BASIX® Certificate

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

Multi Dwelling

Certificate number: 1312924M_02

This certificate confirms that the proposed development will meet the NSW government's requirements for sustainability, if it is built in accordance with the commitments set out below. Terms used in this certificate, or in the commitments, have the meaning given by the document entitled "BASIX Definitions" dated 10/09/2020 published by the Department. This document is available at www.basix.nsw.gov.au

Secretary
Date of issue: Thursday, 04 May 2023
To be valid, this certificate must be lodged within 3 months of the date of issue.

NSW GOVERNMENT | Planning, Industry & Environment

Project summary	
Project name	ORAN PARK RESIDENTIAL 3 A & B_02
Street address	n/s CORNER OF SOUTH CIRCUIT & CIVIC WAY Way Oran Park 2570
Local Government Area	Camden Council
Plan type and plan number	deposited 270899
Lot no.	18
Section no.	-
No. of residential flat buildings	2
No. of units in residential flat buildings	177
No. of multi-dwelling houses	0
No. of single dwelling houses	0

Project score		
Water	✔ 42	Target 40
Thermal Comfort	✔ Pass	Target Pass
Energy	✔ 31	Target 25

Water score comprises:

- Oran Park / Turner Road - single houses only (proposed) reticulated alternative water: 0.0
- Other water efficiency commitments: 42.0

Certificate Prepared by
Name / Company Name: Thermal Environmental Engineering
ABN (if applicable): 166914441

Description of project

Project address	
Project name	ORAN PARK RESIDENTIAL 3 A & B_02
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Local Government Area	Camden Council
Plan type and plan number	deposited 270899
Lot no.	18
Section no.	-

Project type	
No. of residential flat buildings	2
No. of units in residential flat buildings	177
No. of multi-dwelling houses	0
No. of single dwelling houses	0

Site details	
Site area (m²)	6443
Roof area (m²)	3938
Non-residential floor area (m²)	0.0
Residential car spaces	275
Non-residential car spaces	0

Common area landscape	
Common area lawn (m²)	120.7
Common area garden (m²)	1324.8
Area of indigenous or low water use species (m²)	634.6

Assessor details	
Assessor number	101491
Certificate number	CLS80RDKGH
Climate zone	28
Ceiling fan in at least one bedroom	No
Ceiling fan in at least one living room or other conditioned area	No

Project score		
Water	✔ 42	Target 40
Thermal Comfort	✔ Pass	Target Pass
Energy	✔ 31	Target 25

Water score comprises:

- Oran Park / Turner Road - single houses only (proposed) reticulated alternative water: 0.0
- Other water efficiency commitments: 42.0

Description of project

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

Residential flat buildings - Building 3A, 66 dwellings, 7 storeys above ground

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
A1.01	2	78.8	0.8	0.0	0.0
A1.06	2	90.8	1.1	0.0	0.0
A2.01	2	79.1	0.8	0.0	0.0
A2.06	2	91.0	1.1	0.0	0.0
A3.01	2	79.2	0.9	0.0	0.0
A3.06	3	110.2	0.8	0.0	0.0
A4.01	2	79.2	0.8	0.0	0.0
A4.06	2	90.7	0.9	0.0	0.0
A5.01	2	78.6	0.8	0.0	0.0
A5.06	2	89.7	5.2	0.0	0.0
A6.01	1	55.4	0.8	0.0	0.0
A6.06	1	55.1	0.8	0.0	0.0
AG.05	2	94.7	0.9	0.0	0.0
AG.10	1	50.5	0.8	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
A1.02	3	93.9	1.2	0.0	0.0
A1.07	2	78.7	0.9	0.0	0.0
A2.02	3	95.4	0.8	0.0	0.0
A2.07	2	78.7	0.9	0.0	0.0
A3.02	3	94.9	0.7	0.0	0.0
A3.07	1	57.6	0.8	0.0	0.0
A4.02	3	94.6	0.8	0.0	0.0
A4.07	2	77.3	0.8	0.0	0.0
A5.02	3	95.1	0.9	0.0	0.0
A5.07	1	58.3	0.8	0.0	0.0
A6.02	3	119.8	4.1	0.0	0.0
AG.01	1	49.7	0.8	0.0	0.0
AG.06	2	91.0	1.1	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
A1.03	2	84.7	1.0	0.0	0.0
A1.08	2	86.4	0.9	0.0	0.0
A2.03	2	84.8	1.2	0.0	0.0
A2.08	2	86.2	1.2	0.0	0.0
A3.03	2	84.7	1.2	0.0	0.0
A3.08	2	86.0	1.2	0.0	0.0
A4.03	2	85.3	0.9	0.0	0.0
A4.08	2	86.3	1.2	0.0	0.0
A5.03	2	85.7	1.2	0.0	0.0
A5.08	2	86.2	1.3	0.0	0.0
A6.03	2	85.1	1.1	0.0	0.0
AG.02	3	99.1	0.8	0.0	0.0
AG.07	2	79.2	0.9	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
A1.04	1	57.6	0.8	0.0	0.0
A1.09	3	91.0	0.9	0.0	0.0
A2.04	1	58.2	0.9	0.0	0.0
A2.09	3	91.1	0.9	0.0	0.0
A3.04	1	57.7	0.8	0.0	0.0
A3.09	3	91.0	0.9	0.0	0.0
A4.04	2	77.1	0.9	0.0	0.0
A4.09	3	91.1	0.9	0.0	0.0
A5.04	1	58.0	0.8	0.0	0.0
A5.09	3	90.3	0.9	0.0	0.0
A6.04	2	86.0	1.2	0.0	0.0
AG.03	2	80.6	0.8	0.0	0.0
AG.08	2	82.0	0.9	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
A1.05	3	109.7	0.9	0.0	0.0
A1.10	2	78.5	0.9	0.0	0.0
A2.05	3	109.7	0.8	0.0	0.0
A2.10	2	79.0	0.9	0.0	0.0
A3.05	2	75.9	0.9	0.0	0.0
A3.10	2	78.9	0.9	0.0	0.0
A4.05	2	90.0	0.8	0.0	0.0
A4.10	2	79.2	0.8	0.0	0.0
A5.05	2	89.5	5.2	0.0	0.0
A5.10	2	79.0	0.9	0.0	0.0
A6.05	3	113.9	4.1	0.0	0.0
AG.04	2	78.3	0.8	0.0	0.0
AG.09	3	95.6	0.8	0.0	0.0

Residential flat buildings - Building 3B, 111 dwellings, 7 storeys above ground

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
B1.01	1	66.7	0.9	0.0	0.0
B1.06	3	110.3	1.0	0.0	0.0
B1.11	2	79.5	0.9	0.0	0.0
B1.16	1	57.9	1.0	0.0	0.0
B2.04	2	79.6	1.6	0.0	0.0
B2.09	1	57.8	0.8	0.0	0.0
B2.14	2	82.0	0.9	0.0	0.0
B3.02	2	79.3	0.8	0.0	0.0
B3.07	3	108.2	1.2	0.0	0.0
B3.12	2	85.6	0.9	0.0	0.0
B3.17	3	100.8	0.9	0.0	0.0
B4.05	2	93.6	0.8	0.0	0.0
B4.10	2	78.9	0.8	0.0	0.0
B4.15	2	83.6	0.9	0.0	0.0
B5.05	2	93.6	0.8	0.0	0.0
B5.10	2	78.9	0.8	0.0	0.0
B5.15	2	83.6	0.9	0.0	0.0
B6.05	2	93.6	0.8	0.0	0.0
B6.12	2	85.7	0.9	0.0	0.0
BG.02	2	77.9	0.8	0.0	0.0
BG.07	3	108.2	1.1	0.0	0.0
BG.12	2	72.2	0.9	0.0	0.0
BG.17	3	101.0	0.9	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
B1.02	2	79.3	0.8	0.0	0.0
B1.07	3	108.2	1.1	0.0	0.0
B1.12	2	72.1	0.9	0.0	0.0
B1.17	3	100.8	0.9	0.0	0.0
B2.05	2	94.4	0.8	0.0	0.0
B2.10	2	79.1	0.8	0.0	0.0
B2.15	2	78.5	0.8	0.0	0.0
B3.03	2	78.5	0.8	0.0	0.0
B3.08	2	84.1	0.9	0.0	0.0
B3.13	3	100.3	0.9	0.0	0.0
B4.01	1	67.1	0.9	0.0	0.0
B4.06	3	110.1	1.0	0.0	0.0
B4.11	2	79.0	0.9	0.0	0.0
B5.01	1	67.1	0.9	0.0	0.0
B5.06	3	110.1	1.0	0.0	0.0
B5.11	2	79.0	0.9	0.0	0.0
B6.01	1	67.1	0.9	0.0	0.0
B6.08	2	83.9	0.9	0.0	0.0
B6.13	3	100.2	0.9	0.0	0.0
BG.03	2	78.5	0.8	0.0	0.0
BG.08	2	84.1	0.9	0.0	0.0
BG.13	2	89.5	4.6	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
B1.03	2	78.6	0.8	0.0	0.0
B1.08	2	84.1	0.9	0.0	0.0
B1.13	3	100.1	0.9	0.0	0.0
B2.01	1	66.8	0.9	0.0	0.0
B2.06	3	110.1	1.0	0.0	0.0
B2.11	2	79.2	0.9	0.0	0.0
B2.16	1	57.9	1.0	0.0	0.0
B3.04	2	79.3	1.6	0.0	0.0
B3.09	1	57.7	0.8	0.0	0.0
B3.14	2	81.3	0.8	0.0	0.0
B4.02	3	110.7	0.8	0.0	0.0
B4.07	3	108.2	1.2	0.0	0.0
B4.12	2	85.6	0.9	0.0	0.0
B5.02	3	110.7	0.8	0.0	0.0
B5.07	3	108.2	1.2	0.0	0.0
B5.12	2	85.7	0.9	0.0	0.0
B6.02	3	110.6	0.8	0.0	0.0
B6.09	1	57.1	0.9	0.0	0.0
B6.14	2	81.7	0.9	0.0	0.0
BG.04	1	60.8	1.6	0.0	0.0
BG.09	1	55.4	0.8	0.0	0.0
BG.14	1	55.2	4.7	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
B1.04	2	79.4	1.6	0.0	0.0
B1.09	1	57.7	0.8	0.0	0.0
B1.14	2	81.4	0.8	0.0	0.0
B2.02	2	79.3	0.8	0.0	0.0
B2.07	3	108.1	1.1	0.0	0.0
B2.12	2	85.4	0.9	0.0	0.0
B2.17	3	100.8	0.9	0.0	0.0
B3.05	2	94.2	0.8	0.0	0.0
B3.10	2	78.9	0.8	0.0	0.0
B3.15	2	78.5	0.8	0.0	0.0
B4.03	2	78.3	0.8	0.0	0.0
B4.08	2	83.9	0.9	0.0	0.0
B4.13	3	100.3	0.9	0.0	0.0
B5.03	2	78.5	0.8	0.0	0.0
B5.08	2	83.9	0.9	0.0	0.0
B5.13	3	100.3	0.9	0.0	0.0
B6.03	2	78.3	0.8	0.0	0.0
B6.10	2	78.9	0.8	0.0	0.0
B6.15	2	83.6	0.9	0.0	0.0
BG.05	2	88.7	1.1	0.0	0.0
BG.10	2	79.2	0.8	0.0	0.0
BG.15	2	78.7	0.8	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
B1.05	2	93.6	0.8	0.0	0.0
B1.10	2	78.9	0.9	0.0	0.0
B1.15	2	78.5	0.8	0.0	0.0
B2.03	2	78.5	0.8	0.0	0.0
B2.08	2	84.2	0.9	0.0	0.0
B2.13	3	100.3	0.9	0.0	0.0
B3.01	1	66.8	0.9	0.0	0.0
B3.06	3	110.1	1.0	0.0	0.0
B3.11	2	79.0	0.9	0.0	0.0
B3.16	1	57.9	1.0	0.0	0.0
B4.04	2	79.3	1.6	0.0	0.0
B4.09	1	57.9	0.9	0.0	0.0
B4.14	2	81.3	0.8	0.0	0.0
B5.04	2	79.3	1.6	0.0	0.0
B5.09	1	57.1	0.9	0.0	0.0
B5.14	2	81.3	0.8	0.0	0.0
B6.04	2	79.3	1.6	0.0	0.0
B6.11	2	79.1	0.9	0.0	0.0
BG.01	1	59.2	0.9	0.0	0.0
BG.06	1	67.6	1.1	0.0	0.0
BG.11	2	79.1	0.9	0.0	0.0
BG.16	1	57.5	1.0	0.0	0.0

