Roche Group Pty Ltd

469-483 Balmain Rd, Lilyfield

BASIX Assessment Report

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Subject	469-483 Balmain Rd, Lilyfield – BASIX Assessment Report

1. SITE APPRECIATION

The proposed development is located at 469-483 Balmain Rd, Lilyfield and consists of:

- Basement carparking
- Ground floor tenancy spaces
- 89 units over 6 buildings

2. BASIX WATER SECTION

The proposed development will meet the mandatory BASIX water target of 40% as long as the water commitments detailed in Table 1 are installed. For details of the requirements necessary to achieve this target, please refer to the BASIX Certificate No. 1376956M.

Table 1: BASIX Water Commitments

Common Areas and Central Systems	
Area of Indigenous or low water species	• **Please refer to Appendix B**
Rainwater collection	• 5,000L rainwater tank • Roof collection area – minimum 200m^2 • Rainwater to be used for Common areas landscape irrigation only
Common Areas Facility	• 4-star (Water Rating) toilets • 6-star (Water Rating) taps
Fire Sprinkler	• Basement carparking areas only • **No commitment is required for Test water to be diverted to a closed system**
Common Area Pool & Spa	• **No Common Pool & No Spa**
Private Dwellings	
Fixtures for apartments	• 4-star (WELS) showerheads with a flow rate > 6.0L/min & ≤ 7.5L/min • 4-star (WELS) toilets • 5-star (WELS) kitchen taps (Maximum flow rate of 6L/min) • 5-star (WELS) bathroom taps (Maximum flow rate of 6L/min) • 5-star (WELS) dishwashers
Private Pool & Spa	• No Private pool & spas

3. BASIX THERMAL COMFORT SECTION

The thermal performance of the development has been evaluated using BERS Pro 2nd Generation software. The BERS Pro computer simulation of residential developments forms part of the Nationwide House Energy Rating Scheme, and is used to assess the potential of a residential development to have low heating and cooling energy requirements once operational.

3.1 MODELLING ASSUMPTIONS

The "base-case" building fabric and glazing and associated thermal performance specifications are described in Table 2 below as these assumptions are based on the nominated preferred construction materials indicated by the architect.

Note: Table 2 must be read in conjunction with Table 3, Table 4, Table 5, Table 6, Table 7 & Table 8 outlines additional thermal enhancements / treatments to meet the mandatory thermal load targets to achieve compliance.

Table 2: Base Case Assumptions on Construction and Fabric

Element	*Material*	*Detail*
External walls	Brick Veneer	**Partially to Building D, E & F**
		Insulation: See Table 3
		Medium colour: 0.475<absorptance<0.7
	Weatherboard Cavity Panel	**Partially to Building C**
		Insulation: See Table 3
		Medium colour: 0.475<absorptance<0.7
	Light Weight Metal Cladding	**Residential part of Building A & B** **Partially to Building D, E & F**
		Insulation: See Table 3
		Dark colour: absorptance>0.70
Internal walls	Plasterboard	
Party walls	Concrete	To Common corridors
	Concrete	To Neighbour
	Concrete	To Fire stairs & lifts
Windows	**Type 4**	Total Window System Properties **U-value 3.0 & SHGC 0.26 for sliding doors, sliding, Double Hung & fixed windows** **And** Total Window System Properties **U-value 3.0 & SHGC 0.27 for awning windows, Bifold doors & hinged glass doors**
	Type 6	Total Window System Properties **U-value 2.2 & SHGC 0.39 for sliding doors, sliding, Double Hung & fixed windows** **And** Total Window System Properties **U-value 2.2 & SHGC 0.32 for awning windows, Bifold doors & hinged glass doors**
	Note: Only a ±10% SHGC tolerance to the value stated above & U-value can be NO greater than or equal to the value stated above	
	Window Operability	**As per plans & elevations** **Bedrooms only: 10% (BCA D3D29)**
	Vertical & Horizontal External Shading devices	**As per plans & elevations**
Skylight	**Type 1**	**U-value 2.6 & SHGC 0.24**
Roof	Concrete	**Insulation: See Table 3**
		Light colour: Absorptance<0.475
Ceilings	Plasterboard	**Insulation: See Table 3**
Floors	Concrete	**Insulation: See Table 3**
		Tiles: Wet areas
		Timber: Living/Dining/Kitchen/Hallways

