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4-6 Bigge Street, Warwick Farm

Development Application

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TABLE OF CONTENTS

1 INTRODUCTION

This report presents an analysis of the acoustic impacts associated with the proposed Alterations & Additions residential development at 4-6 Bigge Street, Warwick Farm NSW 2170 Australia.

In this report we will:

- Conduct an external noise impact assessment (primarily traffic noise) and recommend acoustic treatments to ensure that a reasonable level of amenity is achieved for future tenants.
- Identify potential noise sources generated by the site and determine noise emission goals for the development to meet Council acoustic requirements, ensuring that nearby developments are not adversely impacted by the subject development.

This assessment is based on the architectural drawings with project number 18013, dated 16th April 2019 and provided by Turner. For detailed architectural drawings refer to Table 1 below.

Table 1 - Architectural Drawings

Drawing number	Drawing Title	Date
DA-000-000	Cover Sheet	16.04.19
DA-001-001	Drawing List	
DA-100-101	Location Plan	
DA-100-102	Site Analysis Plan	
DA-100-104	Demolition Plan	
DA-110-007	Basement Plan	
DA-110-008	Ground Level Plan	
DA-110-010	Level 01 Plan	
DA-110-020	Level 02 Plan	
DA-110-030	Level 03 Plan	
DA-110-040	Level 04 Plan	
DA-110-050	Level 05 Plan	
DA-110-060	Level 06 Plan	
DA-110-070	Level 07 Plan	
DA-110-080	Level 08 Plan	
DA-110-090	Level 09 Plan	

Table 1 - Architectural Drawings (Cont.)

Drawing number	Drawing Title	Date
DA-110-110	Level 10 Plan	16.04.19
DA-110-120	Roof Plan	
DA-250-010	West Elevation	
DA-250-020	North Elevation	
DA-250-030	East Elevation	
DA-250-040	South Elevation	
DA-250-050	Streetscape Elevation	
DA-350-010	Section AA	
DA-350-020	Section BB	
DA-710-001	Shadow Diagrams	
DA-710-002	Shadow Diagrams	
DA-710-010	View from Sun Diagrams – 9am to 12:30pm	
DA-710-020	View From Sun Diagrams - 1pm to 3pm	
DA-720-001	GFA Diagrams/ GF-L5	
DA-720-002	GFA Diagrams/ L6-L9	
DA-730-010	Solar Access & Cross Ventilation	
DA-730-020	Solar Access & Cross Ventilation	
DA-830-010	Materials & Finishes Selection	
DA-850-001	Deep soil & Landscaped area diagram	
DA-850-002	Communal open space diagram	
DA-880-010	Adaptable Apartments	
DA-900-010	Artist's Impression	

2 SITE DESCRIPTION

The site is located at 4-6 Bigge Street, Sydney. The proposed development will be comprised of residential apartments spread across 11 levels and a carpark on the basement.

Potential noise impacts on the site is primarily traffic noise from the surrounding roads. The development is bounded as follows;

- To the north by an existing six-storey residential apartment building. Further to the north, at approximately 50m from the norther boundary of the site, runs Hume Highway which carries a high volume of traffic flow and it is considered as a road that carries an annual average daily traffic volume of more than 40,000 vehicles based on the traffic volume data published on the website of the RTA;
- Directly to the west by Bigge Street which carries medium volumes of traffic flow. Further to the west are existing residential buildings;
- To the south by existing residential buildings. Further to the south at approximately 120m from the southern boundary is Lachlan Street which carries medium volumes of traffic flow.
- To the north-eastern corner by a 5-storey residential apartment building and to the south-eastern corner by a 2-storey residential building. Further to the East is Goulburn Street which carries medium volumes of traffic flow.

An aerial photo of the site and the measurement locations of our noise investigation are presented below:

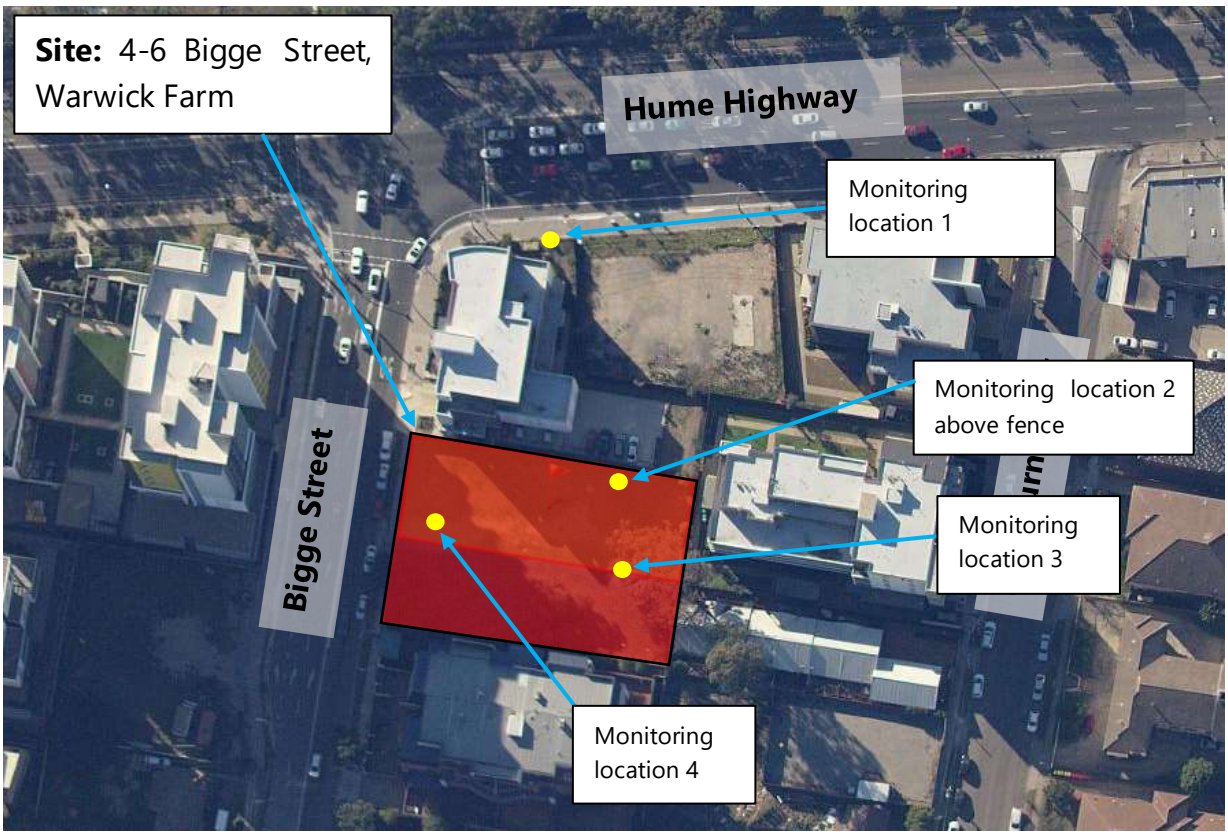

Figure 1 – Site analysis and Measurement Locations

3 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic noise a 15-20-minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of environmental noise three principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement interval.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of traffic noise.

