

BASIX Assessment
for Precinct 3 of the proposed development
Pemulwuy, Redfern

December 13, 2011

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1.0 Introduction

This study investigates the estimated thermal comfort and water and energy usage of the residential components of Precinct 3 of the proposed development known as Pemulwuy, located in Redfern. The assessment is carried out using online BASIX and BERS Pro Thermal Performance assessment tool. This assessment is based on the architectural drawings prepared by Nordon Jago Architects, dated 2nd December, 2011, and are attached in Appendix C of this report.

2.0 Analysis

A BASIX assessment is split into three sections; Water, Thermal Comfort and Energy. Each section measures the efficiency of the development in these areas. For the Water and Energy sections, the development is given a score based on the efficiency. BASIX sets a minimum score in these areas that the development must satisfy. The Thermal Performance section of the BASIX assessment requires a BERS Pro simulation to be undertaken. BASIX sets requirements on the maximum heating and cooling loads for each residential apartment of the development. The results of this are rated in BASIX as either a pass or fail.

2.1 Water Usage

The water usage of the development is measured based on the area of gardens/lawn and the number and efficiency of permanent fixtures within the development (such as showerheads, taps and toilets). The development is given a rating, with BASIX requiring a minimum rating of 40% to pass this section.

Bonus points are available in this section by using a rainwater tank. Water from a rainwater tank can be used for the outdoor landscape, private garden/lawn, laundry and toilets.

2.2 Thermal Comfort

The thermal comfort of the development is measured using the BERS Pro Thermal Performance assessment tool. This gives an expected level of energy consumption (expressed in MegaJoules used per square metre per annum) for the heating and cooling loads.

The thermal comfort of the development can be improved by using higher performance building materials (such as performance glazing) and/or insulation materials. BASIX sets a maximum heating and cooling load that the development is to achieve. This is given as a weighted average heating and cooling load for the entire development, **and** for each

individual unit to achieve. Bonus points can be obtained for the cooling load through natural ventilation throughout the development.

2.3 Energy Usage

The energy section of the BASIX assessment measures the energy efficiency of the development based on the efficiency of the fixed appliances to be used. This includes the hot water system, air-conditioning system, exhaust fans, lighting and the cook top/oven. If a pool is to be included in the proposal then the efficiency measure of the pool heater and the pool pump is also required. The development is given a rating, with BASIX requiring a minimum rating of 20% to pass this section.

3.0 Results of the BASIX Assessment

3.1 Water

The target score in BASIX to achieve water usage compliance is **40%**. For the proposed development a score of **40%** is achieved through the following;

- At least 90% of public landscaping area (1000m²) of landscaping is to be of indigenous or low water use species.
- The common areas toilets and taps should have a water efficiency rating of at least 4.0 Stars.
- The common areas clothes washers should have a water efficiency rating of at least 3.0 Stars.
- All showerheads within each residential dwelling of the proposed development should have a water efficiency rating of at least 3.0 Stars (>6.0 but <=7.5L/min).
- All toilets, kitchen and bathroom taps within each residential dwelling of the proposed development should have a water efficiency rating of at least 5.0 Stars.

3.2 Thermal Comfort

The BERS Pro assessments take into account the following fundamental aspects of energy efficient design:

- The orientation and size of the walls.
- The location, proportion and type of windows and doors, and any internal or external coverings to them.
- The materials and colours of the exterior of the building.
- Internal floor, wall and ceiling materials.
- Cross ventilation.
- Provision of any insulation in walls, roof or ceiling.
- Overshadowing to walls and windows from eaves, other parts of the development and neighbours.
- The topography and climate of the area around the proposed development.

In BASIX, the required weighted averaged maximum heating and cooling loads of the **entire** proposed development are **51.0 MJ/m²/year for heating** and **45.0 MJ/m²/year for cooling** and **for each individual unit** a maximum heating and cooling load of **66.0 MJ/m²/year for heating** and **59.0 MJ/m²/year for cooling**. The required heating and cooling loads for the individual residential dwellings are indicated in Table 2. Note that the overall weighted average heating and cooling loads are significantly harder to achieve than the individual unit requirements indicated in Table 2.

3.2.1 Initial Results

The following construction materials were initially selected for the assessment. Note that the materials described are not prescriptive. The construction materials used on the subject development should be selected to have similar performance characteristics as the ones detailed below so as not to effect the overall thermal performance rating of each apartment. The U-value and Solar Heat Gain Coefficient (SHGC) for the glazing is also indicated. Note that the floor coverings and wall construction materials vary as per the architectural drawings.

- The external walls of the building are Cavity Brick. No wall insulation has been initially proposed.
- The inter-tenancy walls between the dwellings are Single Brick. No wall insulation has been initially proposed.
- The internal walls within the development are plasterboard on studs. No internal wall insulation has been initially proposed.

- The glazing **systems** will have the following properties: U = 6.57, SHGC = 0.74. This typically represents a single clear glazing, set within an aluminium frame system.
- The floor coverings will be carpet in the living and bedrooms, with tiles for the kitchen, bathroom and ensuite. The floors will be concrete slabs. No initial insulation is proposed for the floors.
- The ceilings will be plasterboard suspended from concrete with no initial insulation proposed.
- The roof will be concrete slab with no initial insulation proposed.

The climate zone selected for analysis was Climate Zone 56 (Sydney East). The results of the analysis, indicated in Table 2, indicate that several of the residential units within the proposed development will not satisfy the individual thermal requirements of BASIX. The weighted average heating and cooling loads for the proposed development, with the construction materials listed above, are listed below.

- **Heating Load: 47.4 MJ/m²/year**
- **Cooling Load: 23.1 MJ/m²/year**

Although the proposed development satisfies the weighted average thermal requirements of BASIX, several of the residential dwellings do not satisfy the individual thermal requirements. Hence treatment is required to some of the residential units of the development.

3.2.2 Results with Treatments

Further analysis of the proposed development resulted in some recommended treatments to achieve the BASIX requirements for thermal performance. Note that the following dwelling numbers listed are in accordance with those indicated in the architectural drawings. The recommended treatments are listed in the following Table 1 for the residential dwellings of Precinct 1:

Table 1: Recommended Treatments – Precinct 3

Unit Numbers	Recommended Treatment(s)
U24, U27, U30, U33, U36, U39, U42	<ul style="list-style-type: none"> • R2.5 Ceiling Insulation is to be installed.
All remaining units	<ul style="list-style-type: none"> • No treatment required

The glazing types selected for the windows of the proposed development should *at least* satisfy the required performance data listed in this report. Higher performing glass types than those listed in this report are also

acceptable. Reducing the amount of glazing in each unit is expected to significantly increase the thermal performance of each unit. That is, alternative glazing systems or specifications may be used if their U value is lower, and the SHGC value is less than 10% higher or lower, than the U and SHGC values of the product specified above.

With these treatments in place the weighted average maximum heating and cooling loads are **40.4 MJ/m²/year for heating** and **23.7 MJ/m²/year for cooling**.

The BASIX requirements for the weighted averaged maximum heating and cooling loads of the entire proposed development are **51.0 MJ/m²/year for heating** and **45.0 MJ/m²/year for cooling**. Hence, with the recommended treatments listed above, the proposed development will satisfy the thermal performance requirements of BASIX.

Table 2: BERS Pro Thermal Performance Results

Unit Number	BASIX Requirements (MJ/m ² /year)		Initial Results (MJ/m ² /year) (no treatments)		Final Results (MJ/m ² /year) (with treatments)	
	Heating	Cooling	Heating	Cooling	Heating	Cooling
P3-U01	66.0	59.0	57.9	29.9	57.9	29.9
P3-U02	66.0	59.0	42.4	24.4	42.4	24.4
P3-U03	66.0	59.0	42.4	24.4	42.4	24.4
P3-U04	66.0	59.0	42.4	24.4	42.4	24.4
P3-U05	66.0	59.0	42.4	24.4	42.4	24.4
P3-U06	66.0	59.0	42.4	24.4	42.4	24.4
P3-U07	66.0	59.0	65.2	28.6	65.2	28.6
P3-U08	66.0	59.0	55.9	23.7	55.9	23.7
P3-U09	66.0	59.0	62.8	21.3	62.8	21.3
P3-U10	66.0	59.0	64.2	20.6	64.2	20.6
P3-U11	66.0	59.0	64.2	20.6	64.2	20.6
P3-U12	66.0	59.0	64.2	20.6	64.2	20.6
P3-U13	66.0	59.0	64.2	20.6	64.2	20.6
P3-U14	66.0	59.0	61.2	21.9	61.2	21.9
P3-U15	66.0	59.0	51.6	24.6	51.6	24.6
P3-U16	66.0	59.0	22.8	21.6	22.8	21.6
P3-U17	66.0	59.0	22.8	21.6	22.8	21.6
P3-U18	66.0	59.0	22.8	21.6	22.8	21.6
P3-U19	66.0	59.0	22.8	21.6	22.8	21.6

Table 2: BERS Pro Thermal Performance Results (cont...)

