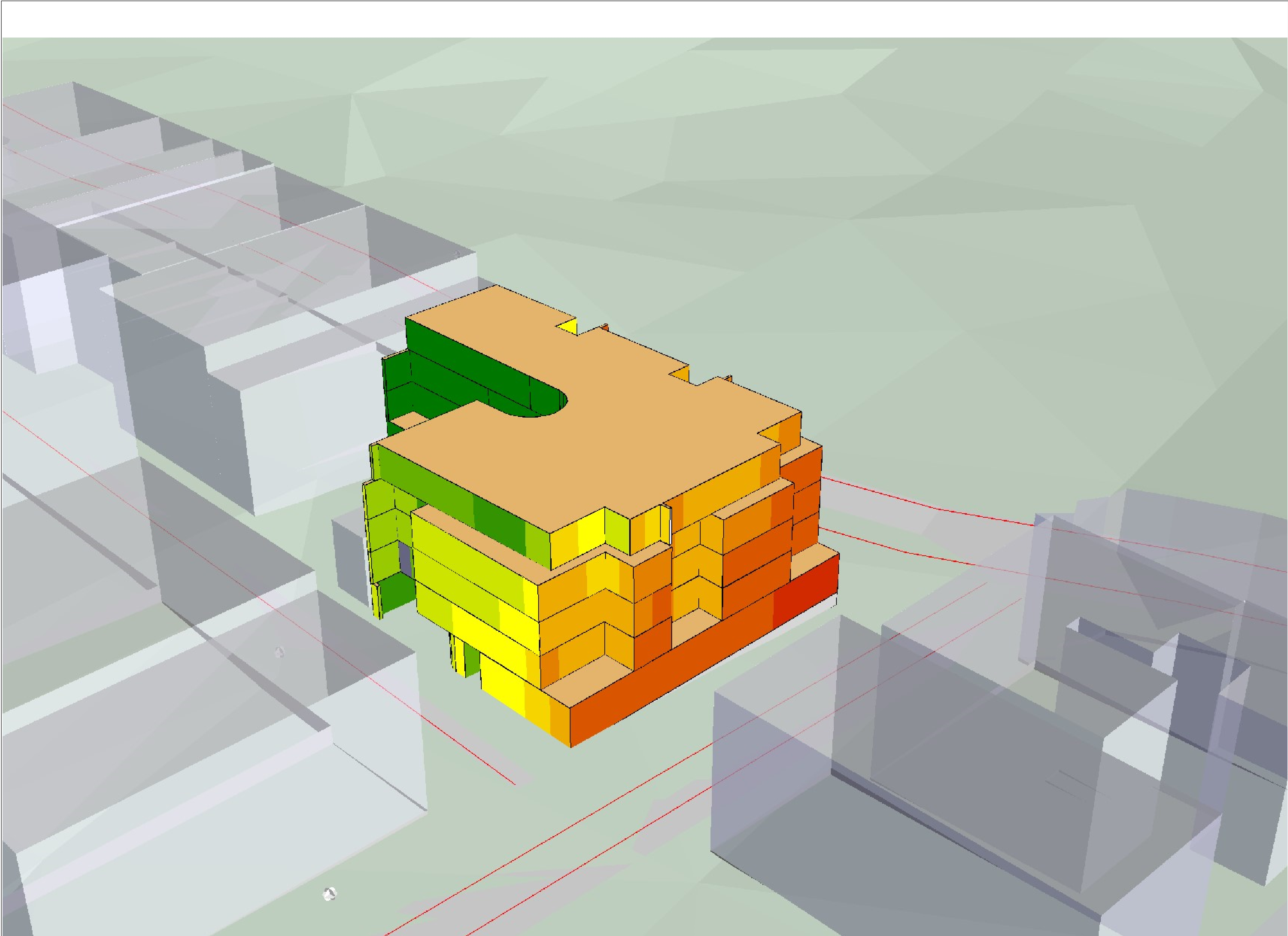
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- AS/NZS 2107:2016 “Acoustics - Recommended design sound levels and reverberation times for building interiors”; and
- NSW EPA’s Noise Policy for Industry 2017 (NPI).

Having given regard to the analysis conducted within this report, it is the finding of this noise and vibration impact assessment that the proposed redevelopment is compliant with the relevant noise and vibration criteria controls for this type of development, and it is expected to comply with the applicable regulations with regards to noise and vibration, particularly those listed above.

It is recommended the development application for the proposed redevelopment is not rejected on the basis of noise and vibration, under the implementation of the mitigation measures outlined within the report.

