Report:

Preliminary ESD Assessment

Project:

Macquarie Park Village, North Ryde

For:

Stamford Property Group

By:

Inhabit Australasia Pty Ltd.

Doc. No: 0290_Prelminary ESD Report_2013.06.19
Date: 2013-06-19
Revision: 00

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00	19/06/2013	**Description**			
			Prepared by	**Checked by**	**Approved by**
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		Signature			

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			Prepared by	**Checked by**	**Approved by**
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		Signature			

Executive Summary

The Macquarie Park Village Precinct site is located on the corner of Epping Road and Herring road at North Ryde. The site will be redeveloped to include 7 residential towers: Perth, Brisbane, Darwin and Adelaide, Sydney, Hobart and Melbourne.

The report outlines the sustainability aspirations of towers Perth, Brisbane, Darwin and Adelaide, while towers Sydney, Hobart and Melbourne are subject to a separate application.

Currently we expect the development to achieve 21% reduction in energy and 42% reduction in water consumption. Heating and cooling requirements exceed the benchmarks hence resulting a high performance of the building envelope.

1.0 Introduction

1.1 Project Description

The Macquarie Park Village Precinct site is located on the corner of Epping Road and Herring road at North Ryde. The site is currently the location of the Stamford Grand Hotel and will be redeveloped to include 7 residential towers: Perth, Brisbane, Darwin and Adelaide, Sydney, Hobart and Melbourne.

The report outlines the sustainability aspirations of towers Perth, Brisbane, Darwin and Adelaide, while towers Sydney, Hobart and Melbourne are subject to a separate application. These towers are to be 10(Perth), 13(Brisbane), 8(Darwin), and 8(Adelaide) floors respectively, and will contain 340 apartments in total. The larger towers are located closest to Epping road, and the smaller towers are located to the rear of the site as indicated in Figure 1-**Error! Reference source not found.**.

Figure 1 Site Plan as per AJ+C 75W submission

1.2 Report Scope

This report outlines the sustainability objectives for the Macquarie Park Village Precinct and reviews both provisional Building Sustainability Index (BASIX) and Green Star Multi- Residential V 1.0 strategy.

1.2.1 BASIX Performance Aspirations

BASIX is implemented under the Environmental Planning and Assessment Act and applies to all residential dwelling types. As part of the development application process in NSW, BASIX is mandatory to gain building approval and sets the minimum standard of efficiency that must be achieved in the proposed development in 3 key areas; energy, water and thermal comfort. This report addresses how compliance is to be achieved in each area.

The energy benchmark aims to improve the efficiency of HVAC systems, hot water, lighting and base building installed appliances within the development. While the thermal comfort benchmark addresses performance of the building envelope to ensure the building has the capacity to perform efficiently. Computer simulations are undertaken in Accurate to assess the performance of the building envelope to determine if compliance objectives are met. Under the water benchmark, fixtures and base building appliances are assessed for water efficiency.

1.3 Green Star Multi-Residential Performance Aspirations

Green Star Multi-Residential is voluntary green building rating scheme that aspires to:

- minimise the environmental impacts of their developments
- reduce Australia's greenhouse gas emissions
- capitalise on the environmental benefits of their initiatives
- receive recognition for more environmentally sustainable design
- deliver health benefits and financial savings for building occupants

Green Star sets more stringent requirements beyond BASIX commitments and such as significantly more onerous to achieve.

This project is aiming to achieve a 4 star Greens Star rating and a preliminary Green Star assessment is included in this report to begin to track progress against this target for both common categories where there is crossover with BASIX (energy, water and thermal comfort) and those that are additional Green Star requirements.

2.0 BASIX

2.1 General Information

The design specifications that were used in the BASIX modelling is based on information received from the architects outlined in Table 1.

Table 1 Site Information

Site	
Site Area	22,433m^2
Roof Area	2708m^2
Car park Area	37,300m^2
Number of Residential Car Spaces	378
Number Non-residential Car Spaces	7

The following architectural drawings were used model the building envelope in Accurate:-

- DA2001-DA2003
- DA2100-DA2115
- DA3100-DA3102
- DA3110-DA3113

In NSW, BASIX is the mandated compliance pathway with NCC (BCA) Section J for Class 1, 2, and 4 buildings. This approach allows for a more flexible design as building envelopes are simulated in NatHERS approved software and are required to achieve heating and cooling benchmarks based on applicable climate zones. In addition to the NatHERS requirements in other states, BASIX includes both energy efficiency and water efficiency requirements.

2.2 Energy

BASIX requires a 20% reduction in energy from the benchmark 3,929kg CO_2 per person per year.

Table 2 contains inputs that were used in the BASIX calculations based on the current design.