Element	*Material*	*Detail*
		Carpet: Bedrooms Only
Common corridors naturally ventilated		Building A, B & C: No Building D, E & F: Yes
Recessed downlights assessed		No. No lighting plan provided. Project will be updated once lighting plan is available.
Exhaust fans (kitchens, bathrooms, laundry)		**All assumed to be sealed**

3.2 BERS PRO RESULTS (THERMAL COMFORT)

The simulated heating and cooling loads per dwelling are summarized in the tables below. Where the dwellings have failed to meet the thermal load targets additional thermal enhancements / treatments are provided. This is typically in the form of bulk insulation. These additional thermal treatments are required to pass the BASIX Thermal performance requirements.

As this development is intended to achieve Green Star accreditation, a credit achievement under Energy Use – NatHERS Rating has been selected. This involves:

- Each sole- occupancy unit must achieve a NatHERS energy rating of at least 5.5-stars
- The weighted-area average of all sole occupancy units in the building must achieve a NatHERS energy rating of at least 7-stars

Under the recommendations listed in Table 3, Table 4, Table 5, Table 6, Table 7 & Table 8 the development achieves an average rating of 7-stars.

Table 3: BERS Pro Thermal Loads – Building A

Unit No.	*Additional Treatments Required to Table 2*	*Heating Load ($MJ/m^2.yr$)*	*Cooling Load ($MJ/m^2.yr$)*	*Stars*	*Pass/Fail*
A201	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16) - North Western Living room glazed door to have at least 75% ventilation opening	19.7	17.7	7.1	PASS
A202	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16) - South Living room glazed door to have at least 75% ventilation opening - South Living room glazed door to have a horizontal bladed awning shading 50% of the glazed area	21.7	28.9	6.0	PASS
A203	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - East Living room glazed door to have at least 75% ventilation opening	19.2	12.6	7.5	PASS
A204	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - East Living room glazed door to have at least 75% ventilation opening	10.6	14.2	8.1	PASS
A205	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56)	20.6	16.7	7.1	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	- Type 4 windows - East Living room glazed door to have at least 75% ventilation opening				
A206	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - North West Living room glazed door to have at least 75% ventilation opening - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16)	18.9	18.7	7.1	PASS
A207	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - North West Living room glazed door to have at least 75% ventilation opening - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16)	2.6	19.0	8.4	PASS
A301	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	21.0	16.3	7.1	PASS
A302	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - South Living room glazed door to have at least 75% ventilation opening	17.4	21.9	6.9	PASS
A303	- R1.5 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt1.7) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - South Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening	27.4	12.4	6.9	PASS
A304	- R1.5 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt1.7) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - South Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening	23.9	12.2	7.2	PASS
A305	- R1.5 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt1.7) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - North Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening	25.5	13.5	7.0	PASS
A306	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	20.5	12.9	7.4	PASS
A307	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	14.1	10.9	8.1	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
A401	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	21.6	16.1	7.1	PASS
A402	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - South Living room glazed door to have at least 75% ventilation opening	17.9	21.1	7.0	PASS
A403	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - South Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16)	26.9	13.8	6.9	PASS
A404	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - North Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16)	23.5	13.7	7.1	PASS
A405	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - North Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16)	15.8	15.2	7.6	PASS
A406	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	16.1	14.1	7.7	PASS
A407	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	14.0	11.0	8.1	PASS
A501	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 6 windows - South Western Living room window to have at least 10% ventilation opening - North Western Living glazed door to have at least 75% ventilation opening - R4.0 Bulk Ceiling Insulation (total ceiling roof system R-value Rt4.16) - Type 1 skylight	19.7	21.7	6.8	PASS
A502	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 6 windows - South Living glazed door to have at least 75% ventilation opening - R4.0 Bulk Ceiling Insulation (total ceiling roof system R-value Rt4.16)	14.9	21.8	7.2	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	- Type 1 skylight				
A503	- R1.5 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt1.7) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 6 windows - R4.0 Bulk Ceiling Insulation (total ceiling roof system R-value Rt4.16) - Type 1 skylight - Eastern Living room glazed door to have at least 75% ventilation opening	15.9	23.1	7.0	PASS
A504	- R1.5 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt1.7) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 6 windows - R4.0 Bulk Ceiling Insulation (total ceiling roof system R-value Rt4.16) - Type 1 skylight - Eastern Living room glazed door to have at least 75% ventilation opening	10.7	29.0	6.9	PASS
A505	- R1.5 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt1.7) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 6 windows - North Eastern Living room window to have at least 10% ventilation opening - North Western Living glazed door to have at least 75% ventilation opening - R4.0 Bulk Ceiling Insulation (total ceiling roof system R-value Rt4.16) - Type 1 skylight	12.7	19.8	7.4	PASS