Unit Number	BASIX Requirements (MJ/m ² /year)		Initial Results (MJ/m ² /year) (no treatments)		Final Results (MJ/m ² /year) (with treatments)	
	Heating	Cooling	Heating	Cooling	Heating	Cooling
P3-U20	66.0	59.0	22.8	21.6	22.8	21.6
P3-U21	66.0	59.0	39.2	36.0	39.2	36.0
P3-U22	66.0	59.0	46.5	25.5	46.5	25.5
P3-U23	66.0	59.0	40.3	31.9	40.3	31.9
P3-U24	66.0	59.0	93.5	26.1	57.8	20.8
P3-U25	66.0	59.0	18.1	13.2	18.1	13.2
P3-U26	66.0	59.0	21.3	23.4	21.3	23.4
P3-U27	66.0	59.0	81.1	20.4	55.3	21.1
P3-U28	66.0	59.0	18.1	13.2	18.1	13.2
P3-U29	66.0	59.0	21.3	23.4	21.3	23.4
P3-U30	66.0	59.0	81.1	20.4	55.3	21.1
P3-U31	66.0	59.0	18.1	13.2	18.1	13.2
P3-U32	66.0	59.0	21.3	23.4	21.3	23.4
P3-U33	66.0	59.0	81.1	20.4	55.3	21.1
P3-U34	66.0	59.0	18.1	13.2	18.1	13.2
P3-U35	66.0	59.0	21.3	23.4	21.3	23.4
P3-U36	66.0	59.0	81.1	20.4	55.3	21.1
P3-U37	66.0	59.0	18.1	13.2	18.1	13.2
P3-U38	66.0	59.0	21.3	23.4	21.3	23.4
P3-U39	66.0	59.0	81.1	20.4	55.3	21.1
P3-U40	66.0	59.0	61.0	24.2	61.0	24.2
P3-U41	66.0	59.0	42.6	28.7	42.6	28.7
P3-U42	66.0	59.0	110.0	32.5	62.7	31.0
Caretaker	66.0	59.0	64.6	43.1	64.6	43.1

3.3 Energy

The target score in BASIX to achieve energy usage compliance is **20%**. A score of **25%** is achieved for the development through the following;

- The central hot water system is to be gas instantaneous. All piping (internal and external) for the system is to include R0.3 (~13mm) insulation.
- The lift systems in the development are to be gearless traction with VVVF motor.
- The clothes dryer and clothes washer in the common area are to have an energy rating of at least 2.5 stars.
- The mechanical ventilation system within the student Lounge will be an air conditioning system and is to be controlled by time clock.
- The mechanical ventilation system within laundry and WC in common area will be ventilation exhaust only.
- No mechanical ventilation system has been proposed within the lobbies and hallways of the proposed development.
- All lighting within the Student Lounge, laundry, WC, lifts, lobbies and hallways are to be compact fluorescent.
- The lighting system in the lobbies is to be controlled by time clocks.
- The lighting system in each lift is to be connected to the lift call button.
- The lighting system in all remaining common area rooms (such as Student Lounge, Laundry, WC) is to be controlled by a manual on/off switch.
- The kitchen, bathroom and laundry exhaust fans of all tower residential dwellings are ducted to the façade and are to be controlled by manual on/off switches.
- No cook-tops or ovens are to be installed within any of the dwellings of the proposed development¹.

Note that if any of the above systems are to be substituted by less efficient systems, an update to the BASIX certificate would also be required.

¹ Note an alternative BASIX assessment has been performed for Precinct 3 due to the exclusion of cooking facilities (cook-tops/ovens). BASIX will input a unique commitment that no cooking facilities are to be installed.

4.0 Conclusion

A BASIX assessment of the residential components of Precinct 3 of the proposed development known as Pemulwuy Eveleigh, located in Redfern has been carried out. The results of the assessment indicate that the development will satisfy the requirements of BASIX if all of the items outlined in this report are carried out.

The certified architectural drawings, ABSA certificate and BASIX certificate are attached in the following appendices of this report.

Appendix A

BASIX Certificate

BASIX[®]Report

Building Sustainability Index www.basix.nsw.gov.au

Project summary		
Project name	Pemulwuy Project, Precinct 3 Student H	
Street address	1 Eveleigh Street Redfern 2016	
Local Government Area	Sydney City Council	
Plan type and plan number	deposited 2/230305	
Lot no.	113	
Section no.	-	
No. of unit buildings	1	
No. of units in unit buildings	43	
No. of attached dwelling houses	0	
No. of separate dwelling houses	0	
Project score		
Water	40	Target 40
Thermal Comfort	Pass	Target Pass
Energy	25	Target 20

Description of project

Project address	
Project name	Pemulwuy Project, Precinct 3 Student H
Street address	1 Eveleigh Street Redfern 2016
Local Government Area	Sydney City Council
Plan type and plan number	deposited 2/230305
Lot no.	113
Section no.	-
Project type	
No. of unit buildings	1
No. of units in unit buildings	43
No. of attached dwelling houses	0
No. of separate dwelling houses	0
Site details	
Site area (m ²)	2385
Roof area (m ²)	1365
Non-residential floor area (m ²)	1585
Residential car spaces	0
Non-residential car spaces	0

Common area landscape		
Common area lawn (m ²)	0	
Common area garden (m ²)	1000	
Area of indigenous or low water use species (m ²)	900	
Assessor details		
Assessor number	20887	
Certificate number	65125955	
Climate zone	56	
Project score		
Water	40	Target 40
Thermal Comfort	Pass	Target Pass
Energy	25	Target 20

Description of project

The tables below describe the dwellings and common areas within the project

Unit building - Building1, 43 dwellings, 7 storeys above ground

Dwelling no.	No. of bedrooms	Conditioned floor area (m ²)	Unconditioned floor area (m ²)	Area of garden & lawn (m ²)	Indigenous species (min area m ²)
1	4 or more bedrooms	128.0	8.0	0	0
5	4 or more bedrooms	128.0	8.0	0	0
9	4 or more bedrooms	50.0	6.0	0	0
13	4 or more bedrooms	52.0	4.0	0	0
17	4 or more bedrooms	174.0	23.0	0	0
21	4 or more bedrooms	171.0	23.0	0	0
2	4 or more bedrooms	128.0	8.0	0	0
6	4 or more bedrooms	128.0	8.0	0	0
10	4 or more bedrooms	52.0	4.0	0	0
14	4 or more bedrooms	52.0	4.0	0	0
18	4 or more bedrooms	174.0	23.0	0	0
22	4 or more bedrooms	50.0	7.0	0	0
3	4 or more bedrooms	128.0	8.0	0	0
7	4 or more bedrooms	129.0	8.0	0	0
11	4 or more bedrooms	52.0	4.0	0	0
15	4 or more bedrooms	174.0	23.0	0	0
19	4 or more bedrooms	174.0	23.0	0	0
23	4 or more bedrooms	128.0	8.0	0	0
4	4 or more bedrooms	128.0	8.0	0	0
8	4 or more bedrooms	49.0	7.0	0	0
12	4 or more bedrooms	52.0	4.0	0	0
16	4 or more bedrooms	174.0	23.0	0	0
20	4 or more bedrooms	174.0	23.0	0	0
24	4 or more bedrooms	126.0	9.0	0	0

Dwelling no.	No. of bedrooms	Conditioned floor area (m ²)	Unconditioned floor area (m ²)	Area of garden & lawn (m ²)	Indigenous species (min area m ²)
25	4 or more bedrooms	52.0	4.0	0	0
29	4 or more bedrooms	128.0	8.0	0	0
33	4 or more bedrooms	128.0	9.0	0	0
37	4 or more bedrooms	52.0	4.0	0	0
41	4 or more bedrooms	128.0	8.0	0	0

Dwelling no.	No. of bedrooms	Conditioned floor area (m ²)	Unconditioned floor area (m ²)	Area of garden & lawn (m ²)	Indigenous species (min area m ²)
26	4 or more bedrooms	128.0	8.0	0	0
30	4 or more bedrooms	128.0	9.0	0	0
34	4 or more bedrooms	52.0	4.0	0	0
38	4 or more bedrooms	128.0	8.0	0	0
42	4 or more bedrooms	128.0	9.0	0	0

Dwelling no.	No. of bedrooms	Conditioned floor area (m ²)	Unconditioned floor area (m ²)	Area of garden & lawn (m ²)	Indigenous species (min area m ²)
27	4 or more bedrooms	128.0	9.0	0	0
31	4 or more bedrooms	52.0	4.0	0	0
35	4 or more bedrooms	128.0	8.0	0	0
39	4 or more bedrooms	128.0	9.0	0	0
ct	1	30.0	6.0	0	0

Dwelling no.	No. of bedrooms	Conditioned floor area (m ²)	Unconditioned floor area (m ²)	Area of garden & lawn (m ²)	Indigenous species (min area m ²)
28	4 or more bedrooms	52.0	4.0	0	0
32	4 or more bedrooms	128.0	8.0	0	0
36	4 or more bedrooms	128.0	9.0	0	0
40	4 or more bedrooms	52.0	4.0	0	0

Description of project

The tables below describe the dwellings and common areas within the project

Common areas of unit building - Building1

Common area	Floor area (m ²)
Lift car (No. 1)	-
Utilities Room	8
Managers Office	14

Common area	Floor area (m ²)
Lift car (No. 2)	-
Other internal common area - Laundry	20
Ground floor lobby type (No. 1)	60

Common area	Floor area (m ²)
Community room - Student Lounge	155
Other internal common area - WC	6
Hallway/lobby type (No. 1)	230

Schedule of BASIX commitments

1. Commitments for unit building - Building1

(a) Dwellings

- (i) Water
- (ii) Energy
- (iii) Thermal Comfort

(b) Common areas and central systems/facilities

- (i) Water
- (ii) Energy

2. Commitments for attached dwelling houses

3. Commitments for separate dwelling houses

4. Commitments for common areas and central systems/facilities for the development (non-building specific)

- (i) Water
- (ii) Energy

Schedule of BASIX commitments

The commitments set out below regulate how the proposed development is to be carried out. It is a condition of any development consent granted, or complying development certificate issued, for the proposed development, that BASIX commitments be complied with.