Appendix A **Façade Noise Map**





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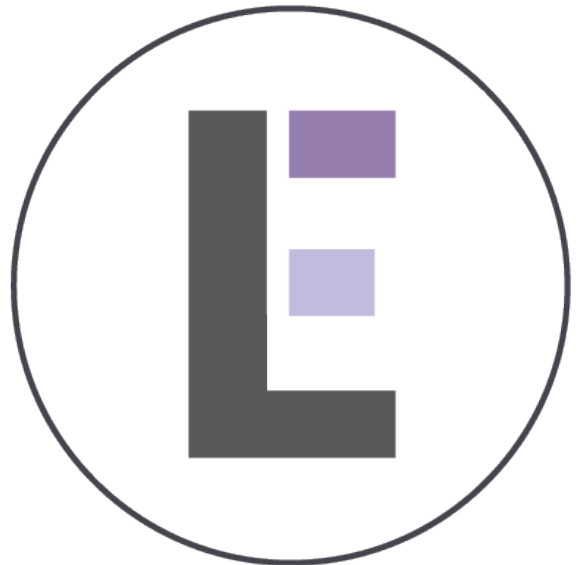
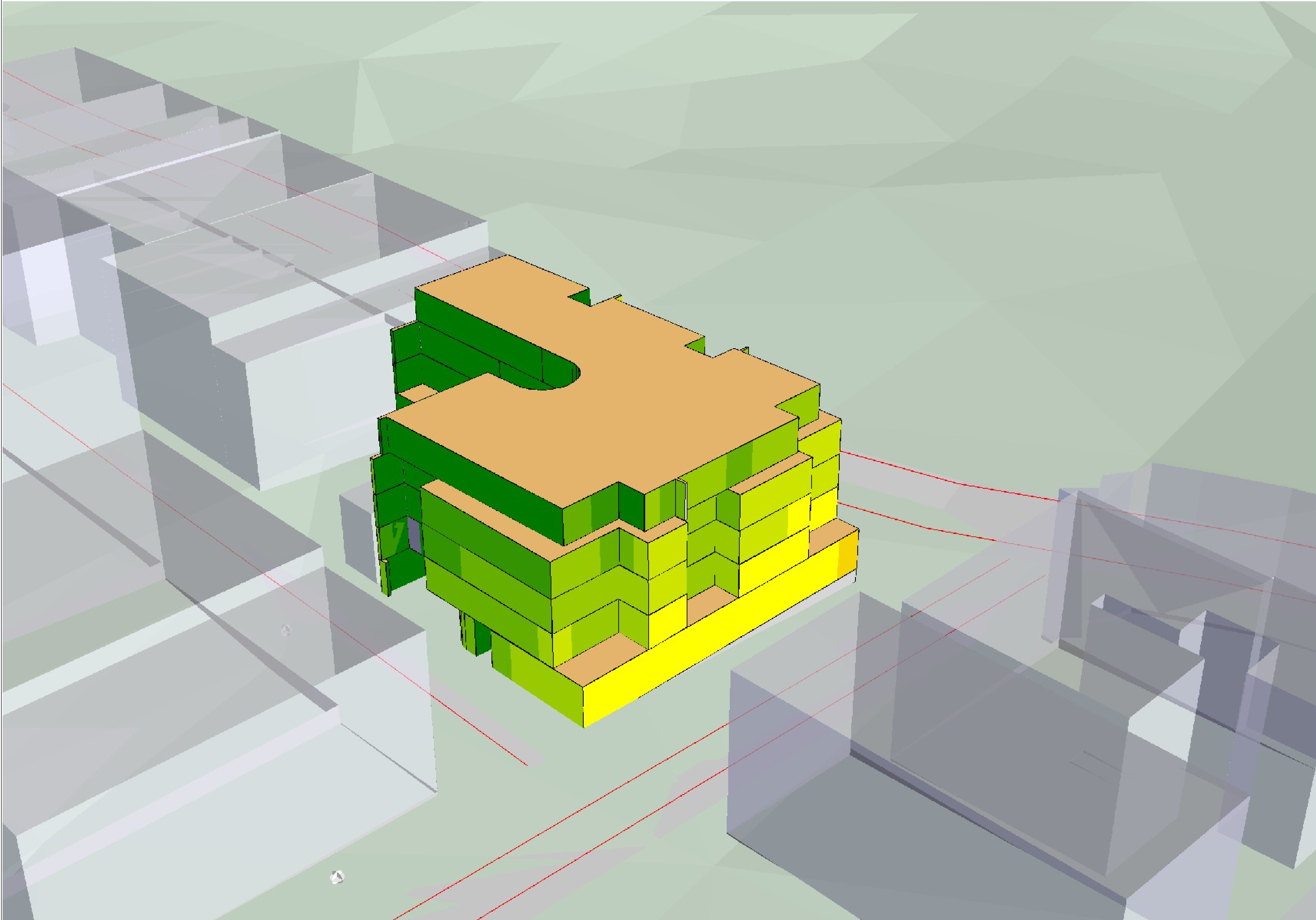
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DRAWING
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DISCIPLINE