Table 4: BERS Pro Thermal Loads – Building B

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
B201	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16) - North West Living room glazed door to have at least 75% ventilation opening - South West Dining room window to have at least 10% ventilation opening	21.8	18.6	6.9	PASS
B202	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16) - South Living glazed door to have at least 75% ventilation opening	33.2	24.6	5.5	PASS
B203	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - East Living room glazed door to have at least 75% ventilation opening	29.5	15.5	6.5	PASS
B204	- R2.5 Bulk External Wall Insulation (total wall	10.5	14.4	8.1	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	system R-value Rt2.56) - Type 4 windows - East Living room glazed door to have at least 75% ventilation opening				
B205	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - East Living room glazed door to have at least 75% ventilation opening	20.1	19.7	6.9	PASS
B206	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16) - North East Living fixed window to have at least 10% ventilation opening - North West Living room glazed door to have at least 75% ventilation opening	18.9	20.7	6.9	PASS
B207	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - North West Living glazed door to have at least 75% ventilation opening - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16)	2.6	19.0	8.4	PASS
B301	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	23.7	11.7	7.3	PASS
B302	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - South Living room glazed door to have at least 75% ventilation opening	20.3	19.0	6.9	PASS
B303	- R2.0 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - South Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening	27.6	12.2	6.9	PASS
B304	- R2.0 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - South Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening	23.2	12.2	7.3	PASS
B305	- R2.0 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - North Living room glazed door to have at least 75% ventilation opening	17.8	13.6	7.5	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	- East Living room window to have at least 10% ventilation opening				
B306	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	18.5	13.9	7.4	PASS
B307	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	13.7	10.9	8.1	PASS
B401	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	23.3	12.2	7.3	PASS
B402	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - South Living room glazed door to have at least 75% ventilation opening	19.9	19.6	6.9	PASS
B403	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - South Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16)	27.9	13.5	6.8	PASS
B404	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - North Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16)	23.8	13.4	7.1	PASS
B405	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows - North Living room glazed door to have at least 75% ventilation opening - East Living room window to have at least 10% ventilation opening - R2.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.16)	14.7	15.4	7.7	PASS
B406	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	14.6	14.7	7.7	PASS
B407	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 4 windows	13.9	11.0	8.1	PASS
B501	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56)- Type 6 windows- South Western Living room window to have at least 10% ventilation opening- North Western Living glazed door to have at least 75% ventilation opening- R4.0 Bulk Ceiling Insulation (total ceiling roof system R-value Rt4.16)- Type 1 skylight	20.2	21.6	6.8	PASS
B502	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56)	15.8	21.4	7.1	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	- Type 6 windows - South Living glazed door to have at least 75% ventilation opening - R4.0 Bulk Ceiling Insulation (total ceiling roof system R-value Rt4.16) - Type 1 skylight				
B503	- R1.5 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt1.7) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 6 windows - R4.0 Bulk Ceiling Insulation (total ceiling roof system R-value Rt4.16) - Eastern Living room glazed door to have at least 75% ventilation opening - Type 1 skylight	16.0	23.1	6.9	PASS
B504	- R1.5 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt1.7) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 6 windows - R4.0 Bulk Ceiling Insulation (total ceiling roof system R-value Rt4.16) - Eastern Living room glazed door to have at least 75% ventilation opening - Type 1 skylight	10.3	28.0	7.1	PASS
B505	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 6 windows - North Eastern Living room window to have at least 10% ventilation opening - North Western Living glazed door to have at least 75% ventilation opening - R4.0 Bulk Ceiling Insulation (total ceiling roof system R-value Rt4.16) - Type 1 skylight	13.4	19.7	7.4	PASS