Description of project

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

Common areas of unit building - Building 3A

Common area	Floor area (m²)
Lift car (No.1)	-

Common areas of unit building - Building 3B

Common area	Floor area (m²)
Lift car (No.2)	-

Common areas of the development (non-building specific)

Common area	Floor area (m²)
Car park area (No. 1)	10800.0
Garbage room (No. 1)	110.0
Ground floor lobby type (No. 1)	562.0

Common area	Floor area (m²)
Lift motor room (No. 1)	20.0
Plant or service room (No. 1)	175.0
Hallway/lobby type (No. 1)	180.0

Common area	Floor area (m²)
Switch room (No. 1)	21.0
Other internal common area (No. 1)	2269.0

Schedule of BASIX commitments

1. Commitments for Residential flat buildings - Building 3A
    - (a) Dwellings
        - (i) Water
        - (ii) Energy
        - (iii) Thermal Comfort
    - (b) Common areas and central systems/facilities
        - (i) Water
        - (ii) Energy

2. Commitments for Residential flat buildings - Building 3B
    - (a) Dwellings
        - (i) Water
        - (ii) Energy
        - (iii) Thermal Comfort
    - (b) Common areas and central systems/facilities
        - (i) Water
        - (ii) Energy

3. Commitments for multi-dwelling houses

4. Commitments for single dwelling houses

5. 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 Residential flat buildings - Building 3A

(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:			
(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.	✔	✔	✔

	Fixtures					Appliances		Individual pool				Individual spa		
Dwelling no.	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	4 star (> 4.5 but <= 6 L/min)	4 star	5 star	5 star	no	-	5 star	-	-	-	-	-	-	-

	Alternative water source							
Dwelling no.	Alternative water supply systems	Size	Configuration	Landscape connection	Toilet connection (s)	Laundry connection	Pool top-up	Spa top-up
All dwellings	central water tank (no. 1)	See central systems	See central systems	no	yes	yes	no	no
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	gas instantaneous 5 star	individual fan, ducted to façade or roof	interlocked to light	individual fan, ducted to façade or roof	interlocked to light	individual fan, ducted to façade or roof	interlocked to light

	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
A1.04, A2.04, A3.04, A3.07, A5.04, A5.07, A6.01, A6.06, AG.01, AG.10	central cooling system 1 (zoned)	central cooling system 1 (zoned)	central heating system 1 (zoned)	central heating system 1 (zoned)	1 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	no
A1.02, A1.05, A1.09, A2.02, A2.05, A2.09, A3.02, A3.06, A3.09, A4.02, A4.09, A5.02, A5.09, A6.02, A6.05, AG.02, AG.09	central cooling system 1 (zoned)	central cooling system 1 (zoned)	central heating system 1 (zoned)	central heating system 1 (zoned)	3 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	no
All other dwellings	central cooling system 1 (zoned)	central cooling system 1 (zoned)	central heating system 1 (zoned)	central heating system 1 (zoned)	2 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	no

	Individual pool		Individual spa		Appliances & other efficiency measures							
Dwelling no.	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	-	-	-	-	electric cooktop & electric oven	4.5 star	-	4 star	-	5 star	no	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.	✔	✔	✔

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
A1.01	16.1	13.7
A1.02	13.4	22.8
A1.03	16.8	23.9
A1.04	24.3	16.2
A1.05	5.9	11.2
A1.06	2.1	11.6
A1.07	23.7	15.6
A1.08	23.9	28.4
A1.09	6.4	24.7
A1.10	21.7	13.8
A2.01	1.8	23.3
A2.02	14.3	27.5
A2.03	0.1	16.4
A2.04	24.9	11.8
A2.05	5.0	12.0
A2.06	3.4	15.3
A2.07	24.3	34.3
A2.08	23.0	26.5
A2.09	7.5	15.0
A3.02	14.2	23.2
A3.03	16.8	27.5
A3.04	24.9	16.6
A3.05	13.1	14.7
A3.06	14.2	11.6
A3.07	22.4	18.5
A3.08	23.2	33.4
A3.09	8.6	26.1

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
A3.10	2.0	15.0
A4.01	1.9	15.2
A4.02	14.7	23.2
A4.03	15.5	28.0
A4.04	25.8	16.2
A4.05	6.6	14.4
A4.06	8.0	11.7
A4.07	25.9	15.7
A4.08	22.9	33.5
A4.09	8.9	25.9
A4.10	2.1	14.7
A5.01	2.1	15.3
A5.02	14.8	22.9
A5.03	15.9	28.2
A5.04	23.0	22.2
A5.05	20.1	15.1
A5.06	31.0	14.5
A5.07	30.6	21.7
A5.08	22.3	33.8
A5.09	9.8	25.7
A5.10	2.4	15.1
A6.01	18.6	17.5
A6.02	14.0	24.8
A6.03	27.4	29.0
A6.04	34.3	33.2
A6.05	17.3	24.5
A6.06	10.6	25.5

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
AG.01	25.9	18.2
AG.02	26.6	23.8
AG.03	51.0	20.1
AG.04	51.0	15.9
AG.05	16.8	10.9
AG.06	18.0	11.2
AG.07	55.1	16.2
AG.08	51.4	31.9
AG.09	27.9	24.2
AG.10	17.4	18.8
All other dwellings	1.9	15.1

(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	4 star (> 6 but <= 7.5 L/min)	4 star	5 star	no common laundry facility

Central systems	Size	Configuration	Connection (to allow for...)
Central water tank - rainwater or stormwater (No. 1)	10000.0	To collect run-off from at least: - 1400.0 square metres of roof area of buildings in the development - 0.0 square metres of impervious area in the development - 0.0 square metres of garden/lawn area in the development - 0.0 square metres of planter box area in the development (excluding, in each case, any area which drains to, or supplies, any other alternative water supply system).	- irrigation of 0.0 square metres of common landscaped area on the site - car washing in 1 car washing bays on the site
Fire sprinkler system (No. 1)	-	-	-

(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 ventilation system		Common area lighting		
Common area	Ventilation system type	Ventilation efficiency measure	Primary type of artificial lighting	Lighting efficiency measure	Lighting control system/BMS
Lift car (No.1)	-	-	light-emitting diode	connected to lift call button	Yes

Central energy systems	Type	Specification
Central hot water system (No. 1)	electric heat pump - air sourced	Piping insulation (ringmain & supply risers): (a) Piping external to building: R1.0 (~38 mm); (b) Piping internal to building: R1.0 (~38 mm)
Central cooling system (No. 1)	variable refrigerant volume units	Energy source: electric driven compressor Heat rejection method: air cooled condenser Unit efficiency (min): medium - COP 3.5 - 5.5
Central heating system (No. 1)	variable refrigerant volume units	Energy source: electric driven compressor + air sourced evaporator Unit efficiency: medium - COP 3.5 - 5.5
Lift (No. 1)	gearless traction with V V V F motor	Number of levels (including basement): 9

2. Commitments for Residential flat buildings - Building 3B

(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: (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.	✔	✔	✔

	Fixtures					Appliances		Individual pool				Individual spa		
Dwelling no.	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	4 star (> 4.5 but <= 6 L/min)	4 star	5 star	5 star	no	-	5 star	-	-	-	-	-	-	-

	Alternative water source							
Dwelling no.	Alternative water supply systems	Size	Configuration	Landscape connection	Toilet connection (s)	Laundry connection	Pool top-up	Spa top-up
All dwellings	central water tank (no. 1)	See central systems	See central systems	no	yes	yes	no	no
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	gas instantaneous 5 star	individual fan, ducted to façade or roof	interlocked to light	individual fan, ducted to façade or roof	interlocked to light	individual fan, ducted to façade or roof	interlocked to light

	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
B1.01, B1.09, B1.16, B2.01, B2.09, B2.16, B3.01, B3.09, B3.16, B4.01, B4.09, B5.01, B5.09, B6.01, B6.09, BG.01, BG.04, BG.06, BG.09, BG.14, BG.16	central cooling system 2 (zoned)	central cooling system 2 (zoned)	central heating system 2 (zoned)	central heating system 2 (zoned)	1 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	no

	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
B1.06, B1.07, B1.13, B1.17, B2.06, B2.07, B2.13, B2.17, B3.06, B3.07, B3.13, B3.17, B4.02, B4.06, B4.07, B4.13, B5.02, B5.06, B5.07, B5.13, B6.02, B6.13, BG.07, BG.17	central cooling system 2 (zoned)	central cooling system 2 (zoned)	central heating system 2 (zoned)	central heating system 2 (zoned)	3 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	no
All other dwellings	central cooling system 2 (zoned)	central cooling system 2 (zoned)	central heating system 2 (zoned)	central heating system 2 (zoned)	2 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	no

	Individual pool		Individual spa		Appliances & other efficiency measures							
Dwelling no.	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	-	-	-	-	gas cooktop & electric oven	4.5 star	-	4 star	-	5 star	no	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.	✔	✔	✔

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
B1.01	19.5	26.2
B1.02	12.0	24.3
B1.03	10.7	20.7
B1.04	8.3	17.5
B1.05	26.4	17.2
B1.06	28.4	11.3
B1.07	9.3	11.4
B1.08	21.4	11.8
B1.09	2.9	18.0
B1.10	28.1	29.5
B1.11	12.3	27.5
B1.12	12.8	26.1
B1.13	25.0	24.2
B1.14	19.7	15.9
B1.15	18.1	29.0
B1.16	17.2	14.1
B1.17	15.3	21.4
B2.01	19.2	29.0
B2.02	12.9	24.1
B2.03	11.1	20.9
B2.04	9.3	17.0
B2.05	21.3	17.9
B2.06	16.8	9.4
B2.07	9.4	11.0
B2.08	21.2	13.0
B2.09	3.2	18.2
B2.10	29.3	31.1

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
B2.11	13.7	24.9
B2.12	12.1	24.3
B2.13	17.9	23.5
B2.14	17.1	18.3
B2.15	19.7	31.4
B2.16	16.8	14.1
B2.17	16.3	23.0
B3.01	20.1	28.7
B3.02	12.2	26.5
B3.03	10.9	20.8
B3.04	9.2	17.4
B3.05	21.8	17.8
B3.06	17.1	9.4
B3.07	9.8	10.9
B3.08	21.6	12.7
B3.09	3.4	18.0
B3.10	30.7	31.2
B3.11	13.1	25.0
B3.12	12.9	24.0
B3.13	14.6	23.4
B3.14	14.5	19.8
B3.15	18.9	39.9
B3.16	17.8	18.9
B3.17	20.1	25.2
B4.01	19.5	28.6
B4.02	15.9	21.9
B4.03	11.4	20.3

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
B4.04	9.4	17.4
B4.05	22.2	17.5
B4.06	17.3	9.2
B4.07	10.0	10.7
B4.08	21.9	12.4
B4.09	3.9	17.6
B4.10	30.6	30.7
B4.11	13.3	24.9
B4.12	13.3	23.7
B4.13	13.3	23.0
B4.14	13.4	20.9
B4.15	13.0	28.2
B5.01	20.6	28.1
B5.02	16.5	20.9
B5.03	9.7	20.0
B5.04	9.6	17.3
B5.05	22.4	17.4
B5.06	28.2	11.1
B5.07	19.4	12.8
B5.08	22.1	12.5
B5.09	3.8	17.3
B5.10	30.8	30.5
B5.11	13.6	24.6
B5.12	13.1	23.4
B5.13	13.3	22.9
B5.14	11.2	22.3
B5.15	12.6	28.2