Table 2 Energy Design Specifications

Base Building Fixtures	
Heating/Cooling	1 phase 4.5 Star Air Conditioning
Hot Water	Centralise gas storage
Lifts	Gearless traction with VVVF motor
Power Factor Correction	No
BMS System	Yes
Clothes Line	NONE
Clothes Washer	NONE
Dwelling Fixtures	
Ventilated Fridge Space	No
Dedicated LED/Fluorescent Fitting	Yes
Bathroom Exhaust	Exhausted to Roof or Facade- interlocked light
Kitchen Exhaust	Exhausted to Roof or Facade- interlocked light
Laundry Exhaust	Exhausted to Roof or Façade- interlocked light
Cook top	Gas
Oven	Electric
Clothes Line	No
AC Zoning	None
Refrigerator	2.5 Star New Rating
Dishwasher	4 star
Clothes Washer	None
Clothes Dryer	2 star

The above design achieves a 21% reduction and meets BASIX requirements.

Table 3 Energy Consumption

BASIX benchmark	3,929kg CO_2 per person per year
Estimated consumption	3,104kg CO_2 per person per year
Reduction	21%

This section outlines minimum compliance to achieve BASIX and thus gain development approval. It does not address requirements to achieve a 4 star Green Star Rating.

2.3 Thermal Comfort

BASIX requires a maximum heating and cooling load based on the building's location. Macquarie Park Village is required to achieve a maximum heating load of 66 MJ/m^2/annum and a cooling load of 59 MJ/m^2/annum.

Table 4 contains the material specifications used in the Accurate Models.

Table 4 Building Envelope Materials

Construction	**Material used in Model**
Walls	1. Brick (110mm)/ Reflective Foil/ Rockwool Insulation (75mm|R1.88)/ Plasterboard (13mm); R-total 2.61 2. Fibre-Cement sheet (6mm)/ Air gap (40mm)/ Rockwool Insulation (70mm|R1.75)/ Plasterboard (13mm); R-total 2.41 3. Concrete (250mm)/ Air gap (20mm)/ Plasterboard (13mm); R-total 0.57 4. Plasterboard (13mm)/ Rockwool (75mm|R1.9)/ Air gap (40mm)/ Rockwool (75mm|R1.9)/ Plasterboard (13mm); R-total 4.23
Roof	1. Concrete (50mm)/ Air gap (40mm)/ Bituminous Roof Membrane (10mm)/ Concrete (200mm)/ Air gap (90mm)/ Expanded polystyrene (R2.0)/ Plasterboard (10mm); R-total 2.8
Glass	1. Generic uPVC Single Glazed clear glass with U Value=5.75W/m^{2}K, SHGC=0.69 2. Double Glazed: 5mm/6mm Air/ 5mm U Value=3.94/m^{2}K, SHGC=0.40 3. Single Glazed: 6mm U Value=5.35/m^{2}K, SHGC=0.38
Floor/Ceiling	1. Plasterboard/ Concrete Slab/ Tiles or Timber (Tiles for wet areas, timber for living areas)

The material outline in Table 4 represents the minimum envelope performance required for the development.

Preliminary results were carried out on the Adelaide tower, and then adjusted to reflect dwellings in the remaining buildings. The results of the simulation can be found in Appendix 1- Thermal Comfort Results. All buildings meet the requirements based on the materials outlined in Table 4.

The acoustic report requires 10.38 mm laminated glass on the Epping Road, Herring Road and North West bedroom façades and 6.38 mm laminated glass on the remaining façades. During detailed design the acoustic requirements and thermal performance will be addressed concurrently when selecting glazing products.

Material selection and screening arrangements are yet to be finalised. The thermal comfort will then be re-assessed to confirm compliance with BASIX during detailed design.

2.4 Water

BASIX requires a 40% reduction in water from the benchmark of 90,340L per person per year to achieve compliance

Table 5 contains the inputs that were used in the BASIX calculation based on the current design:-

Table 5 Water Design Specification

Base Building	
Area of lawn	1802m^2
Area of Garden	3636m^2
Area of Low Water Use Species	1752m^2
Roof Area	1354m^2
Impervious Area	0m^2
Garden/lawn Irrigated	0m^2
Planter box area	0m^2
Overflow	not diverted
Alternative water use	5438 m^2
Common Area shower and toilets	3 star 7.5-9L/min Showers and 4 star Toilets
Common area taps	4 Star Taps
Water Tank	42kL
Swimming Pool	223kL
Dwelling Fixtures	
Shower Heads	3 star 7.5-9L/min
Toilets	4 star
Kitchen Taps	4 star
Bathroom Taps	4 star
Hot Water Demand Reticulation or Diversion	No
Clothes Washer	None
Dishwasher	3 star

The above design achieves a 46% reduction and meets BASIX requirements

Table 6 Water Consumption

BASIX benchmark	90,340L
Estimated consumption	52,397L
Reduction	42%

This section outlines minimum compliance to achieve BASIX and thus gain development approval. This does not address requirements to achieve a 4 star Green Star Rating.

3.0 Green Star

3.1 4 star Green Star strategy

Macquarie Park Village is aiming to deliver a sustainable housing development to the North Ryde area. To monitor the achievement of sustainability objectives the project is targeting a 4 - 4.5 star Green Star rating. The aim is to achieve this rating via the pursuit of low-medium risk credits. In addition to this we will target so high risk credits that are appropriate to this development.

