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*Our Reference: 153120*

*7 December 2015*

**ACOUSTIC REPORT**

**ROAD TRAFFIC NOISE  
IMPACT ASSESSMENT ON**

**THE**

**PROPOSED RESIDENTIAL DEVELOPMENT**

**AT**

**17 – 23 GOULBURN STREET**

**LIVERPOOL NSW**

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## 1. INTRODUCTION

The purpose of this report is to provide impact assessment of the existing ambient noise levels on the new residential development, and to consider the likely noise impacts associated from the use of the new development on the closest sensitive receivers.

This report is required for submission to the Liverpool City Council for Development Application Approval – Acoustic Privacy for residents to ensure; and to comply with the SEPP (Infrastructure) 2007 Clause (102).

Assessment has been carried out in accordance with the following standards and Acts to ensure the amenity of the future occupants.

- SEPP Infrastructure 2007 for Interior LAeq Noise Levels Criteria
- EPA/ Road Traffic Noise criteria for ambient noise levels
- Australian Standard AS 2107 – 2000 for building interiors – sound level design.
- AS 3671 – 1989 Acoustics – Road traffic noise intrusion – Building siting and construction.
- Protection of the Environment Operations Act 1997
- Building Code of Australia – BCA 2015

An objective of this work is to measure the existing ambient noise background and to assess the likely impacts on the proposed development; and outline noise mitigation measures if the results indicate a noise level exceedance against relevant guidelines and abovementioned statutory legislation. Acoustic treatment will be recommended to the most affected façade of the proposed development to mitigate internal noise levels.

## 2. DESCRIPTION OF THE PROPOSED DEVELOPMENT AND EXPECTED NOISE SOURCES

The proposed development is located at the corner of Goulburn Street and Lachlan Street, Liverpool NSW; is a nine (9) storey residential building consisting of (108) apartments over two levels basement car parking as shown in attached architectural plans. Vehicular access to the development will be from a new combined driveway off the Lane way at the rear western boundary.

During site inspection and noise levels monitoring in November 2015, we have noticed the following:

- Goulburn Street is a local road carries low traffic volumes; and 50 km/h vehicle's speed permitted in this street.
- Hume Hwy located on the northern boundary of the site and approximately 205m far from the site development. Heavy trucks are commonly pass-by on highway and contribute mainly on ambient background noise levels for the surrounding environment.
- Existing properties in close vicinity to the site are mainly high density residential of a high rise buildings;
- A high rise residential building located along Goulburn St. considered as a good barrier for northern elevation to reduce noise from the Hume Hwy source; and there is no any other major noise source to be concerned.
- The following figure shows site development and locality;

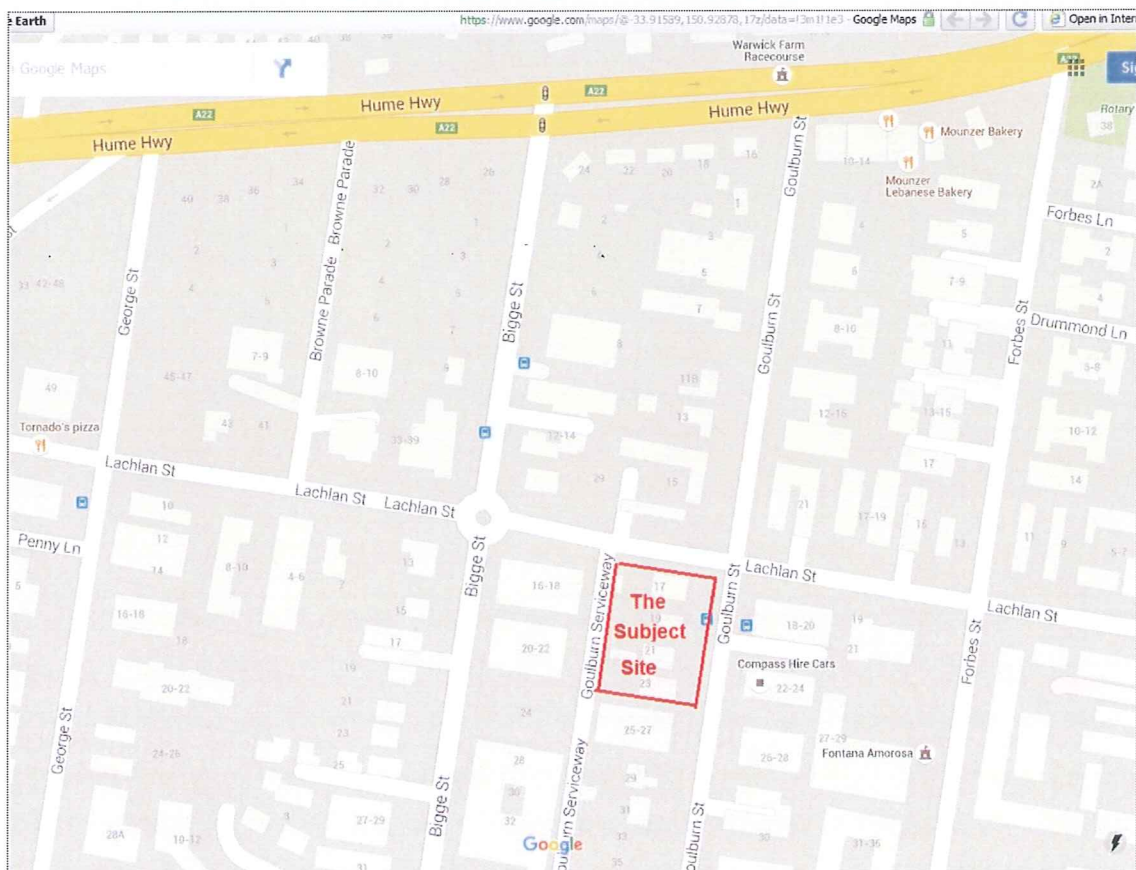


Figure – 1 – Site location and context of the area



### 3. OBJECTIVES AND LOCAL AUTHORITY REQUIREMENT

Liverpool City Council requires the following:

Assessing traffic noise impacts from the roads in close vicinity to the proposed development Particularly Hume Highway and to comply with the interior noise levels design incorporate with the mechanical ventilation system; and to comply with SEPP Infrastructure 2007 – Clause (102). This report is required for submission to Liverpool City Council for Development Application Approval.

Such report shall demonstrate compliance with AS 3671 – 1989 – Building Siting and Construction and the EPA's Environmental Guidelines for Road Traffic Noise.

**Table – 1 Road Traffic Noise Criteria for ambient noise levels**

Type of development	Criteria	
	Day (7am – 10pm) dBA	Night (10pm – 7am) dBA
New residential developments affected by Traffic noise from local roads	LAeq. (1 hr.) 55	LAeq.(1 hr) 50

The building shall be designed and constructed taking into full account the requirement for effective sound insulation against external noise in accordance with the Australian Standard AS 2107 – 2000.

This standard (AS2107-2000) recommended satisfactory levels for different areas of occupancy in the residential development. These are given in the following Table – 2.

**Table – 2 Interior noise design criteria**

Type of occupancy	Recommended Design Sound Level (LAeq.) dBA	
	Satisfactory	Maximum
<b>Residential Building House near Major Roads</b>		
Living areas	35	45
Sleeping areas	30	40
Common Areas	45	55
Basement car parking	55	60

Where the EPA external noise criteria would not practically or reasonably be met, the RTA recommends that Council to apply the following internal noise objectives for all habitable rooms under ventilated conditions complying with the requirements of the Building Code of Australia:

- All habitable rooms other than sleeping rooms: 45 dBA LAeq.(15 hr.) and 40 dBA LAeq.(9 hr) ; and
- Sleeping rooms: 35 dBA LAeq.(9hr)

#### 3.1 SEPP (Infrastructure) 2007 Criteria

Council requires assessment to be carried out based on SEPP Infrastructure 2007 – Claus 102 (Road), as stated that the following LAeq. Levels are not exceeded:

- In any bedroom in the building; 35 dBA at any time between 10pm-7am
- Anywhere else in the building (other than garage, kitchen, bathroom, or hallway); 40 dBA at any time.

## **4. NOISE MEASUREMENTS**

Noise measurements have been performed to comply with the Australian Standard AS 1055 – 1997 “Description and measurement of environmental noise – General Procedures”.

### **4.1 Instrumentation**

The instrumentation used during the noise survey consists of environmental logger noise monitoring/ Acoustic Research Laboratories; logger serial no. 16-302-490 and Model EL-316.

This meter conforms to Australian Standard AS 1259 – 1982 “ Acoustic – Sound Level Meters” or AS 1259.2 (IEC 60804) as a Type (1) precision Sound Level Meter and has an accuracy suitable for general field application.

The calibration of the meter was checked before and after measurements period with acoustic calibrator by Acoustic Research Laboratory.

### **4.2 Measurement Procedure**

An unattended ambient noise monitoring has been performed on Monday 9<sup>th</sup> of November 2015 for one week monitoring. The machine was positioned on the roof of the existing house no. 17 at approximately 3.5m height. This location represents the façade of the proposed building to the main traffic noise.

Sample measurements were taken every 60minutes continuously; all measurements were taken on A- weighted fast response mode.

### **4.3 Measurement Parameters**

Ambient noise constantly varies in levels; this is due to the changes in noise sources. Accordingly, it is not possible to accurately determine prevailing ambient noise conditions by measuring a single instantaneous noise level.