Current practice favours the L_{eq} parameter as a means of measuring traffic noise, whereas the L_{10} parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the L_{90} parameter is not used to assess traffic noise intrusion.

4 EXTERNAL NOISE INTRUSION

Traffic noise from the surrounding roads will be the primary external noise sources impacting the proposed development.

4.1 ASSESSMENT CRITERIA

4.1.1 Liverpool City Council Development Control Plan 2008

Part 4 (Development in Liverpool City Centre) of the Liverpool City Council DCP are relevant to the site. Relevant excerpts are as follows;

5.5. Noise

Background

A range of principal noise sources, based on major road and railway corridors, have been identified within and adjacent to the City Centre. It is important for the amenity and comfort of future occupants of buildings in proximity to these areas that appropriate measures are put in place.

Objectives

(a) Achieve appropriate amenity in noise affected locations.

Controls

1. An acoustic report is required for all noise affected locations, as identified in Figure 25. This report is to demonstrate that appropriate noise attenuation and barrier planning is to be implemented.

2. Sites adjacent to noise sources identified in Figure 25 are to be designed in a manner that any residential development is shielded from the noise source by virtue of the location and orientation of built form on the site. Depending on the type and scale of development, acoustic assessment may be required for sites outside the noise source 3 areas. Fig. 5.1

3. An 8m setback is to be provided to any residential component of development located fronting onto Terminus Street.

4. An 8m setback is to be provided to any habitable building located adjacent to the Hume Highway.

As Liverpool City Council Development Control Plan does not include any specific requirements, noise intrusion criteria contained within the Department of Planning SEPP (Infrastructure) detailed in the following sections will be used for the acoustic assessment of the subject site.

4.1.1 NSW Department of Planning – Development near Rail Corridors or Busy Roads – Interim Guideline

Section 3.5 of the NSW Department of Planning's 'Development near Rail Corridors and Busy Roads (Interim Guideline)' states:

"The following provides an overall summary of the assessment procedure to meet the requirements of clauses 87 and 102 of the Infrastructure SEPP. The procedure covers noise at developments for both Road and Rail.

- *If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*

  - *in any bedroom in the building: 35dB(A) at any time 10pm-7am*

  - *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time."*

4.1.2 NSW Department of Planning – State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007

Clause 102 of the NSW SEPP for road traffic noise stipulates

"This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transit way or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

(a) a building for residential use,

(b) a place of public worship,

(c) a hospital,

(d) an education establishment or child care centre.

If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:

(a) in any bedroom in the building – 35 dB(A) at any time between 10 pm and 7am,

(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway) – 40 dB(A) at any time."

Map 14 of the traffic volume maps for the Infrastructure SEPP classifies the section of Bigge Street (Hume Highway) bounding the site as a carrying more than 40, 000 vehicles per day. Refer to Figure 2 below for the relevant SEPP Map 14 section and site location.

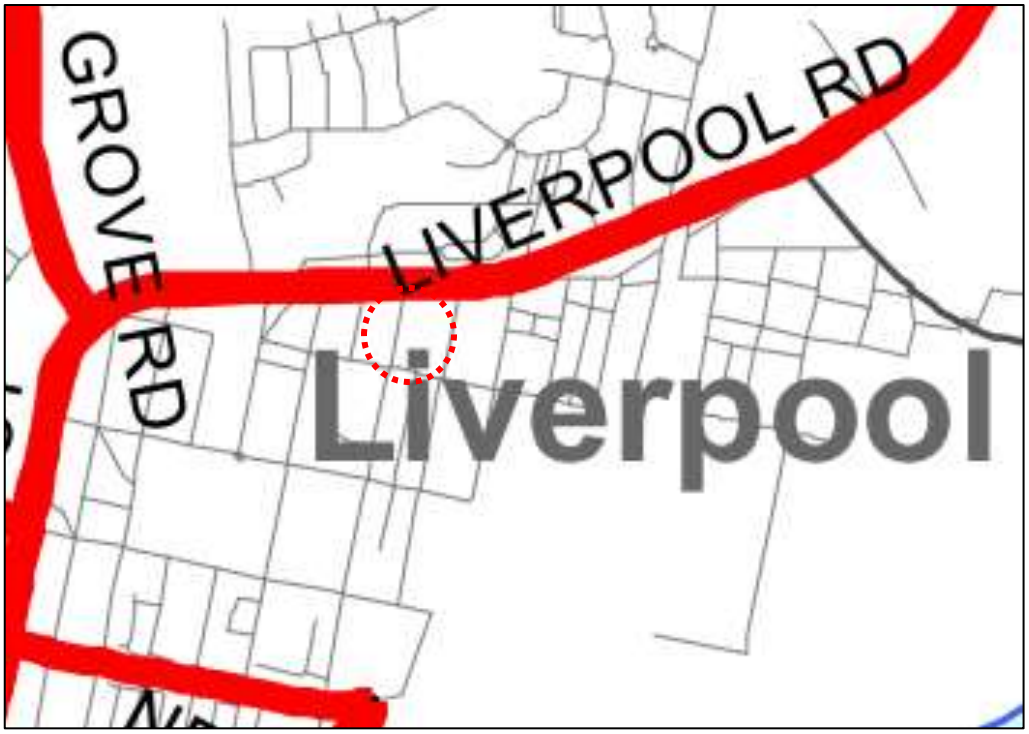

Figure 2 - Site Location and SEPP (Infrastructure) 2007 Classified Roads

4.1.3 Australian Standard AS2107:2016 – *Recommended Design Sound Levels and Reverberation Times for Building Interiors*

Australian Standard AS 2107-2016: Recommended design sound levels and reverberation times for building interiors specifies allowable internal noise levels for internal spaces within residential and commercial buildings. Table 2 presents the sound levels applicable to the proposed redevelopment.