1. Commitments for unit building - Building1

(a) Dwellings

(i) Water	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) The applicant must comply with the commitments listed below in carrying out the development of a dwelling listed in a table below.			
(b) The applicant must plant indigenous or low water use species of vegetation throughout the area of land specified for the dwelling in the "Indigenous species" column of the table below, as private landscaping for that dwelling. (This area of indigenous vegetation is to be contained within the "Area of garden and lawn" for the dwelling specified in the "Description of Project" table).	✓	✓	
(c) If a rating is specified in the table below for a fixture or appliance to be installed in the dwelling, the applicant must ensure that each such fixture and appliance meets the rating specified for it.		✓	✓
(d) The applicant must install an on demand hot water recirculation system which regulates all hot water use throughout the dwelling, where indicated for a dwelling in the "HW recirculation or diversion" column of the table below.		✓	✓
(e) The applicant must install: <ul style="list-style-type: none"> (aa) a hot water diversion system to all showers, kitchen sinks and all basins in the dwelling, where indicated for a dwelling in the "HW recirculation or diversion" column of the table below; and (bb) a separate diversion tank (or tanks) connected to the hot water diversion systems of at least 100 litres. The applicant must connect the hot water diversion tank to all toilets in the dwelling. 		✓	✓
(e) The applicant must not install a private swimming pool or spa for the dwelling, with a volume exceeding that specified for it in the table below.	✓	✓	
(f) If specified in the table, that pool or spa (or both) must have a pool cover or shading (or both).		✓	
(g) The pool or spa must be located as specified in the table.	✓	✓	
(h) The applicant must install, for the dwelling, each alternative water supply system, with the specified size, listed for that dwelling in the table below. Each system must be configured to collect run-off from the areas specified (excluding any area which supplies any other alternative water supply system), and to divert overflow as specified. Each system must be connected as specified.	✓	✓	✓

Dwelling no.	Fixtures					Appliances		Individual pool				Individual spa		
	All shower-heads	All toilet flushing systems	All kitchen taps	All bathroom taps	HW recirculation or diversion	All clothes washers	All dish-washers	Volume (max volume)	Pool cover	Pool location	Pool shaded	Volume (max volume)	Spa cover	Spa shaded
All dwellings	3 star (> 6 but <= 7.5 L/min)	5 star	5 star	5 star	-	-	-	-	-	-	-	-	-	-

Dwelling no.	Alternative water source							
	Alternative water supply systems	Size	Configuration	Landscape connection	Toilet connection (s)	Laundry connection	Pool top-up	Spa top-up
None	-	-	-	-	-	-	-	-

(ii) Energy	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) The applicant must comply with the commitments listed below in carrying out the development of a dwelling listed in a table below.			
(b) The applicant must install each hot water system specified for the dwelling in the table below, so that the dwelling's hot water is supplied by that system. If the table specifies a central hot water system for the dwelling, then the applicant must connect that central system to the dwelling, so that the dwelling's hot water is supplied by that central system.	✓	✓	✓
(c) The applicant must install, in each bathroom, kitchen and laundry of the dwelling, the ventilation system specified for that room in the table below. Each such ventilation system must have the operation control specified for it in the table.		✓	✓
(d) The applicant must install the cooling and heating system/s specified for the dwelling under the "Living areas" and "Bedroom areas" headings of the "Cooling" and "Heating" columns in the table below, in/for at least 1 living/bedroom area of the dwelling. If no cooling or heating system is specified in the table for "Living areas" or "Bedroom areas", then no systems may be installed in any such areas. If the term "zoned" is specified beside an air conditioning system, then the system must provide for day/night zoning between living areas and bedrooms.		✓	✓
(e) This commitment applies to each room or area of the dwelling which is referred to in a heading to the "Artificial lighting" column of the table below (but only to the extent specified for that room or area). The applicant must ensure that the "primary type of artificial lighting" for each such room in the dwelling is fluorescent lighting or light emitting diode (LED) lighting. If the term "dedicated" is specified for a particular room or area, then the light fittings in that room or area must only be capable of being used for fluorescent lighting or light emitting diode (LED) lighting.		✓	✓

(ii) Energy	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(f) This commitment applies to each room or area of the dwelling which is referred to in a heading to the "Natural lighting" column of the table below (but only to the extent specified for that room or area). The applicant must ensure that each such room or area is fitted with a window and/or skylight.	✓	✓	✓
(g) This commitment applies if the applicant installs a water heating system for the dwelling's pool or spa. The applicant must: (aa) install the system specified for the pool in the "Individual Pool" column of the table below (or alternatively must not install any system for the pool). If specified, the applicant must install a timer, to control the pool's pump; and (bb) install the system specified for the spa in the "Individual Spa" column of the table below (or alternatively must not install any system for the spa). If specified, the applicant must install a timer to control the spa's pump.		✓ ✓	
(h) The applicant must install in the dwelling: (aa) the kitchen cook-top and oven specified for that dwelling in the "Appliances & other efficiency measures" column of the table below; (bb) each appliance for which a rating is specified for that dwelling in the "Appliances & other efficiency measures" column of the table, and ensure that the appliance has that minimum rating; and (cc) any clothes drying line specified for the dwelling in the "Appliances & other efficiency measures" column of the table.		✓ ✓ ✓	✓
(i) If specified in the table, the applicant must carry out the development so that each refrigerator space in the dwelling is "well ventilated".		✓	

	Hot water	Bathroom ventilation system		Kitchen ventilation system		Laundry ventilation system	
Dwelling no.	Hot water system	Each bathroom	Operation control	Each kitchen	Operation control	Each laundry	Operation control
All dwellings	central hot water system 1	individual fan, ducted to façade or roof	manual switch on/off	individual fan, ducted to façade or roof	manual switch on/off	individual fan, ducted to façade or roof	manual switch on/off

	Cooling		Heating		Artificial lighting					Natural lighting		
Dwelling no.	living areas	bedroom areas	living areas	bedroom areas	No. of bedrooms &/or study	No. of living &/or dining rooms	Each kitchen	All bathrooms/toilets	Each laundry	All hallways	No. of bathrooms &/or toilets	Main kitchen
All dwellings	-	-	-	-	0	0	no	no	no	no	0	no

Dwelling no.	Individual pool		Individual spa		Appliances & other efficiency measures							
	Pool heating system	Timer	Spa heating system	Timer	Kitchen cooktop/oven	Refrigerator	Well ventilated fridge space	Dishwasher	Clothes washer	Clothes dryer	Indoor or sheltered clothes drying line	Private outdoor or unsheltered clothes drying line
All dwellings	-	-	-	-	-	-	no	-	-	-	-	-

(iii) Thermal Comfort	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) The applicant must attach the certificate referred to under "Assessor details" on the front page of this BASIX certificate (the "Assessor Certificate") to the development application and construction certificate application for the proposed development (or, if the applicant is applying for a complying development certificate for the proposed development, to that application). The applicant must also attach the Assessor Certificate to the application for a final occupation certificate for the proposed development.			
(b) The Assessor Certificate must have been issued by an Accredited Assessor in accordance with the Thermal Comfort Protocol.			
(c) The details of the proposed development on the Assessor Certificate must be consistent with the details shown in this BASIX Certificate, including the details shown in the "Thermal Loads" table below.			
(d) The applicant must show on the plans accompanying the development application for the proposed development, all matters which the Thermal Comfort Protocol requires to be shown on those plans. Those plans must bear a stamp of endorsement from the Accredited Assessor, to certify that this is the case.			
(e) The applicant must show on the plans accompanying the application for a construction certificate (or complying development certificate, if applicable), all thermal performance specifications set out in the Assessor Certificate, and all aspects of the proposed development which were used to calculate those specifications.			
(f) The applicant must construct the development in accordance with all thermal performance specifications set out in the Assessor Certificate, and in accordance with those aspects of the development application or application for a complying development certificate which were used to calculate those specifications.		✓	✓
(g) Where there is an in-slab heating or cooling system, the applicant must: (aa) Install insulation with an R-value of not less than 1.0 around the vertical edges of the perimeter of the slab; or (bb) On a suspended floor, install insulation with an R-value of not less than 1.0 underneath the slab and around the vertical edges of the perimeter of the slab.	✓	✓	✓
(h) The applicant must construct the floors and walls of the development in accordance with the specifications listed in the table below.	✓	✓	✓

Dwelling no.	Thermal loads	
	Area adjusted heating load (in mJ/m ² /yr)	Area adjusted cooling load (in mJ/m ² /yr)
1	57.9	29.9
7	65.2	28.6
8	55.9	23.7
9	62.8	21.3
14	61.2	21.9
15	51.6	24.6
21	39.2	36
22	46.5	25.5
23	40.3	31.9
24	57.8	20.8
40	61	24.2
41	42.6	28.7
42	62.7	31
ct	64.6	43.1
2, 3, 4, 5, 6	42.4	24.4
10, 11, 12, 13	64.2	20.6
16, 17, 18, 19, 20	22.8	21.6
25, 28, 31, 34, 37	18.1	13.2
26, 29, 32, 35, 38	21.3	23.4
All other dwellings	55.3	21.1

(b) Common areas and central systems/facilities

(i) Water	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) If, in carrying out the development, the applicant installs a showerhead, toilet, tap or clothes washer into a common area, then that item must meet the specifications listed for it in the table.		✓	✓
(b) The applicant must install (or ensure that the development is serviced by) the alternative water supply system(s) specified in the "Central systems" column of the table below. In each case, the system must be sized, be configured, and be connected, as specified in the table.	✓	✓	✓
(c) A swimming pool or spa listed in the table must not have a volume (in kLs) greater than that specified for the pool or spa in the table.	✓	✓	
(d) A pool or spa listed in the table must have a cover or shading if specified for the pool or spa in the table.		✓	
(e) The applicant must install each fire sprinkler system listed in the table so that the system is configured as specified in the table.		✓	✓
(f) The applicant must ensure that the central cooling system for a cooling tower is configured as specified in the table.		✓	✓

Common area	Showerheads rating	Toilets rating	Taps rating	Clothes washers rating
All common areas	no common facility	4 star	4 star	3 star

(ii) Energy	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) If, in carrying out the development, the applicant installs a ventilation system to service a common area specified in the table below, then that ventilation system must be of the type specified for that common area, and must meet the efficiency measure specified.		✓	✓
(b) In carrying out the development, the applicant must install, as the "primary type of artificial lighting" for each common area specified in the table below, the lighting specified for that common area. This lighting must meet the efficiency measure specified. The applicant must also install a centralised lighting control system or Building Management System (BMS) for the common area, where specified.		✓	✓
(c) The applicant must install the systems and fixtures specified in the "Central energy systems" column of the table below. In each case, the system or fixture must be of the type, and meet the specifications, listed for it in the table.	✓	✓	✓