To accurately determine the effects of ambient noise a 15 or 60 minutes 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. These main descriptors are:

- LA90, represents noise level exceeded for 90% of a certain time period, and is used as background noise.
- LA10, represents noise level exceeded for 10% of a certain time period, and is used as the source noise.
- LAeq, represents the average of noise energy and the noisiest hour during day and night time.
- LA1, represents noise level exceeded for 1% of a certain time period, and is used as sleep disturbance.

#### 4.4 Noise Results

An actual trace of road traffic noise over 24 hours shows the typical clear drop in the background noise level LA90 during the early hours of morning. In some cases the LAeq. values are higher than the LA10, this indicates that the road traffic flow is not constant depend on the type and speed of vehicles passed the road. *See Results in Appendix-B of this report.*

This section presents the statistical ambient noise levels recorded during an unattended noise monitoring taken place on the site development from 9<sup>th</sup> to 16<sup>th</sup> November 2015. Logarithmic average of LAeq. for each monitoring period has been calculated and the following table-3 is a summary daily average of the measurement results for the day and night time.

**Table – 3 Daily Average Noise Level Results**

Period	LAeq.	LAmaz	LA1	LA10	LA90
Day (7:00am – 10:00pm)	61	83	69	62	51
Night (10:00pm-7:00am)	56	78	65	56	43

The outcomes of these results will be assessed against SEPP (Infrastructure) 2007 Clause (102), and NSW Environmental Criteria for Road Traffic Noise ECRTN as mentioned in table-1 of this report.

#### 4.5 Project-Specific Noise Criterion

Rating background and intrusiveness criterion applying to this project is as follows:

Period	Rating Background	Intrusiveness
Day (7:00am – 6:00pm)	52 dBA	(52 + 5) = 57 dBA
Evening (6:00pm – 10:00pm)	50 dBA	(50 + 5) = 55 dBA
Night (10:00pm – 7:00am)	43 dBA	(43 + 5) = 48 dBA

## **5.0 POTENTIAL MITIGATION MEASURES**

The Environmental Criteria for Road Traffic Noise – NSW 1999 sets out ameliorative measures when the measured and/or calculated noise levels exceed the noise level criteria for any receiver. In order to mitigate against intrusive traffic noise at the proposed residential allotments, it's possible to use a number of the following ameliorative measures:

### **5.1 Building Design**

Appropriate building design to minimise or eliminate the noise emission to noise sensitive areas within the building is effective in reducing internal noise levels. The building orientation such that noise sensitive areas i.e. bedrooms are shielded from the dominate noise source will also assist to keep internal noise levels below acceptable standards.

A review of the proposed building layouts, design and orientation has been undertaken for the units of the proposed building; some bedrooms have been shielded by balconies and the middle building has a suitable set back from traffic noise source; and this will provide a reasonable response to limit internal noise environmental levels.

### **5.2 Building Construction Components and Acoustical Treatment**

This may include the provision of noise control treatments to the building fabric, particularly glazing where is required as it is a weak element, and the provision of the mechanical ventilation such that windows can be closed to limit internal noise levels.

The typical outdoor to indoor noise reduction provided by most standard dwellings (i.e. without special acoustical treatment) is generally accepted as being 10 dBA with windows open (allowing for natural ventilation); and 25 dBA with windows closed.

Experience with residential construction, demonstrates that typical sound transmission loss characteristics for standard type construction will achieve the following:

- Rendered masonry walls with laminated or double glazed windows 40 dBA
- Masonry or lightweight insulated external walls with 6mm glazing 30 dBA
- Standard un-insulated domestic grade framing with 4mm glass 18 dBA

External wall for the proposed building has been suggested to be a Hebel wall consist of 75mm Powerpanel with 12mm gap and 64mm steel studs filled with 50mm Bradford Glasswool and fixed to 10mm Gyprock plasterboard on both sides of the wall. Sound transmission loss for this construction of the wall will achieve  $R_w$  not less than 45 dBA.

### 5.3 The use of the Development (Mechanical Ventilation, Plant & Equipment)

Mechanical ventilation/ exhaust & supply fans for the basement car parking and outdoor condenser units for air conditioning system or other equipment to be used by the proposal including roller shutter door are of our concerns of creating the likely offensive noise nature to the building's occupant or to the adjoining neighbours.

Mechanical ventilation for the basement car parking and air conditioning system to be proposed for the building shall be designed in accordance with AS1668.2.

Air conditioning either split or ducted system to be suggested for the building, consideration should be taken into full account the location of the outdoors units (condensers) to ensure the amenity of the neighbours; and roller shutter door to be electrical with lightweight material.

Noise sources from all plant/ equipment to be used by the proposed building must comply with Protection of the Environment Operations Act 1997; *(noise source may be considered acceptable if the LAeq. (15 min.) noise source does not exceed the background noise levels measured in the absence of the noise source, by more than 5 dBA)*, and must comply with project intrusiveness criterion as indicated in clause 4.5 of this report.

### 6.0 TRAFFIC NOISE GENERATION

NSW Road Noise Policy – Environment, Climate Change & Water, has framework guidelines to protect existing quiet areas from excessive changes in amenity due to noise from a road project. Any increase in the total traffic noise level at the location due to a proposed project or traffic-generation development must be considered. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dBA.

In order to increase the traffic noise levels by greater than 2dBA, the required increase in traffic volumes is greater than 65%. Roads are functionally classified by a range of factors, including their role in facilitating traffic movement; their relationship to other road categories; and whether they support through or local traffic, access to adjacent land uses and applicable traffic management options.

Since the access to the site development will be from a new combined driveway off the Lane Way, the additional traffic volumes on the surrounding road network will not be significant, therefore it is expected that noise generated from additional traffic will be below the 2 dBA limit recommended by the Road Noise Policy RNP.

## 7.0 SLEEP DISTURBANCE

The sleep disturbance criterion is commonly used to assess the impacts on sensitive receivers. Environmental Criteria for Road Traffic Noise published by EPA/NSW in May 1999 has compared a number of sleep disturbance criteria and concluded the following:

- Maximum internal noise levels below 50-55 dBA are unlikely to cause awakening reactions.
- One or two noise events per night, with maximum internal noise levels of 65-70 dBA are not likely to affect health and wellbeing significantly.

The ECRTN recommends internal levels of 35-40 dBA at night for sleeping areas, being the most sensitive area to noise impact. The guidance for other living areas is that noise levels 10 dBA below external levels are recommended on the basis of openable windows opened sufficiently to provide adequate ventilation, typically equating to a minimum of 20% of the window area being open.

The following internal noise criteria for the existing dwellings façade to Goulburn Street are affected by traffic noise:

Internal Criteria		
Day (7am – 10pm)	Night (10pm – 7am)	
	Sleeping areas	Other living areas
61 -10 = 51 dBA	35-40 dBA	56 -10 = 46 dBA

We consider that maximum noise levels from vehicle movements, mainly heavy trucks pass-by significantly create maximum noise levels exceeds 80 dBA per more than two noise events in night time as the results indicated from noise surveying; and results also revealed that the levels of the LA1 are higher than LA90 by more than 15 during the night and this obviously will cause a sleep disturbance as stated in the ECRTN.



## 8.0 ASSESSMENT OF THE AMBIENT NOISE LEVELS

The impact of ambient noise on the neighbourhood during construction should be taken into account; therefore a letter of notification to be issued to all occupants surrounding the site before commencement of any construction works.

Traffic noise can potentially causing sleep disturbance and other specific activities within residence, when the level of sleep disturbance L<sub>1</sub> level of any noise source exceeds the ambient L<sub>90</sub> background noise level by more than 15 dBA. Therefore the construction materials for the proposed building must be chosen with acoustic performance to achieve the requirements of interior noise design mentioned in SEPP (Infrastructure) 2007. Acoustic treatment for the proposed building is recommended for this project to avoid sleep disturbance.

Results in section 4.4 – table 3 revealed that the existing ambient noise levels have slightly exceeded the ambient noise criteria as mentioned in table-1; the result of 61 dBA during day time and 56 dBA during night time will be used to assess the glazing required for this project.

Noise sources from all plant/ equipment to be used by the proposed building should not cause a nature of “offensive noise” as defined by the *Protection of the Environment Operations Act 1997* and to comply with the project intrusiveness criterion as mentioned in clause 4.5 of this report.

## 9.0 Sound Insulation for the Proposed Building

The proposed building is classified as Class 2 residential units & class 7a for basement car parking and must comply with the Deemed-To-Satisfy provision of Part F5 of the Building Code of Australia 2015, regarding sound transmission and insulation rating for construction materials.

- Common walls between units must achieve a minimum of  $(R_w + C_{tr}) = 50$ ; and wall separating dry-to-wet areas i.e. (bedroom, living/dining room-to-bathroom, laundry, kitchen) must have a discontinuous wall with minimum 20mm cavity and achieve minimum  $(R_w + C_{tr}) = 50$  to minimise the impacts of airborne noise; and
- Wall separating unit from plant room & lift shaft must have a discontinuous construction with minimum cavity of 20mm and to achieve  $R_w = 50$  to achieve the requirements of F5.5.
- Floors for the proposed building must have minimum 200mm concrete with carpet on underlay to achieve the requirements of F5.4;

If floor is not covered by carpet (i.e. dining, living & kitchen areas) therefore; it needs to be treated with sound absorption materials. *(Apply a 10mm rubber underlay complete with plywood panels or use 4.5mm Regupol or 5mm Damtec before installing the floor tiles).*

For wet area floors (i.e. bathrooms, laundries), apply *Thermotec Impact Foam 5mm* to concrete plain or with self-adhesive backing over waterproof membrane (Refer to AS 3740: Waterproofing of wet areas within residential buildings). Return edge strip of foam to walls to isolate mortar bed from adjoining walls.