Table 2 – Recommended Design Sound Levels of AS2107:2016

Space /Activity Type	Recommended Maximum Design Sound Level
Residential Buildings Near Major Roads Sleeping Areas (Night Time)	40 dB(A)L_{eq}
Residential Buildings Near Major Roads Living Areas (Any Time)	50 dB(A)L_{eq}
Common Areas	45 dB(A)L_{eq}

4.1.4 Summarised External Noise Intrusion Criteria

Summarised internal noise criteria adopted for each internal space is summarised below.

Table 3 – Adopted Internal Noise Levels

Space / Activity Type	Design Internal Noise Level
Sleeping Areas	35 dB(A) $L_{eq\,(9hr)}$ ***SEPP (Infrastructure) 2007***
Living Areas	40 dB(A) $L_{eq\,(15hr)}$ ***SEPP (Infrastructure) 2007***
Common Areas	45 dB(A) $L_{eq(15hour)}$ ***AS2107:2016***

5 TRAFFIC AND BACKGROUND NOISE MEASUREMENTS

Measurements of existing ambient noise levels on site was conducted using both long term unattended monitoring and short term attended measurements. Unattended long-term monitoring was conducted by this office from the 11th to 18th April 2019 to measure the existing ambient noise levels at the site.

Traffic and background noise measurements were taken at the site of the proposed development. Measurements were performed generally in accordance with the Australian Standard AS1055 – "Description and measurement of environmental noise – General Procedures".

5.1 UNATTENDED NOISE MEASUREMENTS

Long term noise monitoring was conducted by installing an unattended noise monitor on site. The noise monitor was installed at the site - which is currently undeveloped - approximately 30m from Bigge Street and 70m from Hume Highway.

Acoustic Research Laboratories noise monitors were used for the long-term monitoring, set to record continuously on an A-weighted fast response mode. The monitors were calibrated at the start and end of the monitoring period using a Rion NC-73 calibrator. No significant drift was noted. Noise logging was conducted from the 11th to the 18th April 2019.

Description of the unattended noise monitoring is detailed in Section 6.1.

5.2 ATTENDED TRAFFIC NOISE MEASUREMENTS

Attended traffic noise measurements were conducted on 11th April and 7 May 2019. Measurements were undertaken using a Norsonics Type 140 precision sound level analyser, set to A-weighted fast response. The precision sound level analyser was calibrated before and after the measurements using a Norsonics 1251 precision sound level calibrator. No significant drift was recorded.

The Table below presents the resultant noise levels from undertaken measurements around the project site.

Table 4 - Traffic Noise Levels

Date	Location	Time	Measured Noise Level
11-April-2019	1	1:30pm – 1:45pm	73dB(A)L_{eq}
7 May -2019	1	4:39pm – 5:04pm	70dB(A)L_{eq}
	2	3:45pm – 4:00pm	57dB(A)L_{eq}
		4:01pm – 4:06pm	64 dB(A)L_{eq}
	3	3:28pm – 3:43pm	56dB(A)L_{eq}
		4:07pm – 4:12pm	56dB(A)L_{eq}
	4	4:14pm – 4:29pm	62dB(A) L_{eq}
		4:32pm – 4:37pm	61 dB(A)L_{eq}

5.3 NOISE IMPACT LEVELS

Traffic noise predictions have been carried out by CORTN program and predicted traffic volume as presented above. The traffic noise levels listed in the Table 5 below were determined based on the traffic noise levels measured on Hume Highway. In determination of acoustic treatments at each façade, the measured level is adjusted for distance and orientation.

Table 5 - External Noise Levels

Facade	Time Period	Predicted Traffic Noise Levels
Northern façade (Hume Highway)	Day (7am – 10pm)	66 dB(A) $L_{Aeq\,(15hour)}$
	Night (10pm – 7am)	62 dB(A) $L_{Aeq\,(9hour)}$
Western façade (Bigge Street)	Day (7am – 10pm)	62 dB(A) $L_{Aeq\,(15hour)}$
	Night (10pm – 7am)	59 dB(A) $L_{Aeq\,(9hour)}$
Eastern façade	Day (7am – 10pm)	63 dB(A) $L_{Aeq\,(15hour)}$
	Night (10pm – 7am)	59 dB(A) $L_{Aeq\,(9hour)}$
Southern façade	Day (7am – 10pm)	62 dB(A) $L_{Aeq\,(15hour)}$
	Night (10pm – 7am)	58 dB(A) $L_{Aeq\,(9hour)}$

5.4 RECOMMENDATIONS

Traffic noise intrusion into the proposed development was assessed using the measured external noise levels reported above as a basis.

Calculations were performed taking into account the orientation of windows, the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way the likely interior noise levels can be predicted. Acoustic treatment required to ensure compliance with the assessment criteria are detailed in this section.

Internal noise levels will primarily be as a result of noise transfer through the windows and doors as these are relatively light building elements that offer less resistance to the transmission of sound. Noise transfer through the masonry elements will not be significant and need not be considered further.

The constructions necessary to achieve the noise levels are detailed below. The predicted noise levels have been based on the expected level and spectral characteristics of the external noise, the area of building elements exposed to traffic noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

5.4.1 Glazed Windows and Doors

Traffic noise intrusion into the proposed development was assessed using the measured external noise levels reported above as a basis.

Calculations were performed taking into account the orientation of windows, the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way the likely interior noise levels can be predicted. Acoustic treatment required to ensure compliance with the assessment criteria are detailed in this section.

Internal noise levels will primarily be as a result of noise transfer through the windows and doors as these are relatively light building elements that offer less resistance to the transmission of sound. Noise transfer through the masonry elements will not be significant and need not be considered further.

The constructions necessary to achieve the noise levels are detailed in Appendix 1 – Glazing Mark-up. The predicted noise levels have been based on the expected level and spectral characteristics of the external noise, the area of building elements exposed to traffic noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

In addition to complying with the minimum scheduled glazing thickness, the STC rating of the glazing fitted into operable frames and fixed into the building opening should not be lower than the values listed in Table 6 in all areas. Where nominated, this will require the use of acoustic seals around the full perimeter of operable frames and the frame will need to be sealed into the building opening using a flexible sealant. Note that mohair seals in windows and doors are not acceptable where acoustic seals are required. The proposed suppliers should provide evidence that the window systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum STC requirements listed in Table 8, and that they will be constructed and installed in a manner equal to the test samples.

The window/door suppliers should provide evidence that the systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum listed STC requirements. Also, the glazing installer should certify that the window/doors have been constructed and installed in a manner equivalent to the tested samples.

Table 6 - Minimum STC of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum STC of Installed Window
6mm float	29
6.38mm laminate	31
10.38mm laminate	35
12.38mm laminate	37

5.4.2 External Wall Construction

External walls are proposed to be constructed of masonry construction materials, hence will not require upgrading.