Common area	Common area ventilation system		Common area lighting		
	Ventilation system type	Ventilation efficiency measure	Primary type of artificial lighting	Lighting efficiency measure	Lighting control system/BMS
Lift car (No. 1)	-	-	compact fluorescent	connected to lift call button	No
Lift car (No. 2)	-	-	compact fluorescent	connected to lift call button	No
Community room - Student Lounge	air conditioning system	time clock or BMS controlled	compact fluorescent	manual on / manual off	No
Utilities Room	no mechanical ventilation	-	compact fluorescent	manual on / manual off	No
Other internal common area - Laundry	ventilation exhaust only	none ie. continuous	compact fluorescent	manual on / manual off	No
Other internal common area - WC	ventilation exhaust only	none ie. continuous	compact fluorescent	manual on / manual off	No
Managers Office	no mechanical ventilation	-	compact fluorescent	manual on / manual off	No
Ground floor lobby type (No. 1)	no mechanical ventilation	-	compact fluorescent	time clocks	No
Hallway/lobby type (No. 1)	no mechanical ventilation	-	compact fluorescent	time clocks	No

Central energy systems	Type	Specification
Central hot water system (No. 1)	gas instantaneous	Piping insulation (ringmain & supply risers): (a) Piping external to building: R0.3 (~13 mm); (b) Piping internal to building: R0.3 (~13 mm)
Lift (No. 1)	gearless traction with V V V F motor	Number of levels (including basement): 7
Lift (No. 2)	gearless traction with V V V F motor	Number of levels (including basement): 4

4. Commitments for common areas and central systems/facilities for the development (non-building specific)

(b) Common areas and central systems/facilities

(i) Water	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) If, in carrying out the development, the applicant installs a showerhead, toilet, tap or clothes washer into a common area, then that item must meet the specifications listed for it in the table.		✓	✓
(b) The applicant must install (or ensure that the development is serviced by) the alternative water supply system(s) specified in the "Central systems" column of the table below. In each case, the system must be sized, be configured, and be connected, as specified in the table.	✓	✓	✓
(c) A swimming pool or spa listed in the table must not have a volume (in kLs) greater than that specified for the pool or spa in the table.	✓	✓	
(d) A pool or spa listed in the table must have a cover or shading if specified for the pool or spa in the table.		✓	
(e) The applicant must install each fire sprinkler system listed in the table so that the system is configured as specified in the table.		✓	✓
(f) The applicant must ensure that the central cooling system for a cooling tower is configured as specified in the table.		✓	✓

Common area	Showerheads rating	Toilets rating	Taps rating	Clothes washers rating
All common areas	no common facility	4 star	4 star	3 star

(ii) Energy	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) If, in carrying out the development, the applicant installs a ventilation system to service a common area specified in the table below, then that ventilation system must be of the type specified for that common area, and must meet the efficiency measure specified.		✓	✓
(b) In carrying out the development, the applicant must install, as the "primary type of artificial lighting" for each common area specified in the table below, the lighting specified for that common area. This lighting must meet the efficiency measure specified. The applicant must also install a centralised lighting control system or Building Management System (BMS) for the common area, where specified.		✓	✓
(c) The applicant must install the systems and fixtures specified in the "Central energy systems" column of the table below. In each case, the system or fixture must be of the type, and meet the specifications, listed for it in the table.	✓	✓	✓

Notes

1. In these commitments, "applicant" means the person carrying out the development.
2. The applicant must identify each dwelling, building and common area listed in this certificate, on the plans accompanying any development application, and on the plans and specifications accompanying the application for a construction certificate / complying development certificate, for the proposed development, using the same identifying letter or reference as is given to that dwelling, building or common area in this certificate.
3. This note applies if the proposed development involves the erection of a building for both residential and non-residential purposes (or the change of use of a building for both residential and non-residential purposes). Commitments in this certificate which are specified to apply to a "common area" of a building or the development, apply only to that part of the building or development to be used for residential purposes.
4. If this certificate lists a central system as a commitment for a dwelling or building, and that system will also service any other dwelling or building within the development, then that system need only be installed once (even if it is separately listed as a commitment for that other dwelling or building).
5. If a star or other rating is specified in a commitment, this is a minimum rating.
6. All alternative water systems to be installed under these commitments (if any), must be installed in accordance with the requirements of all applicable regulatory authorities. NOTE: NSW Health does not recommend that stormwater, recycled water or private dam water be used to irrigate edible plants which are consumed raw, or that rainwater be used for human consumption in areas with potable water supply.

Legend

1. Commitments identified with a "✓" in the "Show on DA plans" column must be shown on the plans accompanying the development application for the proposed development (if a development application is to be lodged for the proposed development).
2. Commitments identified with a "✓" in the "Show on CC/CDC plans and specs" column must be shown in the plans and specifications accompanying the application for a construction certificate / complying development certificate for the proposed development.
3. Commitments identified with a "✓" in the "Certifier check" column must be certified by a certifying authority as having been fulfilled. (Note: a certifying authority must not issue an occupation certificate (either interim or final) for a building listed in this certificate, or for any part of such a building, unless it is satisfied that each of the commitments whose fulfilment it is required to monitor in relation to the building or part, has been fulfilled).

Appendix B

ABSA Certificate

Assessor Certificate

Multiple Dwellings

Certificate Version 6.1. Prior versions not valid after 1 March 2006

Issued in accordance with
BASIX Thermal Comfort Simulation Method.



Assessor			
Name:	Trong Thien Huynh	Company:	Windtech Consultants Pty Ltd
Address:	19 Willis Street, Wollli Creek NSW 2205 Australia		
Phone:	(02) 9567 0722	Fax:	(02) 9567 0733
Email:	reception@windtech.com.au		
ABSA #:	20887		
Declaration of Interest: The Assessor may receive financial benefit from use of recommended services			
Client			
Name:	GREG COLBRAN	Company:	DEICORP CONSTRUCTIONS (NSW) PTY LTD
Address:	SHOP 5, 140-152 NEW CANTERBURY RD, PETERSHAM, NSW, 2049		
Phone:	8507 5600	Fax:	8507 5688
Email:	gcolbran@deicorp.com.au		
Project			
Address:	PEMULWUY PRECINCT 3, REDFERN 2016		
Applicant:	GREG COLBRAN	LGA:	City of Sydney
Assessment			
Date:	12/12/2011	File Ref:	WB028-01
Software:	BERS	Version:	PRO Plus v.

Documentation

All details, upon which this assessment has been based, are included in the project documentation that has been stamped and signed by the Assessor issuing this certificate, as identified below:

Thermal Performance Spec:

Attached, Affixed to Drawings Page #: 1

Drawings: (Title, Drawing #, Revision, Date)

Precinct 3 Perspectives & Site Analysis, 3DA005 E, Revision E, 02/12/20
 Lower Ground & Ground Floor Plan, 3DA100 D, Revision D, 02/12/2011
 Level 1 Plan, 3DA101 D, Revision D, 02/12/2011
 Level 2 Plan, 3DA102 D, Revision D, 02/12/2011
 Level 3 Plan, 3DA103 D, Revision D, 02/12/2011
 Level 4 Plan, 3DA104 D, Revision D, 02/12/2011
 Level 5 Plan, 3DA105 D, Revision D, 02/12/2011
 Level 6 Plan, 3DA106 D, Revision D, 02/12/2011

Building Specifications: (Title, Drawing #, Revision, Date)

See Drawings



ABSA Assessor Certificate Assessor # 20887 Certificate # 65125955 Issued: 12/12/2011

Thermal Performance Specifications

Page 1 of 2

Unit number(s)	Certificate Number	Floor area (M2)		Predict. Loads (MJ/M2/y)		Concessions	Qualify for ventilation bonus
		Cond.	Uncond.	Heat	Cool (Sens & Lat)		
P3-U01	65125955	136.2	0	57.9	29.9	N/A	N/A
P3-U02	19653981	135.7	0	42.4	24.4	N/A	N/A
P3-U03	19653981	135.7	0	42.4	24.4	N/A	N/A
P3-U04	19653981	135.7	0	42.4	24.4	N/A	N/A
P3-U05	19653981	135.7	0	42.4	24.4	N/A	N/A
P3-U06	19653981	135.7	0	42.4	24.4	N/A	N/A
P3-U07	82061630	136.9	0	65.2	28.6	N/A	N/A
P3-U08	50920943	55.7	0	55.9	23.7	N/A	N/A
P3-U09	25522736	56	0	62.8	21.3	N/A	N/A
P3-U10	84974779	56	0	64.2	20.6	N/A	N/A
P3-U11	84974779	56	0	64.2	20.6	N/A	N/A
P3-U12	84974779	56	0	64.2	20.6	N/A	N/A
P3-U13	84974779	56	0	64.2	20.6	N/A	N/A

Thermal Performance Specifications - BASIX THERMAL COMFORT - Simulation Method

These are the Specifications upon which the Certified Assessment is based. If details included in these Specifications vary from other drawings or written specifications, these Specifications shall take precedence. If only one specification option is detailed for a building element, that specification must apply to all instances of that element for the project. If alternate specifications are detailed for a building element, the location and extent of alternate specifications must be detailed below and / or clearly indicated on referenced documents.