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
B6.01	29.4	30.2
B6.02	14.7	36.9
B6.03	18.0	21.5
B6.04	12.9	25.8
B6.05	36.3	20.4
B6.08	38.0	15.8
B6.09	10.1	21.6
B6.10	38.9	29.0
B6.11	22.5	29.4
B6.12	19.9	29.9
B6.13	21.3	23.5
B6.14	17.1	23.1
B6.15	18.0	26.7
BG.02	37.3	20.7
BG.03	28.0	20.7
BG.04	24.9	18.4
BG.05	41.0	20.3
BG.06	32.0	20.4
BG.07	31.9	10.4
BG.08	45.8	11.0
BG.09	12.4	18.1
BG.10	46.8	29.0
BG.11	30.7	26.9
BG.12	31.2	20.5
BG.13	42.0	14.9
BG.14	43.2	23.0
BG.15	48.4	25.2

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
BG.16	47.2	10.8
All other dwellings	31.3	33.6

(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	4 star (> 6 but <= 7.5 L/min)	4 star	5 star	no common laundry facility

Central systems	Size	Configuration	Connection (to allow for...)
Central water tank - rainwater or stormwater (No. 2)	15000.0	To collect run-off from at least: - 2400.0 square metres of roof area of buildings in the development - 0.0 square metres of impervious area in the development - 0.0 square metres of garden/lawn area in the development - 0.0 square metres of planter box area in the development (excluding, in each case, any area which drains to, or supplies, any other alternative water supply system).	- irrigation of 0.0 square metres of common landscaped area on the site - car washing in 1 car washing bays on the site
Fire sprinkler system (No. 2)	-	-	-

(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 ventilation system		Common area lighting		
Common area	Ventilation system type	Ventilation efficiency measure	Primary type of artificial lighting	Lighting efficiency measure	Lighting control system/BMS
Lift car (No.2)	-	-	light-emitting diode	connected to lift call button	Yes

Central energy systems	Type	Specification
Central hot water system (No. 2)	electric heat pump - air sourced	Piping insulation (ringmain & supply risers): (a) Piping external to building: R1.0 (~38 mm); (b) Piping internal to building: R1.0 (~38 mm)
Central cooling system (No. 2)	variable refrigerant volume units	Energy source: electric driven compressor Heat rejection method: air cooled condenser Unit efficiency (min): medium - COP 3.5 - 5.5
Central heating system (No. 2)	variable refrigerant volume units	Energy source: electric driven compressor + air sourced evaporator Unit efficiency: medium - COP 3.5 - 5.5
Lift (No. 2)	gearless traction with V V V F motor	Number of levels (including basement): 9

5. 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	4 star (> 6 but <= 7.5 L/min)	4 star	5 star	no common laundry facility

Central systems	Size	Configuration	Connection (to allow for...)
Reticulated alternative water supply	-	Installation of plumbing to make provision for connection to Oran Park / Turner Road - single houses only (proposed) reticulated alternative water supply.	- irrigation of 0.0 square metres of common landscaped area on the site - car washing in 0 car washing bays on the site

(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 ventilation system		Common area lighting		
Common area	Ventilation system type	Ventilation efficiency measure	Primary type of artificial lighting	Lighting efficiency measure	Lighting control system/BMS
Car park area (No. 1)	ventilation (supply + exhaust)	carbon monoxide monitor + VSD fan	light-emitting diode	motion sensors	Yes
Lift motor room (No. 1)	ventilation exhaust only	none ie. continuous	light-emitting diode	manual on / manual off	Yes
Switch room (No. 1)	ventilation supply only	none ie. continuous	light-emitting diode	motion sensors	Yes
Garbage room (No. 1)	ventilation exhaust only	-	light-emitting diode	motion sensors	Yes
Plant or service room (No. 1)	ventilation exhaust only	none ie. continuous	light-emitting diode	motion sensors	Yes
Other internal common area (No. 1)	ventilation (supply + exhaust)	time clock or BMS controlled	light-emitting diode	motion sensors	Yes
Ground floor lobby type (No. 1)	ventilation (supply + exhaust)	time clock or BMS controlled	light-emitting diode	motion sensors	Yes
Hallway/lobby type (No. 1)	ventilation (supply + exhaust)	time clock or BMS controlled	light-emitting diode	motion sensors	Yes

Central energy systems	Type	Specification
Other	Building management system installed?: yes Active power factor correction installed?: yes	-

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).

ORAN PARK RESIDENTIAL 3 - CORNER OF SOUTH CIRCUIT AND CIVIC WAY

DA Acoustic Assessment

29 April 2022

Greenfields Development Company No. 2 c/- Anmeri Consulting

TM651-01F01 Acoustic Assessment (r1)

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1 Introduction

Renzo Tonin & Associates was engaged to undertake a noise impact assessment of the proposed residential development at the corner of South Circuit and Civic Way, within the Oran Park Town Centre. This report forms part of the supporting documentation being prepared for a new Development Application (DA), to be submitted to Camden Council.

The purpose of this assessment is to determine future road traffic noise levels at site, to demonstrate that the proposed apartment development is capable of meeting typically adopting acoustic requirements with respect to internal noise levels and determine appropriate building control treatments to ensure an acceptable level of internal acoustic amenity is achieved, in accordance with the Oran Park Development Control Plan (DCP) 2007.

In addition, this report sets the project noise emission goals for use of the development in accordance with the NSW Environmental Protection Authority "Noise Policy for Industry" (2017) and Camden Council Environmental Noise Policy 2018, particularly in relation to mechanical plant and equipment. As detailed plant selections are not available at this early stage, a follow-up assessment of external noise emissions from mechanical plant and equipment will be required for Construction Certificate.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. A glossary of acoustic terms used in this report is detailed in APPENDIX A.

1.1 References

- Oran Park DCP 2007, published 2016.
- Camden Council '*Environmental Noise Policy*', 2018
- NSW Government. State Environmental Planning Policy (Infrastructure), 2007.
- NSW Department of Planning, Industry and Environment (DPIE). '*Development Near Rail Corridors and Busy Roads – Interim Guideline*', 2008.
- Allen Jack and Cottier, Oran Park Residential 3, Corner of South Circuit and Civic Way Oran Park, architectural drawing set, dated 21 April 2022.
- Standards Australia. (2018). AS 1055:2018 *'Acoustics-Description and measurement of environmental noise'*.

2 Project Overview and Site Description

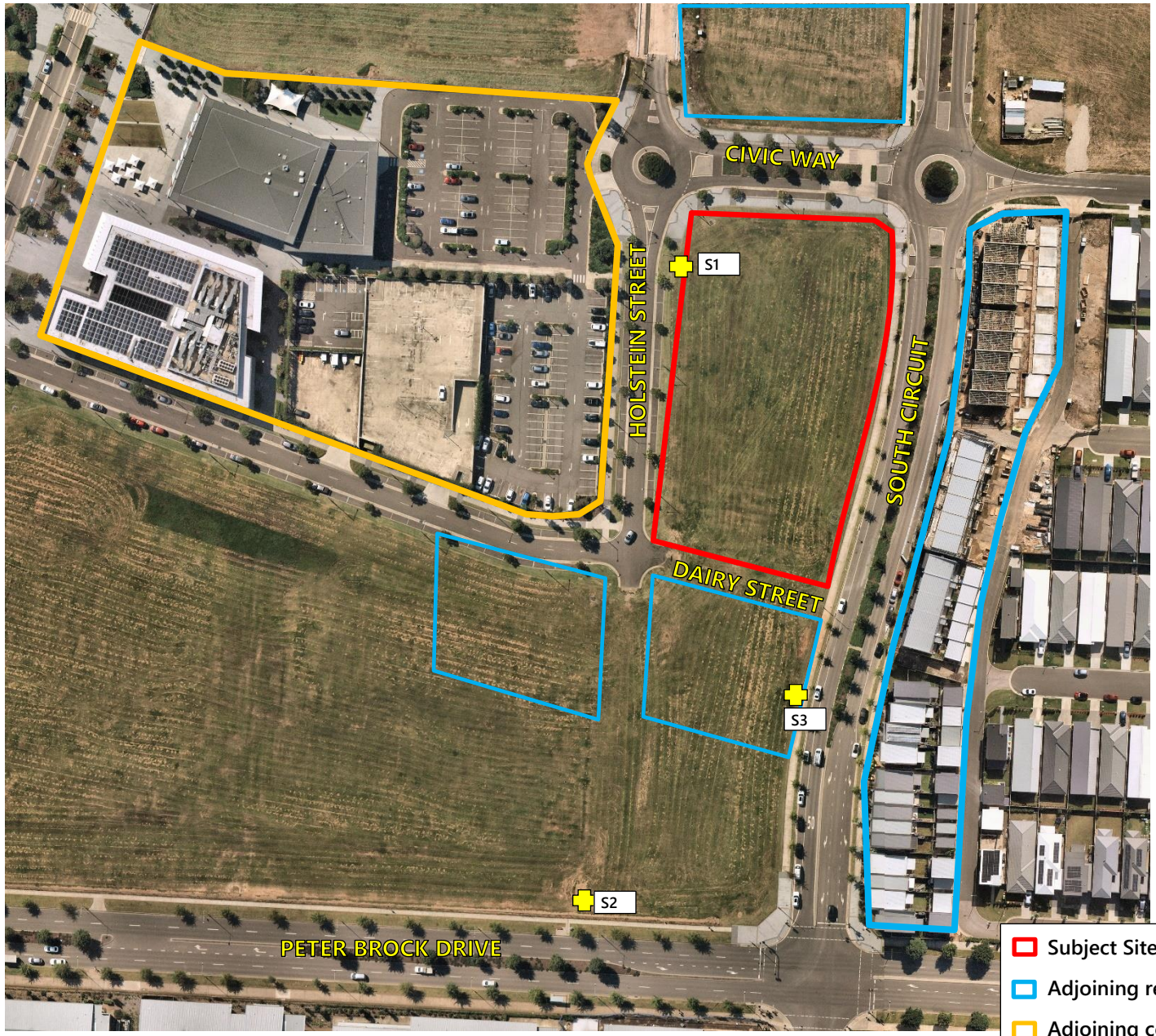
The DA seeks consent for excavation of two basement levels and construction of two residential buildings each of 7 storeys – Building A in the North with the long axis fronting Civic Way and Building B in the South with three sides wrapping around a central courtyard.

The subject site is located within the Camden Council local government area (LGA) in the Oran Park Town Centre. It is bounded by local and collector roads - Civic Way in the North, Dairy Street in the South, South Circuit in the East and Holstein Street in the West.

The site is greater than 100m radius from any arterial, sub-arterial or transit boulevards (the nearest being Peter Brock Drive, more than 100mm to the south of the site). Access to the basement carpark is proposed via driveway Dairy Street (in the South).

Figure 2-1 illustrates the subject site, surrounds and noise monitoring locations.

Figure 2-1: Site, Surrounds and Noise Monitoring Locations



3 Site Noise Survey

A survey of the existing traffic and ambient daytime noise levels at the subject site was conducted using attended measurements on site during the morning period from 8am to 10am. All instruments have current calibration from a NATA accredited laboratory and complies with Australian Standard AS1259.2-1990 *"Acoustics - Sound Level Meters"*.

Peter Brock Drive is an arterial road, with the section of carriageway nearest the site comprising of four-lanes and noted as carrying moderate volumes of traffic.

In addition to the site monitoring, future façade traffic noise levels for year 2036 were predicted using a CoRTN calculation, based on the traffic volumes predicted in the GHD report "Oran Park Town Centre Traffic Assessment", dated 21 June 2021, specifically the approach lane flows for Site 16 (which is the intersection of Civic Way and South Circuit at the North-East Corner of the site. These are addressed in 4

3.1 Attended Noise Measurements

Attended short term measurements were conducted during a typical weekday peak traffic period, at three representative locations near/within the subject site (see Figure 2-1).

- Location 1 (S1) – Holstein Street, approx. 1.5m above street level and 5m from the near side of the curb.
- Location 2 (S2) – Peter Brock Drive, approx. 1.7m above the street level and 5.8m from the near side of the curb.
- Location 3 (S3) – South Circuit, approx. 1.9m above road level and approx. 7m from near side of the curb.

Measurements were conducted on the 23rd of March 2022, between 8am and 10am.