ACOUSTICS

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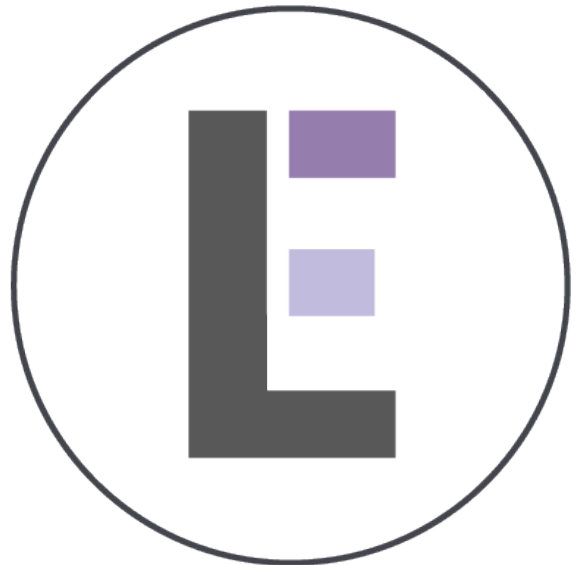
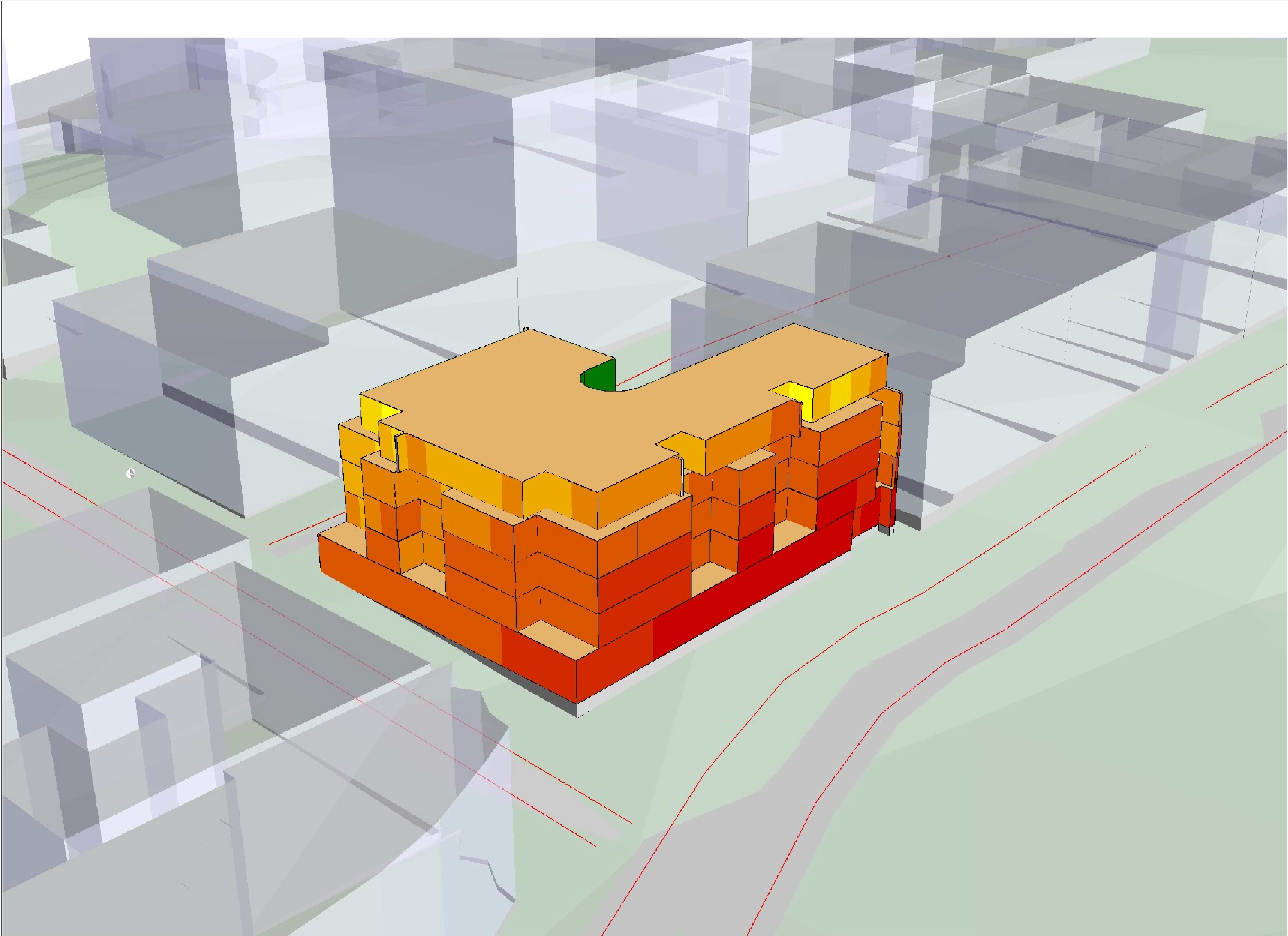
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DRAWING
FACADE NOISE MAPS NIGHT TIME VIEW 1