Table 5: BERS Pro Thermal Loads – Building C

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
C201	- R2.0 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - North West Kitchen window to have at least 10% ventilation opening - North West Living room glazed door to have at least 75% ventilation opening - North West Kitchen window to have a vertical bladed vertical shading device	42.3	14.3	5.6	PASS
C202	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - R1.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value Rt1.16) - South East Bedroom window to have at least 10% ventilation opening	16.6	18.5	7.3	PASS
C203	- R2.0 Bulk Floor Insulation to exposed areas only	25.9	23.5	6.1	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	(total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - South East Living room window to have at least 10% ventilation opening - North East Dining room window to have at least 10% ventilation opening				
C204	- R2.0 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - North East Living room window to have at least 10% ventilation opening	21.1	20.1	6.8	PASS
C301	- R2.0 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - North West Living room window to have at least 10% ventilation opening - North West Bedroom glazed door to have at least 75% ventilation opening	15.9	14.5	7.6	PASS
C302	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - South East Living room glazed door to have at least 75% ventilation opening	28.1	21.5	6.1	PASS
C303	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - South East Living room window to have at least 10% ventilation opening - North East Dining room window to have at least 10% ventilation opening	29.1	20.8	6.1	PASS
C304	- R2.0 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - North East Living room window to have at least 10% ventilation opening	6.8	13.5	8.4	PASS
C305	- R2.0 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - North West Living room glazed door to have at least 75% ventilation opening	20.7	15.2	7.2	PASS
C306	- R2.5 Bulk Floor Insulation to exposed areas only (total floor system R-value Rt2.61) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - North West Living room glazed door to have at least 75% ventilation opening	42.6	9.5	5.9	PASS
C401	- R2.5 Bulk External Wall Insulation (total wall	22.7	16.5	6.9	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	system R-value Rt2.61) - Type 4 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.66) - North West Living room window to have at least 10% ventilation opening - North West Bedroom glazed door to have at least 75% ventilation opening				
C402	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.61) - Type 4 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.66) - South East Living room glazed door to have at least 75% ventilation opening	36.2	19.3	5.7	PASS
C403	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.66) - Type 4 windows - South East Living room window to have at least 60% ventilation opening - North East Dining room window to have at least 60% ventilation opening	37.6	20.2	5.5	PASS
C404	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt2.66) - Type 4 windows - North East Living room window to have at least 10% ventilation opening	11.1	17.2	7.8	PASS
C405	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - North West Living room glazed door to have at least 75% ventilation opening	13.1	17.9	7.6	PASS
C406	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - Type 4 windows - North West Living room glazed door to have at least 75% ventilation opening	32.7	10.7	6.6	PASS
C501	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - R4.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt4.16) - Type 6 windows - North West Living room glazed door to have at least 75% ventilation opening	27.5	16.9	6.6	PASS
C502	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - R4.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt4.16) - Type 6 windows - Type 1 skylight - North East Kitchen glazed door to have at least 75% ventilation opening - North East Living room glazed door to have at least 75% ventilation opening	20.5	18.3	7.0	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	- North East Bedroom glazed door to have at least 75% ventilation opening - East Bedroom 1 window to have at least 10% ventilation opening - East Bedroom 3 window to have at least 10% ventilation opening				
C503	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.72) - R4.0 Bulk Ceiling Insulation to exposed areas only (total ceiling/roof system R-value of Rt4.16) - Type 6 windows - Type 1 skylight - North West Living room glazed door to have at least 75% ventilation opening	11.4	20.3	7.5	PASS

Table 6: BERS Pro Thermal Loads – Building D

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
D001	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R3.0 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt3.16)	32.8	16.5	6.1	PASS
D002	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R2.5 Bulk External Wall Insulation to walls adjacent to the lobby (total wall system R-value Rt2.74) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66)	32.0	14.2	6.4	PASS
D003	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R2.5 Bulk External Wall Insulation to walls adjacent to the lobby (total wall system R-value Rt2.74) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66)	31.1	15.2	6.4	PASS
D004	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11)	23.7	13.9	7.1	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66) - North West Living room glazed door to have at least 75% ventilation opening - North West Ensuite glazing to have at least 45% ventilation opening				
D201	- R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - Type 6 windows - R4.0 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt4.16) - South East Living room glazed door to have at least 75% ventilation opening - Roof overhang to extend over the Study window and to have a width of 1.6m	31.7	22.9	5.7	PASS
D202	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - R2.5 Bulk External Wall Insulation to walls adjacent to the lobby (total wall system R-value Rt2.74) - Type 6 windows - R4.0 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt4.16) - South East Living room glazed door to have at least 75% ventilation opening - Roof overhang to extend over the Study window and to have a width of 1.6m	29.3	18.2	6.3	PASS