- For waste pipes service;  
Services must not be chased into concrete or masonry elements. The pipe must be separated from the rooms of any sole-occupancy unit by construction with an  $R_w + C_{tr}$  (airborne) not less than:

- i- 40 if the adjacent room is a habitable room (other than a kitchen); or
- ii- 25 if the adjacent room is a kitchen or non-habitable room.

The waste pipes passing through adjacent habitable (bedroom, living/dining room & family room) of the unit; must be acoustically treated by using Soundlag 4525C Acoustic Pipe Wrap from Pyrotek with  $R_w$  40; and

The waste pipes passing through adjacent kitchen, laundry, and bathroom of the unit must be acoustically treated by using Soundlag 4525C Acoustic Pipe Wrap from Pyrotek or equivalent; this will reduce the noise in hydraulic and waste pipes by 25 dBA.

If the services are passing through a duct; this construction must have minimum two layers of 16mm thick fire protective grade plasterboard to achieve minimum requirements of  $(R_w + C_{tr})$  not less than 40.

## **10.0 RECOMMENDATION**

The construction materials designed including recommended glazing for the proposed development details are as the following:

### **10.1 Sliding windows & doors**

The proposed building located in close vicinity to the main traffic noise required acoustic treatment, glazing as recommended in appendix- A will be able to minimize and enhance internal noise to the acceptable interior sound design levels as stated in SEPP Infrastructure 2007.

### **10.2 Roof / Ceiling System**

A flat concrete roof of 200mm thick, and foil water proofing membrane underside the roof above one layer of 13mm gyprock plasterboard ceiling provided to the proposed building will achieve  $R_w$  not less than 50 dBA. Terrace roof should be treated with acoustic absorbance materials i.e. Damtec or Regupol, use 4.5 mm Damtec or Regupol underlay before installing tiling floor to avoid airborne noise impacts on beneath apartments.

### **10.3 External walls**

External walls are suggested to be Hebel of 75mm Powerpanel, this construction will achieve  $R_w$  not less than 45 dBA.

### **10.4 External Doors**

All external doors to the units must be solid-core 35mm thick plywood door and fire rated, soft plastics gasket around sides and top, and drop seal at base.

### **10.5 Ventilation and air conditioning**

Assessment of the noise levels and recommendation for the construction components are based on the assumption that external sliding doors, windows and external doors are closed in order to achieve the recommended interior sound design detailed in clause 3.1 of this report.

If any air conditioning system is used to keep doors and windows closed and to introduce a fresh air inside the building and thus must meet the requirements of noise interior sound design criteria. The design of mechanical ventilation system must comply with AS1668 part 1 & part 2 and to comply with the project specific noise criteria.

### **10.6 Sound Insulation for the Building**

The proposed building is classified as Class 2 and must comply with the Deemed-To-Satisfy provisions of Part F5 of the Building Code of Australia 2015, regarding sound insulation and Sound Transmission Class rating for the construction materials.

## 11.0 CONCLUSION

The existing ambient noise  $L_{Aeq}$  during the day and the night are slightly exceeding Environmental Criteria for Road Traffic Noise as mentioned in table-1.

Therefore the proposed building will require acoustic treatment to achieve SEPP (Infrastructure) 2007, Clause 102 (Road).

Ambient noise assessment of the proposed development located at 17 – 23 Goulburn Street, Liverpool has been carried out based on the relevant environmental standards mentioned in this report; and assessment has considered that the highest levels of the proposed building will be exposed to traffic noise from Hume Hwy, and the existing high rise buildings located along Goulburn Street, will act as a good barrier and shielding the proposed building from the Hume Highway noise source.

The use of the proposed development shall not cause noise of an intrusive or offensive nature to the nearby residents at any time. Thus to comply with the requirement of Protection of the Environment Operations Act 1997 (limiting noise levels to no more than 5dBA above the background noise levels) as mentioned in clause 4.5 of this report;

Our recommendation as stated in section 10 of this report to be fully implemented, we certify that the proposed building for this project complies with relevant Australian Standards mentioned in this report.

We trust this information is satisfactory. Please contact us should you have further queries on 8838 3200.



Shony Toma A.A.A.S  
Acoustic Engineer  
MS. Env. Eng. Mgt.  
B. Sc.

## APPENDIX – A – GLAZING RECOMMENDATION

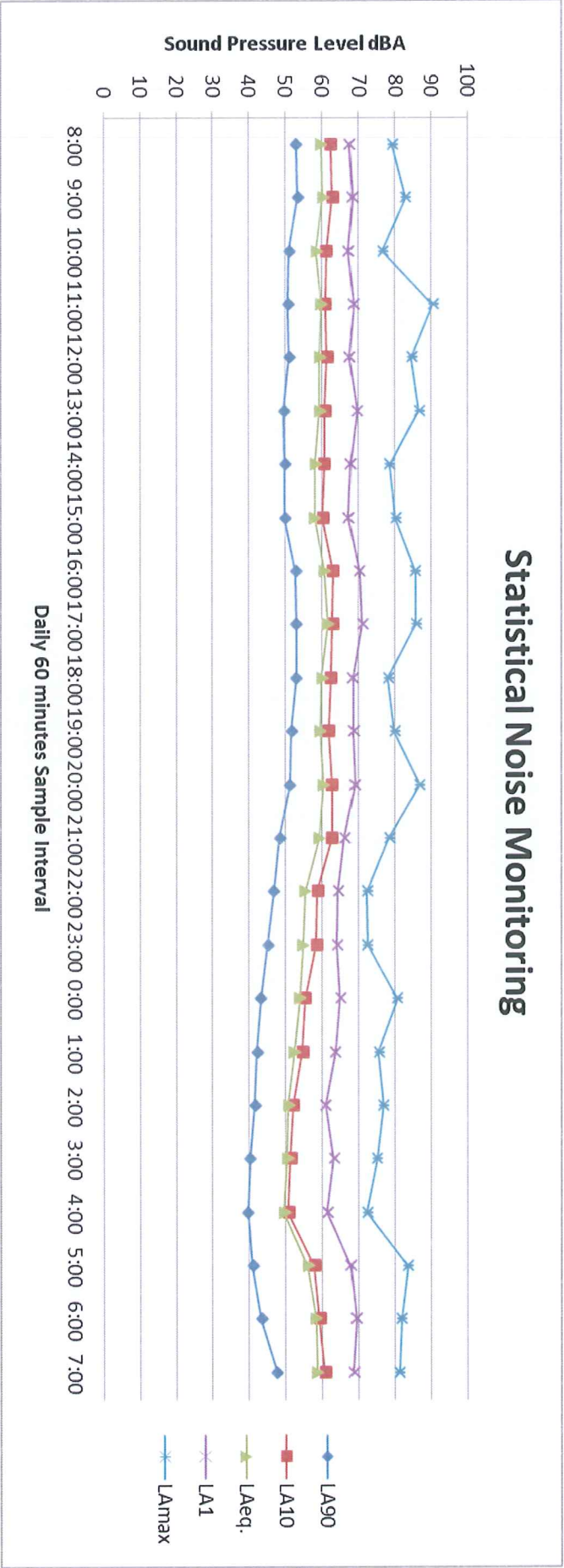
The recommended glazing is as detailed in the following table:

Levels	Location	Glazing Thickness	Acoustic Seals	Minimum Rw or STC Rating
<b>Level 0</b> Façade to Lachlan St. and Goulburn St.	Living/dining & bedrooms	6.38 mm laminated	Yes	30
<b>Level 1-3 Typical</b> Façade to Lachlan St. and Goulburn St.	Bedrooms & Living/dining rooms	6.38 mm laminated	Yes	32
<b>Level 4-7 Typical</b> Façade to Lachlan St. and Goulburn St.	Living/dining rooms	6.38mm Laminated	Yes	32
	Bedrooms	6.5mm Laminated	Yes	36
<b>Level 8</b> Façade to Goulburn St.	Living/dining & bedroom	6.38mm laminated	Yes	30
<b>Level 0</b> Façade to driveway Unit A003, A004	Bedrooms	8.5mm laminated	Yes	38
	Living/dining rooms	6.5mm laminated	Yes	36
<b>Level 1</b> Façade to driveway Unit A105	Bedrooms	6.5mm laminated	Yes	36

*Note:*

- All acoustic seal to be a Q-Lon seal type with Rw 33; and
- Any alternatives of glazing, Far West Consulting Engineers should be advised.

Appendix – B  
Daily Noise Monitoring Result







*Photo – 1 – Site Development and the context of the surrounding area*

## **APPENDIX – C**

### **PROJECT ARCHITECTURAL PLANS**

## An architectural rendering of a modern multi-story building. The building features a complex, stepped facade with multiple levels of balconies and large windows. The balconies and window frames are highlighted in a vibrant orange color, contrasting with the white and grey structural elements. The building is shown from a low-angle perspective, emphasizing its height and the intricate details of its design. The rendering is set against a plain, light-colored background.