The credits targeted will be confirmed as the detail design progresses. Currently the proposed credits are split between the categories as outline in Figure 2.

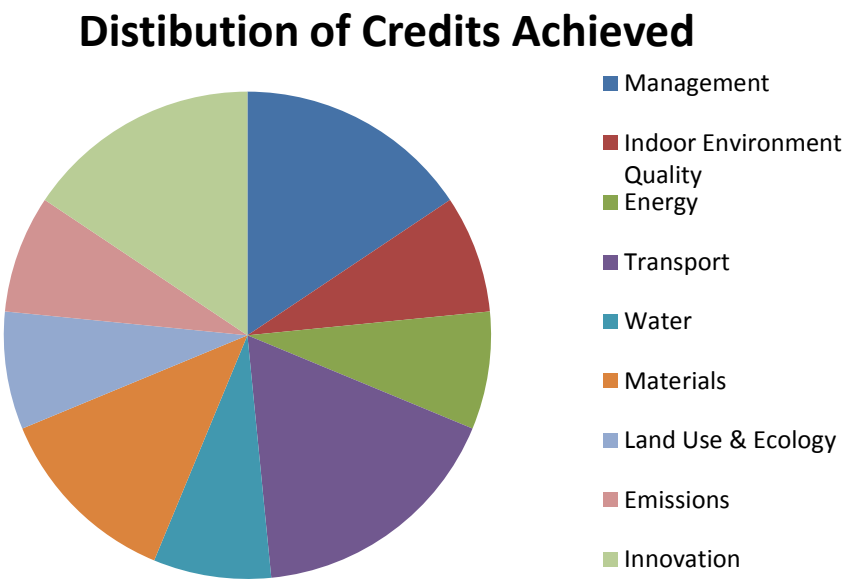

Figure 2 Distribution of Green Star credits across categories

3.2 Summary of Preliminary Green Star Assessment

Green Star - Multi Unit Residential v1 Risk Matrix

Date:08/08/2014
Project: Macqurie Park Village
Author: Samantha Anderson

					4 Star TARGET Rating		
Category	Title	Credit No.	Points Available	Points Achieved	Points to be Confirmed	Approximate Cost	Risk
Management							
	Green Star Accredited Professional	Man-1	2	2	0	included	Low
	Commissioning Clauses	Man-2	2	0	0	$XXXX	High
	Building Tuning	Man-3	1	0	0		High
	Independent Commissioning Agent	Man-4	1	0	0	$XXXX	Medium
	Building Users' Guide	Man-5	1	1	0		Low
	Environmental Management	Man-6	2	2	0		Low
			1	1	0		Low
	Waste Management	Man-7	2	2	0	included	Low
	Metering	Man-16	1	0	0		Low
			1	1	0		Low
			1	0	0		Low
			1	1	0		Low
			2	0	0		Medium
		TOTAL	18	10	0		
Indoor Environment Quality							
	Daylight	IEQ-4	2	0	0		Not Achieved
	Thermal Comfort	IEQ-5	2	0	0		Medium
	Hazardous Materials	IEQ-6	1	1	0		Low
	Internal Noise Levels	IEQ-7	1	0	0		High
			1	0	0		High
	Volatile Organic Compounds	IEQ-8	1	1	0		Low
			1	0	0		Low
			1	1	0		Low
			1	1	0		Medium
	Formaldehyde Minimisation	IEQ-9	1	0	0		Medium
	Electric Lighting Levels	IEQ-13	1	0	0		Medium
	Private External Space	IEQ-20	1	0	0		Medium
	Dwelling Ventilation -Trickle Vents	IEQ-21	2	0	0		High
	Dwelling Ventilation -Dedicated Kitchen Extract Fans	IEQ-21	1	1	0		Low
	Natural Ventilation- Effective Ventialtion (Dual Aspect)	IEQ-22	2	0	0		High
	Natural Ventilation- Lobbies	IEQ-22	1	0	0		Not Achieved
		TOTAL	20	5	0		
Energy							
	Conditional Requirement	Ene-Con	Yes	-	-		Medium
	Greenhouse Gas Emissions	Ene-1	20	4	0		Medium
	Unoccupied Areas	Ene-7	1	0	0		Low
			1	1	0		Low
	Energy Efficient Appliances	Ene-11	2	0	0		Not Achieved
	Peak Electricity Demand Reduction	Ene-12	2	0	0		Medium
		TOTAL	26	5	0		
Transport							
	Provision of Car Parking	Tra-1	2	0	0		Not Achieved
	Fuel-Efficient Transport	Tra-2	2	2	0		Medium
	Cyclist Facilities	Tra-3	3	2	0		Low
	Commuting Mass Transport	Tra-4	5	5	0		Achieved
	Trip Reduction - Mixed Use	Tra-5	2	2	0		Achieved
		TOTAL	14	11	0		