Table 7: BERS Pro Thermal Loads – Building E

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
E001	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66) - North West Living room glazed door to have at least 75% ventilation opening - North West Ensuite glazing to have at least 45% ventilation opening	28.0	12.5	6.9	PASS
E002	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R2.5 Bulk External Wall Insulation to walls adjacent	21.4	12.2	7.4	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	to the lobby (total wall system R-value Rt2.74) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66) - North West Living room glazed door to have at least 75% ventilation opening - North West Ensuite glazing to have at least 45% ventilation opening				
E003	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R2.5 Bulk External Wall Insulation to walls adjacent to the lobby (total wall system R-value Rt2.74) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66) - North West Living room glazed door to have at least 75% ventilation opening - North West Ensuite glazing to have at least 45% ventilation opening	23.1	12.1	7.3	PASS
E004	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66) - North West Living room glazed door to have at least 75% ventilation opening - North West Ensuite glazing to have at least 45% ventilation opening	22.6	14.3	7.1	PASS
E201	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - R2.5 Bulk External Wall Insulation to walls adjacent to the lobby (total wall system R-value Rt2.74) - Type 6 windows - R4.0 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt4.16) - South East Living room glazed door to have at least 75% ventilation opening - Type 6 window to skylight - Roof overhang to extend over the Study window and to have a width of 1.6m	23.9	22.3	6.4	PASS
E202	- R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56)	28.0	28.7	5.6	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	- R2.5 Bulk External Wall Insulation to walls adjacent to the lobby (total wall system R-value Rt2.74) - Type 6 windows - R4.0 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt4.16) - South East Living room glazed door to have at least 75% ventilation opening - Type 6 window to skylight - Roof overhang to extend over the Study window and to have a width of 1.6m				

Table 8: BERS Pro Thermal Loads – Building F

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
F001	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66) - North West Living room glazed door to have at least 75% ventilation opening	33.2	14.9	6.2	PASS
F002	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R2.5 Bulk External Wall Insulation to walls adjacent to the lobby (total wall system R-value Rt2.74) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66) - North West Living room glazed door to have at least 75% ventilation opening	30.9	9.1	6.9	PASS
F003	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R2.5 Bulk External Wall Insulation to walls adjacent to the lobby (total wall system R-value Rt2.74) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66) - North West Living room glazed door to have at least 75% ventilation opening	28.9	10.6	6.9	PASS
F004	- R2.5 Bulk Floor Insulation adjacent to carpark only (total floor system R-value Rt2.61)	21.8	18.0	6.9	PASS

Unit No.	Additional Treatments Required to Table 2	Heating Load ($MJ/m^2.yr$)	Cooling Load ($MJ/m^2.yr$)	Stars	Pass/Fail
	- R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - R2.5 Bulk External Wall Insulation (total wall system R-value Rt3.02) - R1.0 Bulk Internal Wall Insulation (total wall system R-value Rt1.28) - Type 6 windows - R2.5 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt2.66) - North West Living room glazed door to have at least 75% ventilation opening				
F201	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - R2.5 Bulk External Wall Insulation to walls adjacent to the lobby (total wall system R-value Rt2.74) - Type 6 windows - R4.0 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt4.16) - South East Living room glazed door to have at least 75% ventilation opening - Type 6 window to skylight - Roof overhang to extend over the Study & Bedroom window and to have a width of 1m	25.2	22.8	6.2	PASS
F202	- R2.5 Bulk External Wall Insulation (total wall system R-value Rt2.56) - R2.5 Bulk External Wall Insulation to walls adjacent to the lobby (total wall system R-value Rt2.74) - R2.0 Bulk Floor Insulation to exposed areas on the top floor (total floor system R-value Rt2.11) - Type 6 windows - R4.0 Bulk Ceiling Insulation to exposed areas only (total ceiling roof system R-value Rt4.16) - South East Living room glazed door to have at least 75% ventilation opening - Type 6 window to skylight - Roof overhang to extend over the Study & Bedroom window and to have a width of 1m	23.5	24.3	6.3	PASS

4. BASIX ENERGY SECTION

The proposed development will meet the mandatory BASIX Energy target as long as the energy commitments detailed in Table 9 are installed.