Windows	Product ID	Glass	Frame	U value	SHGC	Area M2	Detail
		Single clear	Aluminium			32	As per plans

Skylights	Product ID	Glass	Frame	U value	SHGC	Area M2	Detail
-----------	------------	-------	-------	---------	------	---------	--------

Any U and SHGC values specified on Certificates Issued after 1 May 2007 are according to NFRC. All values prior to this date are ANAC. Alternate products may be used if their U value is lower, and the SHGC value is less than 10% higher or lower

External Walls	Construction	Insulation	Colour - Solar absorptancy	Detail
Cavity Brick		None	Medium - SA 0.475 - 0.7	As per plans
Single Brick		None	Medium - SA 0.475 - 0.7	As per plans

Internal walls	Construction	Insulation	Detail
Plasterboard on Studs		None	As per plans

Floors	Construction	Insulation	Covering	Detail
Concrete		None	Carpet	As per plans
Concrete		None	Ceramic Tile	As per plans

Ceilings	Construction	Insulation	Detail
Plasterboard		None	As per plans

Roof	Construction	Insulation	Colour - Solar absorptancy	Detail
Concrete		None	Medium - SA 0.475 - 0.7	As per plans

Window cover	Internal (curtains)	External (awnings, shutters, etc)
None		Louvres As per plans

Fixed Shading	Eaves (width - inc gutters, height above windows)	Verandahs, Pergolas (type, description)
0	0 As per plans	Balconies As per plans

Overshadowing	Overshadowing structures	Overshadowing trees
---------------	--------------------------	---------------------

Orientation, Exposure, Ventilation and Infiltration

ABSA Assessor Stamp

Orientation of nominal north elevation	60
Terrain category	Suburban
Roof Ventilation	Not Applicable
Cross Ventilation	Standard
Subfloor Ventilation	Not Applicable
Living area open to entry:	Yes
Living areas separated by doors:	Yes
Stair open to heated areas:	Yes
Seals to windows and doors:	Yes
Exhaust fans without dampers:	No
Ventilated skylights:	No
Open fire or unflued gas heater:	No
Vented downlights:	No
Wall and ceiling vents:	No



Appendix C

Certified Architectural Drawings

Thermal performance Specifications

These are the Specifications upon which the Certified Assessment is based. If details included in these Specifications vary from other drawings or written specifications, these Specifications shall take precedence. If only one specification option is detailed for a building element, that specification must apply to all instances of that element for the project. If alternate specifications are detailed for a building element, the location and extent of alternate specifications must be detailed below and / or clearly indicated on referenced documents.

Windows	Product ID	Glass	Frame	U value SHGC	Area M2	Detail
		Single clear	Aluminium		32	As per plans

Skylights	Product ID	Glass	Frame	U value SHGC	Area M2	Detail

Any U and SHGC values specified on Certificates issued after 1 May 2007 are according to NFRC. All values prior to this date are ANAC Alternate products may be used if their U value is lower, and the SHGC value is less than 10% higher or lower.

External walls	Construction	Insulation	Colour - Solar Absorptivity	Detail
Cavity Brick	None		Medium - SA 0.475 - 0.7	As per plans
Single Brick	None		Medium - SA 0.475 - 0.7	As per plans

Internal walls	Construction	Insulation	Detail
Plasterboard on Studs	None		As per plans

Floors	Construction	Insulation	Covering	Detail
Concrete	None		Carpet	As per plans
Concrete	None		Ceramic Tile	As per plans

Ceilings	Construction	Insulation	Detail
Plasterboard	None		As per plans

Roof	Construction	Insulation	Colour - Solar Absorptivity	Detail
Concrete	None		Medium - SA 0.475 - 0.7As per plans	

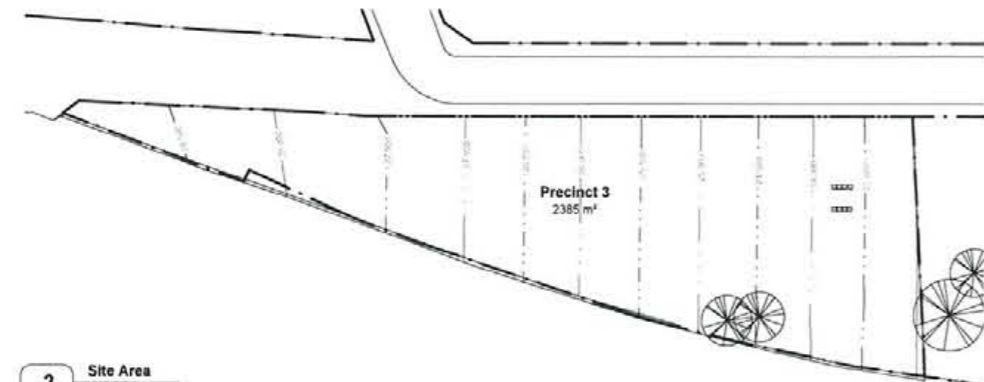
Window Cover	Internal (curtains)	External (awnings, shutters, etc.)
None		Louvers

Fixed Shading	Exposed (width, etc. pattern, height above windows)	Verandas, Pergolas (type, description)
0	0	Balconies

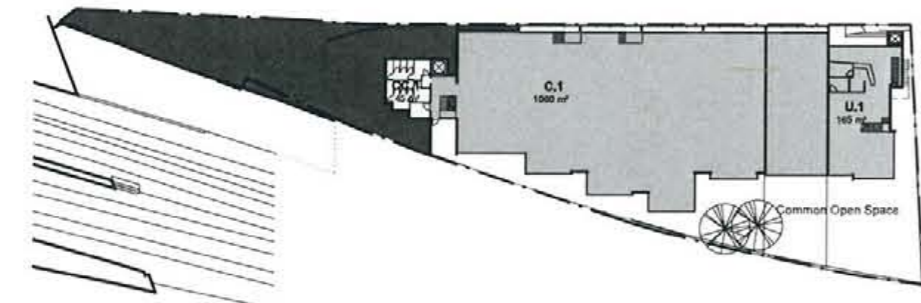
Overshadowing	Overshadowing structures	Overshadowing trees

Orientation, Exposure, Ventilation and Isolation			
Orientation of nominal north:	60 Living area open to entry:	Yes	Ventilated skylights
Terrain category:	Suburban Living area separated by doors:	Yes	Open fire / unfueled gas heater:
Roof Ventilation:	Not Applicable Stair open to heated areas:	Yes	Vented downlights:
Cross Ventilation:	Standard Seals to windows and doors:	Yes	Wall and ceiling vents:
Subfloor Ventilation:	Not Applicable Exhaust fans without dampers:	No	

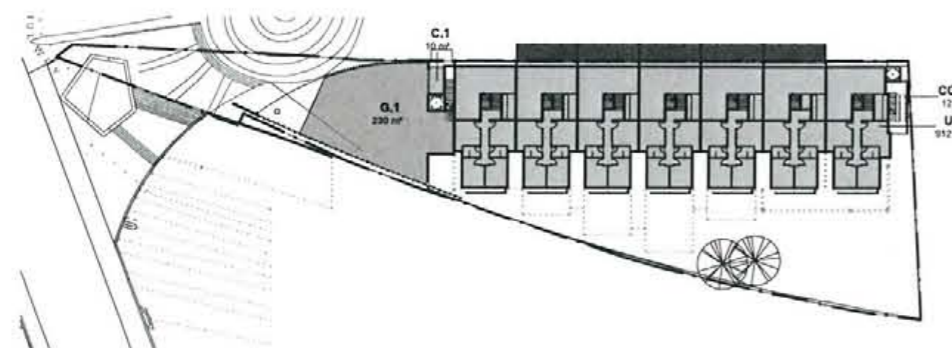
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65125955
12/12/2011



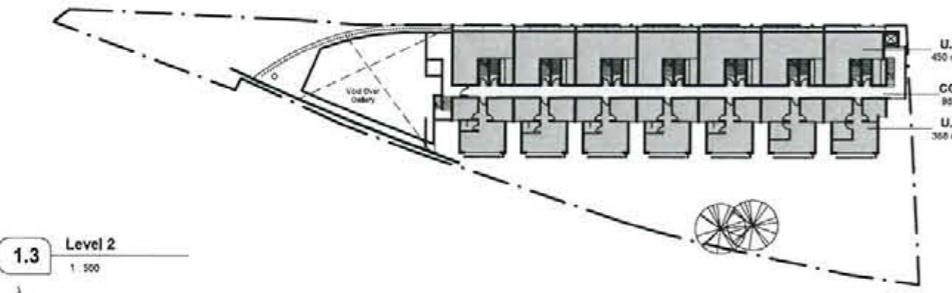
2 Site Area
1:500



1.1 Ground Level
1:500



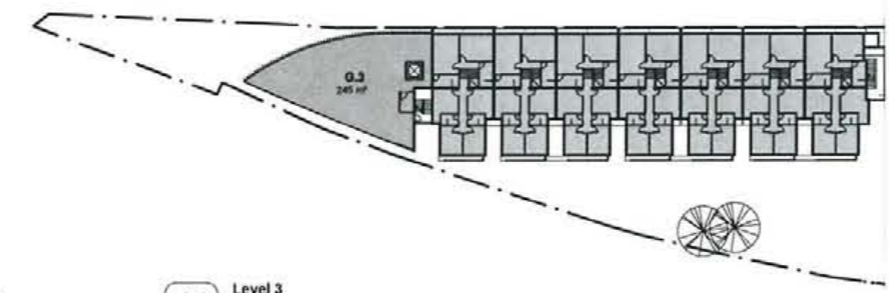
1.2 Level 1
1:500



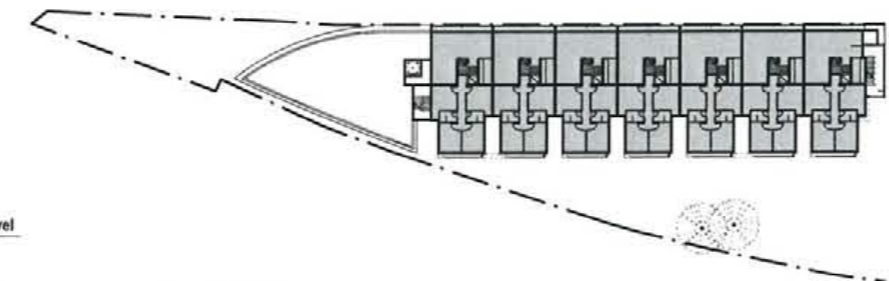
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1:500



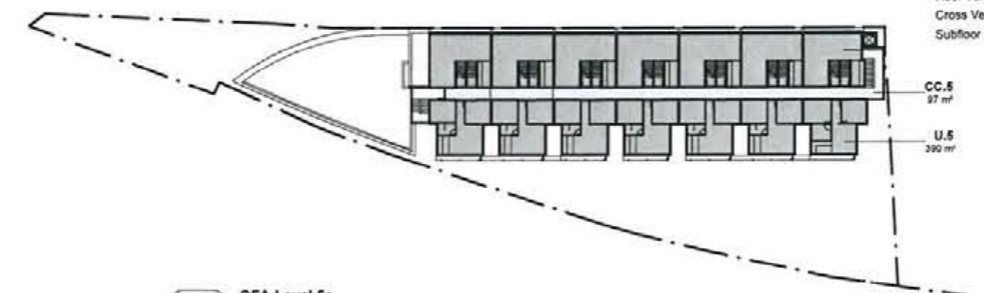
View Looking North Towards Evelyn Street From Peninsula Place