Water							
	Occupant Amenity Water	Wat-1	5	1	0		Low
	Landscape Irrigation	Wat-3	1	1	0		Medium
	Heat Rejection Water	Wat-4	2	2	0		Achieved
	Fire System Water	Wat-5	1	0	0	$ 50,000.00	High
	Water Efficient Appliances	Wat-7	1	1	0		Medium
	Swimming Pool/Spa Water Efficiency	Wat-8	2	0	0		Low
		TOTAL	**12**	**5**	**0**		
Materials							
	Recycling Waste Storage	Mat-1	2	2	0		Low
	Building Re-use	Mat-2	2	0	0		Not Achieved
			4	0	1		Not Achieved
	Recycled-Content & Re-used Products and Materials	Mat-3	1	0	1		Not Achieved
	Concrete	Mat-4	3	1	0		Low
	Steel	Mat-5	2	1	0		Low
	PVC	Mat-6	2	1	0		Medium
	Timber	Mat-7	1	0	0		High
	Design for Disassembly	Mat-8	1	0	0		High
	Dematerialisation	Mat-9	2	2	0		Medium
	Flooring	Mat-11	1	0	0		Low
	Joinery	Mat-12	1	0	0		High
	Internal Walls	Mat-14	2	0	0		High
	Universal Design	Mat-15	1	1	0		Achieved
		TOTAL	**25**	**8**	**2**		
Land Use & Ecology							
	Conditional Requirement	Eco-Con	Yes	0	0		Low
	Topsoil	Eco-1	1	0	1		Low
	Re-use of Land	Eco-2	1	1	0		Achieved
	Reclaimed Contaminated Land	Eco-3	NA	0	0		Low
	Change of Ecological Value	Eco-4	4	1	0		Low
	Outdoor Communal Facilities	Eco-5	3	3	0		Low
		TOTAL	**9**	**5**	**1**		
Emissions							
	Refrigerant ODP	Emi-1	1	1	0		Low
	Refrigerant GWP	Emi-2	2	0	0		High
	Refrigerant Leaks	Emi-3	1	0	0		High
	Insulant ODP	Emi-4	1	0	0		Low
	Stormwater	Emi-5	3	2	0		Medium
	Discharge to Sewer	Emi-6	4	0	0		Medium
	Light Pollution	Emi-7	1	1	0		Medium
	Legionella	Emi-8	1	1	0		Low
		TOTAL	**14**	**5**	**0**		
Innovation							
	Innovation		10	10	0		High
Total Weighted Points:				47	1		

4.0 Conclusion

4.1 BASIX

The material and products specified above will enable the project to meet and exceed BASIX requirements. Currently we expect:-

- 21% energy reduction
- 42% water reduction
- Heating and cooling requirements exceed the benchmarks hence resulting a high performance of the building envelope

4.2 Green Star

A preliminary Green Star assessment has been outlined in section 3.0 with an aim of achieving 4 star Green Star. Currently a range of low and medium risk credits will be targeted, with potentially some high risk credits being target where appropriate. Throughout the detailed design process the documentation and credits pursued will be further refined and confirmed.

5.0 Appendix 1- Thermal Comfort Results

5.1 Adelaide Building

Table 7 Adelaide Accurate Results

Adelaide	Bedrooms	Conditioned floor area	Unconditioned floor area	Heating	Total Cooling	Star Rating
GROUND						
G01	1	54.8	4.8	49.6	14.3	5.1
G02	2	67.2	4.9	57.9	36.4	3.8
G03	2	72.3	4.7	14.5	20.7	7.3
G05	1	54.1	6.5	10.0	34.9	6.5
G06	1	54.1	6.5	10.0	34.9	3.4
G07	2	78.4	4.4	9.5	16.0	8.0
G08	1	51.5	8.1	9.0	22.9	7.5
G09	1	54.5	6.5	60.2	26.1	4.1
G10	1	51.5	8.1	9.0	22.9	7.5
G11	2	75.9	4.6	11.0	14.4	8.0
G12	1	59.8	4.6	63.2	27.8	3.9
FIRST						
101	1	54.8	4.8	42.5	23.1	5.0
102	2	73.1	4.9	32.7	38.4	4.7
103	2	72.3	4.7	14.1	54.0	4.9
105	1	54.1	8.8	10.9	50.8	5.3
106	1	54.1	8.8	10.5	50.7	5.3
107	2	78.4	4.8	8.8	23.1	7.5
108	1	51.5	8.1	11.2	31.9	6.7
109	1	54.5	6.5	6.2	30.2	7.2
110	1	51.5	8.1	11.2	31.9	6.7
111	2	75.9	3.9	10.7	26.7	7.1
112	1	59.8	4.6	42.4	57.2	3.6
SECOND						
201	1	54.8	4.8	42.5	23.1	5.0
202	2	73.1	4.9	32.7	38.4	4.7
203	2	72.3	4.7	14.1	54.0	4.9
205	1	54.1	8.8	10.9	50.8	5.3
206	1	54.1	8.8	10.5	50.7	5.3
207	2	78.4	4.8	8.8	23.1	7.5
208	1	51.5	8.1	11.2	31.9	6.7
209	1	51.5	8.1	11.2	31.9	6.7
210	1	51.5	8.1	11.2	31.9	6.7
211	2	75.9	3.9	10.7	24.1	7.3
212	1	59.8	4.6	41.4	44.1	4.1
THIRD						
301	1	54.8	4.8	52.4	29.6	4.2
302	2	73.1	4.9	45.3	46.6	3.9
303	2	63.2	8.1	33.2	46.4	4.3