DISCIPLINE
ACOUSTICS

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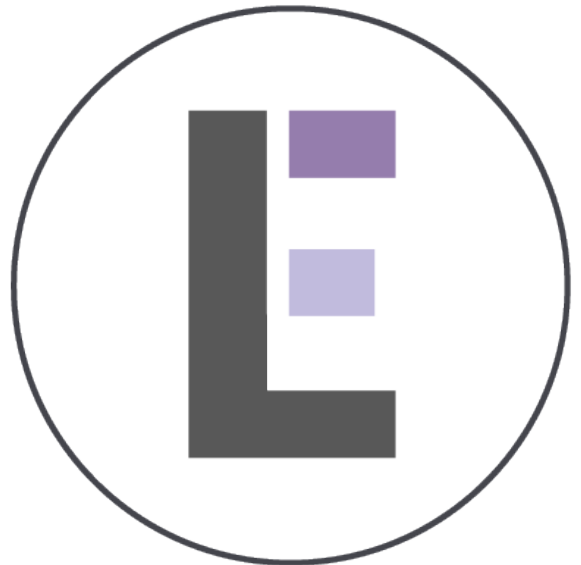
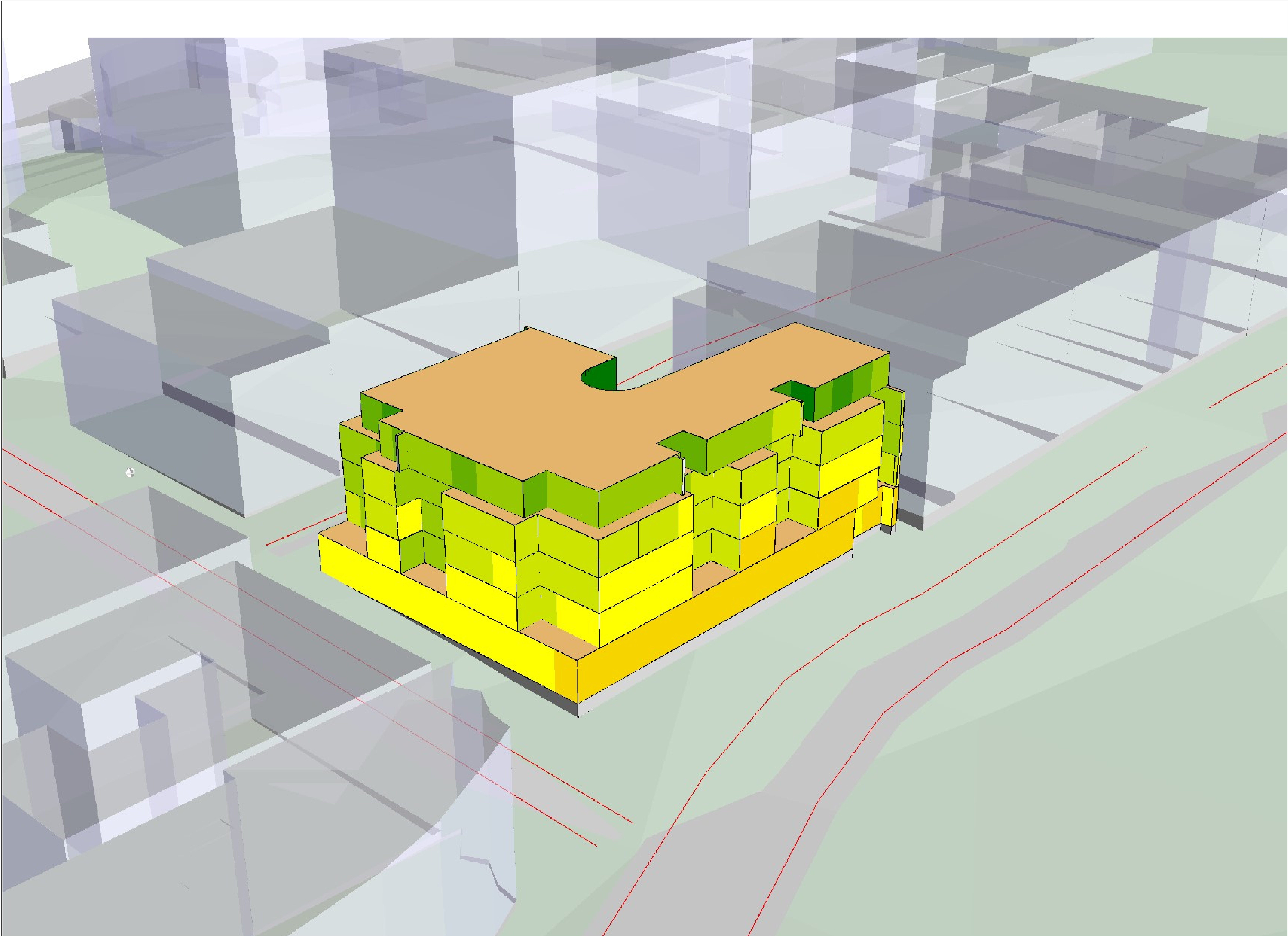
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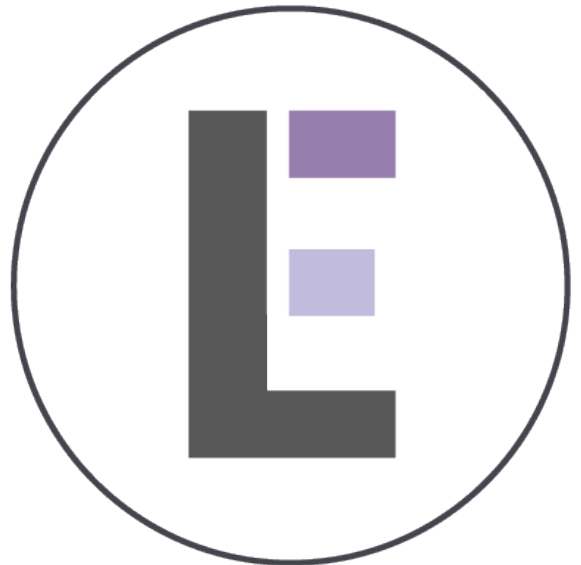
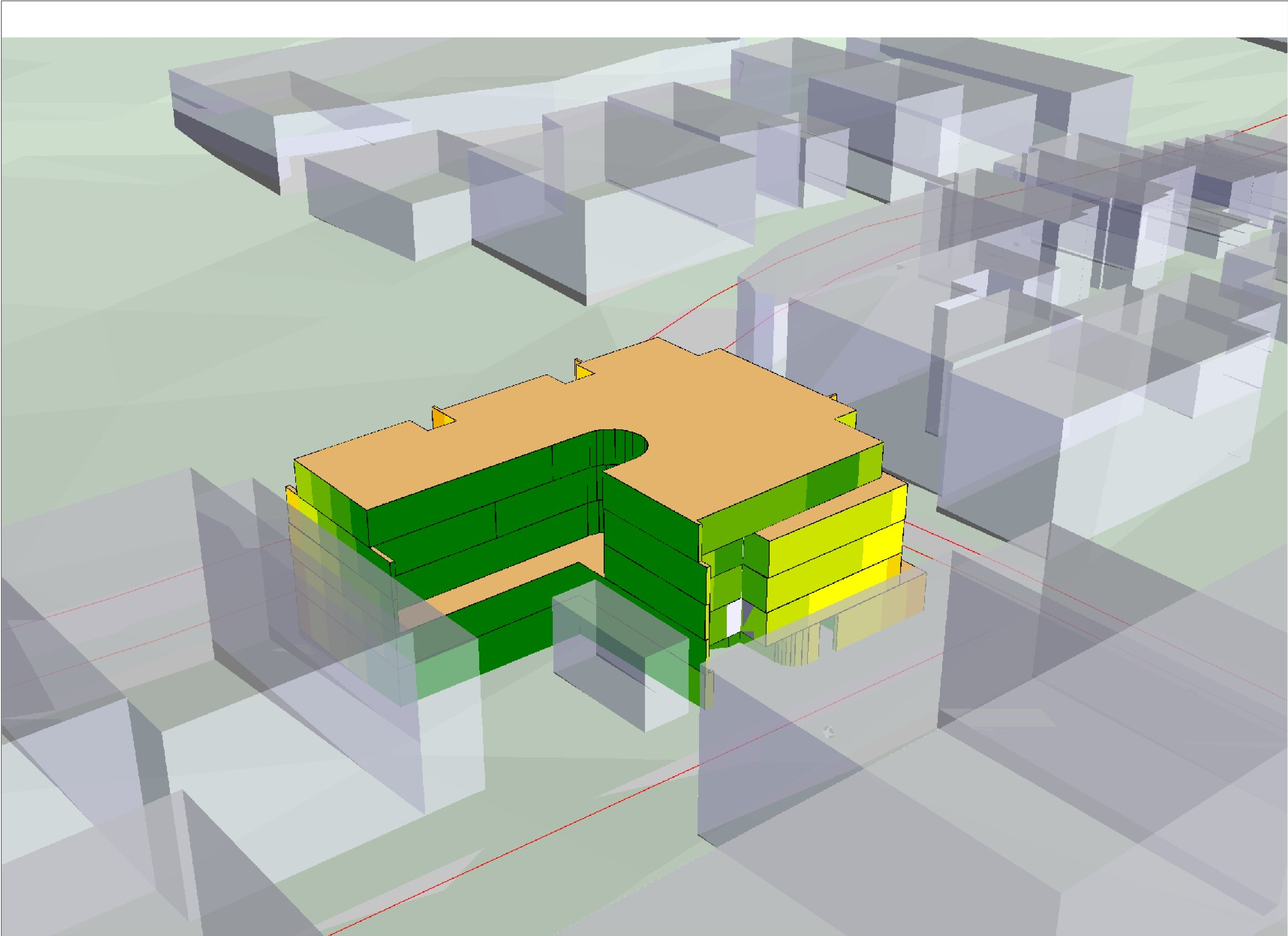
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LEGEND