The equipment used for noise measurements was an NTi Audio Type XL2 precision sound level analyser which is a class 1 instrument having accuracy suitable for field and laboratory use. The instrument was calibrated prior and subsequent to measurements using a Bruel & Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with IEC 61672 (parts 1-3) '*Electroacoustics - Sound Level Meters*' and IEC 60942 '*Electroacoustics - Sound calibrators*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

3.2 Results of Traffic Noise Survey

A summary of the short-term noise survey and results of attended noise measurements are presented in Table 3-1.

Table 3-1: Results of traffic noise survey

Item	Time of Day	Measured Traffic Noise Levels	
		Traffic Noise[1]	Background Noise[1]
S1 Holstein Street (approx. 5m from kerb and 1.5m high)	9:35am to 9:50am	56 dB(A)$L_{eq(15min)}$	48 dB(A)$L_{90(15min)}$
S2 Peter Brock Drive (approx. 5.8m from kerb and 1.7m high)	8:50am to 9:05am	61 dB(A) $L_{eq(15min)}$	52 dB(A) $L_{90(15min)}$
S3 South Circuit (approx. 7m from kerb and 1.9m high)	9:05am to 9:30am	56 dB(A) $L_{eq(15min)}$	47 dB(A) $L_{90(15min)}$

Notes: 1. Day is defined as 7am to 10pm; Night is defined as 10pm to 7am

4 Predicted future traffic noise levels

Future morning (am) and evening (pm) peak period traffic flows for the Year 2036 have been predicted by GHD in their report "Oran Park Town Centre Traffic Assessment", dated 21 June 2021. Daily averages were not provided at the intersection of interest.

The following assumptions were used consistent with previous assessments for the Oran Park Precinct:

- Peak hour traffic volumes are 10% of the 24hr volume;
- The 15hr daytime volume is 85% of the 24hr volume;
- Percentage of heavy vehicles in traffic mix is assumed to be 0% for the local roads immediately surrounding the site, based on the predictions from GHD.

The traffic volumes used for the acoustic assessment are presented in Table 2. It is noted that variations in the actual traffic volumes, will affect the traffic noise exposure.

Table 2: Road traffic volumes

Forecast Year	Road	Classification	Period	Traffic flow	% heavy vehicles
2036	South Circuit Between Civic Way and Peter Brock Drive	Local	Day worst 1-hour	1244	0
2036	Civic Way just west of South Circuit	Local	Day worst 1-hour	229	0

While both 'day' and 'night' traffic noise goals are to be satisfied, the daytime traffic goals are more likely to be exceeded in a developed residential area. This corresponds with the assumed traffic distribution. Night-time road traffic noise levels are likely to create greater impact only where the night-time percentage of heavy vehicles is significantly higher than the daytime period.

4.1 Prediction methodology

Noise predictions are based on a method developed by the United Kingdom Department of Environment entitled '*Calculation of Road Traffic Noise (*1988)' known as the CoRTN (1988) method. The method has been adapted to Australian conditions and extensively tested by the Australian Road Research Board. As a result, it is recognised and accepted by the NSW Environment Protection Authority (EPA). The model predicts noise levels for steady flowing traffic and adjustments have been made to account for the higher source locations associated with heavy vehicle engines and exhausts.

Noise modelling for the project was carried out using in-house spreadsheet-based software, which applies the CoRTN algorithms. The noise prediction model considers the following:

Table 3: Summary of modelling inputs

Input parameters	Input used
Traffic volumes and mix	As described in Section 4
Vehicle speed	South Circuit - 50km/h
Gradient of roadways	2% on South Circuit based on RLs from architectural drawings
Source height	0.5m for car engines, exhaust and car & truck tyres, 1.5m for truck engines and 3.6m for truck exhaust as detailed within CoRTN
Ground topography at receiver and road	From architectural drawings
Angles of view from receiver	160 degrees (full view)
Reflections from existing barriers, structures and cuttings on opposite side of road	No reflections
Air and ground absorption – Values vary between 0 (hard surface) to 1 (100% absorptive)	0.25 has been used in this study
Receiver heights	1.5m above ground level for ground floor
Facade correction	+2.5dB(A) (added even for private open space for conservative assessment)
Australian conditions correction	-1.7dB(A) facade
Acoustic properties of road surfaces	No corrections applied
Roadside mounds / barriers	None

4.2 Predicted noise levels

The following table presents the

Table 4-4: Predicted noise levels – free field at facades

Item	Measured Traffic Noise Levels	
	Day[1]	Night[1]
South Circuit Façade	63 dB(A) $L_{eq(15\text{-hour})}$	58 dB(A) $L_{eq(9\text{-hour})}$
Civic Way Façade	55 dB(A) $L_{eq(15\text{-hour})}$	50 dB(A) $L_{eq(9\text{-hour})}$
Dairy Street Façade[2]	55 dB(A) $L_{eq(15\text{-hour})}$	50 dB(A) $L_{eq(9\text{-hour})}$
Holstein Street Façade[2]	55 dB(A) $L_{eq(15\text{-hour})}$	50 dB(A) $L_{eq(9\text{-hour})}$

Notes: 1. Day is defined as 7am to 10pm; Night is defined as 10pm to 7am
2. Dairy Street and Holstein Streets are assumed to be the same as Civic Way

5 Assessment Criteria

5.1 Oran Park DCP 2007 & Camden Council Environmental Noise Policy 2018

Oran Park DCP 2007 and Camden Council Environmental Noise Policy 2018 (Camden ENP) requires a formal assessment of road traffic noise for sites which adjoin arterial or sub-arterial roads, or transit boulevards; or where the site is on a collector road within 100m radius of such roads.

South Circuit is the largest road with the potential to impact the site and is a Collector Street. It is not a nominated Transit Boulevard under the Oran Park DCP 2007. As such, the subject site is not required to have a noise intrusion assessment under either the Oran Park DCP and Camden ENP.

5.2 Department of Planning, Industry and Environment

The DPIE publication '*Development near rail corridors and busy roads - Interim guideline*' (ISEPP Guideline), provides direction for developments that may be impacted by rail corridors and/or busy roads and consideration of this guideline is a requirement for development specified under the Infrastructure SEPP.

The guideline recommends an acoustic traffic assessment be undertaken for roads having an AADT of greater than 20,000 and less than 40,000 vehicles per day and states an assessment is mandatory for roads having an AADT of greater than 40,000 vehicles per day.

However, South Circuit is predicted to carry less than 20,000 vehicles per day and so compliance with the of the ISEPP Guideline is not a mandatory requirement.

5.3 Project Assessment Criteria

The resulting project specific internal noise criteria for the development is summarised in Table 5-1.

Table 5-1: Project internal noise criteria

Condition	Occupancy	Design Internal Noise Level
Windows closed	Bedroom (10pm – 7am)	35 dB(A) $L_{eq(9hr)}$
	All other habitable rooms (24 hours)	40 dB(A) $L_{eq(24hr)}$

6 Traffic Noise Intrusion Assessment

6.1 Methodology

Traffic noise from vehicle movements along South Circuit, is the primary environmental noise source with the potential to impact on the amenity of future receivers within the proposed development. A survey of the existing traffic noise levels associated with this carriageway is summarised in Section 3 and the UK Calculation of Road Traffic Noise (CoRTN) calculation model was used to determine façade incident traffic noise levels on the subject proposal, based on these levels. The resulting façade incident noise levels are detailed in Table 6-1.

Table 6-1: Calculated façade incident traffic noise levels (free field at facades)

Item	Measured Traffic Noise Levels	
	Day[1]	Night[1]
South Circuit Façade	63 dB(A) $L_{eq(15\text{-hour})}$	58 dB(A) $L_{eq(9\text{-hour})}$
Civic Way Façade	55 dB(A) $L_{eq(15\text{-hour})}$	50 dB(A) $L_{eq(9\text{-hour})}$
Dairy Street Façade[2]	55 dB(A) $L_{eq(15\text{-hour})}$	50 dB(A) $L_{eq(9\text{-hour})}$
Holstein Street Façade[2]	55 dB(A) $L_{eq(15\text{-hour})}$	50 dB(A) $L_{eq(9\text{-hour})}$

1. Notes: 1. Day is defined as 7am to 10pm; Night is defined as 10pm to 7am
2. Dairy Street and Holstein Streets are assumed to be the same as Civic Way

Calculations were then undertaken based on the traffic noise levels incident on the façade, spectral characteristics of the traffic noise, building fabric design (area of building element exposed to noise), façade transmission loss and internal area (room) sound absorption characteristics. In this way the likely internal noise levels can be predicted.

The following acoustic treatments are required to ensure compliance with the noise goals identified in Table 5-1.

6.2 Recommended Acoustic Treatments

6.2.1 Glazed windows and doors

The installation of façade elements in building openings and the design of window mullions, door frames and perimeter seals, must not reduce the sound insulation of the glazing assembly (i.e. glass, frame and seals) below the values nominated in Table 6-2. Key items to note to prevent this include:

- Acoustic seals nominated for all external windows and doors, are required to be fitted with Q-lon type acoustic seals or equivalent rubber bulb acoustic seals. **Mohair of fin type seals are not acceptable for the windows and doors requiring acoustic seals**.
- Perimeter of opening around façade element is acoustically sealed i.e. space between frame (before architraves are installed for windows) and wall structure is sealed with silicone or polyurethane acoustic sealant and foam backing rod.

The glazing specification is indicative only and other constructions that provide the same or better sound transmission loss performance are also acceptable. The window/door supplier/manufacturer shall provide evidence that the glazing system proposed has been tested in a registered laboratory, with results showing compliance with the minimum listed R_W requirements. Also, the glazing installer should certify that the window/doors have been constructed and installed in a manner equivalent to the tested samples. Design review should also be conducted during the detailed design phase to ensure ongoing compliance.

Table 6-2: Recommended minimum façade glazing specification

Façade Treatment	Space	Minimum Sound Insulation Rating of Glazing Assembly	Typical Compliance Glazing Configuration	Acoustic Seals	Laboratory Test Reference
South Circuit (including corner apartments)	Any	R_w 32	6.38mm laminate or 6.38mm laminate / 12mm airgap/ 6mm float or toughened	Yes	ESTIMATE
Civic Way, Holstein Street, Dairy Street	Any	R_w 30	6mm (float or toughened) or 6mm / 12mm airgap/ 4mm float or toughened	Yes	ESTIMATE
Remaining	Any	R_w 22	4mm (float or toughened) or 4mm / 12mm airgap/ 4mm float or toughened	Weather seals only	ESTIMATE

By way of explanation, the Sound Insulation Rating Rw is a measure of the noise reduction property of the partition, a higher rating implying a higher sound reduction performance.

Note that the Rw rating of systems measured as built on site (R'w Field Test) may be up to 5 points lower than the laboratory result.

LEGEND where no appropriate test certificate exists:

1. ESTIMATE: The client is advised not to commence detailing or otherwise commit to partition construction systems which have not been tested in an approved laboratory or for which an opinion only is available. Testing of partition construction systems is a component of the quality control of the design process and should be viewed as a priority because there is no guarantee the forecast results will be achieved thereby necessitating the use of an alternative which may affect the cost and timing of the project. No responsibility is taken for use of or reliance upon untested partition construction systems, estimates or opinions. The advice provided here is in respect of acoustics only.
2. ESTIMATE – APPROVED FOR CONSTRUCTION: Use of the form of construction is approved prior to laboratory certification. To complete the quality control of the design process and confirm the acoustical performance of the construction, we recommend testing in a laboratory to confirm the Rw rating as soon as practicable. In the case of impact rating for floor systems, no particular impact rating is guaranteed to comply with either the Building Code of Australia or Strata Scheme Management Act and hence carpet runners may still be required.
3. ESTIMATE – TEST NOT REQUIRED: Use of the form of construction is approved without laboratory certification. The STC/R_w of the form of construction exceeds the project requirements.
4. The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.

NOTES FOR GLAZING CONSTRUCTIONS:

1. The information in this table is provided for the purpose of Council approvals process and cost planning and shall not be used for construction unless otherwise approved in writing by the acoustic consultant.
2. The design in this table is preliminary and a comprehensive assessment shall be conducted prior to Construction Certification.
3. Before committing to any form of construction or committing to any builder, advice should be sought from an acoustic consultant to ensure that adequate provisions are made for any variations which may occur as a result of changes to the form of construction where only an "estimate" is available for the sound insulation properties of recommended materials.
4. The glazing supplier shall ensure that installation techniques will not diminish the Rw performance of the glazing when installed on site.
5. All openable glass windows and doors shall incorporate full perimeter acoustic seals equivalent to Q-Lon, which enable the Rw rating performance of the glazing to not be reduced.
6. The above glazing thicknesses should be considered the minimum thicknesses to achieve acoustical ratings. Greater glazing thicknesses may be required for structural loading, wind loading etc.