Adelaide	Bedrooms	Conditioned floor area	Unconditioned floor area	Heating	Total Cooling	Star Rating
THIRD						
305	1	53.6	8.5	37.4	47.2	4.1
306	1	53.6	8.5	37.4	47.2	4.1
307	1	53.6	8.5	37.4	47.2	4.1
308	1	53.6	8.5	37.4	47.2	4.1
309	1	53.6	8.1	18.0	50.8	4.8
310	2	78.4	4.8	8.8	23.1	7.5
311	1	51.5	8.1	11.2	31.9	6.7
312	1	51.5	8.1	11.2	31.9	6.7
313	1	51.5	8.1	11.2	31.9	6.7
315	2	75.9	3.9	10.7	26.7	7.1
316	1	59.8	4.6	42.4	57.2	3.6
FIFTH						
501	2	78.4	4.8	8.8	23.1	7.5
502	1	51.5	8.1	11.2	31.9	6.7
503	1	51.5	8.1	11.2	31.9	6.7
505	1	51.5	8.1	11.2	31.9	6.7
506	2	75.9	3.9	10.7	26.7	7.1
507	1	59.8	4.6	41.4	44.1	4.1
SIXTH						
601	2	81.6	4.8	19.5	28.4	6.3
602	2	78.4	4.8	8.8	23.1	7.5
603	1	51.5	8.1	11.2	31.9	6.7
605	1	51.5	8.1	11.2	31.9	6.7
606	1	51.5	8.1	11.2	31.9	6.7
607	2	75.9	3.9	10.7	26.7	7.1
608	1	59.8	4.6	42.4	57.2	3.6
SEVENTH						
701	2	81.6	4.8	19.5	28.4	6.3
702	2	78.4	4.8	8.8	23.1	7.5
703	1	51.5	8.1	11.2	31.9	6.7
705	1	51.5	8.1	11.2	31.9	6.7
706	1	51.5	8.1	11.2	31.9	6.7
707	2	75.9	3.9	10.7	26.7	7.1
708	1	59.8	4.6	41.4	44.1	4.1
EIGHT						
801	2	81.6	4.8	35.4	33.8	4.8
802	2	78.4	4.4	27.4	25.6	5.9
803	1	51.5	8.1	31.6	36.6	4.9
805	1	51.5	8.1	31.6	36.6	4.9
806	1	51.5	8.1	31.6	36.6	4.9
807	2	76.7	3.9	24.9	26.4	5.9
808	1	59.8	4.6	51.1	58.8	3.1

5.2 Perth Building

Table 8 Perth Accurate Results

Adelaide	Bedrooms	Conditioned floor area	Unconditioned floor area	Heating	Total Cooling	Star Rating
GROUND						
G01	1	54.8	4.8	49.6	14.3	5.1
G02	2	67.2	4.9	57.9	36.4	3.8
G03	2	72.3	4.7	14.5	20.7	7.3
G05	1	54.1	6.5	10.0	34.9	6.5
G06	1	54.1	6.5	10.0	34.9	3.4
G07	2	78.4	4.4	9.5	16.0	8.0
G08	1	51.5	8.1	9.0	22.9	7.5
G09	1	54.5	6.5	60.2	26.1	4.1
G10	1	51.5	8.1	9.0	22.9	7.5
G11	2	75.9	4.6	11.0	14.4	8.0
G12	1	59.8	4.6	63.2	27.8	3.9
FIRST						
101	1	54.8	4.8	42.5	23.1	5.0
102	2	73.1	4.9	32.7	38.4	4.7
103	2	72.3	4.7	14.1	54.0	4.9
105	1	54.1	8.8	10.9	50.8	5.3
106	1	54.1	8.8	10.5	50.7	5.3
107	2	78.4	4.8	8.8	23.1	7.5
108	1	51.5	8.1	11.2	31.9	6.7
109	1	54.5	6.5	6.2	30.2	7.2
110	1	51.5	8.1	11.2	31.9	6.7
111	2	75.9	3.9	10.7	26.7	7.1
112	1	59.8	4.6	42.4	57.2	3.6
SECOND						
201	1	54.8	4.8	42.5	23.1	5.0
202	2	73.1	4.9	32.7	38.4	4.7
203	2	72.3	4.7	14.1	54.0	4.9
205	1	54.1	8.8	10.9	50.8	5.3
206	1	54.1	8.8	10.5	50.7	5.3
207	2	78.4	4.8	8.8	23.1	7.5
208	1	51.5	8.1	11.2	31.9	6.7
209	1	51.5	8.1	11.2	31.9	6.7
210	1	51.5	8.1	11.2	31.9	6.7
211	2	75.9	3.9	10.7	24.1	7.3
212	1	59.8	4.6	41.4	44.1	4.1
THIRD						
301	1	54.8	4.8	52.4	29.6	4.2
302	2	73.1	4.9	45.3	46.6	3.9
303	2	63.2	8.1	33.2	46.4	4.3