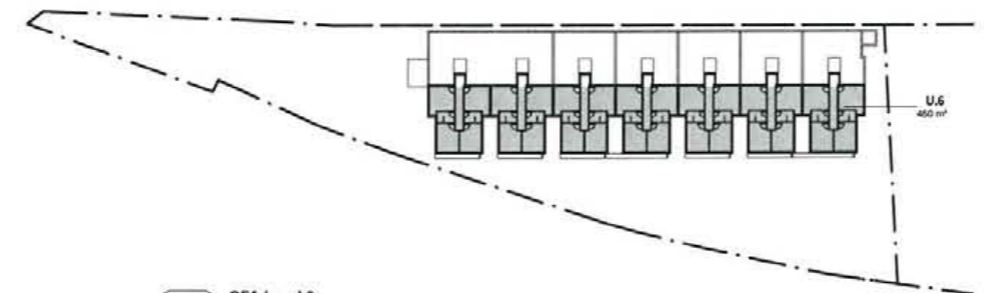
1.4 Level 3
1:500



1.5 Level 4
1:500



3 GFA Level 5a
1:500



4 GFA Level 6a
1:500

Bird's Eye View From Railway Corridor



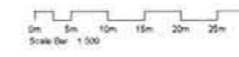
3.0 Perspective View



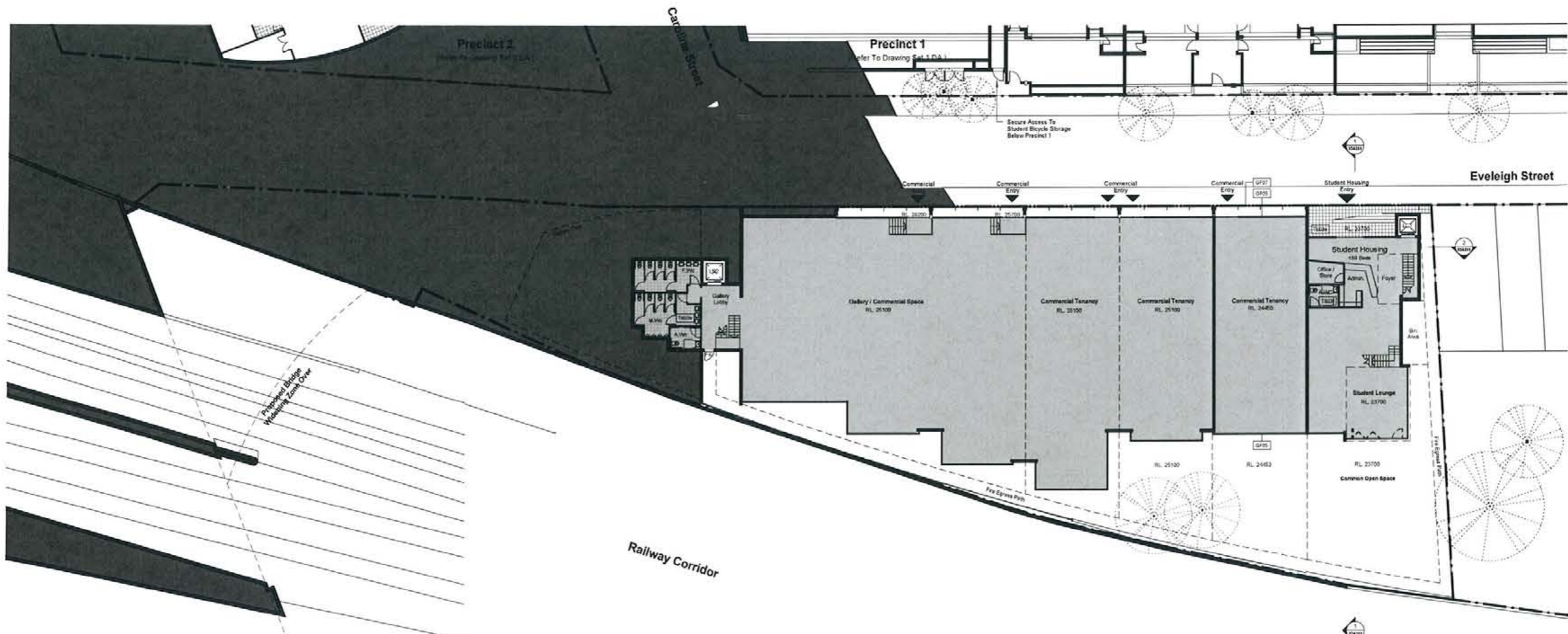
3.1 Perspective View

Rev	Description	Date
A	Current Development Summary Issue	20.02.11
B	Preliminary DA Issue For Review	11.07.11
C	Preliminary DA Issue For Review	20.07.11
D	Preliminary Environmental Assessment Issue (PEA)	28.07.11
E	Development Application Issue	09.09.10

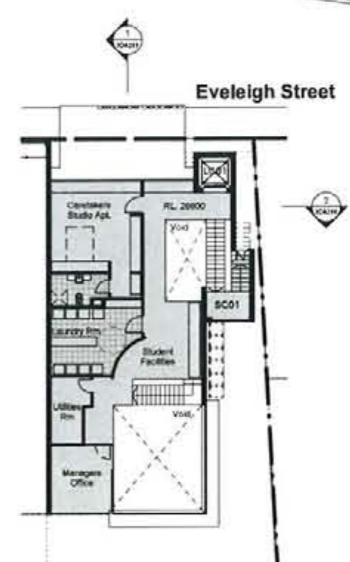
Preliminary Draft Issue [Rev. E] - 02.12.11



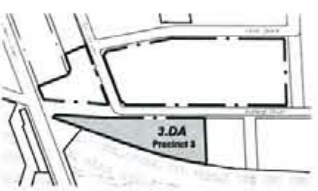
JOB No.	DEK0210
DATE	October 2010
SCALE	A1 @ 1:500
DWG No.	3DA005 E



1 Lower Ground Floor
1 : 200



2 Ground Floor Mezzanine
1 : 200



Development Application		
Rev	Description	Date
A	Current Development Summary Issue	10.06.11
B	Preliminary DA Issue For Review	11.07.11
C	Preliminary DA Issue For Review	20.07.11
D	Development Application Issue	02.12.11

Preliminary Draft Issue [Rev. D] - 02.12.11



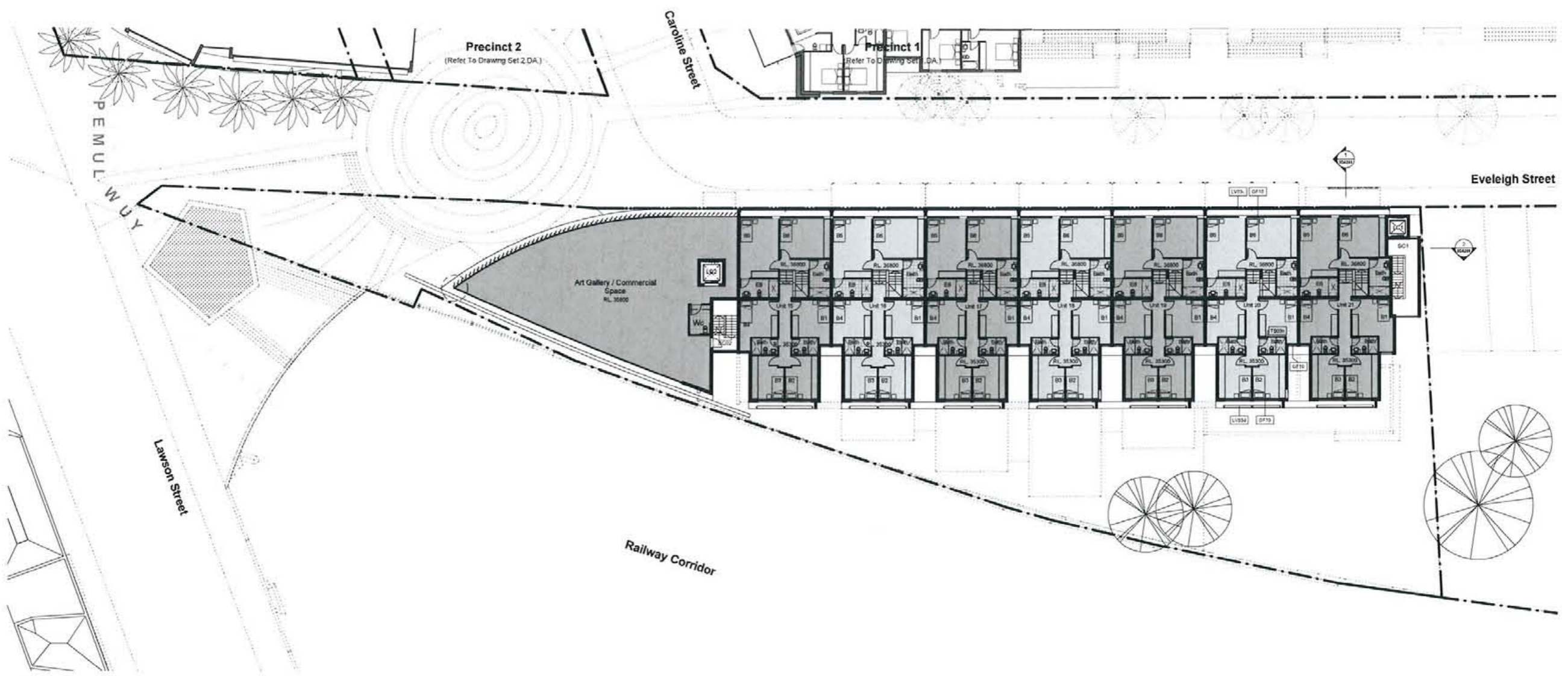
Precinct 3 - Pemulwuy Mixed Use Development, REDFERN