NOTES

PROJECT
35-43 BEL GRAVE STREET, MANLY

PROJECT NO.
P00667

ARCHITECT
SJB Architects

CLIENT
TIME AND PLACE

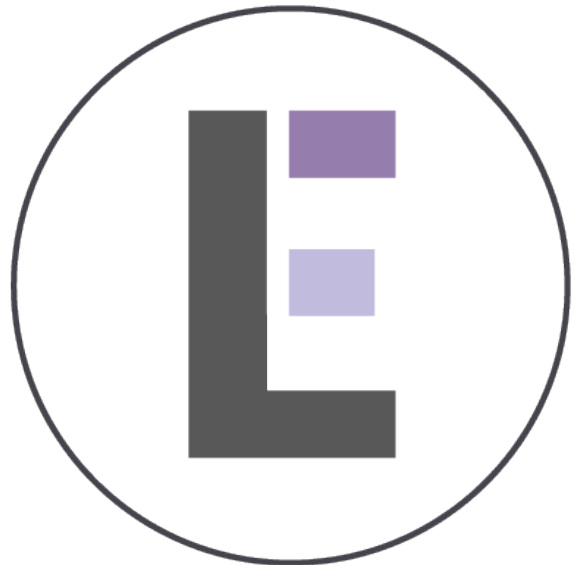
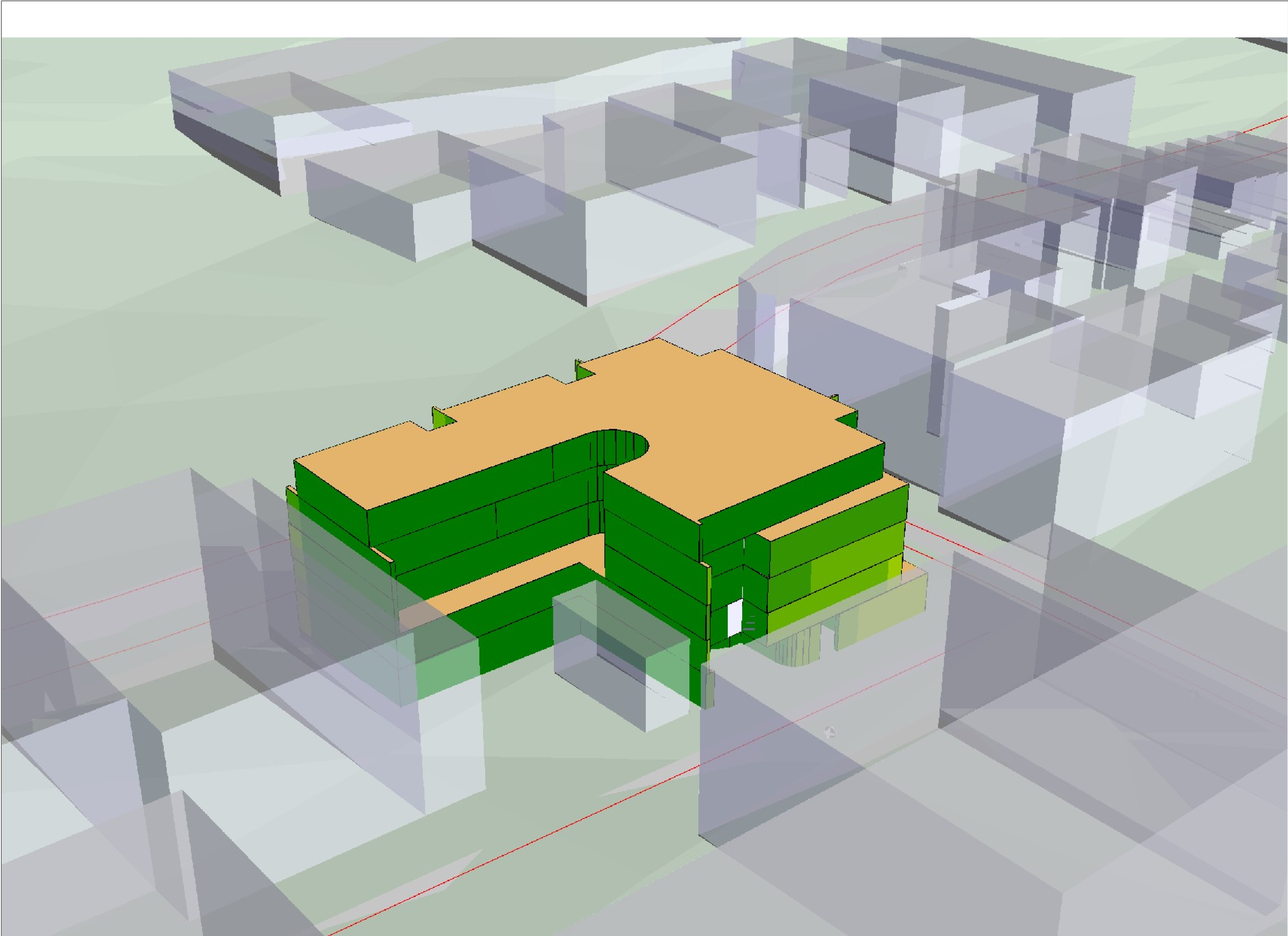
SCALE
NTS