Adelaide	Bedrooms	Conditioned floor area	Unconditioned floor area	Heating	Total Cooling	Star Rating
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305	1	53.6	8.5	37.4	47.2	4.1
306	1	53.6	8.5	37.4	47.2	4.1
307	1	53.6	8.5	37.4	47.2	4.1
308	1	53.6	8.5	37.4	47.2	4.1
309	1	53.6	8.1	18.0	50.8	4.8
310	2	78.4	4.8	8.8	23.1	7.5
311	1	51.5	8.1	11.2	31.9	6.7
312	1	51.5	8.1	11.2	31.9	6.7
313	1	51.5	8.1	11.2	31.9	6.7
315	2	75.9	3.9	10.7	26.7	7.1
316	1	59.8	4.6	42.4	57.2	3.6
FIFTH						
501	2	78.4	4.8	8.8	23.1	7.5
502	1	51.5	8.1	11.2	31.9	6.7
503	1	51.5	8.1	11.2	31.9	6.7
505	1	51.5	8.1	11.2	31.9	6.7
506	2	75.9	3.9	10.7	26.7	7.1
507	1	59.8	4.6	41.4	44.1	4.1
SIXTH						
601	2	81.6	4.8	19.5	28.4	6.3
602	2	78.4	4.8	8.8	23.1	7.5
603	1	51.5	8.1	11.2	31.9	6.7
605	1	51.5	8.1	11.2	31.9	6.7
606	1	51.5	8.1	11.2	31.9	6.7
607	2	75.9	3.9	10.7	26.7	7.1
608	1	59.8	4.6	42.4	57.2	3.6
SEVENTH						
701	2	81.6	4.8	19.5	28.4	6.3
702	2	78.4	4.8	8.8	23.1	7.5
703	1	51.5	8.1	11.2	31.9	6.7
705	1	51.5	8.1	11.2	31.9	6.7
706	1	51.5	8.1	11.2	31.9	6.7
707	2	75.9	3.9	10.7	26.7	7.1
708	1	59.8	4.6	41.4	44.1	4.1
EIGHT						
801	2	81.6	4.8	35.4	33.8	4.8
802	2	78.4	4.4	27.4	25.6	5.9
803	1	51.5	8.1	31.6	36.6	4.9
805	1	51.5	8.1	31.6	36.6	4.9
806	1	51.5	8.1	31.6	36.6	4.9
807	2	76.7	3.9	24.9	26.4	5.9
808	1	59.8	4.6	51.1	58.8	3.1

5.3 Darwin Building

Table 9 Darwin Accurate Results

Darwin	Bedrooms	Conditioned floor area	Unconditioned floor area	Heating	Total Cooling	Star Rating
GROUND						
G01	2	51.5	8.76	14	30.5	6.5
G02	1	54.5	6.97	7.7	20	7.9
G03	2	51.5	8.76	7.2	22	7.7
G05	2	51.5	8.76	25.4	39.9	5
G06	1	39.9	9.9	20.7	28	6.2
G07	2	70.1	5.25	50.9	47	3.7
G08	2	70.1	5.25	39.6	25	5.1
G09	1	72	4.1	14	26.6	6.9
FIRST						
101	2	72	4.1	5	25.9	7.6
102	2	51.5	8.76	11.6	42.9	5.8
103	1	54.5	6.97	4.2	29.1	7.4
105	2	51.5	8.76	8.2	30.6	7
106	2	51.5	8.76	21.2	49.4	4.7
107	1	39.9	3.9	27.6	46.4	4.6
108	2	70.1	5.25	52.1	46.1	3.7
109	2	70.1	5.25	37.2	46.4	4.2
SECOND						
201	2	72	4.1	5	25.9	7.6
202	2	51.5	8.76	11.6	42.9	5.8
203	1	54.5	6.97	4.2	29.1	7.4
205	2	51.5	8.76	8.2	30.6	7
206	2	51.5	8.76	21.2	49.4	4.7
207	1	39.9	3.9	27.6	46.4	4.6
208	2	70.1	5.25	52.1	46.1	3.7
209	2	70.1	5.25	37.2	46.4	4.2
THIRD						
301	2	72	4.1	5	25.9	7.6
302	2	51.5	8.76	11.6	42.9	5.8
303	2	54.5	6.97	4.2	29.1	7.4
305	1	51.5	8.76	8.2	30.6	7
306	1	51.5	8.76	21.2	49.4	4.7