Lower Ground & Ground Floor Plan

NORDON · JAGO
ARCHITECTS

CHR PARRAMATTA RD & JOHNSTON ST - PO BOX 254 - ANNANDALE - NSW 2038 - T.02 9517 2822 F.02 9517 2833
STEPHEN J. NORDON REGISTRATION No. NSW - 4704 GRAHAM P. JAGO REGISTRATION No. NSW - 4926

JOB No.	DER00210
DATE	October 2010
SCALE	A1 @ 1 : 200
DWG No.	3DA100 D

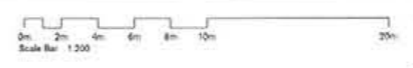



 Assn# 20887 Date 6/5/25/55
 Plan *[Signature]*
 Date 12/12/2011



Development Application		
Rev	Description	Date
A	Current Development Summary Issue	10/06/11
B	Preliminary DA Issue For Review	11/07/11
C	Preliminary DA Issue For Review	20/07/11
D	Development Application Issue	09/10/11

Preliminary Draft Issue [Rev. D] - 02.12.11



Precinct 3 - Pemulwuy Mixed Use Development, REDFERN

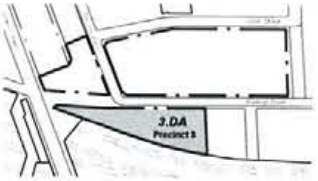
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JOB No.	DEX00210
DATE	October 2010
SCALE	A1 @ 1:200
DWG No.	3DA103 D



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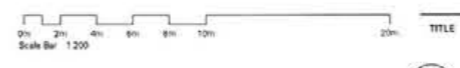
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 12/12/2011



Development Application		
Rev	Description	Date
A	Current Development Summary Issue	10.06.11
B	Preliminary DA Issue For Review	11.07.11
C	Preliminary DA Issue For Review	20.07.11
D	Development Application Issue	00.00.00

Preliminary Draft Issue [Rev. D] - 02.12.11



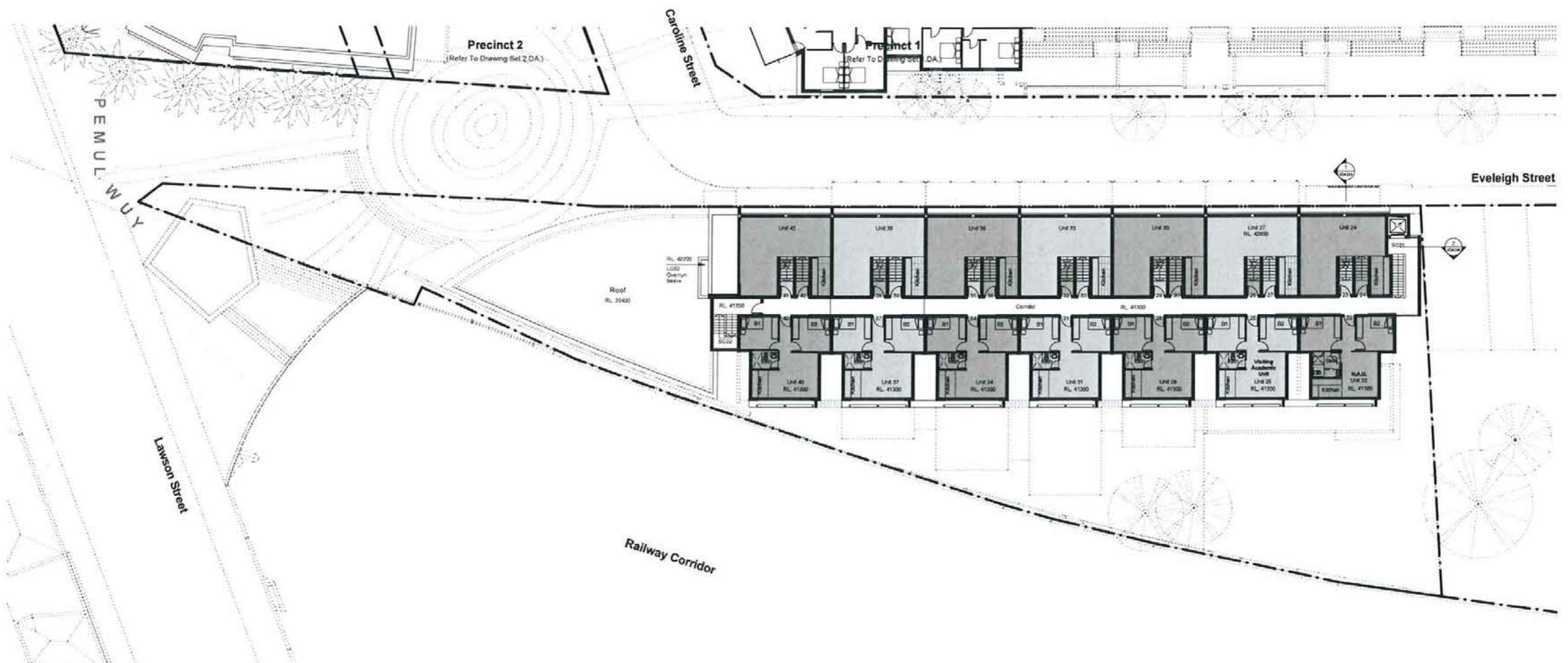
Precinct 3 - Pemulwuy Mixed Use Development, REDFERN

Level 4 Plan

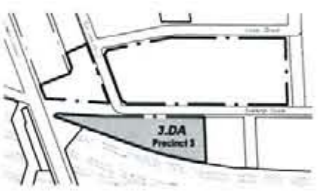
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6/11 PARRAMATTA RD & JOHNSTON ST - PO BOX 264 - ANNANDALI - NSW 2038 - T:02 9517 2822 F:02 9517 2833
STEPHEN J. NORDON REGISTRATION No. NSW - 4704 GRAHAM P. JAGO REGISTRATION No. NSW - 4928

JOB No.	DEX00210
DATE	October 2010
SCALE	A1 @ 1:200
DWD No.	3DA104 D

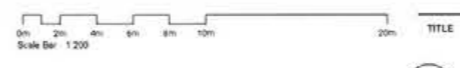


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 12/12/2011



Development Application		
Rev	Description	Date
A	Development Application Issue	00.00.00

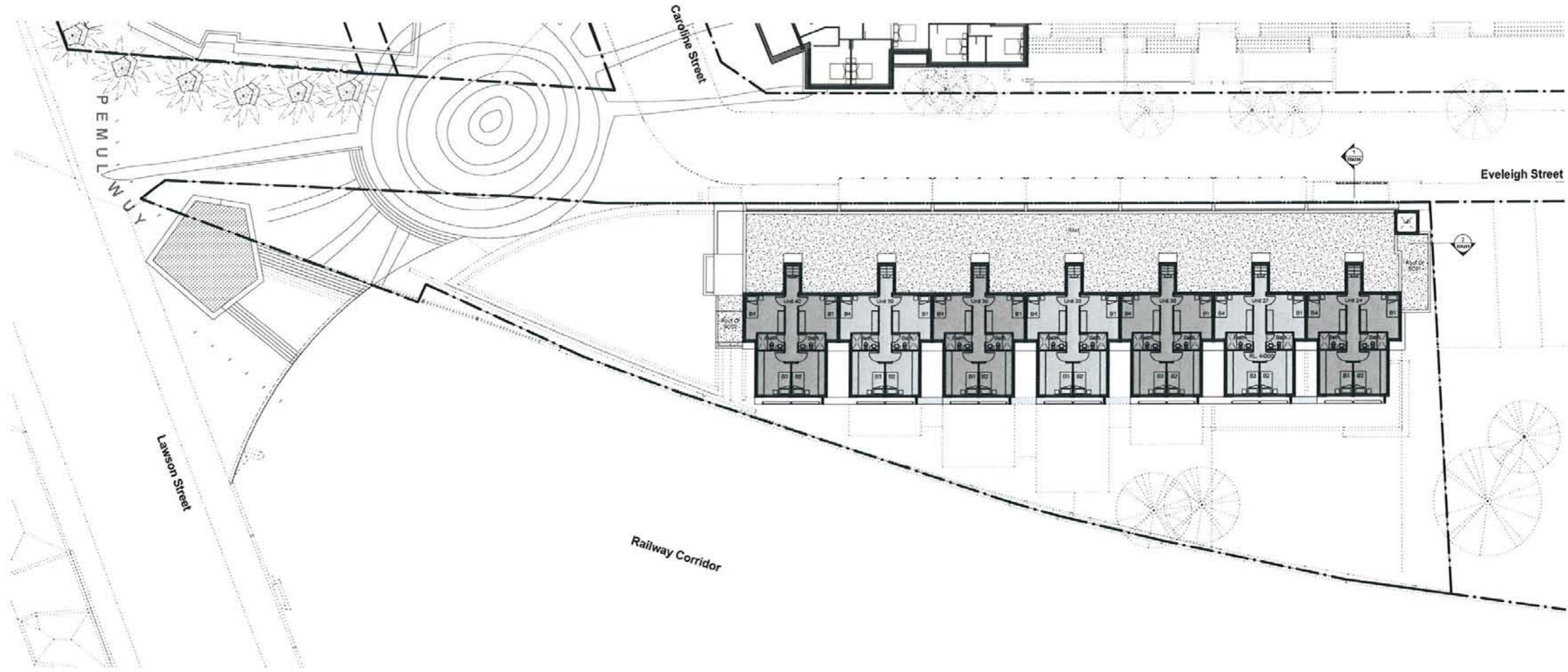
Preliminary Draft Issue [Rev. A] - 02.12.11



Precinct 3 - Penulwuy Mixed Use Development, REDFERN

TITLE	Level 5 Plan
JOB No.	DEX00210
DATE	October 2010
SCALE	A1 @ 1:200
DWD No.	3DA105 A


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 Assn# 20887 Cert# 65125955
 Date 12/12/2011



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Development Application		
Rev	Description	Date
A	DEVELOPMENT APPLICATION MARK	00/00/00