STATUS
FOR INFORMATION

DRAWING
FACADE NOISE MAPS DAYTIME VIEW 3

DISCIPLINE
ACOUSTICS

DRAWING NUMBER	REVISION
AC-DWG-100-05-01	001



E-LAB CONSULTING

ISSUE	DATE	STATUS
1	11/01/2023	FOR INFORMATION

LEGEND

NOTES

PROJECT
35-43 BEL GRAVE STREET, MANLY

PROJECT NO.
P00667

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NTS

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FOR INFORMATION

DRAWING
FACADE NOISE MAPS NIGHT TIME VIEW 3

DISCIPLINE
ACOUSTICS

DRAWING NUMBER	REVISION
AC-DWG-100-06-01	001

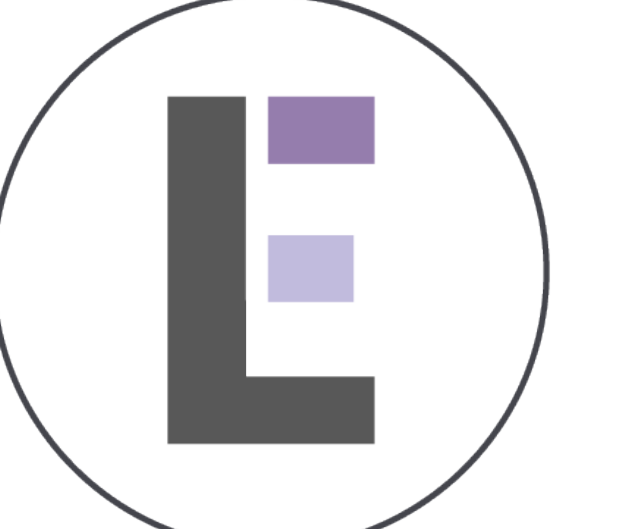
Appendix B **Façade Glazing Markup**



RAGLAN STREET

BELGRAVE STREET

WHISTLER STREET



E-LAB CONSULTING

ISSUE	DATE	STATUS
1	11/01/2023	FOR INFORMATION

LEGEND

- Acoustic Facade Type 1
- Acoustic Facade Type 2

NOTES

PROJECT
35-43 BELGRAVE STREET, MANLY

PROJECT NO.
P00567

ARCHITECT
SJB Architects

CLIENT
TIME AND PLACE

SCALE
NTS

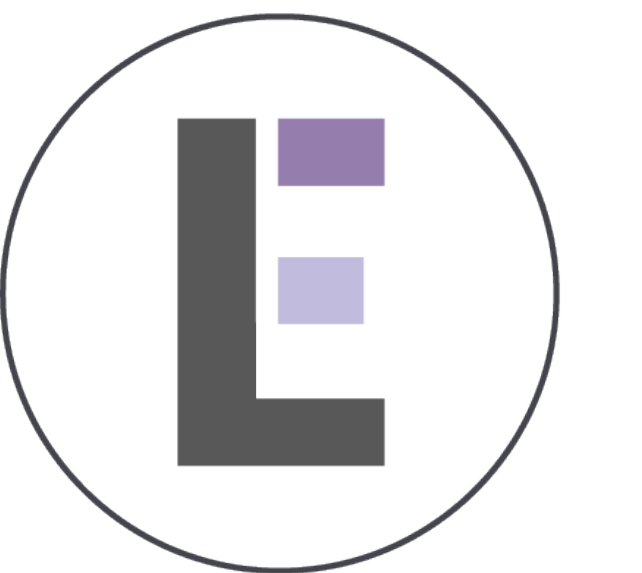
STATUS
FOR INFORMATION

DRAWING
FACADE GLAZING MARKUP LEVEL 1

DISCIPLINE
ACOUSTICS

DRAWING NUMBER
AC-DWG-200-01-01

REVISION
001



E-LAB CONSULTING

ISSUE	DATE	STATUS
1	11/01/2023	FOR INFORMATION

LEGEND	
	Acoustic Facade Type 1
	Acoustic Facade Type 2

NOTES

PROJECT
35-43 BELGRAVE STREET, MANLY

PROJECT NO.
P00567

ARCHITECT
SJB Architects

CLIENT
TIME AND PLACE

SCALE
NTS

STATUS
FOR INFORMATION

DRAWING
FACADE GLAZING MARKUP LEVEL 2

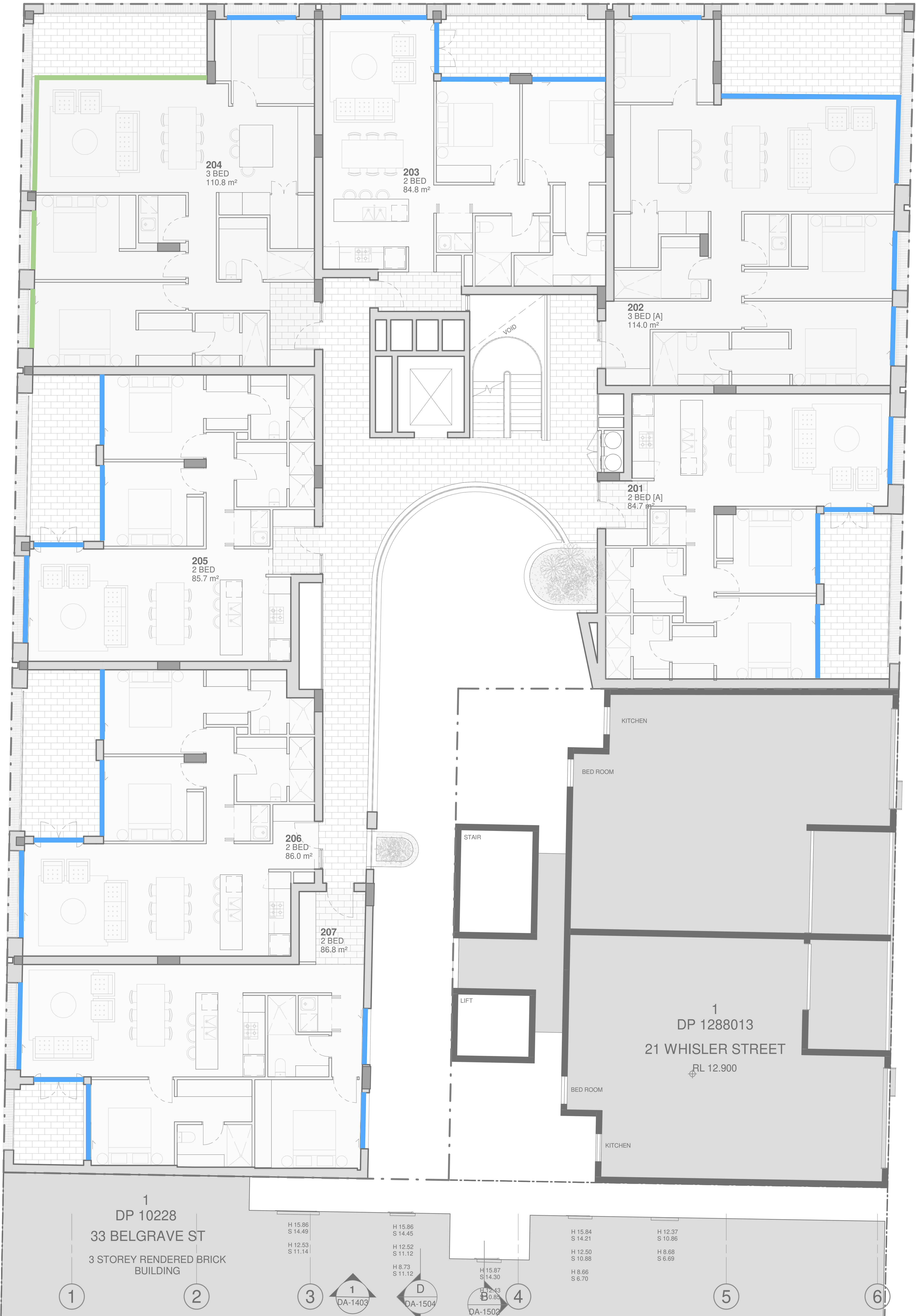
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ACOUSTICS