A000	Cover Page
A001	Site Analysis
A002	Site Information
A101	Basement Plans
A102	Level 0 Plans/Shadow Diagrams
A103	Typical Floor Plans
A104	Level 8 Plan
A105	Typical Unit A-L
A106	Typical Unit M-W
A201	Elevations, Streetscapes
A301	Soil Access Study / Cross Ventilation Study
D001	Demolition Plan



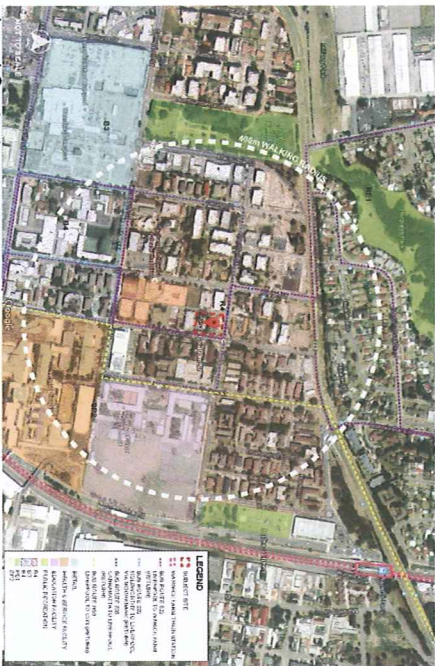
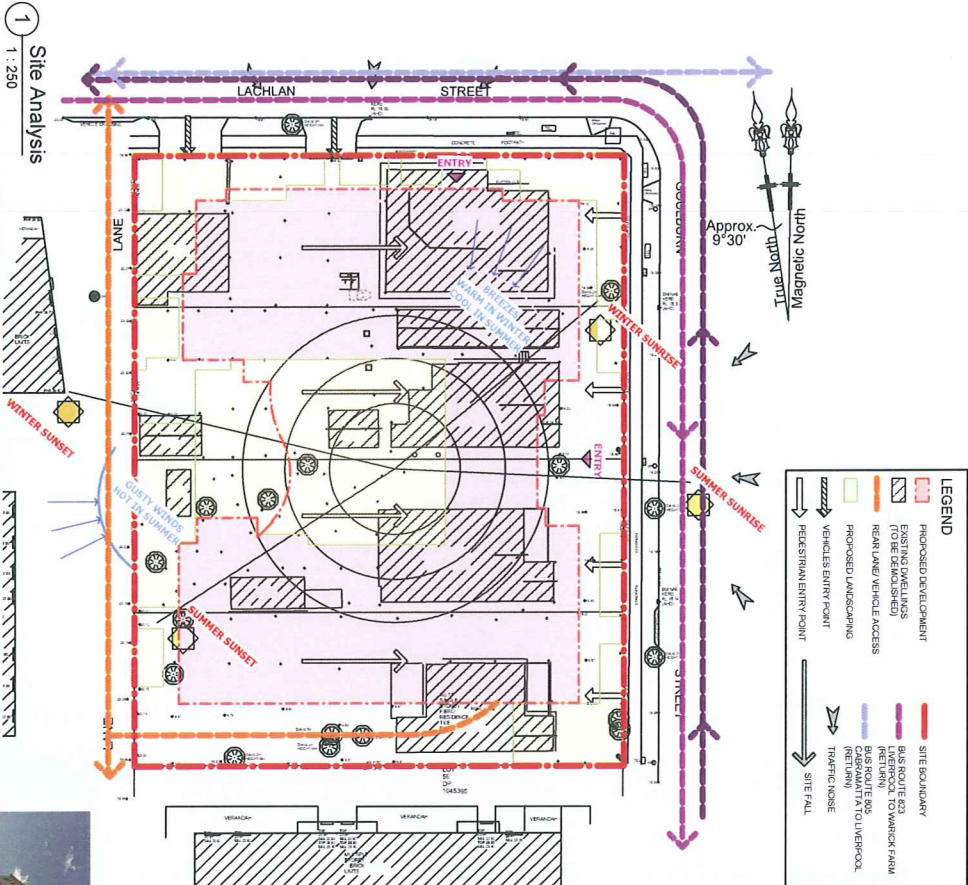
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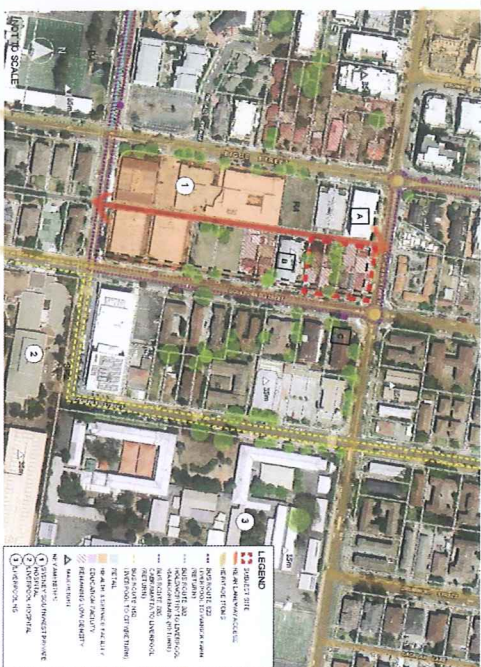
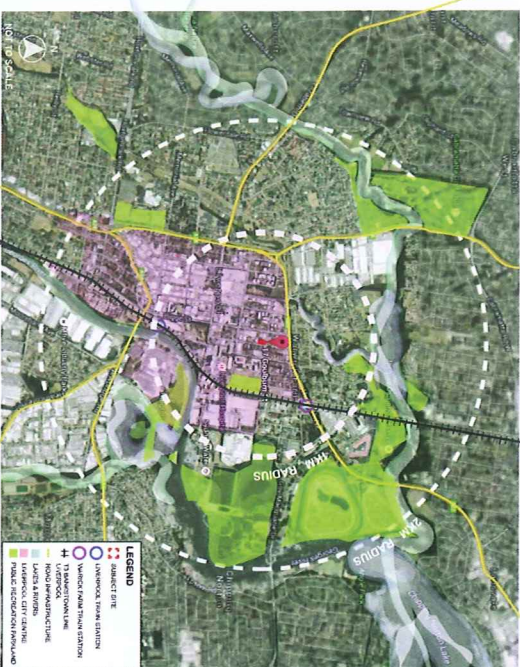




**A. Adjoining Building: 16-18 Lachlan Street**



B Adjoining Building: 25-27 Goulburn Street



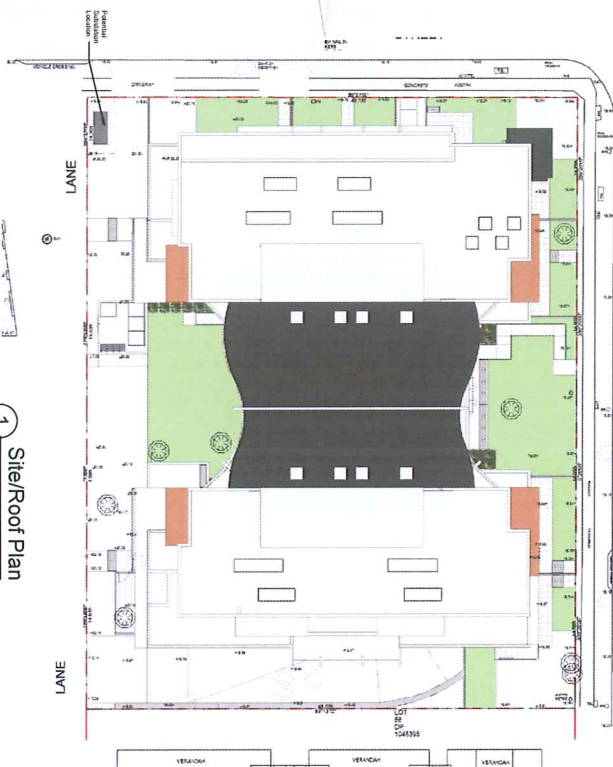
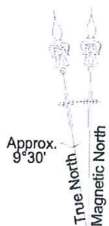
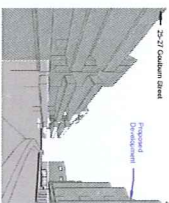
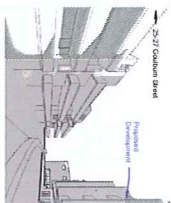
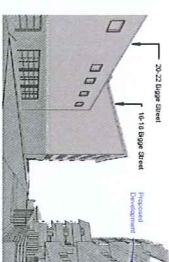
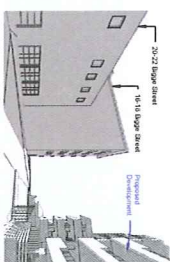
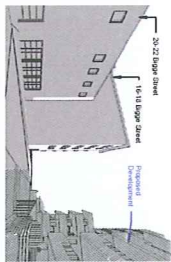
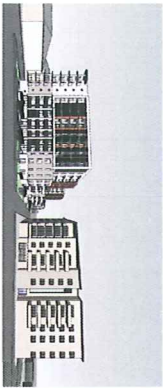
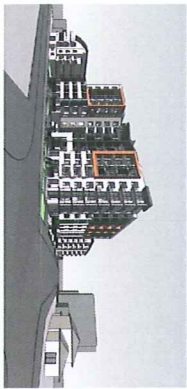
C Opposite Buildings on Goulburn Street