There should not be vents on the internal skin of external walls. All penetrations in the internal skin of external walls should be acoustically sealed.

Where light weight construction for external walls for apartments are to be used these shall be reviewed by a suitably qualified acoustic consultant prior to Construction Certificate to ensure compliance with project acoustic criteria nominated in Section 4.1.3.

5.4.3 Roof / Ceiling

The proposed concrete slab roof is acoustically acceptable. No details of ceiling construction or corner junctions are required as the necessary acoustic performance is achieved by the concrete. Penetrations in all sleeping area ceilings (such as for light fittings etc.) must be acoustically treated and sealed gap free with a flexible sealant.

5.4.4 External Doors

Any glass doors should be constructed using glazing thickness set out in Appendix 1 – Glazing Mark-up and full perimeter acoustic seals around the doors are required.

5.4.5 Ventilation Requirements

With respect to natural ventilation of the dwelling, the NSW Department of Planning document "Development near Busy Roads and Rail Corridors - Interim Guideline" dictates that:

- *"If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."*

With windows open, the allowable internal noise goal is permitted to be 10dB(A) higher than when the windows are closed (i.e -allowable level in bedrooms becomes 45dB(A), and 50dB(A) in living rooms).

In order to achieve suitable internal noise levels, windows need to be closed in all bedrooms and living areas. Although windows can be openable, the required internal noise level for these areas is only achieved when the windows are closed.

Should any supplementary fresh air for these rooms (ventilation system or other) be required, it should be acoustically designed to ensure that the acoustic performance of the acoustic treatments outlined above are not reduced and does not exceed Council criteria for noise emission to nearby properties.

6 NOISE EMISSION ASSESSMENT

Noise emissions from the development should be assessed to ensure that the amenity of nearby users is not adversely affected. Potential noise sources which should be assessed are;

- Noise generated by mechanical plant (typically air-conditioning and car park ventilation fans).

Noise emission criteria will be determined based on the following documents:

- NSW EPA Industrial Noise Policy;
- Protection of Environmental Operation Act Regulation 2000.

6.1 BACKGROUND NOISE MONITORING

Background noise levels for the site were obtained using an unattended noise monitor (refer to Figure 1 for monitor's location). The noise logger was installed with 180 degrees view of Bigge Street. The noise logger location was approximate 30m distance from Bigge Street kerb and 70m from Hume Highway kerb. For detailed location refer to Figure 1.

The unattended monitoring was conducted using an Acoustic Research Laboratory noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode. There were no significant periods of adverse weather conditions during the measurement period.

The measured background noise levels have been processed based on requirements of NSW EPA NPfI and results are summarised below.

Table 7 – Measured Background Noise Levels

Location	Period/Time	Background Noise Level dB(A) L_{90}
4-6 Bigge Street, Warwick Farm @approximately 30m from Bigge Street and 70m from Hume Highway	Day (7am-6pm)	63
	Evening (6pm-10pm)	59
	Night (10pm-7am)	51

6.2 ACOUSTIC OBJECTIVES

NSW EPA – Noise Policy for Industry (NPfI) will be used to establish the noise emission criteria for the development site as Willoughby Council DCP does not have specific control for noise emission.

6.2.1 NSW EPA - Noise Policy for Industry (NPFI)

Intrusiveness, amenity and sleep disturbance criteria are applicable, and are detailed below.

6.2.1.1 Project Intrusiveness Criteria

Intrusiveness criteria requires that noise from the site not exceed background noise level by more than 5dB(A)$L_{Aeq(15min)}$.

For the proposed residential development, the following goals will apply:

Table 8 – Intrusiveness Criteria

Time of Day	Background Noise Level (Measured) dB(A)L_{90}	Intrusiveness Noise Emission Objective dB(A)$L_{Aeq(15min)}$
Day (7am-6pm)	63	68
Evening (6pm-10pm)	59	64
Night (10pm-7am)	51	56

For future residential development:

- As per section 2.4.3 of the NPfI, for sites where changing land use is expected to change the existing acoustic environment, it is appropriate to use the Amenity Criteria (based on the zoned use/density) as opposed to the Intrusiveness Criteria.
- The applicable Amenity Criteria are detailed in the following section.

6.2.1.2 Project Amenity Criteria

Project amenity criteria are determined based on the land use in the area (residential/commercial/industrial). The residential land use is then further categorised into rural, sub-urban and urban areas.

For the purpose of this assessment, the proposed residential dwellings will be considered urban.

Table 9 – Project Amenity Criteria

Noise Receiver	Amenity Noise Level – dB(A)$L_{Aeq(15min)}$		
	Daytime (7am – 6pm)	Evening (6pm – 10pm)	Night (10pm – 7am)
Neighbouring Residences	58	48	43

6.3 MECHANICAL PLANT

Mechanical plant items are not typically selected at DA stage.

Detailed review of all external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised). Acoustic treatments should be determined in order to control plant noise emissions to the levels set out in Section 6.2 of this report.

All plant can be satisfactorily attenuated to levels complying with noise emission criteria through appropriate location and (if necessary) standard acoustic treatments such as noise screens, enclosures, in-duct) treatments (silencers/lined ducting or similar).

7 CONCLUSION

This report provides the results of our assessment of traffic and operation noise impacts on the amenity of future tenants within the proposed residential development at 4-6 Bigge Street, Warwick Farm.

Provided that the acoustic treatments set out in Section 5.4 of this report are adopted, traffic noise impacts on the development will comply with the requirements of;

- Liverpool City Council DCP 2008;
- NSW Department of Planning SEPP (Infrastructure);
- Australian and New Zealand Standard AS/NZS 2107-2016: Acoustics - Recommended design sound levels and reverberation for building interiors.

Noise emission criteria from the development have been setup in Section 6 to satisfy the requirements of;

- The Environmental Protection Authority NSW Industrial Noise Policy for Industry (NPfI).

Detailed acoustic treatment will be determined at CC Stage (if required).

Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Eleni Chrysafis

APPENDIX 1 - GLAZING MARK-UP

Glazing Mark-up

6mm

6.38mm laminate

10mm

10.38mm laminate

All systems with acoustic

2 Bigge Street
6 Storeys

11 Goulburn Street
5 Storeys

9 Goulburn Street
2 Storeys

8-10 Bigge Street
6 Storeys

Bigge Street

Site Boundary

3m min Separation

Substation Kiosk

Communal Flower Garden

Play

Play

RL 19.300

RL 19.700

RL 19.700

RL 19.650

RL 19.650

RL 19.650

RL 19.650

RL 19.650

RL 19.64

RL 19.50

RL 19.52

RL 19.67

RL 19.78

RL 19.79

RL 19.84

Site Boundary

Lobby Entry
RL 19.650

Lobby
RL 19.650

Residential Visitor Bicycle Spaces (2 spaces)

Residential Bicycle Storage (14 spaces)

Maintenance Zone Only

Maintenance + Egress Zone Only

Garbage Holding Room

Bulky goods

Mail

FIP EWIS

CP Exhaust

Fire Booster

Main Water Meter

Ramp 1:14

Ramp 1:8

Ramp 1:40

Ramp 1:20

Ramp 1:8

Ramp 1:5

9m Boundary Setback

6m Boundary Setback

6m Setback

Building doted over

Entry

Exit

14,800

LR

L_01

L_02

FS_03
Basement

FS_02

FS_01

TCE
A: 20 m²

2B_01
A: 84 m²

TCE
A: 13 m²

1B_02
A: 52 m²

TCE
A: 13 m²

1B_02
A: 52 m²

TCE
A: 8 m²

TCE
A: 14 m²

2B_08
A: 86 m²

1B_03C
A: 53 m²

TCE
A: 12 m²

1B_09
A: 56 m²

TCE
A: 16 m²

Nominated 1 Bedroom apartment for Future Community Room

0.01

0.02

0.03

0.04

0.05

0.06

Sewer Diversion Pit
Final location TBC

Existing Sewer Line

18.3

18.150

18.270

18.350

18.510

18.700

18.740

18.820

18.860

18.900

19.030

19.090

19.160

19.170

19.220

19.400

19.650

18.900

19.235

19.400

19.300

19.300

19.300

19.050

1
DA-350-011

1
DA-350-020

1
DA-350-020

1
DA-350-011

CLIENT

Land and Housing Corporation
31 Macquaire Street, Parramatta NSW 2150

Hutchinson Builders
23 Dunning Avenue, Rosebery NSW 2018

Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Ground Level

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-008
Drawn by: DF,MM,YX
Rev: 01
North

TURNER
Level 7 ONE Oxford Street
Darlinghurst NSW 2010
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turnerstudio.com.au

Glazing Mark-up

6mm

6.38mm laminate

10mm

10.38mm laminate

All systems with acoustic

2 Bigge Street
6 Storeys

1
DA-350-011

11 Goulburn Street
5 Storeys

Site Boundary

9 Goulburn Street
2 Storeys

1
DA-350-020

1
DA-350-011

8-10 Bigge Street
6 Storeys

Bigge Street

Site Boundary

CLIENT
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31 Macquaire Street, Parramatta NSW 2150

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Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Level 1

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-010
Drawn by: DF,MM,YX
Rev: 01
North

TURNER
Level 7 ONE Oxford Street
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Glazing Mark-up

6mm

6.38mm laminate

10mm

10.38mm laminate

All systems with acoustic

2 Bigge Street
6 Storeys

1
DA-350-011

Site Boundary

Bigge Street

11 Goulburn Street
5 Storeys

9 Goulburn Street
Roof Below

1
DA-350-020

1
DA-350-020

Site Boundary

1
DA-350-011

8-10 Bigge Street
6 Storeys

NOTES

DLCS Quality Endorsed Company ISO 9001:2008, Registration Number 20476
Nominated Architect: Nicholas Turner 6685, ABN 86 064 094 911

CLIENT

Land and Housing Corporation
31 Macquaire Street, Parramatta NSW 2150

Hutchinson Builders
23 Dunning Avenue, Rosebery NSW 2018

Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Level 2

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-020
Drawn by: DF,MM,YX
Rev: 01
North

TURNER
Level 7 ONE Oxford Street
Darlinghurst NSW 2010
AUSTRALIA
T +61 2 8668 0000
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Glazing Mark-up

6mm

6.38mm laminate

10mm

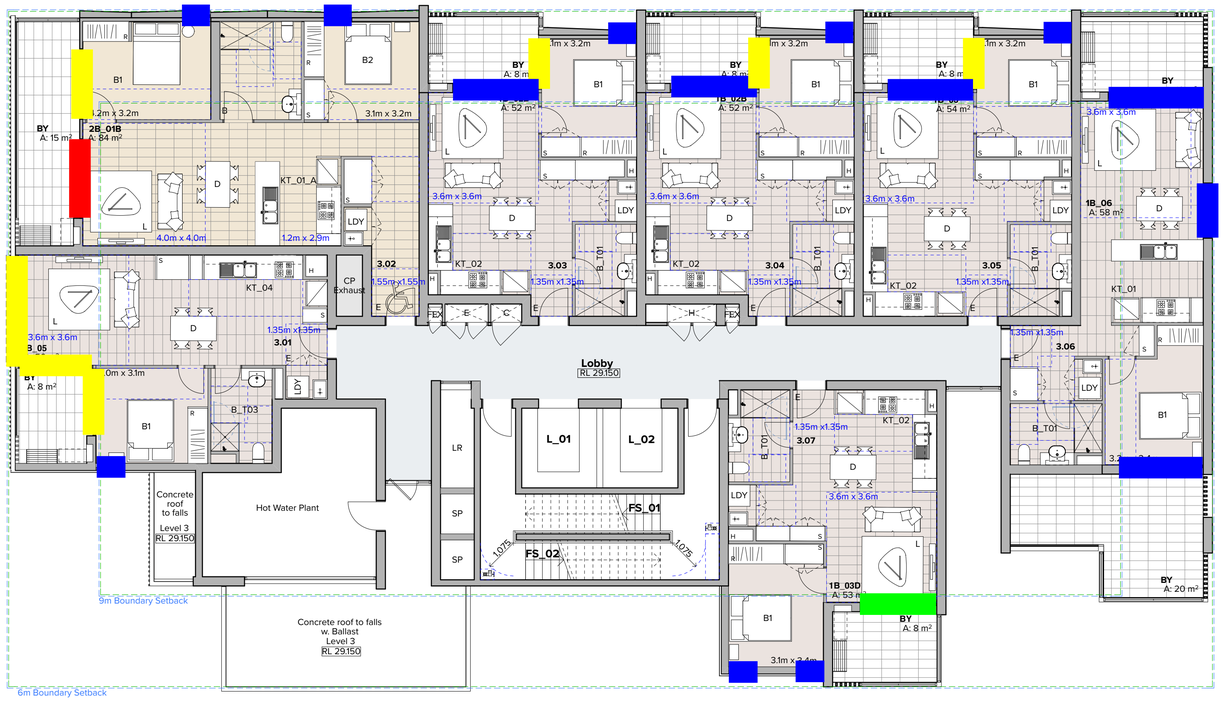
10.38mm laminate

All systems with acoustic

2 Bigge Street
6 Storeys

1
DA-350-011

Site Boundary



Bigge Street

11 Goulburn Street
5 Storeys

9 Goulburn Street
Roof Below

1
DA-350-028

1
DA-350-029

Site Boundary

1
DA-350-017

8-10 Bigge Street
6 Storeys

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DLCS Quality Endorsed Company ISO 9001:2008, Registration Number 20476
Nominated Architect: Nicholas Turner 6935, ABN 86 064 084 911