DRAWING NUMBER AC-DWG-200-01-01	REVISION 001
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RAGLAN STREET

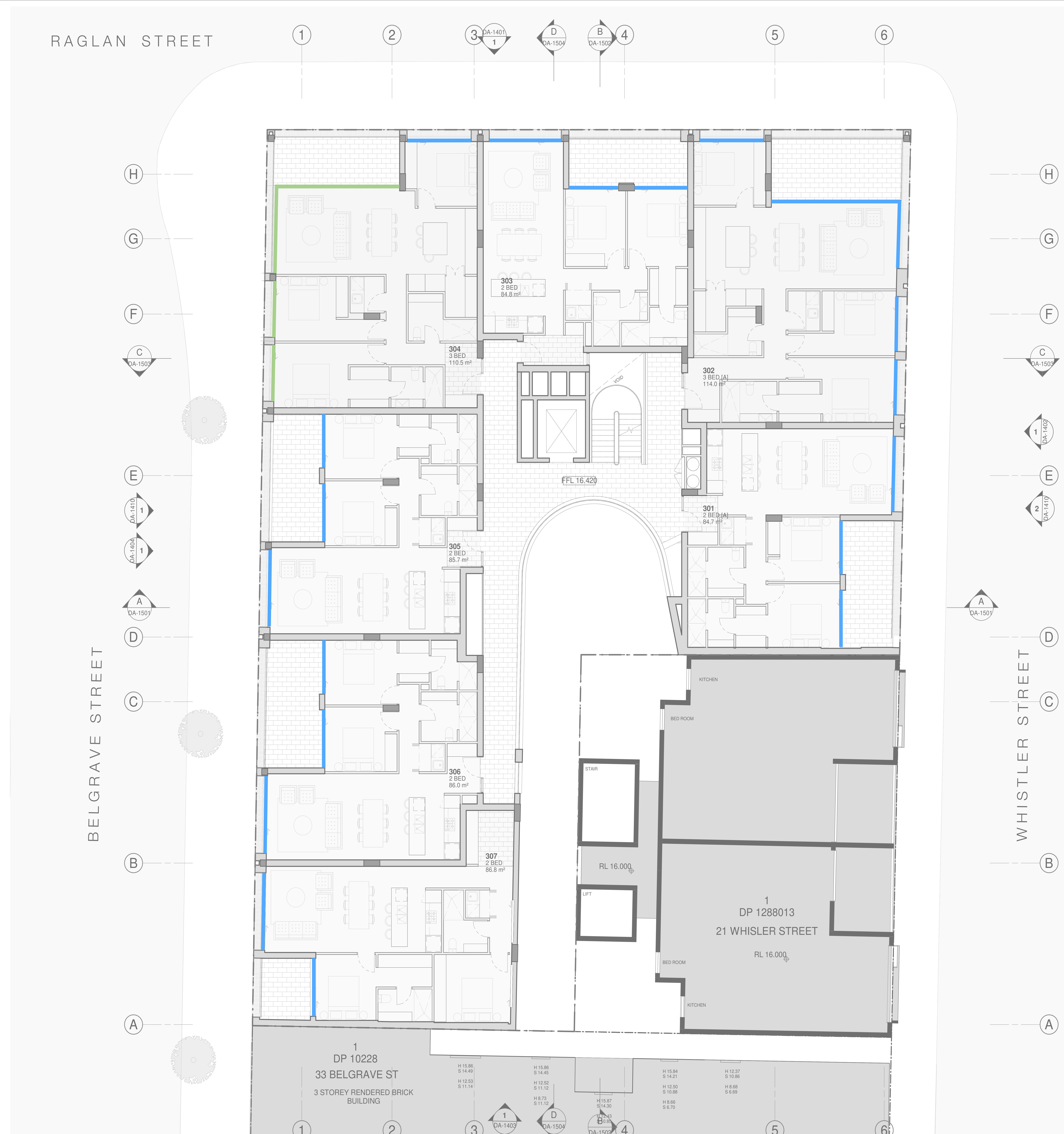
BELGRAVE STREET

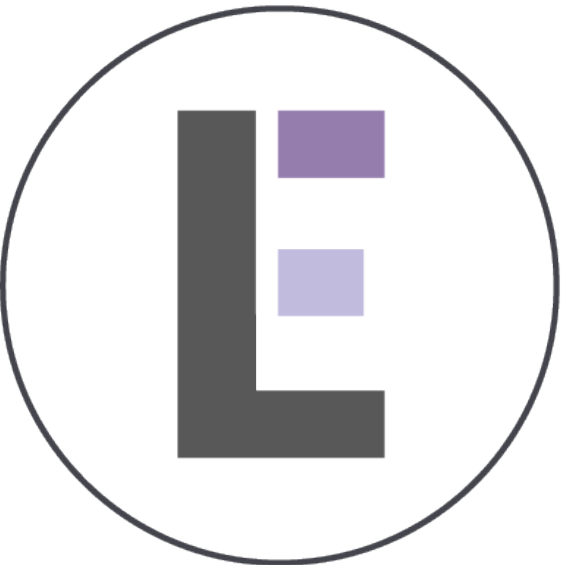
WHISTLER STREET





DRAWING NUMBER	REVISION
C-DWG-200-01-01	001





E-LAB CONSULTING

ISSUE	DATE	STATUS
1	11/01/2023	FOR INFORMATION

LEGEND

- Acoustic Facade Type 1
- Acoustic Facade Type 2

NOTES

PROJECT
35-43 BELGRAVE STREET, MANLY

PROJECT NO.
P00667

ARCHITECT
SJB Architects

CLIENT
TIME AND PLACE