Table 9: BASIX Energy Commitments

Component		Commitment

Common Areas and Central Systems	Hot Water System	• **Centralised Electric Heat Pump (Air sourced) HWS**
		  • **Internal piping insulation of minimum R0.6 (~25mm)**
		  • **External piping insulation of minimum R2.0 as per Green Star**
		• **The Electric Heat Pump HWS selected must have a minimum COP of 3.0 at 20˚C Ambient and 65˚C leaving temperatures.**

	Lifts	• All lifts to use Gearless traction with VVVF motor servicing all levels
	Alternative Energy Supply	• **Must Install Photovoltaic System with Rated electrical output of minimum 85.0 kW (Peak)**

Component		Commitment
	Ventilation	• Car park: Ventilation (supply & exhaust) with a CO monitor & VSD fan • Switch Rooms: Ventilation (supply only), thermostatically controlled • Garbage Rooms: No mechanical ventilation • Plant Rooms: Ventilation (exhaust only), Thermostatically controlled • Ground floor Hallways & lobbies: Ventilation (supply only), time clock/BMS controlled • Other levels' Hallways & lobbies: Ventilation (supply only), time clock/BMS controlled
	Lighting	• Car park: LED lighting with time clocks and motion sensors • Lift Cars: LED lighting, connected to Lift Call button • Garbage Rooms: LED lighting with motion sensors • Plant & Switch Rooms: LED lighting with manual on/off switch • Community Room: LED lighting with manual on/off switch • Hallways & lobbies: LED lighting with time clocks and motion sensors
Private Dwellings	Hot Water System	• Central HWS above
	Ventilation	• Kitchen Exhaust: Individual fan, ducted to roof or façade, with manual on/off switch • Bathroom Exhaust: Individual fan, ducted to roof or façade, with manual on/off switch • Laundry Exhaust: Individual fan, ducted to roof or façade, with manual on/off switch
	Heating & Cooling	• **Heating:** Living & Beds to have individual 1-phase air-conditioning with 3.0 -star Rating (Average Zone) • **Cooling:** Living & Beds to have individual 1 phase air-conditioning with 3.5-star Rating (Average Zone) • **No refrigerant-based cooling and no combustion-based heating are allowed**
	Lighting	• At least 80% of light fittings (including the main light fitting) in all hallways, laundries, bathrooms, kitchens, bedrooms and living areas to use Fluorescent or LED lights with dedicated fittings[1]
	Other	• Induction cook top and electric oven • Install 4.0-star (Energy Rating) Dishwashers • Install 2.0-star (Energy Rating) Dryers

5. CONCLUSION

The proposed development has been assessed to optimise its thermal performance (passive and fabric design) using the Nationwide House Energy Rating scheme (NatHERS) and also been assessed in terms of its ability to conserve water and minimise energy consumption through BASIX Tool.

With the commitment recommendations contained within this report the proposed development is able to meet BASIX requirements and is BASIX compliant.

For further details, please refer to the BASIX Certificate No. 1376956M provided.

[1] Definition of dedicated fittings is a light fitting that is only capable of accepting fluorescent or LED (Light Emitting Diode) lamps. It will not accept incandescent, halogen or any other non-fluorescent or non-LED lamps.

APPENDIX A - ARCHITECTURAL DRAWINGS

The building sustainability performance assessment carried out in this report was based on the following architectural drawings supplied by CHROFI received on 17th May 2023.