② Site Location

### Local Context

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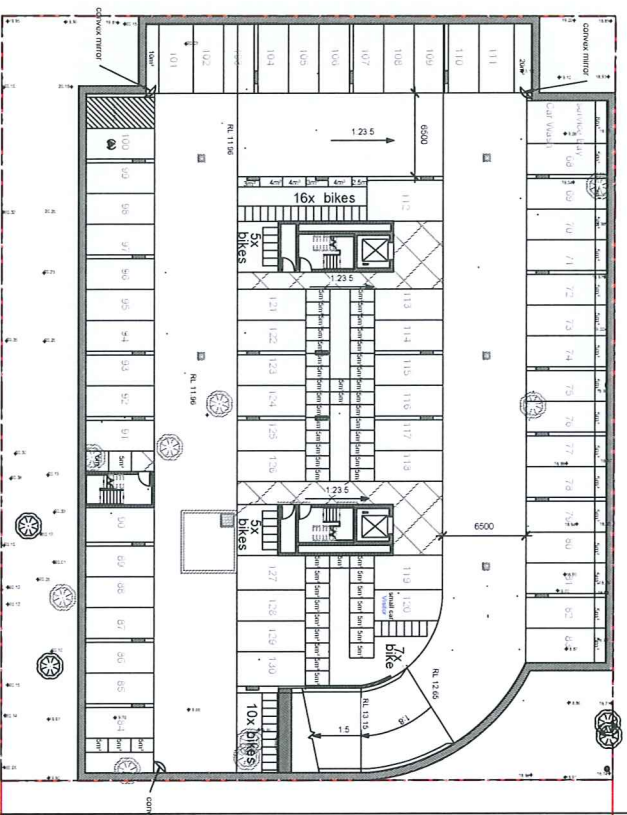
BASIC COMMITMENTS	
UNITS	EXTRA
ALL SINKS/HOLES TOILET FLUSHING KITCHEN TAPS/ BATHROOM TAPS WATER CIRCULATION OR DIVERSION RAINWATER RUNOFF TO RAINWATER TANK RAINWATER TANK CONNECTION	3 STAR RATING (4-15 BT or 6-16MM) 4 STAR RATING 5 STAR RATING NO NO NO
THERMAL ALL ROOF TO HAVE PARAPET ALL ROOF TO HAVE R.3 INSULATION HEATING LOAD AND COOLING LOAD REFER TABLE BELOW	
ENERGY HOT WATER SYSTEM HEATING AND COOLING VENTILATION TO BATHROOM VENTILATION TO KITCHEN VENTILATION TO LAUNDRY LIGHTING	GAS INSTANTANEOUS WITH 3 STAR RATING NONE INDIVIDUAL FAN DUCTED TO FACHSE OR ROOF OPERATIONAL CONTROL, MANUAL SWITCH ON/OFF INDIVIDUAL FAN NOT DUCTED OPERATIONAL CONTROL, MANUAL SWITCH ON/OFF INDIVIDUAL FAN NOT DUCTED OPERATION CONTROL, MANUAL SWITCH ON/OFF ALL LIGHTINGS TO BE EITHER LED OR FLUORESCENT LIGHTING
REFRIGERATING ALL UNITS HAVE GAS COOLANT AND ELECTRIC OVEN	
ALL UNITS HAVE INDOOR OR SHELTERED CLOTHES DRYING LINE	

[illegible]

Issue	Description	Date
A	DA Lodgement	Dec 2015

Client	Gouldburn Liverpool (NSM) P/L		
Project Address	17-23 Gouldburn Street Liverpool		
Site Information			
NOT FOR CONSTRUCTION			
Project number	2015-24		
Date	DEC 2015		
Drawn by	AH	Printed	17/12/2015 1:10:25 PM
Checked by	GF		
A002			
Scale	Drawing	Issue	
As indicated	DA	A	





Unit Area Schedule				
Unit	Occupancy	Unit Area	POS	Storage(Unit) Storage(Basement)

B044	2.6d	78.8	25.0	4.00 m	5.00 m
B445	2.6d	78.8	27.2	4.50 m	5.00 m
B446	1.9d	53.9	12.4	4.00 m	5.00 m
B407	2.6d	79.9	35.9	4.50 m	5.00 m
B407	2.6d	79.9	35.9	4.50 m	5.00 m
B501	2.6d	79.9	35.9	4.50 m	5.00 m
B502	2.6d	78.8	13.3	4.00 m	4.00 m
B503	2.6d	77.7	19.0	4.00 m	5.00 m
B504	2.6d	83.9	25.9	4.00 m	5.00 m
B505	2.6d	78.7	27.2	4.50 m	5.00 m
B506	1.9d	53.9	12.4	4.00 m	5.00 m
B507	2.6d	79.9	35.9	4.50 m	5.00 m
B601	2.6d	79.9	35.9	4.50 m	5.00 m
B602	2.6d	78.8	13.3	4.00 m	4.00 m
B603	2.6d	77.7	19.0	4.00 m	5.00 m
B604	2.6d	83.9	25.9	4.00 m	5.00 m
B605	2.6d	78.7	27.2	4.50 m	5.00 m
B606	1.9d	53.9	12.4	4.00 m	5.00 m
B607	2.6d	79.9	35.9	4.50 m	5.00 m
B701	2.6d	79.9	35.9	4.50 m	5.00 m
B702	2.6d	77.7	19.0	4.00 m	5.00 m
B703	2.6d	83.9	25.9	4.00 m	5.00 m
B704	2.6d	78.8	13.3	4.50 m	5.00 m
B705	1.9d	53.9	12.4	4.00 m	5.00 m
B707	2.6d	79.9	35.9	4.50 m	5.00 m
B801	2.6d	85.9	29.9	4.50 m	5.00 m
B802	2.6d	88.9	32.9	4.50 m	5.00 m

Client	Goulburn Liverpool (NSW) P/L		
Project Address	17-23 Goulburn Street Liverpool		
Basement Plans			
NOT FOR CONSTRUCTION			
Project number	2015-24		
Date	DEC 2015		
Drawn by	AH	Printed	7/12/2015 1:10:27 PM
Checked by	GF		
A101			
Scale	Drawing	Issue	
As indicated	DA	A	





GOULBURN

STREET



**Gus Fares Architects P.L.L.C.**

ACI 11.209.1237  
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Paramatta NSW 2150  
email: [gudglens@glens.com](mailto:gudglens@glens.com) [www.glens.com](http://www.glens.com)  
Normalised Architect: Chastain / Evans, Rog 5606



**Notes:**

1. Do not scale the drawings, read all dimensions shown.
2. The contractor shall check and verify all dimensions before commencing any work, and shall use it as a guide.
3. The drawings shall be in accordance with the Australian Standards (AS) and the Building Code of Australia (BCA).
4. This document is for the purposes of development application approval only. They cannot be used as construction documents. Tender documents contain the construction documents.
5. All events should be read as one document. For any discrepancy, the project manager should return the architect immediately.
6. Note that ground levels may vary due to site conditions.

2 Mid-Winter 9am  
1 : 500

7/12/2015 1:12:19 PM





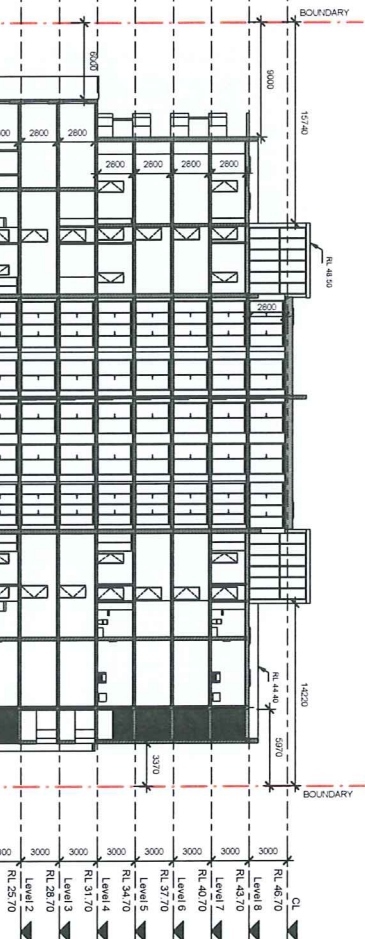
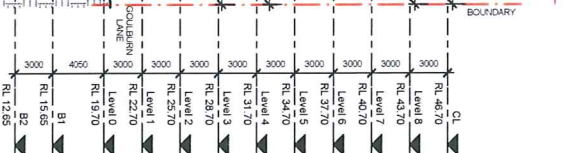