GENERAL

1. The sealing of all gaps in partitions is critical in a sound rated construction. Use only sealer approved by the acoustic consultant.
2. Check design of all junction details with acoustic consultant prior to construction.
3. Check the necessity for HOLD POINTS with the acoustic consultant to ensure that all building details have been correctly interpreted and constructed.
4. The information provided in this table is subject to modification and review without notice.
5. The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.
6. Façade treatments defined for traffic noise intrusion. Client may elect to upgrade the façade facing into the courtyard if noise from use of the communal space is a concern, but that can be determined during detailed design phase.

6.2.2 External walls

At present, all external wall elements are proposed to be of masonry construction (brick and concrete). Masonry construction will provide adequate sound insulation (in principle, external wall constructions with a sound isolation rating 15dB higher than the recommended glazing specifications, are sufficient to maintain the acoustic performance of the overall facade system) against the site traffic noise sources and no further upgrade is required for acoustic purposes. There should not be vents on the internal skin of external walls. All penetrations in the internal skin of external walls should be acoustically sealed (i.e. airtight).

If light-weight external wall systems are proposed during subsequent stages of design, this will need to be reviewed in detail at the Construction Certificate (CC) stage, to determine minimum constructions (additional insulation and/or linings).

6.2.3 Roof and ceiling

At present, the proposed concrete roof is acoustically acceptable and does not require any additional treatments. If light-weight roof systems are proposed during subsequent stages of design, this will need to be reviewed in detail at the Construction Certificate (CC) stage, to determine minimum constructions (additional linings, minimum suspension cavity sizes, acoustic insulation etc.).

7 External Noise Emission Assessment

There is potential for external noise emissions associated with the proposed residential development. Operational noise sources must be reviewed to ensure that the amenity of surrounding existing land uses is not adversely affected. Operational noise sources with the potential to impact on the amenity of surrounding sensitive land users include:

- Mechanical services plant and equipment (ventilation and exhaust systems, air-conditioning condensers)

For noise from mechanical plant and equipment, Oran Park DCP 2007 does not itself define objective criteria. However the Camden Council Environmental Noise Policy, 2018 does nominate objective criteria (Note: whilst the Oran Park DCP 2007 references the earlier 2008 version of the Camden ENP, it is assumed that the instrument would be superseded by the 2018 version).

7.1 Camden Environmental Noise Policy 2018

Acoustic Amenity Control 4 states the following:

Residential plant and equipment must not generate a noise level greater than 5dBA above background noise level as measured at the boundary of a noise sensitive property during the hours of 7.00am to 10.00pm. Noise from plant and equipment must not be audible in habitable rooms of adjoining noise sensitive properties during the hours of 10.00pm to 7.00am.

It is assumed that the above criteria would be applicable to plant and equipment operated by a resident and emitted to a residential receiver external to the site, but would not apply to central building plant serving a residential flat building overall or cumulative impacts of noise emissions from multiple residents' use. For central building plant, the Environment Protection Authority (EPA) *Noise Policy for Industry* (NPfI) (2017) would be an appropriate control.

7.2 NSW EPA Noise Policy for Industry 2017

Noise impact is assessed in accordance with the NSW 'Noise Policy for Industry' (NPfI), 2017. The assessment procedure has two components:

- Controlling intrusive noise impacts in the short-term for residences; and
- Maintaining noise level amenity for residences and other land uses.

In accordance with the NPfI, noise impact should be assessed against the project noise trigger level which is the lower value of the project intrusiveness noise levels and project amenity noise levels.

7.2.1 Project intrusive noise levels

According to the NPfI, the intrusiveness of a noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the $L_{Aeq,15min}$ descriptor) does not exceed the background noise level measured in the absence of the source by more than 5dB(A). The project intrusiveness noise level, which is only applicable to residential receivers, is determined as follows:

$L_{Aeq,15minute}$ Intrusiveness noise level = Rating Background Level ('RBL') plus 5dB(A)

The subject site and surrounding are currently undergoing a period of substantial change, with the construction of the Oran Park Town Centre and surrounding residential and commercial uses. As such, the existing background noise levels at the subject site are not representative of what will be in existence when the development is occupied. However, consideration still needs to be given to external noise emissions to maintain the amenity of surrounding receivers.

Short term attended background noise measurements have determined that the existing background noise level is greater than the minimum levels nominated in the NPfI. Further, in lieu of conducting background noise monitoring for the site, Council has advised in a letter dated 23 May 2016 [ref: DA 2015 1084 1 - Additional Information - Standard Applications - 48 Skaife ~ LOT 5447 DP 1198455] that L_{90} levels of 40 dB(A) for daytime, 35 dB(A) for evening and 30 dB(A) for the night-time periods are acceptable.

Table 7-1: Intrusiveness noise levels

Receiver	Intrusiveness noise level, $L_{Aeq,15min}$		
	Day	Evening	Night
Residences	40 + 5 = 45	35 + 5 = 40	30 + 5 = 35

Notes: Day: 7:00 to 18:00 Monday to Saturday and 8:00 to 18:00 Sundays & Public Holidays
Evening: 18:00 to 22:00 Monday to Sunday & Public Holidays
Night: 22:00 to 7:00 Monday to Saturday and 22:00 to 8:00 Sundays & Public Holidays

4.2.2 Amenity noise levels

The project amenity noise levels for different time periods of day are determined in accordance with Section 2.4 of the NPfI. The NPfI recommends amenity noise levels ($L_{Aq,period}$) for various receivers including residential, commercial, industrial receivers and sensitive receivers such as schools, hotels, hospitals, churches and parks. These "recommended amenity noise levels" represent the objective for total industrial noise experienced at receiver location. However, when assessing a single industrial development and its impact on an area, "project amenity noise levels" apply.

The recommended amenity noise levels applicable for the subject area are reproduced Table 7-2 overleaf.

Table 7-2: Recommended amenity noise levels

Type of Receiver	Noise Amenity Area	Time of Day	Recommended amenity noise level, L_{Aeq}, dB(A)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
Commercial premises	All	When in use	65

Notes:
1. Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am.
2. On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.
3. The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.
4. The recommended amenity noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The level

To ensure that the total industrial noise level (existing plus new) remain within the recommended amenity noise levels for an area, the project amenity noise level that applies for each new industrial noise source is determined as follows:

$$L_{Aeq,period}\ \text{Project amenity noise level} = L_{Aeq,period}\ \text{Recommended amenity noise level} - 5\text{dB(A)}$$

Furthermore, given that the intrusiveness noise level is based on a 15 minute assessment period and the project amenity noise level is based on day, evening and night assessment periods, the NPfI provides the following guidance on adjusting the $L_{Aeq,period}$ level to a representative $L_{Aeq,15minute}$ level in order to standardise the time periods.

$$L_{Aeq,15minute} = L_{Aeq,period} + 3\text{dB(A)}$$

The project amenity noise levels ($L_{Aeq, 15min}$) applied for this project are reproduced in Table 7-3below, based on a 'suburban' noise amenity area.

Table 7-3: Project amenity noise levels

Type of Receiver	Noise Amenity Area	Time of Day	Recommended Noise Level, dB(A)	
			$L_{Aeq, Period}$[4]	$L_{Aeq, 15min}$
Residence	Suburban	Day	55 – 5 = 50	50 + 3 = **53**
		Evening	45 – 5 = 40	40 + 3 = **43**
		Night	40 – 5 = 35	35 + 3 = **38**
Commercial Premises		All	When in use	65 – 5 = 60	60 + 3 = **63**

Notes:
1. Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am.
2. On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.
3. The LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

7.2.2 Project noise trigger levels

In accordance with the NPfI the project noise trigger levels, which are the lower (i.e. more stringent) value of the project intrusiveness noise level and project amenity noise level, have been determined as shown in Table 7-4below.

Table 7-4: Project noise trigger levels

Receiver Location	$L_{Aeq, 15min}$ Project noise trigger levels, dB(A)		
	Day	Evening	Night
Residential receivers	45	40	35
Commercial	63	n/a	n/a

Notes:
1. Conversion of trigger levels from internal to external for school classroom and place of worship assumes 10dB(A) loss from outside to inside through open window.

4.2.4 Sleep disturbance noise levels

The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. In accordance with NPfI, a detailed maximum noise level event assessment should be undertaken where the subject development night-time noise levels at a residential location exceed:

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

Where there are noise events found to exceed the initial screening level, further analysis is undertaken to identify:

- The likely number of events that might occur during the night assessment period,

- The extent to which the maximum noise level exceeds the rating background noise level.

The sleep disturbance noise levels for the project are presented in Table 7-5.

Table 7-5: Sleep disturbance assessment levels

Receiver type	Assessment Level $L_{Aeq,15min}$	Assessment Level L_{AFmax}
Residential	40	52

The specific sources applicable to assessment under the NPfI are generally steady-state, and therefore there is unlikely to be significant variation between $L_{Aeq,15min}$ values and L_{AFmax} values, hence compliance with the more stringent project trigger noise level presented in Table 7-4will result in compliance with the project's sleep disturbance criteria set out in Table 7-5.

7.3 General controls for mechanical plant and equipment

Building services design is not typically conducted at this early stage, as plant selections and layouts have not been determined. This is typically only done after DA approval. Similarly, the proposed design and equipment specification of the car lift is not available at this stage.

- Ventilation and exhaust plant will be located internally within the building envelope and can be sufficiently treated to comply with the provisions of the NSW Environment Protection Authority (EPA), using in-duct lining (in the case of ventilation plant) and vibration isolation (in the case of reciprocating machinery).
- Air-conditioning condensers, if installed, will most likely be located either on the roof or balconies (along the eastern façade) or internally within the building envelope (basement). Similar to above, these plant items can be sufficiently treated to comply with the provisions of the NSW EPA.
- Typical treatments include:
  - Procurement of 'quiet' or low noise emitting plant/equipment.
  - Utilisation of variable speed controls to ramp down plant/equipment when full-load is not required (e.g. low noise operation mode during night-time for A/C condensers).
  - Strategic positioning of roof and balcony plant away from sensitive neighbouring premises; maximising distance and any barrier/screening benefits between the plant and sensitive neighbouring premises.
  - Building solid noise barriers / partial enclosures on the roof where necessary, around noisy plant.
  - Installation of acoustic attenuators, acoustically lined ductwork and acoustic louvres, as required.

8 Conclusion

Renzo Tonin & Associates has completed an acoustic assessment of the proposed residential development at South Circuit and Civic Way, Oran Park.

The assessment includes the investigation of year 2036 future traffic noise impacts from adjacent local roads onto the site and nominates in-principle controls for the building shell to ensure the internal acoustic amenity for future residents.

- Reasonable controls can be incorporated into the building design to comply with applicable Council and NSW Planning Guidelines with respect to internal noise levels from road traffic. Indicative requirements are detailed in Section 6.2.

This assessment also set project noise emission goals for noise from mechanical plant and equipment associated with a residential apartment and noise from cumulative use of the residential flat building overall, to protect the acoustic amenity of surrounding residential receivers.

- Details of the mechanical plant servicing this development are yet to be finalised, however operational noise emissions from these sources can be controlled to ensure compliance with NSW EPA provisions, using standard and typical acoustic ameliorative treatments. In principal treatments are discussed in Section 7. A detailed assessment will be required for Construction Certificate.

APPENDIX A Glossary of Terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment Point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of common sounds in our daytime environment:

threshold of hearing	0 dB	The faintest sound we can hear
	10 dB	Human breathing
almost silent	20 dB	
	30 dB	Quiet bedroom or in a quiet national park location
generally quiet	40 dB	Library
	50 dB	Typical office space or ambience in the city at night
moderately loud	60 dB	CBD mall at lunch time
	70 dB	The sound of a car passing on the street
loud	80 dB	Loud music played at home
	90 dB	The sound of a truck passing on the street
very loud	100 dB	Indoor rock band concert
	110 dB	Operating a chainsaw or jackhammer
extremely loud	120 dB	Jet plane take-off at 100m away
threshold of pain	130 dB	
	140 dB	Military jet take-off at 25m away

dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
L_{Max}	The maximum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.