CLIENT

Land and Housing Corporation
31 Macquaire Street, Parramatta NSW 2150

Hutchinson Builders
23 Dunning Avenue, Rosebery NSW 2018

Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Level 03

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-030
Drawn by: DF,MM,YX
Rev: 01
North

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Glazing Mark-up

6mm

6.38mm laminate

10mm

10.38mm laminate

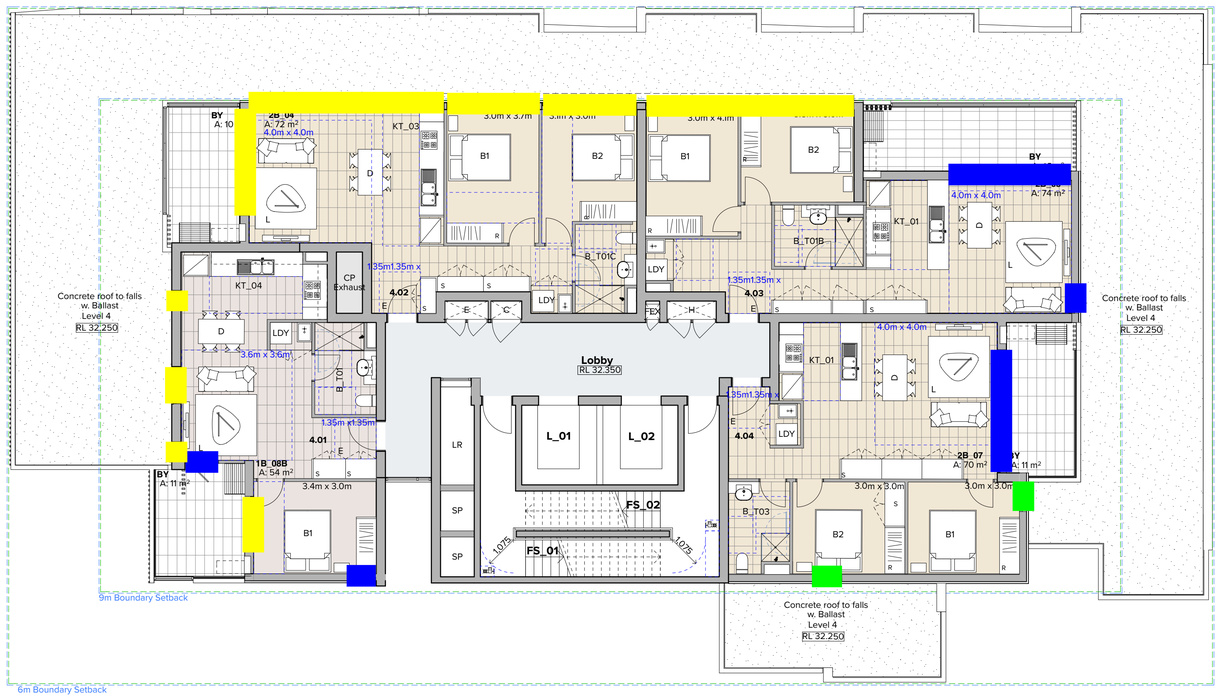
All systems with acoustic

2 Bigge Street
6 Storeys

1
DA-350-011

11 Goulburn Street
5 Storeys

Site Boundary



Bigge Street

9 Goulburn Street
Roof Below

1
DA-350-028

1
DA-350-028

1
DA-350-011

8-10 Bigge Street
6 Storeys

Site Boundary

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31 Macquaire Street, Parramatta NSW 2150

Hutchinson Builders
23 Dunning Avenue, Rosebery NSW 2018

Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Level 04

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-040
Drawn by: DF,MM,YX
Rev: 01
North

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Glazing Mark-up

6mm

6.38mm laminate

10mm

10.38mm laminate

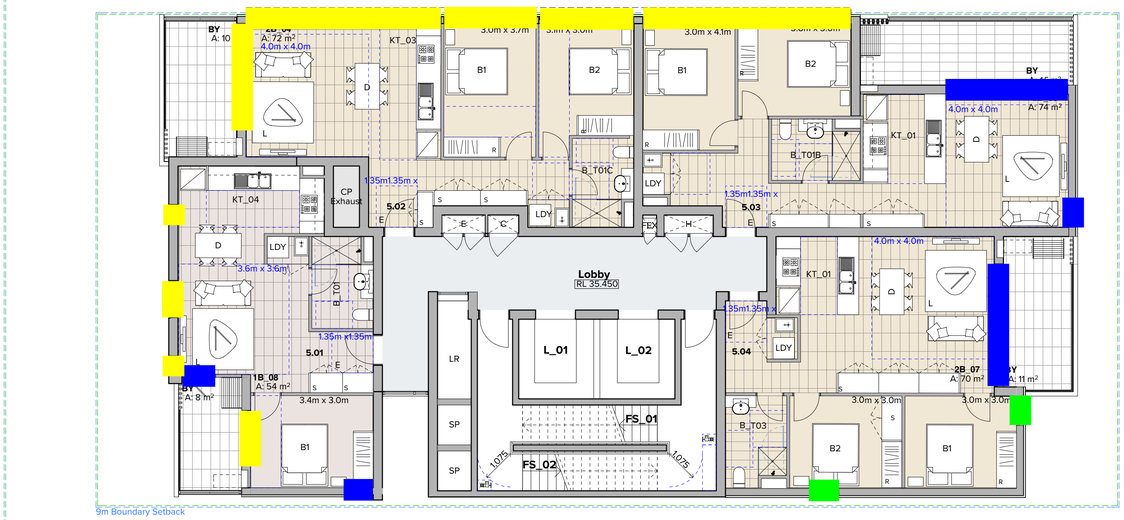
All systems with acoustic

2 Bigge Street
6 Storeys

1
DA-350-011

11 Goulburn Street
5 Storeys

Site Boundary



Bigge Street

9 Goulburn Street
Roof Below

1
DA-350-028

1
DA-350-028

1
DA-350-011

8-10 Bigge Street
6 Storeys

Site Boundary

NOTES

DLCS Quality Endorsed Company ISO 9001:2008. Registration Number 20476
Nominated Architect: Nicholas Turner 6695, ABN 86 094 094 911