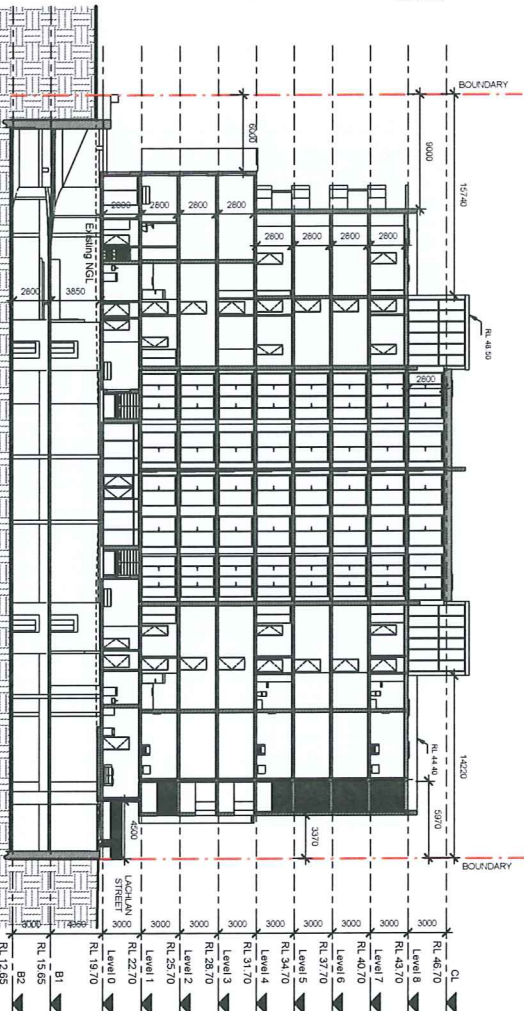
STREET



**Cross Section**  
1 : 200



4 Long Section  
1 : 200



ACN 115261237  
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Suite 22, 103 George Street,  
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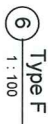
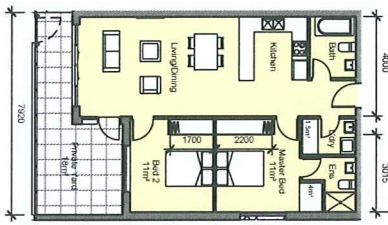
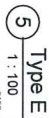
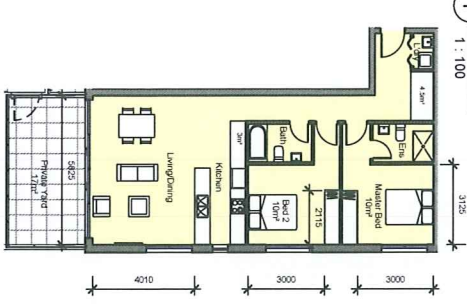
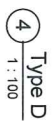
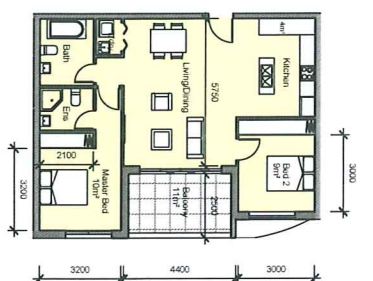
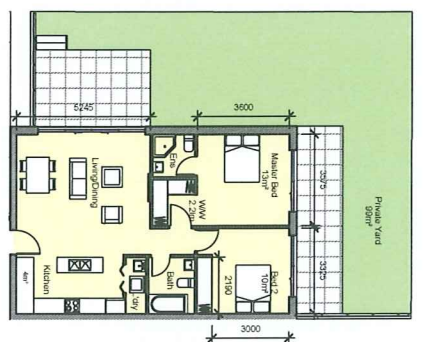
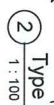
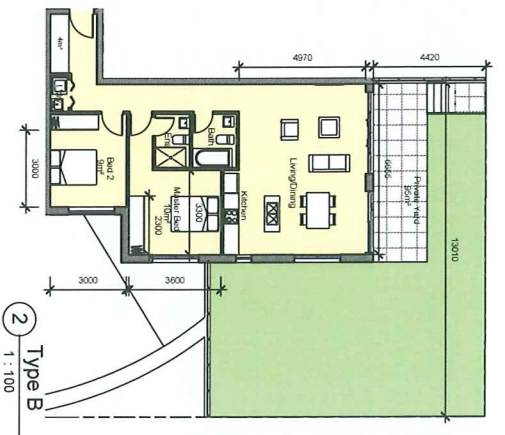
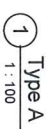
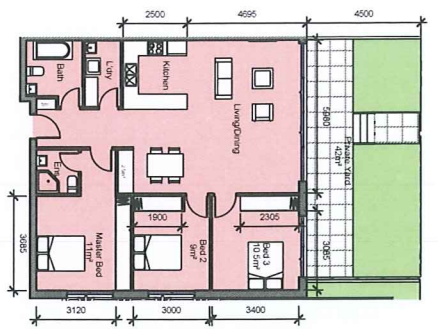
1. Do not scale the drawings, read all dimensions shown.
2. The contractor shall check and verify all dimensions before commencing new work, and shall say if it doesn't.
3. The contractor shall comply with all relevant Australian Standards (AS) and the Building Code of Australia (BCA).
4. This document is for the purpose of Development Approval (DA) approval only. It may cannot be used as a contract document, nor as a basis for contract administration drawings, nor working drawings.
5. All sheets should be read as one document. For any discrepancy, the project manager should inform the architect immediately.
6. Note that ground levels may vary due to site conditions.

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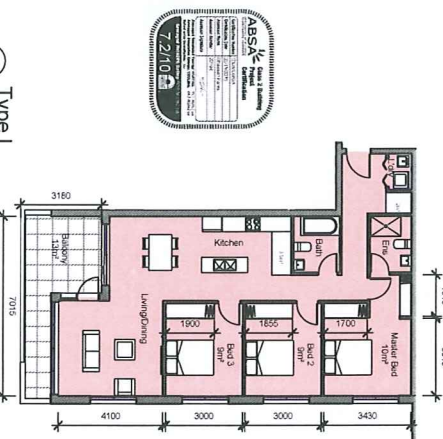
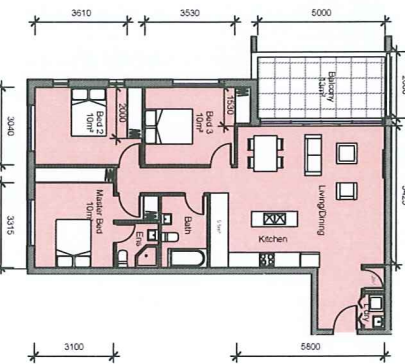
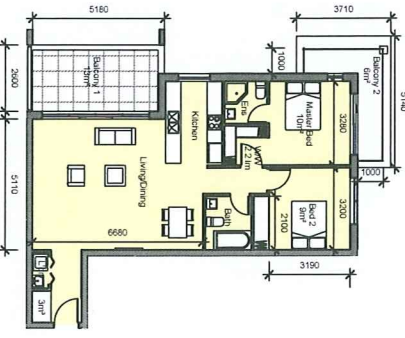
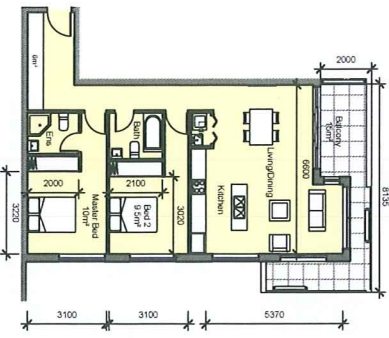
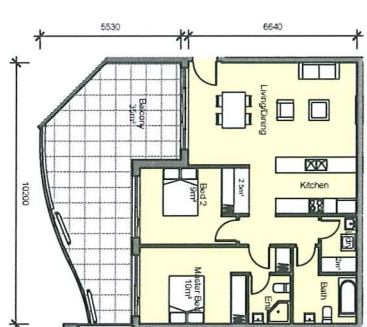
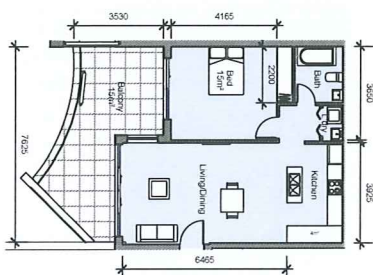
Issue	Description	Date
A	DA Lodgement	Dec 2015

Client	Goulburn Liverpool (NSW) PIL		
Project address	17-23 Goulburn Street Liverpool		
Level 8 Plan			
NOT FOR CONSTRUCTION			
Project number	2015-24		
Date	DEC 2015		
Drawn by	AH	Printed 7/12/2015 11:13:36	
Checked by	GF		
A104			
Scale	Drawing	DA	Issue
As indicated			A