SCALE
NTS

STATUS
FOR INFORMATION

DRAWING
FACADE GLAZING MARKUP LEVEL 4

DISCIPLINE
ACOUSTICS

DRAWING NUMBER
AC-DWG-200-01-01

REVISION
001

RAGLAN STREET

1

2

3

D

B

4

5

6

H

G

F

C

E

D

C

B

A

BELGRAVE STREET

H

G

F

C

E

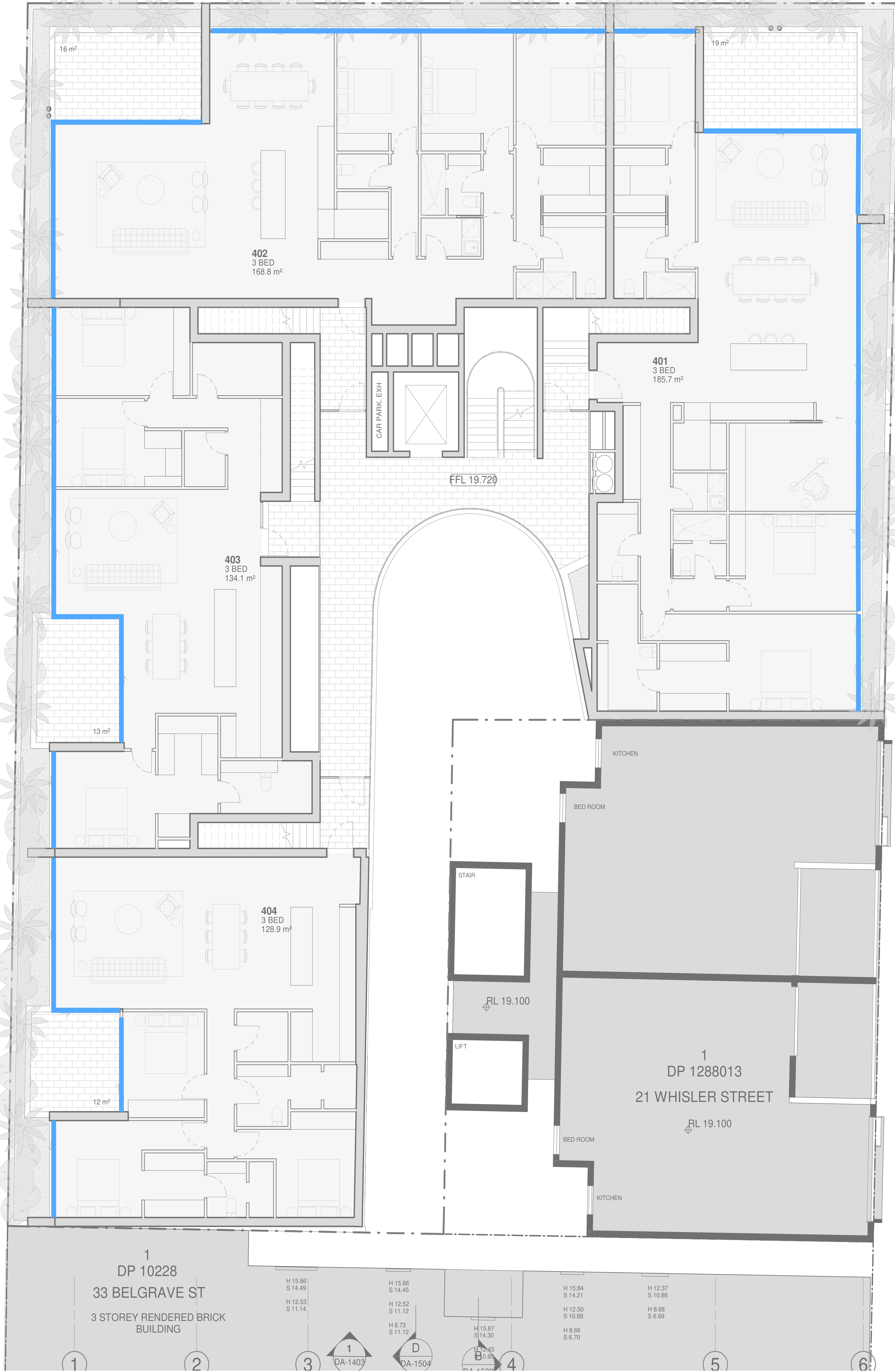
D

C

B

A

WHISTLER STREET



H 15.86
S 14.49

H 12.53
S 11.14

H 15.96
S 14.45

H 12.52
S 11.12

H 8.73
S 11.12

H 15.87
S 14.30

H 15.84
S 14.21

H 12.50
S 10.88

H 15.84
S 14.21

H 12.37
S 10.86

H 9.88
S 6.69

H 9.66
S 6.70