CLIENT
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Hutchinson Builders
23 Dunning Avenue, Rosebery NSW 2018

Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Level 05

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-050
Drawn by: DF,MM,YX
Rev: 01
North

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Glazing Mark-up

6mm

6.38mm laminate

10mm

10.38mm laminate

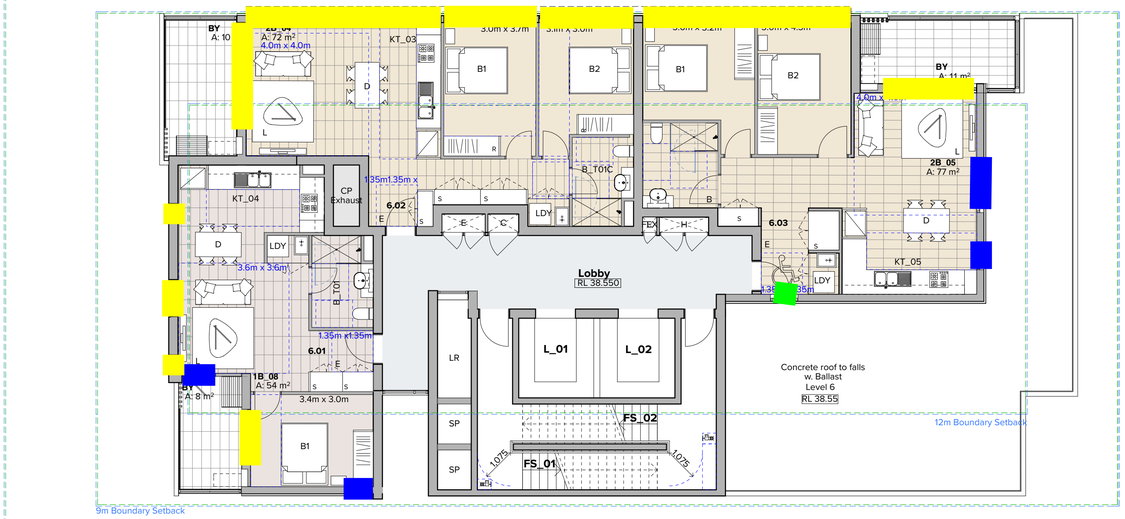
All systems with acoustic

2 Bigge Street
6 Storeys

1
DA-350-011

11 Goulburn Street
Roof Below

Site Boundary



Bigge Street

9 Goulburn Street
Roof Below

1
DA-350-020

1
DA-350-021

8-10 Bigge Street
6 Storeys

Site Boundary

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Nominated Architect: Nicholas Turner 6695, ABN 86 094 691 911

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Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Level 06

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-060
Drawn by: DF,MM,YX
Rev: 01
North

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Glazing Mark-up

6mm

6.38mm laminate

10mm

10.38mm laminate

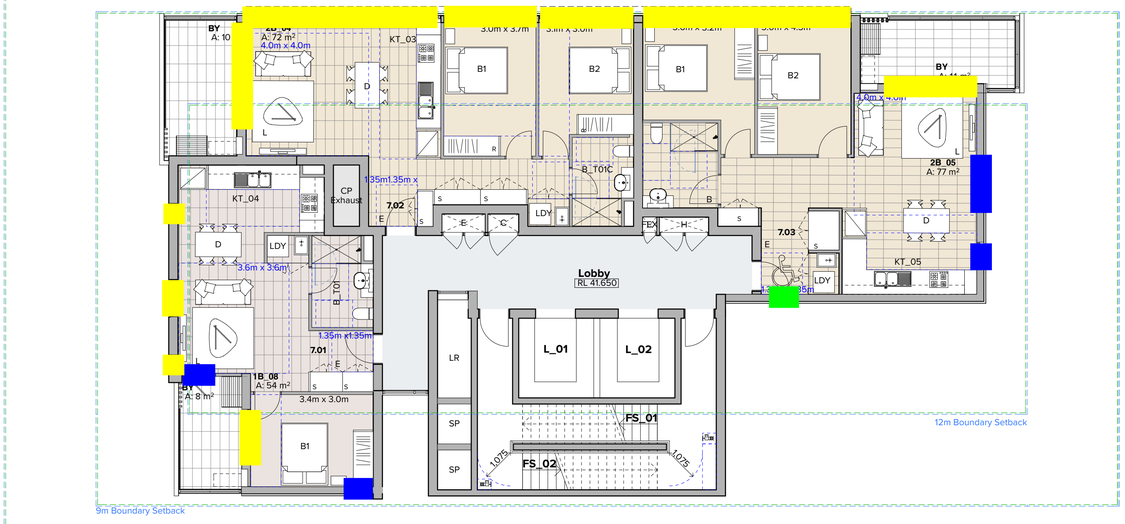
All systems with acoustic

2 Bigge Street
Roof Below

1
DA-350-011

11 Goulburn Street
Roof Below

Site Boundary



9m Boundary Setback

12m Boundary Setback

6m Boundary Setback

Bigge Street

9 Goulburn Street
Roof Below

1
DA-350-020

1
DA-350-028

Site Boundary

1
DA-350-017

8-10 Bigge Street
Roof Below

NOTES

DLCS Quality Endorsed Company ISO 9001:2008. Registration Number 20476
Nominated Architect: Nicholas Turner 6695, ABN 86 094 691 911

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Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Level 07

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-070
Drawn by: DF,MM,YX
Rev: 01
North