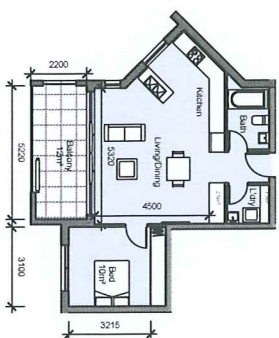
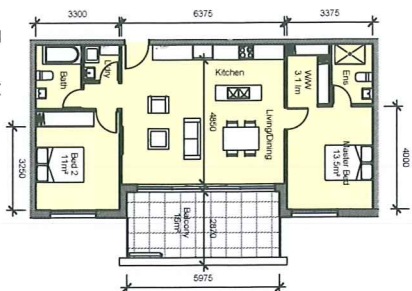
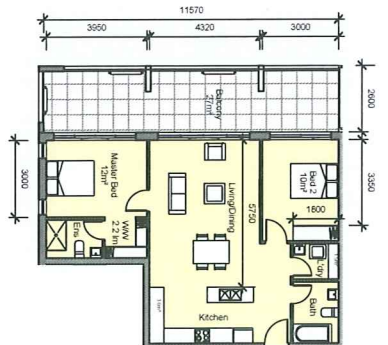
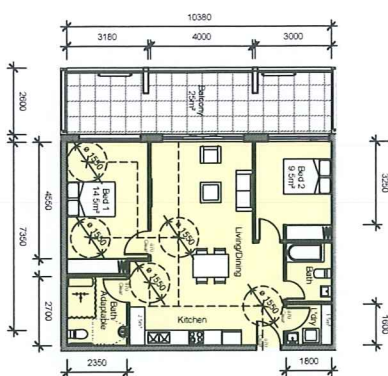
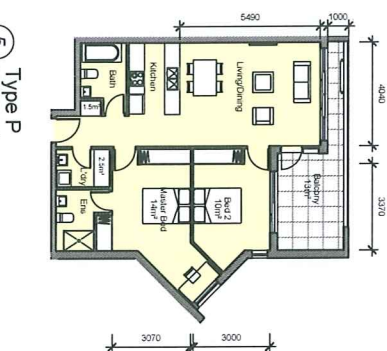
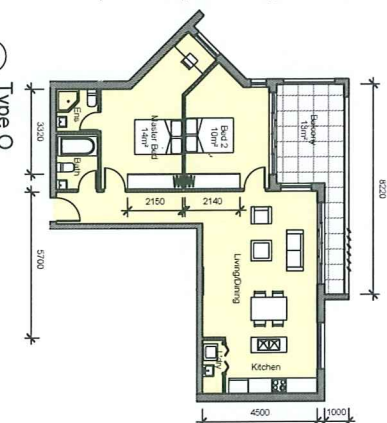
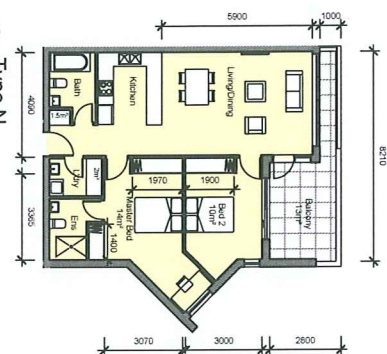
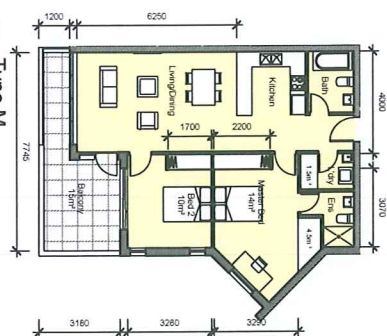




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	A003	1
	A004	1
	A005	1
	A006	2
	A007	1
	A008	1
	A009	14
	A010	3
Type B	B101	3
	B102	3
	B103	5
	B104	3
	B105	4
	B106	6
	B107	6
	B108	6
	B109	11
	B110	4
Type C	C201	4
	C202	4
	C203	4
	C204	4
	C205	4
	C206	4
	C207	4
	C208	4
	C209	4
	C210	4
Type D	D301	4
	D302	4
	D303	4
	D304	4
	D305	4
	D306	4
	D307	4
	D308	4
	D309	4
	D310	4
Type E	E401	4
	E402	4
	E403	4
	E404	4
	E405	4
	E406	4
	E407	4
	E408	4
	E409	4
	E410	4
Type F	F501	2
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	F504	2
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Type G	G601	2
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Type H	H701	2
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	H703	2
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Type I	I801	2
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	I803	2
	I804	2
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Type J	J901	2
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Type K	K001	2
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	K010	2
Type L	L101	2
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Type M	M201	2
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Type N	N301	2
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	N304	2
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Type O	O401	2
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	O404	2
	O405	2
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	O408	2
	O409	2
	O410	2
Type P	P501	2
	P502	2
	P503	2
	P504	2
	P505	2
	P506	2
	P507	2
	P508	2
	P509	2
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Type Q	Q601	2
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	Q603	2
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Type R	R701	2
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Type S	S801	2
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Type T	T901	2
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	T910	2
Type U	U001	2
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	U003	2
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	U005	2
	U006	2
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	U010	2
Type V	V101	2
	V102	2
	V103	2
	V104	2
	V105	2
	V106	2
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Type W	W201	2
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Type X	X301	2
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	X309	2
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Type Y	Y401	2
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	Y405	2
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	Y410	2
Type Z	Z501	2
	Z502	2
	Z503	2
	Z504	2
	Z505	2
	Z506	2
	Z507	2
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Type AA	AA601	2
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Type AB	AB701	2
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Type AC	AC801	2
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Type AD	AD901	2
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Type AE	AE001	2
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Type AF	AF101	2
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Type AG	AG201	2
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Type AH	AH301	2
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Type AI	AI401	2
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Type AJ	AJ501	2
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Type AK	AK601	2
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Type AL	AL701	2
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Type AM	AM801	2
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Type AN	AN901	2
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Type AO	AO001	2
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Type AP	AP101	2
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Type AQ	AQ201	2
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Type AR	AR301	2
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Type AS	AS401	2
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Type AT	AT501	2
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Type AU	AU601	2
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Type AV	AV701	2
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Type AW	AW801	2
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	AX904	2
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Type AY	AY001	2
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Type BB	BB301	2
	BB302	2
	BB303	2
	BB304	2
	BB305	2
	BB306	2
	BB307	2
	BB308	2
	BB309	2
	BB310	2
Type BC	BC401	2
	BC402	2
	BC403	2
	BC404	2
	BC405	2
	BC406	2
	BC407	2
	BC408	2
	BC409	2
	BC410	2
Type BD	BD501	2
	BD502	2
	BD503	2
	BD504	2
	BD505	2
	BD506	2
	BD507	2
	BD508	2
	BD509	2
	BD510	2
Type BE	BE601	2
	BE602	2
	BE603	2
	BE604	2
	BE605	2
	BE606	2
	BE607	2
	BE608	2
	BE609	2
	BE610	2
Type BF	BF701	2
	BF702	2
	BF703	2
	BF704	2
	BF705	2
	BF706	2
	BF707	2
	BF708	2
	BF709	2
	BF710	2
Type BG	BG801	2
	BG802	2
	BG803	2
	BG804	2
	BG805	2
	BG806	2
	BG807	2
	BG808	2
	BG809	2
	BG810	2
Type BH	BH901	2
	BH902	2
	BH903	2
	BH904	2
	BH905	2
	BH906	2
	BH907	2
	BH908	2
	BH909	2
	BH910	2
Type BI	BI001	2
	BI002	2
	BI003	2
	BI004	2
	BI005	2
	BI006	2
	BI007	2
	BI008	2
	BI009	2
	BI010	2
Type BJ	BJ101	2
	BJ102	2
	BJ103	2
	BJ104	2
	BJ105	2
	BJ106	2
	BJ107	2
	BJ108	2
	BJ109	2
	BJ110	2
Type BK	BK201	2
	BK202	2
	BK203	2
	BK204	2
	BK205	2
	BK206	

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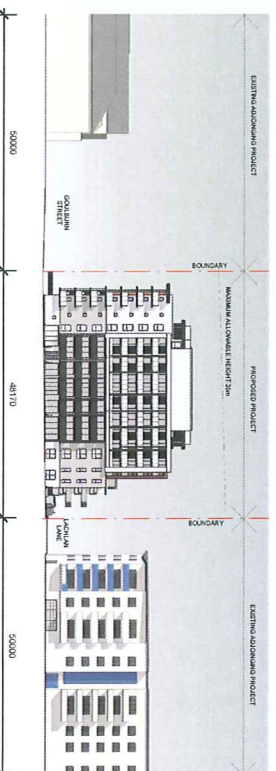
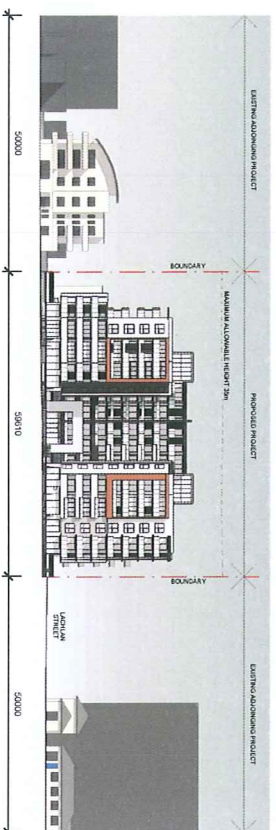
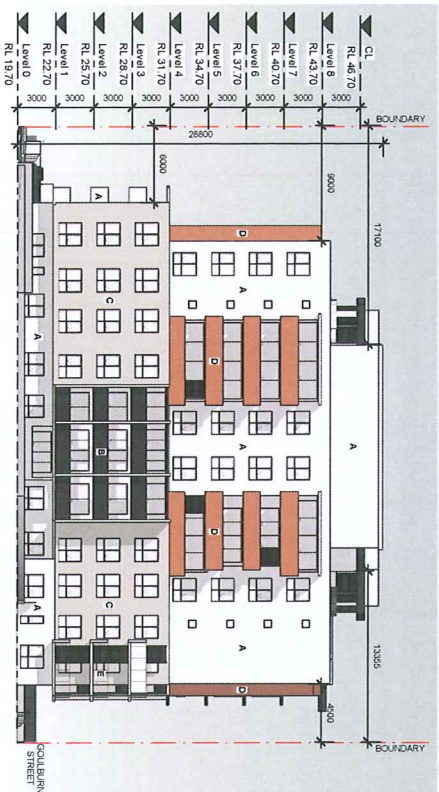
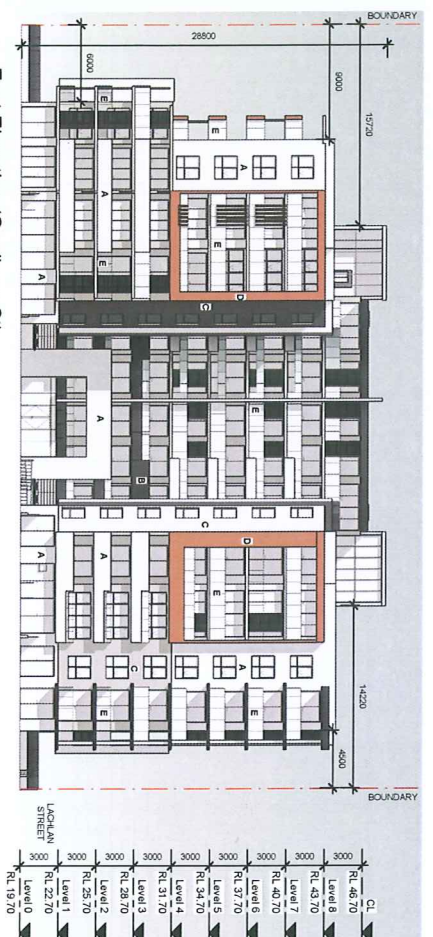