L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{Aeq} or L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time, which would produce the same energy as a fluctuating sound level. When A-weighted, this is written as the L_{Aeq}.
Rw	Weighted Sound Reduction Index A measure of the sound insulation performance of a building element. It is measured in very controlled conditions in a laboratory. The term supersedes the value STC which was used in older versions of the Building Code of Australa. Rw is measured and calculated using the procedure in ISO 717-1. The related field measurement is the DnT,w. The higher the value the better the acoustic performance of the building element.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 pico watt.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone referenced to 20 mico Pascal.
Transmission Loss	The sound level difference between one room or area and another, usually of sound transmitted through an intervening partition or wall. Also the vibration level difference between one point and another. For example, if the sound level on one side of a wall is 100dB and 65dB on the other side, it is said that the transmission loss of the wall is 35dB. If the transmission loss is normalised or standardised, it then becomes the Rw or Raw or DnT,w.

RICHARD CROOKES
CONSTRUCTIONS

ORAN PARK – RESIDENTIAL 3
[JOB NUMBER]

CONSTRUCTION WASTE MANAGEMENT PLAN

5 May 2023

This plan has been approved for use by the following:

Approved by / Date	
	Michael Ryan, Project Manager
Approved by / Date	
	Craig Richmond, Business Systems , QA/Env Manager
Approved by / Date	
	Tamara Jonson WHS Manager
Approved by / Date	
	Ian West, General Manager – Commercial & Risk

AUTHORITY POSITION	COMPANY NAME	NO. OF COPIES
Todd Crameri	Anmeri Management Pty Ltd	1 copy
Michael Viskovich	Greenfields Developments Pty Ltd	1 copy
Michael Ryan	Richard Crookes Constructions	1 copy

REVISION REGISTER

REVISION DATE	REVISION DESCRIPTION	PMS INITIALS (ACCEPTANCE OF CHANGES)
05 May 2022	Original issue	

PROJECT POSITION	NAME	SIGNATURE	REVISIONS
Construction Manager	Cameron Waller		
Project Manager	Michael Ryan		
Principal	Todd Crameri		
Principal	Michael Viskovich		
WHS Environmental Co-ordinator	Craig Richmond		
Quality Co-ordinator	Kevin Hyde		

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1 INTRODUCTION

This Construction Waste Management Plan forms part of the Project Management Pan for Oran Park Residential 3 Project.

1.1 PURPOSE OF THE PLAN

Richard Crookes Constructions (RCC) recognises the importance of promoting building design and construction techniques which minimise waste and provides an efficient recycle procedure for all waste material.

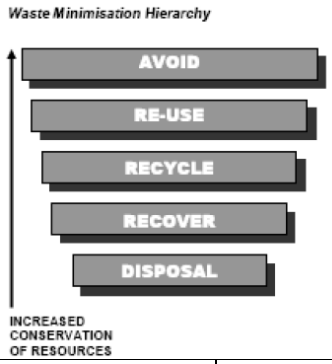
The purpose of this plan is to outline processes for:

- Objectives and Targets;
- Operational Controls;
- Recording, Monitoring Corrective Action; and,
- Reporting.

2 RCC OBJECTIVES AND TARGETS

RCC's overall objective is to achieve a minimum of (80%) for recycled waste (by weight) generated by the Project.

The Operational Controls implemented to achieve this include:

Operational Controls		Method of Recording
General	Identify any hazardous and toxic materials (e.g. asbestos) and comply with WorkCover requirements. Develop project Waste Management Plan Try not to over-order on materials (initial waste avoidance). Communicate housekeeping & litter reduction rules with subcontractors during contract letting and site inductions.	Hazardous substance survey Waste Records Inductions
Implement the waste hierarchy – avoid, reuse, recycle and lastly disposal to landfill.		
		
Demolition Plan	Demolition disposal for concrete, bricks, plasterboard, timber, tiles, PVC, metal, paper & cardboard, glass, appliance, carpet, vegetation, soil – to Recycled Facility Asbestos ACM to be removed by a licenced contractor (up to 30 June 2007 >200m2, 1 July 2007 > 50m3, from 1 Jan 2008 > 10m2 of bonded asbestos) & managed in accordance with WHS Act & Regulation 2012 and EPA requirements. Lead paints & dusts will be removed using we sanding and vacuum techniques (cleaners which comply with AS/NZS 3544 Industrial vacuum cleaners for particulates hazardous to health). Waste will be contained within sealed plastic bags for disposal. Clean up with a wet mop.	Monthly Waste Report Disposal dockets
Consider recycling reprocessing	Where practicable: Timber for reuse or mulching Aluminium wall frames – reprocess Plasterboard – recycled or use as soil improvers Steel – reprocess Toughened Glass – reprocess Carpet & underlay – reprocess & mulch mats	Monthly Waste Report
Product Stewardship	Investigate returning waste to the supplier? (e.g. plasterboard, packaging)	Contract/ Supply agreem'ts
Putrescibles Waste	Putrescible waste is to be contained in bins and collected by licenced contractor for disposal	Invoices

Operational Controls		Method of Recording
Contaminated Soils	Contaminated soils will be excavated and classified in accordance with EPA guidelines "Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes" (June 2004) – www.environment.nsw.gov.au/waste/envguidlns/index.htm.	RAP Reports Test Reports Waste Records Disposal Dockets
Virgin Excavated Natural Materials (VEMN)	VENM excavated from site with suitable compaction qualities will be beneficially re-used on other construction sites whenever possible. Disposal to landfill will be the last option. No fill will be received on site that does not comply with EPA guidelines i.e. Contamination limits appropriate to the development.	Test Reports Waste Records Disposal Dockets
Acid Sulphate Soils (ASS)	Potential for acid sulphate soils ASS will be assessed based on the sites proximity to low-lying coastal areas e.g. coastal plains, wetlands and mangroves where the surface elevation is less than five metres above mean sea level. If suspected, consultant to prepare Acid Sulphate Soil Management Plan (ASSMP). Excavation and neutralisation to be supervised by consultants as per ASSMP.	ASSMP Test Reports Product delivery (lime) dockets Site Plans
Monitoring	Bin(s) with heavy lids shall be provided for putrescibles waste Daily inspections shall be carried out to ensure the worksite is litter free.	Env. Inspection Checklist
Reporting	Waste reports/management plans indicate estimated waste min (80%) of accumulated totals for the project.	Monthly Reports
Non-Compliance	Generation of water pollution and/or air pollution from onsite waste storage Inappropriate/illegal off-site disposal of waste materials Asbestos & CCA treated timber contamination of recoverable waste stream thereby requiring landfill disposal.	Env. Inspection Checklist Incident Report, NCRS
Emergency Response	No specific requirements associated with waste management Scenarios such as spill, fires, explosions covered by the project emergency response plans.	Incident Report

2.1 ESTIMATED WASTE QUANTITIES: USE THIS TO ESTIMATE THE WASTE QUANTITIES

Source Blacktown Council Waste Not Development Control Plan (internet, http://www.blacktown.nsw.gov.au/planning-anddevelopment/waste-not-overview/waste-not-overview_home.cfm, 2007).

Block of Flats (per 1000 m2)			
Waste Type	**Conversion Factor**	**Demolition (t)**	**Construction (t)**
Excavated Material	1.8 t/m3	na	na
Concrete (incl. Blocks)	2.4 t/m3	813	813
Bricks	1.0 t/m3	655	655
Timber Gyprock	Timber 0.5 t/m3[3] Gyprock: 0.75 t/m3	22	22
Steel	2 -4 t/m3	9	9
Roof Tiles	0.75 t/m3	33	33
Other – vegetation, cardboard, plastic	0.05 t/m3	26	26

Factory (per 1000 m2)			
Waste Type	**Conversion (t to m3)**	**Demolition (t)**	**Construction (t)**
Excavated Material	1.8 t/m3	na	na
Concrete	2.4 t/m3	448	0.25
Bricks	1.0 t/m3	205	2.10
Timber Gyprock	Timber 0.5 t/m33 Gyprock: 0.75 t/m3	4	1.65
Steel	2 -4 t/m3	23	0.45
Roof Tiles	0.75 t/m3	na	4.80
Other	0.05 t/m3	?	0.60

Office Block (per 1000 m2)			
Waste Type	**Conversion (t to m3)**	**Demolition (t)**	**Construction (t)**
Excavated Material	1.8 t/m3	7,410	5.10
Concrete	2.4 t/m3	1,485	18.80
Bricks	1.0 t/m3	124	8.50
Timber Gyprock	Timber 0.5 t/m33 Gyprock: 0.75 t/m3	29	8.60

3 REPORTING

Greenstar:

The Project Green Star Administrator will be responsible for collecting monthly waste reports (Form 18.1) or utilising the waste subcontractor reporting format and issuing them to the Project Manager and Client Representative.

These reports will measure the weight of waste generated of material by classification, total weight of waste, percentage by weight recycled and percentage by weight to landfill.

General waste reporting:

Nominated member of the project team will be responsible for collecting monthly waste reports and issuing them to the Project Manager and Client Representative.

These reports will measure the weight of waste generated of material by classification, total weight of waste, percentage by weight recycled and percentage by weight to landfill.

4 ESTIMATED QUANTITIES

The Waste management plan – Construction chart (Form 18.2b) is an estimate of the core waste streams that will be removed from the Oran Park Residential 3 project waste to be removed will be assessed for the Reuse & recycling content and the Disposal to landfill.

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Delivering Certainty

ARCHITECTURE
URBAN DESIGN
INTERIORS
GRAPHICS

WASTE MANAGEMENT PLAN - ON GOING MANAGEMENT

Prepared by: Allen Jack + Cottier Architects

Proposal: Residential 3 Building Oran Park Drive, Oran Park

Site Address: Located on the Eastern edge of Oran Park Town Centre, referred to as Precinct B Residential Block 3 North West of the corner of the intersection of Peter Brock Drive and South Circuit.

Applicant's name and address:
Greenfields Development Company
Cnr Peter Brook Drive, Oran Park Drive
Oran Park, 2570
AUSTRALIA
Phone: 02 9043 7500
Mobile: 02 4773 4104

Buildings and other structures on site:
No current building/s occupy the site

Description of Proposal: *What do you want to do on the land?*
Low rise medium density residential development

The details provided in the Waste Management plan are how I intend to treat waste during this project.

Applicant's signature: _____ Date: _____

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ISSUES

Issue	Date	Reason for Issue	Comment	Checked	Approved
01	25/05/22	Issued for DA		JG	MH
02	04/12/22	Issued for DA		JG	MH
03	12/01/23	Issued for DA		JG	MH
04	25/04/23	Issued for DA		JG	MH
05	04/08/23	Issued for DA		JG	MH
06	18/10/23	Issued for council RFI		JG	MH

C/- Todd Crameri
Mobile 0417 491 885

EXECUTIVE SUMMARY

This waste management plan covers the ongoing management of operational waste generated by the Residential 3 development Located on the Eastern edge of Oran Park Town Centre, referred to as Precinct B Residential Block 3 North West of the corner of the intersection of Peter Brock Drive and South Circuit.

Waste audit and management strategies are recommended for new developments to provide support for the building design and promote strong sustainability outcomes for the building. All recommended waste management plans will comply with council codes and any statutory requirements. The waste management plan has three key objectives:

i. Ensure waste is managed to reduce the amount of waste and recyclables to land fill by assisting building users to segregate appropriate materials that can be recycled; displaying signage to remind and encourage recycling practices; and reinforce these messages through placement of recycling and waste bins in the ground level precinct.

ii. Recover, reuse and recycle generated waste practices wherever possible.

iii. Compliance with all relevant codes and policies.

To assist in providing clean and well-segregated waste material, it is essential that this waste management plan is integral to the overall management of the building and clearly communicated to owners, tenants and users.