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Glazing Mark-up

6mm

6.38mm laminate

10mm

10.38mm laminate

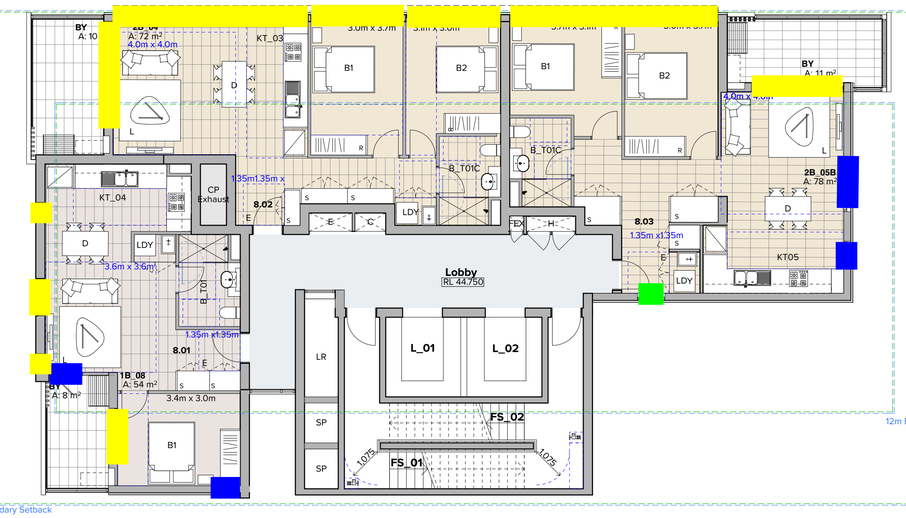
All systems with acoustic

2 Bigge Street
Roof Below

1
DA-350-011

11 Goulburn Street
Roof Below

Site Boundary



Bigge Street

9 Goulburn Street
Roof Below

1
DA-350-028

1
DA-350-029

1
DA-350-017

8-10 Bigge Street
Roof Below

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DLCS Quality Endorsed Company ISO 9001:2008, Registration Number 20476
Nominated Architect: Nicholas Turner 6695, ABN 86 094 691 911

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Hutchinson Builders
23 Dunning Avenue, Rosebery NSW 2018

Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Level 08

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-080
Drawn by: DF,MM,YX
Rev: 01
North

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Glazing Mark-up

6mm

6.38mm laminate

10mm

10.38mm laminate

All systems with acoustic

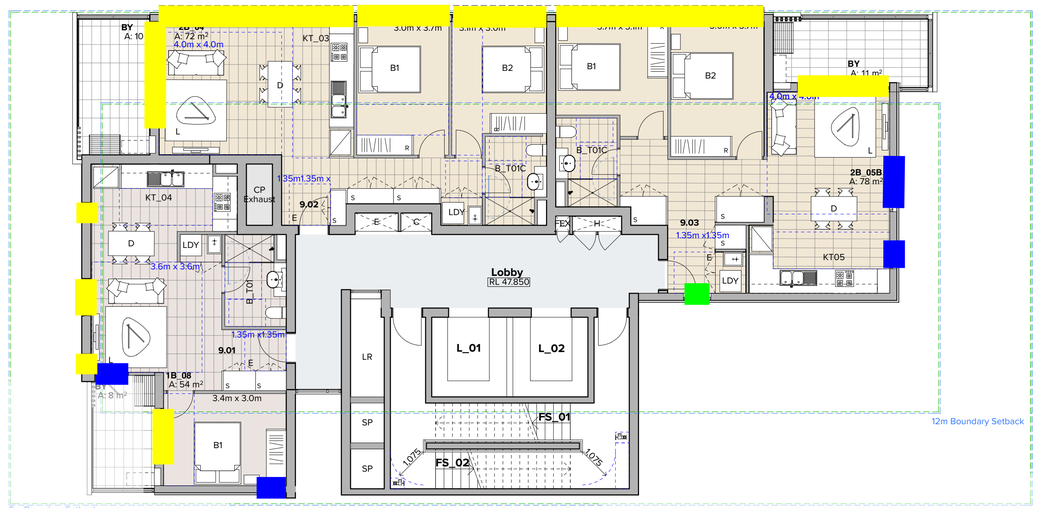
2 Bigge Street
Roof Below

1
DA-350-011

11 Goulburn Street
Roof Below

Site Boundary

Bigge Street



9 Goulburn Street
Roof Below

1
DA-350-028

1
DA-350-029

Site Boundary

1
DA-350-010

8-10 Bigge Street
Roof Below

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Nominated Architect: Nicholas Turner 6695, ABN 86 094 691 911

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31 Macquaire Street, Parramatta NSW 2150

Hutchinson Builders
23 Dunning Avenue, Rosebery NSW 2018

Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Level 09

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-090
Drawn by: DF,MM,YX
Rev: 01
North

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Glazing Mark-up

6mm

6.38mm laminate

10mm

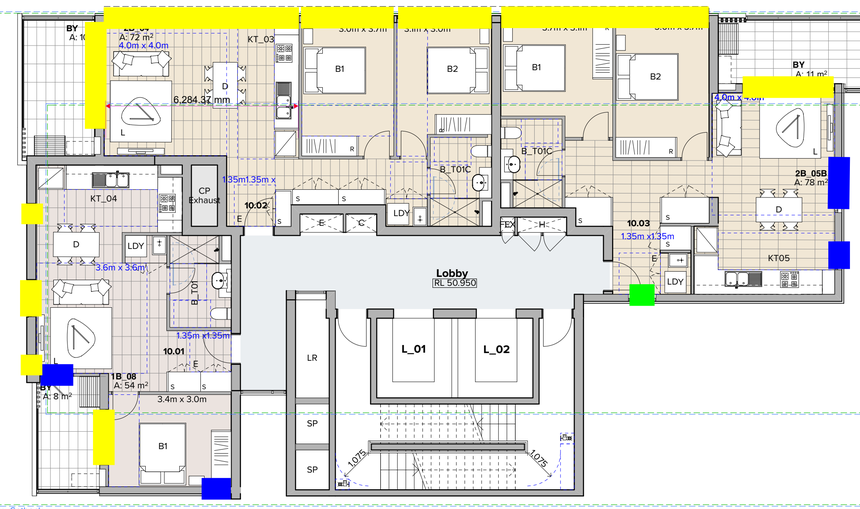
10.38mm laminate

All systems with acoustic

2 Bigge Street
Roof Below

1
DA-350-011

Site Boundary



12m Boundary Setback

9m Boundary Setback

6m Boundary Setback

Bigge Street

11 Goulburn Street
Roof Below

9 Goulburn Street
Roof Below

1
DA-350-028

1
DA-350-029

Site Boundary

1
DA-350-017

8-10 Bigge Street
Roof Below

NOTES

DLCS Quality Endorsed Company ISO 9001:2008. Registration Number 20476
Nominated Architect: Nicholas Turner 6695, ABN 86 094 684 911

CLIENT
Land and Housing Corporation
31 Macquaire Street, Parramatta NSW 2150

Hutchinson Builders
23 Dunning Avenue, Rosebery NSW 2018

Rev	Date	Approved by	Issue Name
01	16.04.19	VS	For Information

Project Title
Bigge Street Liverpool
4-6 Bigge Street Liverpool NSW 2170 Australia

Drawing Title
GA Plans
Level 10

Scale: 1:100 @A1, 50%@A3
Status: For Information
Project No.: 18013
Dwg No.: DA-110-110
Drawn by: DF,MM,YX
Rev: 01
North

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