Unit Type	Unit Number	Counts
199A	4001-5001	2
199B	5002	1
199C	5003	1
199D	5004	1
199E	5005	1
199F	5006-5008	2
199G	4010-5017 and 5019-5023	16
199H	4018-5020	3
199I	5021-5023	3
199J	5024	3
199K	5025-5027	3
199L	5028-5030 and 5032-5036	6
199M	4033-5035 and 5037-5039	6
199N	4036-5038 and 5040-5042	6
199O	4039-5041 and 5043-5044	11
199P	5045-5050	6
199Q	5051-5052	2
199R	4053-5054 and 5056-5058	11
199S	5059-5063	5
199T	4064-5065	2
199U	4066-5068	3
199V	4069-5070 and 5068-5069	4
199W	5071-5072	2
Total	22 Types	108 Units

[illegible]



[illegible]



Parramatta NSW 2150  
email: [outriders@outriders.com.au](mailto:outriders@outriders.com.au) web: [www.outriders.com.au](http://www.outriders.com.au)

James Fares Architects P.L. (JFA) are the owners of the building in these drawings, plans, design and specifications.

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- 1 Do not scale the drawings, read all dimensions shown.
- 2 The contractor shall check and verify all dimensions before commencing new work, and shall say so in detail.
- 3 The contractor shall comply with all relevant Australian Standards (AS) and the Building Code of Australia (BCA).
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- 5 All sheets should be read as one document. For any discrepancy, the project manager should return the document immediately.
- 6 Note that drawings may vary due to site conditions.

[illegible]

Client	Goulburn Liverpool (NSW) P/L
Project Address	

17-23 Goulburn Street Liverpool

Solar Access Study /  
Ventilation Study

NOT FOR CONSTRUCTION

2015-2

DEC 2011

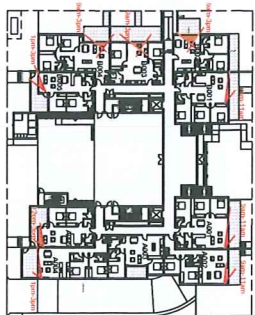
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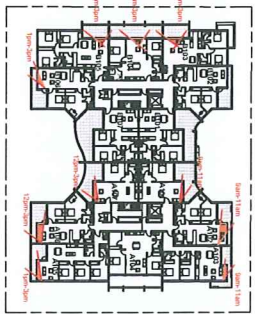
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A301

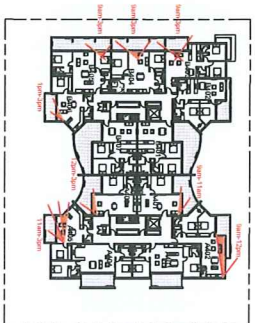
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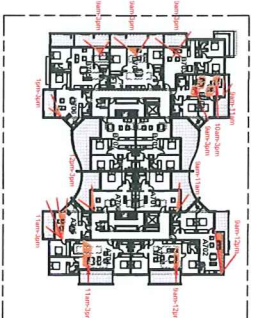
1 Solar Access\_Level 0  
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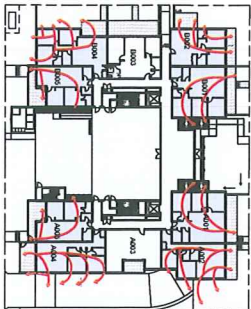
② Solar Access\_Level 1-3  
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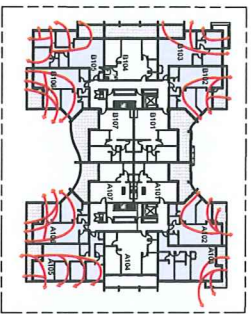
3 Solar Access\_Level 4-6  
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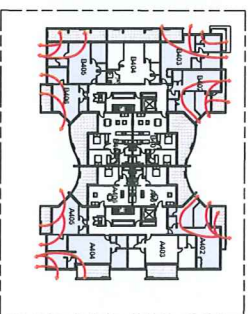
4 Solar Access\_Level 7  
1 : 500



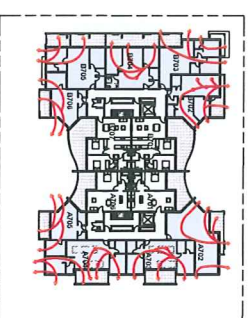
6 Natural Ventilations\_ Level 0  
1 : 500



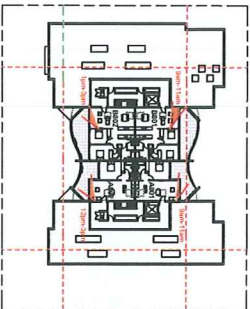
7 Natural Ventilation\_Level 1-3  
1 : 500



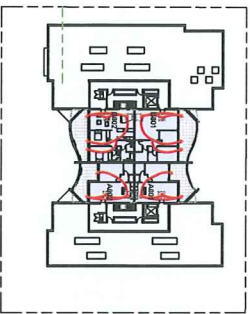
8 Natural Ventilation\_Level 4-6  
1 : 500



9 Natural Ventilations\_Level 7  
1 : 500



5 Solar Access\_Level 8  
1 : 500



10 Natural Ventilation\_Level 8  
1 : 500

Solar Access & Natural Ventilation...			
Number	Natural Ventilation	Solar Access	
A001	Yes	Yes	
A002	Yes	Yes	
A003	No	No	
A004	Yes	Yes	
A005	Yes	Yes	
B001	Yes	Yes	
B002	Yes	Yes	
B003	No	Yes	
B004	Yes	Yes	
B005	Yes	Yes	
A101	No	Yes	
A102	Yes	Yes	
A103	No	Yes	
A104	No	No	
A105	Yes	Yes	
A106	Yes	Yes	
A107	No	Yes	
B101	No	No	
B102	Yes	No	
B103	Yes	Yes	
B104	No	Yes	
B105	Yes	Yes	
B106	Yes	Yes	
B107	No	Yes	
A201	No	Yes	
A202	Yes	Yes	
A203	Yes	Yes	
A204	No	No	

Solar Access & Natural Ventilation			
Number	Natural Ventilation	Solar Access	
A205	Yes	Yes	
A206	Yes	Yes	
A207	Yes	Yes	
B201	No	No	
B202	Yes	Yes	
B203	Yes	Yes	
B204	No	Yes	
B205	Yes	Yes	
B206	Yes	Yes	
B207	No	Yes	
A301	No	Yes	
A302	Yes	Yes	
A303	Yes	Yes	
A304	No	No	
A305	Yes	Yes	
A306	Yes	Yes	
A307	Yes	Yes	
B301	No	Yes	
B302	No	No	
B303	Yes	Yes	
B305	Yes	Yes	
B306	Yes	Yes	
B307	No	Yes	
A401	No	Yes	
A402	Yes	Yes	
A403	Yes	Yes	
A404	Yes	No	

Solar Access & Natural Ventilation			
Number	Natural Ventilation	Solar Access	
A405	Yes	Yes	
A406	No	Yes	
B401	No	No	
B402	Yes	No	
B403	Yes	No	
B404	No	Yes	
B405	Yes	Yes	
B406	Yes	Yes	
B407	No	No	
A501	No	Yes	
A502	Yes	Yes	
A503	Yes	No	
A504	Yes	No	
A505	Yes	Yes	
A506	No	Yes	
B501	No	No	
B502	Yes	No	
B503	Yes	Yes	
B504	Yes	Yes	
B505	Yes	Yes	
B506	Yes	Yes	
B507	No	Yes	
A601	No	Yes	
A602	Yes	Yes	
A603	No	No	
A604	Yes	No	
A605	Yes	Yes	
A606	No	Yes	

Solar Access & Natural Ventilation		
Number	Natural Ventilation	Solar Access
B6B1	No	No
B6B2	Yes	No
B6B3	Yes	No
B6B4	No	Yes
B6B5	Yes	Yes
B6B6	Yes	Yes
B6B7	No	No
A7C1	No	Yes
A7C2	Yes	Yes
A7C3	Yes	Yes
A7C4	Yes	Yes
A7C5	Yes	Yes
A7C6	No	Yes
B7D1	No	No
B7D2	Yes	Yes
B7D3	Yes	Yes
B7D4	Yes	Yes
B7D5	Yes	Yes
B7D6	Yes	Yes
B7D7	No	No
A8E1	Yes	Yes
A8E2	Yes	Yes
B9E1	Yes	Yes
B9E2	Yes	Yes
	61%	72%