CAMDEN COUNCIL WASTE MANAGEMENT PLAN CHECKLIST:

Have you provided applicant's name, address and phone number?
YES NO

Have you noted the structures currently on site and details of your proposal?
YES NO

Have you specified each material to be used on site?
YES NO

Have you identified any hazardous and toxic materials (e.g. asbestos) and complied with Workcover requirements?
YES NO (Refer to separate DA submission for Construction Waste Management Plan)

Have you specified who your recycling and waste contractors are?
YES NO

Have you estimated how much general waste will be produced on your site?
YES NO

Have you provided realistic volumes/tonnes?
YES NO

Have you made sure not to over order on materials?
YES NO

Have you investigated returning waste to the supplier? (E.g. plasterboard)
YES NO (Refer to separate DA submission for Construction Waste Management Plan)

Have you maximised recycling & reuse of materials?
YES NO

Have you specified your recycling and / or landfill, (if any), destinations?
YES NO

DEMOLITION: Not Applicable to this development

CONSTRUCTION: Refer to separate Construction Waste management report

ON GOING MANAGEMENT: Residential 3

Oran Park Residential 3 is a proposed new medium density low rise residential development on the eastern edge of the town centre near the council building, the building will comprise the following :

- 6 Level apartment building
- Roof top terrace
- 2 basement car parking levels and external communal areas
- The residential building will be strata subdivided into 177 apartments.

Camden Council
Waste Management Guideline – August 2019

Multi dwelling housing
Collection of waste from these properties will occur on a weekly basis kerbside at the front of the property (upon agreement a collect and return service may be provided).
The service is to be provided by way of shared bins, with the number of bins onsite determined by Council's generation rates as per APPENDIX 1, Table 3. (reproduced below for this Report)

The service consists of:

- Shared 240L or 360L garbage bins
- Shared 240L or 360L recycling bins; and
- 2 bulky waste collections per unit each year.

APPENDIX 1, Table 3 – Residential waste generation rates

Development Classification	GARBAGE - Litres per dwelling per week	RECYCLING – Litres per dwelling per week	GREEN WASTE - Litres per dwelling per week
General housing & Attached dwellings	120L	240L	240
Multi dwelling & residential flat bldgs	120L	120L	Nil

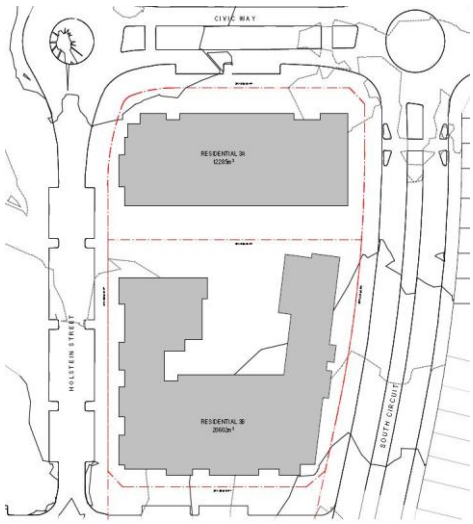
Example residential waste generation calculation
For a development with 12 units (multi dwelling housing) in accordance with the Waste Generation Rate in Table 3:
Garbage Generated = 12 units x 120L/unit/week = 1440L garbage per week
Number of garbage bins required = 1440L/week ÷ 240L bin/week = 6 X 240L bins per week

RESIDENTIAL 3 – Unit No's for determining garbage volumes

As per the Block Plan diagram, the proposed Residential 3 development consists of 177 units in total which for the purposes of calculating waste volumes and garbage room sizes are further broken down as follows; ;

- Building A, Northern facing 6 storey band of units located between the North western and eastern corners of the site. From the North Building table below, there are 66 units served by two independent lift cores. For the purposes of Garbage volume calculations, there are two additional units serviced by the NW core (33 units) Vs the NE Core (33 Units)

- Building B, Southern core in contrast is a "C" shaped form encompassing a central green space and following the sites road network setbacks to the outer perimeter. The Southern unit development is similarly 6 storeys and served by two service cores. Garbage volume calculations are derived from the table indicating the SW core (55 units) while the SE core is (56 units).



North Building - 2 Service/Lift Cores

Level	1 Bed	2 Bed	3 Bed	No of Units	NW Core	NE Core
Ground floor	2	6	2	10	5	5
Level 1	1	6	3	10	5	5
Level 2	1	6	3	10	5	5
Level 3	2	5	3	10	5	5
Level 4	0	8	2	10	5	5
Level 5	2	6	2	10	5	5
Level 6	2	2	2	6	3	3
Total Units	**10**	**39**	**17**	66	33	33
Unit Mix	**15%**	**59%**	**26%**			

South Building - 2 Service/Lift Cores

Level	1 Bed	2 Bed	3 Bed	No of Units	SW Core	SE Core
Ground floor	5	10	2	17	8	9
Level 1	2	11	4	17	8	9
Level 2	2	11	4	17	8	9
Level 3	2	11	4	17	8	9
Level 4	1	10	4	15	8	7
Level 5	1	10	4	15	8	7
Level 6	1	10	2	13	7	6
Total Units	**14**	**73**	**24**	**111**	**55**	**56**
Unit Mix	**13%**	**66%**	**22%**			

RESIDENTIAL 3 – General & Recycling Bin No's and Waste Room Area by Core and Level

North Building - NW Core Waste Management calculations by Level					Basement	
Level	**NW Core Units**	**Recycling**	**# 240L Bins**	**Waste**	**# 660L Bins**	
Ground floor	5	600	3	600	1	
Level 1	5	600	3	600	1	
Level 2	5	600	3	600	1	
Level 3	5	600	3	600	1	
Level 4	5	600	3	600	1	
Level 5	5	600	3	600	1	
Level 6	3	360	2	360	1	
Total Units	33	3960	20	3960	7	
Camden Waste Management Guidelines, Table 3, Waste calculated @ 120L/wk per unit (Recycling & General Waste)						

North Building - SW Core Waste Management calculations by Level					Basement	
Level	**NE Core Units**	**Recycling**	**# 240L Bins**	**Waste**	**# 660L Bins**	
Ground floor	5	600	3	600	1	
Level 1	5	600	3	600	1	
Level 2	5	600	3	600	1	
Level 3	5	600	3	600	1	
Level 4	5	600	3	600	1	
Level 5	5	600	3	600	1	
Level 6	3	360	2	360	1	
Total Units	33	3960	20	3960L	7	
Camden Waste Management Guidelines, Table 3, Waste calculated @ 120L/wk per unit (Recycling & General Waste)						

South Building - SE Core Waste Management calculations by Level					Basement	
Level	**SE Core Units**	**Recycling**	**#240 L Bins**	**Waste**	**# 660L Bins**	
Ground floor	9	1080	5	1080	2	
Level 1	9	1080	5	1080	2	
Level 2	9	1080	5	1080	2	
Level 3	9	1080	5	1080	2	
Level 4	7	840	4	840	2	
Level 5	7	840	4	840	2	
Level 6	6	720	4	720	2	
Total Units	56	6720	32	6720	14	
Camden Waste Management Guidelines, Table 3, Waste calculated @ 120L/wk per unit (Recycling & General Waste)						

South Building - SW Core Waste Management calculations by Level					**Basement**	
Level	**SW Core Units**	**Recycling**	**#240 L Bins**	**Waste**	**# 660L Bins**	
Ground floor	8	960	4	960	2	
Level 1	8	960	4	960	2	
Level 2	8	960	4	960	2	
Level 3	8	960	4	960	2	
Level 4	8	960	4	960	2	
Level 5	8	960	4	960	2	
Level 6	7	840	4	720	2	
Total Units	**55**	6600	28	6480	14	
Camden Waste Management Guidelines, Table 3, Waste calculated @ 120L/wk per unit (Recycling & General Waste)						

Waste management strategy for this site

The strata bi-laws conditions will stipulate the overall responsibilities for owner and tenants in relation to a waste management strategy. Individual owner to tenants will commit to a green waste strategy.

The base premise being that waste generated within each lot will be sorted. Two under sink storage bins will be provided in the apartments, the bins will allow for the separation of waste material in each of the apartments based on the following categories:
Recyclable material – paper and cardboard will be co-mingled with glass plastic and aluminium, this material is designated to be transferred to the yellow bin on each level, and;
General waste material –– food scraps and other non-recyclable material will be disposed of on each floor via the garbage chute to 660L red bins on the basement carousel.
The Basement Waste Areas (4 in total) will be managed by the Owners Corporation and cleaners.
Yellow bin, recycled waste collection occurs on each tenanted level with waste bins being moved via the service lifts for collection from the designated ground/street level waste handling days
Other material - Household furniture, appliances, electronic waste printers, computers, batteries phones cartridges etc. will be stored for recycling in the bulky good store. In this instance, the Building Manager will arrange transferring waste on the designated collection day for council pickups.

Waste generated - overall

	Paper / cardboard Metals / plastics /glass	General waste
Amount generated (L per unit per day)	3034L	3034L
Amount generated (L per development per week)	21240L	21240L
Any reduction due to compacting equipment	None	None
Frequency of collections (per week)	Once	Once
Number and size of storage bins required	101 X 240L Due to unit collection points, refer table previous page	22 x 660L Due to unit collection points, refer table previous page
Floor area required for storage bins (m2)	$8m^2$ Distributed in the building 3-4 per floor	$2X24m^2$ Note located in basement 1

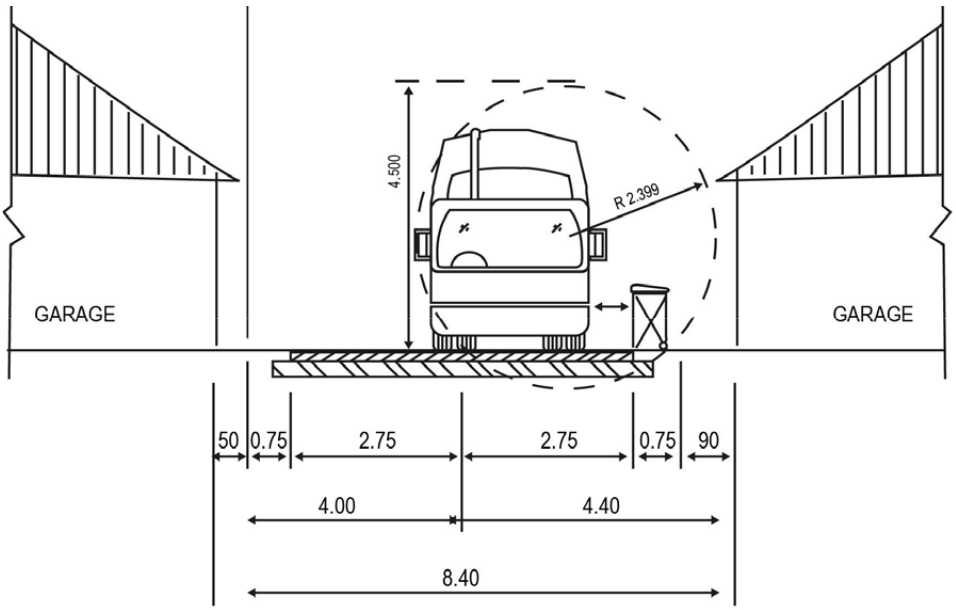
GARBAGE TRUCK DIMENSIONS

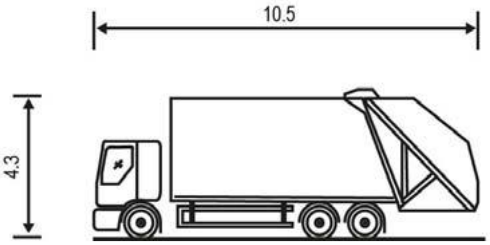
This page includes information regarding the dimensions of waste handling service trucks that are typically used for the collection of residential tenancy waste.