Darwin	Bedrooms	Conditioned floor area	Unconditioned floor area	Heating	Total Cooling	Star Rating
307	1	39.9	3.9	27.6	46.4	4.6
308	2	70.1	5.25	52.1	46.1	3.7
309	2	70.1	5.25	37.2	46.4	4.2
FIFTH						
501	2	72	4.1	5	25.9	7.6
502	1	51.5	8.76	11.6	42.9	5.8
503	1	54.5	6.97	4.2	29.1	7.4
505	1	51.5	8.76	8.2	30.6	7
506	2	51.5	8.76	21.2	49.4	4.7
507	1	39.9	3.9	41.5	44.2	4.1
508	2	70.1	5.25	56.6	57.2	3.3
509	2	70.1	5.25	37.2	46.4	4.2
SIXTH						
601	2	72	4.1	5	25.9	7.6
602	2	51.5	8.76	11.6	42.9	5.8
603	1	54.5	6.97	4.2	29.1	7.4
605	1	51.5	8.76	8.2	30.6	7
606	1	51.5	8.76	21.2	49.4	4.7
607	2	70.1	5.25	56.6	57.2	3.3
608	2	70.1	5.25	37.2	46.4	4.2
SEVENTH						
701	2	72	4.1	5	25.9	7.6
702	2	51.5	8.76	11.6	42.9	5.8
703	1	54.5	6.97	4.2	29.1	7.4
705	1	51.5	8.76	8.2	30.6	7
706	1	51.5	8.76	21.2	49.4	4.7
707	2	70.1	5.25	56.6	57.2	3.3
708	1	70.1	5.25	37.2	46.4	4.2
EIGHT						
801	2	72	4.1	27.5	54.1	4.2
802	2	51.5	8.76	30.6	46.3	4.4
803	1	54.5	6.97	22.4	34.7	5.6
805	1	51.5	8.76	27.2	35.1	5.2
806	1	51.5	8.76	42.9	55.9	3.7
807	2	70.1	5.25	52.8	55.4	3.4
808	2	70.1	5.25	55.2	46.1	3.6

Brisbane Building

Table 10 Brisbane Building Results

Brisbane	Bedrooms	Conditioned floor area	Unconditioned floor area	Heating	Total Cooling	Star Rating
GROUND						
G01	2	86.8	7	7.3	57.6	5.1
G02	1	50.4	4.81	24.5	50.2	4.5
G03	2	80.8	4.81	50.3	41.6	3.9
G05	1	50.4	4.81	13.9	51.6	5
G06	1	50.4	4.81	6.8	56.8	5.2
G07	1	50.4	4.81	6.8	56.8	5.2
G08	1	50.4	4.81	6.8	56.8	5.2
G09	1	50.4	4.81	13.9	51.6	5
G10	2	80.8	4.81	50.3	41.6	3.9
G11	1	50.4	4.81	24.5	50.2	4.5
G12	2	86.8	7	7.3	57.6	5.1
SECOND						
201	1	58.7	6.19	8	30.5	7
202	2	74.1	4.3	16	11.8	7.8
203	2	81.3	7.4	25.9	35.6	5.3
205	1	44.2	6.7	22.1	56.8	4.7
206	2	69.93	4.11	12.1	58.6	4.7
207	1	49.2	4.41	6.4	18.5	8.2
208	1	49.2	4.41	6.4	18.5	8.2
209	2	69.9	4.11	17.5	29.7	6.3
210	1	60.3	5.6	5	19.1	8.2
211	2	78.5	7.4	18.1	44.9	5.2
212	2	75.3	4.41	15.2	11.8	7.9
213	2	60.3	5.6	8.2	21	7.7
THIRD						
301	1	58.7	6.19	8	30.5	7
302	2	74.1	4.3	12	29.4	6.8
303	2	81.3	7.4	25.9	35.6	5.3
305	1	44.2	6.7	22.1	56.8	4.7
306	2	69.93	4.11	12.1	58.6	4.7
307	1	49.2	4.41	6.4	18.5	8.2
308	1	49.2	4.41	6.4	18.5	8.2
309	2	69.9	4.11	17.5	29.7	6.3
310	1	60.3	5.6	5	19.1	8.2
311	2	78.5	7.4	18.1	44.9	5.2
312	2	75.3	4.41	15.2	11.8	7.9
313	2	60.3	5.6	8.2	21	7.7