Preliminary Draft Issue [Rev. A] - 02.12.11

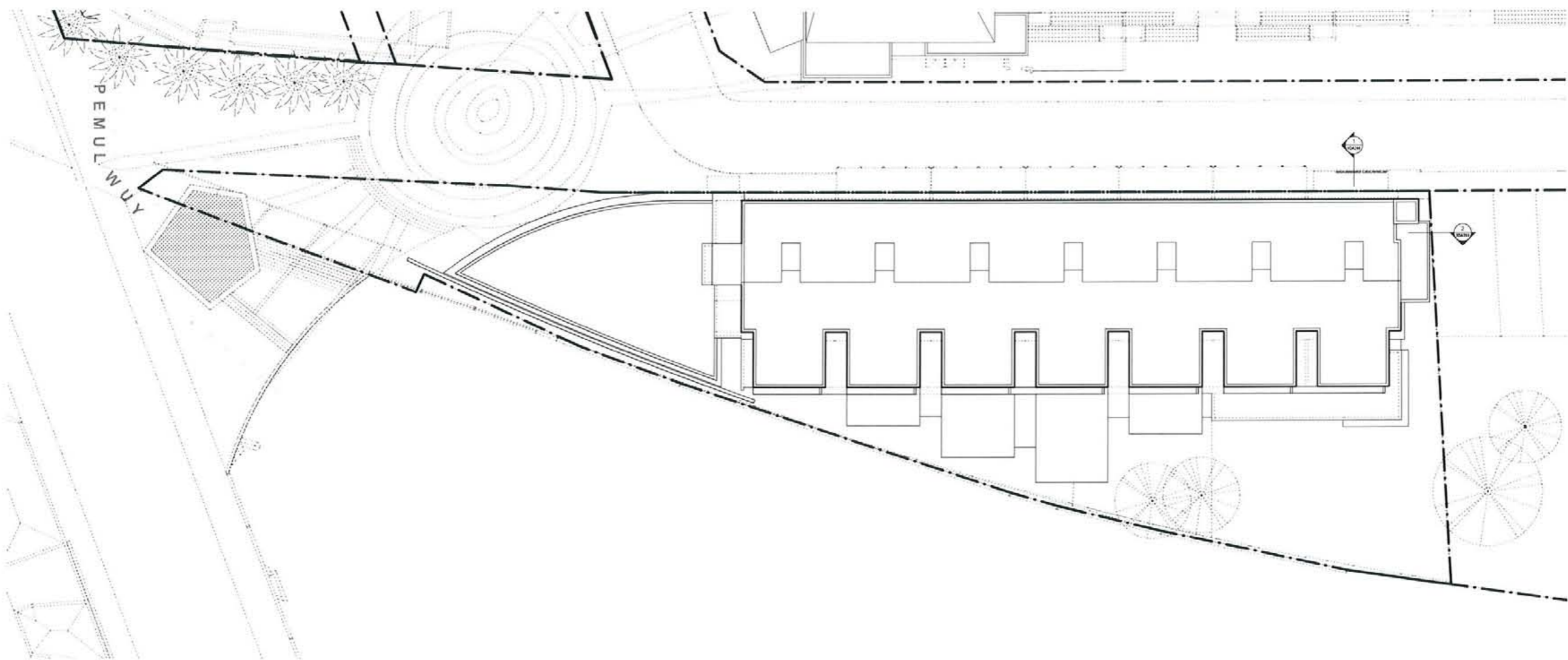


Precinct 3 - Pemulwuy Mixed Use Development, REDFERN

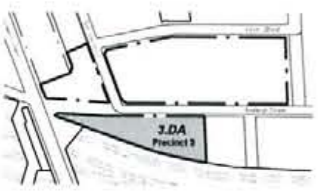
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Level 6 Plan

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DATE	October 2010
SCALE	A1 @ 1:200
DWG No.	3DA106 A




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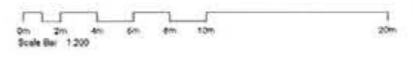


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STEPHEN J. NORDON REGISTRATION No. NSW - 4704 GRAHAM P. JAGO REGISTRATION No. NSW - 4928

Development Application		
Rev	Description	Date
A	Preliminary DA Issue For Review	20.07.11
B	Development Application Issue	26.08.11

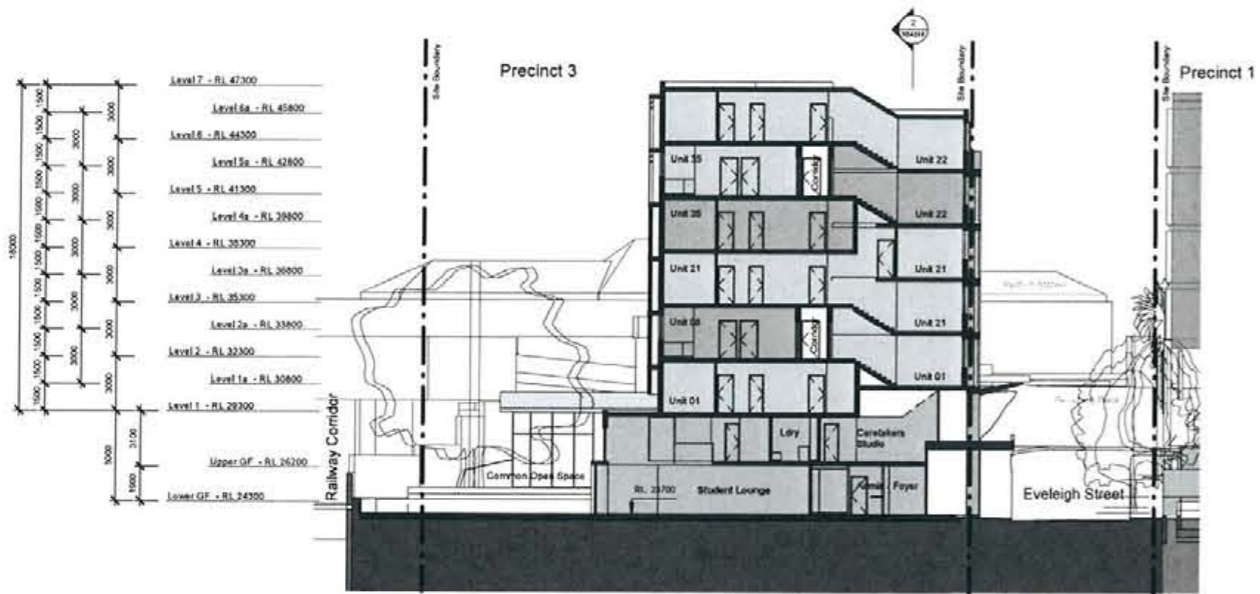
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Precinct 3 - Pemulwuy Mixed Use Development, REDFERN

JOB No.	DEK00210
DATE	October 2010
SCALE	A1 @ 1:200
DWD No.	3DA120 B

Roof Plan



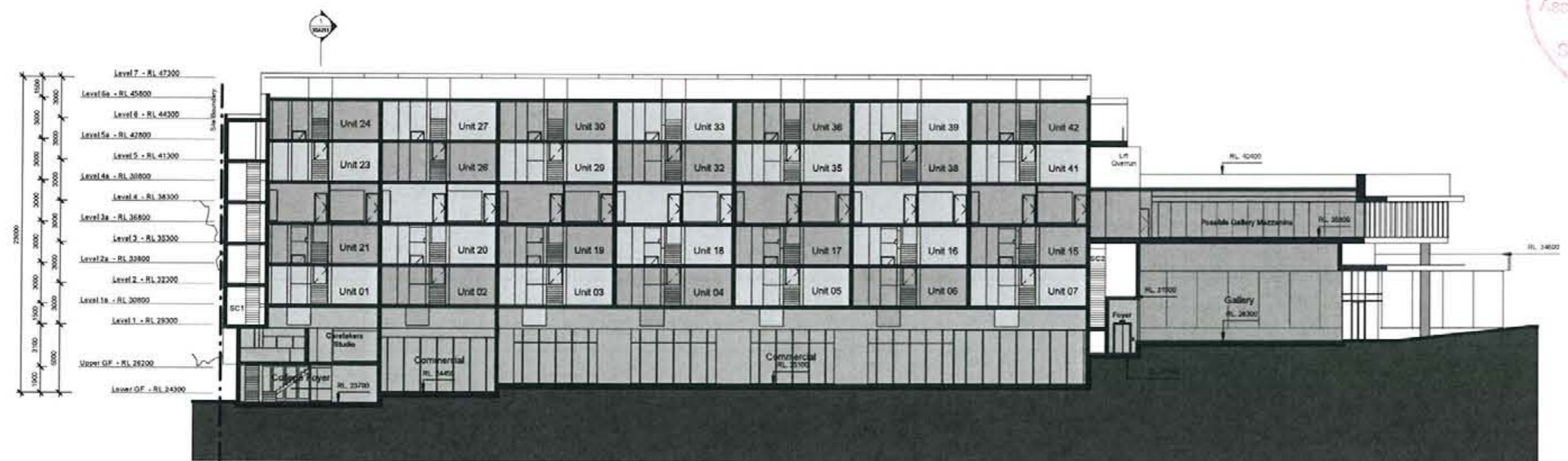
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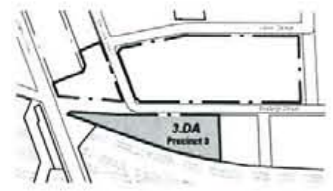
Acct# 20887 Call 65125955

Sign *[Signature]*

Date 12/12/2011



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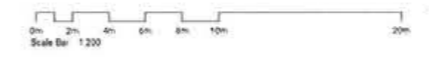


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STEPHEN J. NORDON REGISTRATION No. NSW - 4704 GRAHAM P. JAGO REGISTRATION No. NSW - 4926

Rev	Description	Date
A	Current Development Summary Issue	13.05.11
B	Preliminary DA Issue For Review	11.07.11
C	Preliminary DA Issue For Review	20.07.11
D	Development Application Issue	00.00.00

Preliminary Draft Issue [Rev. D] - 02.12.11



Precinct 3 - Pemulwuy Mixed Use Development, REDFERN

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JOB No.	DER00210
DATE	October 2010
SCALE	A1 @ 1:200
DWG No.	3DA200 D

Sections