Waste collection vehicles are generally heavy rigid vehicles and can be side-loading, rear-end loading or front-end loading.
All waste management plans are assessed based on the ability for Council's waste collection vehicle to service the development.
Table 8 below. shows the dimensions of Council's waste collection vehicle. Developments that require onsite underground or at grade collection should be designed to accommodate on-site truck movement. Submission Requirements regarding vehicle driveway width/gradient and turning circles are contained in Australian Standard 2890.2 2018/Parking Facilities – off street commercial vehicles.
Table 8. Typical Council Garbage Truck used for Domestic Waste Collection

APPENDIX 4, *Table 8. Typical Council Garbage Truck used for Domestic Waste Collection*

Dimension	Measure	Design Requirements
Length overall	10.5 metres	12.5 metres
Width (vehicle)	2.5 metres	3 metres
Width (extended arm grab)	6.0 metres	6.0 metres
Operational height	4.3 metres	4.5 metres
Weight (vehicle and load)	22.5 tonnes	23 tonnes
Weight (vehicle only)	13 tonnes	14 tonnes
Turning Circle	19.0 metres	27.8 metres




10.5
4.3

TYPICAL WASTE BIN SIZES

Additionally, a clearance space of 1 meter is required at the rear of each bin as it extends out into this area when being lifted for collection (i.e. allowing for the trucks lifting arm arc).

Mobile bins are the most commonly used bins in commercial and residential settings. These bins can be either two wheeled, commonly referred to as 'wheelie bins' or four wheeled.
Council provides three different sizes for garbage bins at residential developments which include 80 litres, 120 litres and 240 litres.
Recycling and green waste bins are only available in 240 litres

APPENDIX 2, Table 5 – Typical mobile garbage bin sizes (two wheeled) – guide only

Bin type	Height (mm)	Depth (mm)	Width (mm)	Area m^2
80 Litre Bin	825	500	452	0.23
120 Litre Bin	930	545	480	0.26
140 Litre Bin	915	615	535	0.30
240 Litre Bin	1060	730	585	0.43
360 Litre Bin	1100	850	680	0.58

APPENDIX 2, Table 6 – Typical larger (four wheeled) mobile bin sizes - guide only

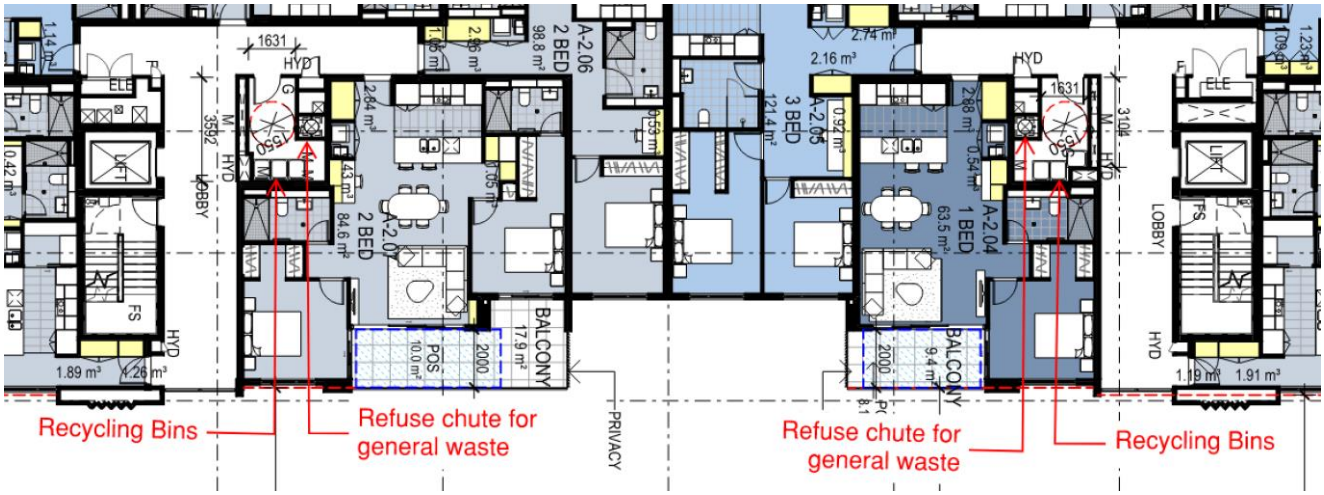
Bin type	Height (mm)	Depth (mm)	Width (mm)	Area m^2
660 Litre Bin	1230	810	1260	1.02
1100 Litre Bin	1330	1070	1240	1.33

Waste management strategy for this site

The strata bi-laws conditions will stipulate the overall responsibilities for owner and tenants in related to the waste management strategy. Individual owner to tenants will commit to a green waste strategy.

The base premise being that waste generated within each lot will be sorted. Two under sink storage bins will be provided in the apartments, the bins will allow for the separation of waste material in each of the apartments based on the following categories:

General layout typical floor

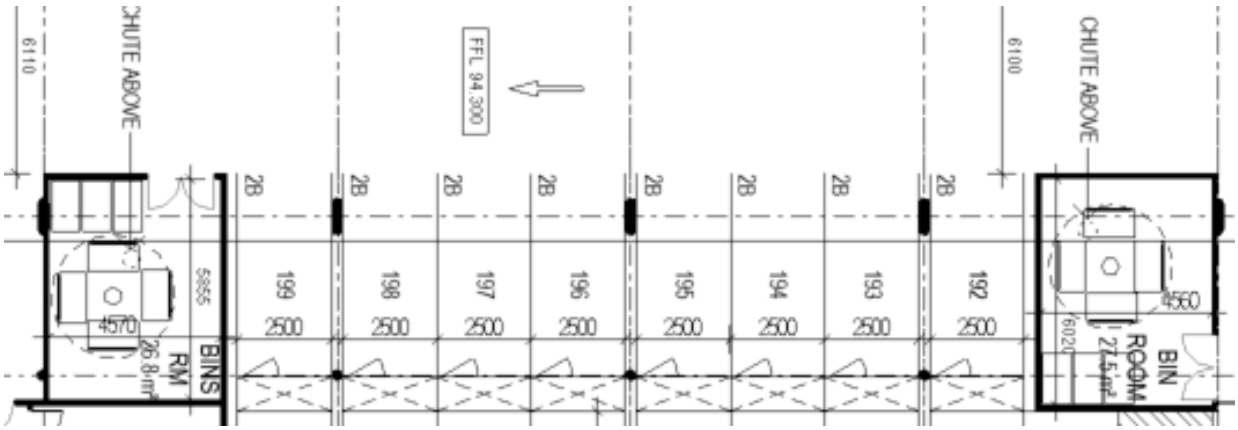


NORTH BUILDING

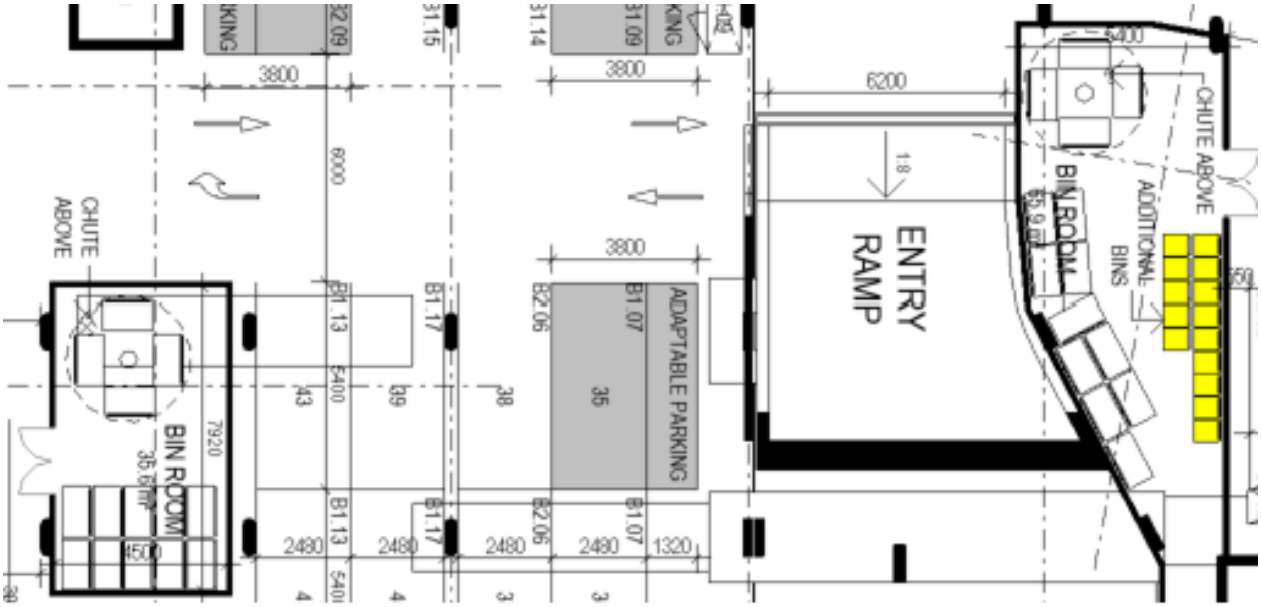
SOUTH BUILDING

Basement 1

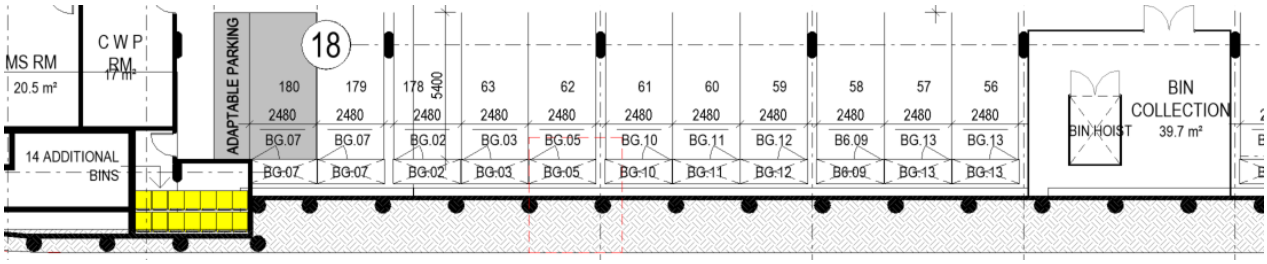
The recycling and waste bin storage is located in basement 1, along with a bulky goods store, cleaners room and parking bay for the wheelie bin trailer and electric vehicle. In addition to the required yellow bins, 14 additional bins are provided for each building and its stored in the basement storage rooms, these bins will be replaced by the cleansers on the bin rooms on apartment levels. Each core has a bin room associated with the chute above. This garbage room contains a waste storage area, a compactor and linear carousal which will collect and compact the waste material in 1100 litre red bins. Bulky good store is in the adjacent room.



NORTH BUILDING



SOUTH BUILDING



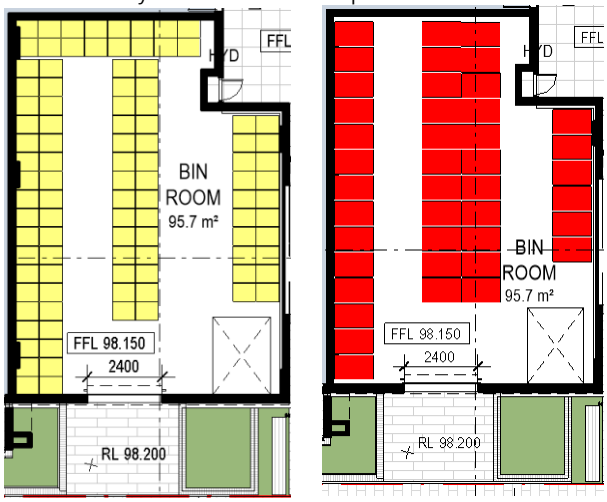
The building will be provided with a trailer and electric vehicle to transport the waste and recycling material to the kerbside for collection by the Camden City Council waste management services on a weekly pick up.

Collection Day:

The building manager/cleaners will move all the yellow bins to the basement from each level and move to the bin hoist room on basement 1 and move up to the ground floor through the hoist and manoeuvre to the street side collection area and after the pick up the building manager/cleaners will leave the yellow bins back to the respective floors. Similarly, red bins will be moved from the basement bin room to the bin hoist room location and move up to the ground floor through the hoist and manoeuvre to the street side collection area. After the pickup, the building manager/cleaners will leave the red bins back in the basement bin rooms. Bellow are the three options for the bin collection.

Different collection days

All the yellow bins and red bins of the entire development are to pick up on different days. The total number of yellow bins to be picked is 110nos and yellow bins are 42nos.



Option 1: Red bin collection

All the red bin of the entire development are to pick up in one day. The total number of red bins to be picked is 42nos.