NO.	DRAWING TITLE	REV
A-DA001	COVER PAGE	01
A-DA002	SITE PLAN	01
A-DA003	SITE ANALYSIS	01
A-DA010	GROUND FLOOR DEMOLITION AND RETENTION PLAN	01
A-DA011	LEVEL 1 DEMOLITION AND RETENTION PLAN	01
A-DA101	BASEMENT 2 FLOOR PLAN	01
A-DA102	BASEMENT 1 FLOOR PLAN	01
A-DA103	GROUND FLOOR PLAN	01
A-DA104	LEVEL 1 / PODIUM	01
A-DA105	LEVEL 2	01
A-DA106	LEVEL 3	01
A-DA107	LEVEL 4	01
A-DA108	LEVEL 5	01
A-DA109	ROOF PLAN	01
A-DA201	NORTH ELEVATION	01
A-DA202	EAST ELEVATION	01
A-DA203	SOUTH ELEVATION	01
A-DA204	WEST ELEVATION	01
A-DA301	SECTIONS A & B	01
A-DA302	SECTIONS C & D	01
A-DA303	SECTIONS E & F	01
A-DA304	SECTIONS G & H	01
A-DA305	SECTIONS I & J	01
A-DA306	SECTION K	01
A-DA401	APARTMENTS - BUILDING A+B - LEVEL 2	01
A-DA402	APARTMENTS - BUILDING A+B - LEVEL 2	01
A-DA403	APARTMENTS - BUILDING A+B - LEVEL 2 - 5	01
A-DA404	APARTMENTS - BUILDING A+B - LEVEL 3 + 4	01
A-DA405	APARTMENTS - BUILDING A+B - LEVEL 3 + 4	01
A-DA406	APARTMENTS - BUILDING A+B - LEVEL 5	01
A-DA407	APARTMENTS - BUILDING A+B - LEVEL 5	01
A-DA408	APARTMENTS - BUILDING C - LEVEL 2	01
A-DA409	APARTMENTS - BUILDING C - LEVEL 3+4	01
A-DA410	APARTMENTS - BUILDING C - LEVEL 3 + 4	01
A-DA411	APARTMENTS - BUILDING C - LEVEL 5	01
A-DA412	APARTMENTS - BUILDING C - LEVEL 5	01
A-DA413	APARTMENTS - BUILDING D + E	01
A-DA414	APARTMENTS - BUILDING F	01
A-DA601	SHADOW DIAGRAMS - 21ST JUNE	01
A-DA602	SHADOW DIAGRAMS - 21ST SEPTEMBER	01
A-DA603	SUN ANGLED VIEWS - EXISTING - 21ST JUNE	01
A-DA604	SUN ANGLED VIEWS - PROPOSED - 21ST JUNE	01
A-DA605	GFA DIAGRAMS	01
A-DA606	SOLAR ACCESS DIAGRAMS	01
A-DA607	ADG STORAGE DIAGRAMS	01
A-DA608	COMMUNAL & PUBLIC OPEN SPACE	01
A-DA609	DEEP SOIL AREA	01
A-DA610	MATERIAL PALETTE	01
A-DA611	SIGNAGE	01
A-DA612	PUBLIC ARTWORK	01
A-DA901	3D VISUALISATION	01
A-DA902	3D VISUALISATION	01
A-DA903	3D VISUALISATION	01
A-DA904	3D VISUALISATION	01
A-DA905	3D VISUALISATION	01
A-DA906	3D VISUALISATION	01
A-DA907	3D VISUALISATION	01

APPENDIX B – LANDSCAPING AREAS

BASIX for Multi Dwellings - Landscape Checklist

WATER - Central systems and common areas

Common area landscape

Please fill out mandatory fields marked in a *

Notes for assessor

Number of Unit-Buildings	
Building Name(s)	"Building 1"
Common area of lawn (m²) *	
Common area of garden (exlcuding lawn) (m²) *	868
Common area of indigenous species (m²) *	607.6

WATER - dwellings

Private area landscape

Notes for assessor

For *each dwelling*, gather the following information:

How many units have private garden & lawn. Please list these separately below

Unit No.	Total area of Private garden (m²)	Total area of Private lawn (m²)	Area of indigenous species (m²)
D002	4.5		3.375
D003	4.5		3.375
D004	2.2		1.65
E001	2.2		1.65
E002	7.1		5.25
E003	7.1		5.25
E004	4.2		3.15
F001	5.1		3.825
F002	5.1		3.825
F003	5.1		3.825
F004	5.1		3.825

Total green roof area 675m^2