Brisbane	Bedrooms	Conditioned floor area	Unconditioned floor area	Heating	Total Cooling	Star Rating
FIFTH						
501	1	58.7	6.19	8	30.5	7
502	2	74.1	4.3	12	29.4	6.8
503	2	78.5	7.41	22.7	53.2	4.4
505	1	44.2	6.7	22.1	56.8	4.7
506	2	69.93	4.11	12.1	58.6	4.7
507	1	49.2	4.41	6.4	18.5	8.2
508	1	49.2	4.41	6.4	18.5	8.2
509	2	69.9	4.11	17.5	29.7	6.3
510	1	60.3	5.6	5	19.1	8.2
511	2	78.5	7.4	18.1	44.9	5.2
512	2	75.3	4.41	15.2	11.8	7.9
513	2	60.3	5.6	8.2	21	7.7
SIXTH						
601	1	58.7	6.19	8	30.5	7
602	2	74.1	4.3	12	29.4	6.8
603	2	78.5	7.41	22.7	53.2	4.4
605	1	44.2	6.7	22.1	56.8	4.7
606	2	69.93	4.11	12.1	58.6	4.7
607	1	49.2	4.41	6.4	18.5	8.2
608	1	49.2	4.41	6.4	18.5	8.2
609	2	69.9	4.11	17.5	29.7	6.3
610	1	60.3	5.6	5	19.1	8.2
611	2	78.5	7.4	18.1	44.9	5.2
612	2	75.3	4.41	15.2	11.8	7.9
613	2	60.3	5.6	8.2	21	7.7
SEVENTH						
701	1	58.7	6.19	8	30.5	7
702	2	74.1	4.3	12	29.4	6.8
703	2	78.5	7.41	22.7	53.2	4.4
705	1	44.2	6.7	22.1	56.8	4.7
706	2	69.93	4.11	12.1	58.6	4.7
707	1	49.2	4.41	6.4	18.5	8.2
708	1	49.2	4.41	6.4	18.5	8.2
709	2	69.9	4.11	17.5	29.7	6.3
710	1	60.3	5.6	5	19.1	8.2
711	2	78.5	7.4	18.1	44.9	5.2
712	2	75.3	4.41	15.2	11.8	7.9
713	2	60.3	5.6	8.2	21	7.7

Brisbane	Bedrooms	Conditioned floor area	Unconditioned floor area	Heating	Total Cooling	Star Rating
EIGHT						
801	1	58.7	6.19	8	30.5	7
802	2	74.1	4.3	12	29.4	6.8
803	2	78.5	7.41	22.7	53.2	4.4
805	1	44.2	6.7	22.1	56.8	4.7
806	2	69.93	4.11	12.1	58.6	4.7
807	1	49.2	4.41	6.4	18.5	8.2
808	1	49.2	4.41	6.4	18.5	8.2
809	2	69.9	4.11	17.5	29.7	6.3
810	1	60.3	5.6	5	19.1	8.2
811	2	78.5	7.4	18.1	44.9	5.2
812	2	75.3	4.41	15.2	11.8	7.9
813	2	60.3	5.6	8.2	21	7.7
NINTH						
901	1	56.5	6.19	4.2	31.1	7.3
902	2	74.1	4.3	15.6	24.4	6.9
903	2	78.5	7.41	22.7	53.2	4.4
905	1	44.2	6.7	22.1	56.8	4.7
906	2	69.93	4.11	12.1	58.6	4.7
907	1	49.2	4.41	6.4	18.5	8.2
908	2	77.6	7.41	18.4	23.1	6.8
909	2	78.5	7.41	22.3	50.7	4.6
910	2	75.8	4.41	12.8	15.9	7.8
911	2	55.9	5.6	4.8	24.5	7.7
TENTH						
1001	1	56.5	6.19	4.2	31.1	7.3
1002	2	74.1	4.3	15.6	24.4	6.9
1003	2	78.5	7.41	22.7	53.2	4.4
1005	1	44.2	6.7	22.1	56.8	4.7
1006	2	69.93	4.11	12.1	58.6	4.7
1007	1	49.2	4.4	6.6	17.8	8.1
1008	2	77.6	7.41	18.4	23.1	6.8
1009	2	78.5	7.41	22.3	50.7	4.6
1010	2	75.8	4.41	12.8	15.9	7.8
1011	2	55.9	5.6	4.8	24.5	7.7
ELEVENTH						
1101	1	56.5	6.19	4.2	31.1	7.3
1102	2	74.1	4.3	15.6	24.4	6.9
1103	2	87	7.04	40.9	25.5	4.9
1105	2	73.3	4	18.1	40.8	5.4

Brisbane	Bedrooms	Conditioned floor area	Unconditioned floor area	Heating	Total Cooling	Star Rating
ELEVENTH						
1106	1	49.2	4.41	6.7	17.5	8.1
1107	2	77.6	7.41	18.4	23.1	6.8
1108	2	78.5	7.41	22.3	50.7	4.6
1109	2	75.8	4.41	12.8	15.9	7.8
1110	2	55.9	5.6	4.8	24.5	7.7
TWELFTH						
1201	1	56.5	6.19	4.2	31.1	7.3
1202	2	74.1	4.3	15.6	24.4	6.9
1203	2	87	7.04	40.9	25.5	4.9
1205	2	73.3	4	18.1	40.8	5.4
1206	1	49.2	4.41	6.7	17.5	8.1
1207	2	77.6	7.41	18.4	23.1	6.8
1208	2	78.5	7.41	22.3	50.7	4.6
1209	2	75.8	4.41	12.8	15.9	7.8
1210	2	55.9	5.6	4.8	24.5	7.7
THIRTEENTH						
1301	1	56.5	6.19	17.9	36.9	5.9
1302	2	74.1	4.3	29.3	30.7	5.4
1303	2	87	7.04	52	32.5	4.1
1305	2	73.3	4	35.8	49.9	4.1
1306	1	49.2	4.41	23.7	18.8	6.7
1307	2	77.6	7.41	31.9	28.6	5.3
1308	2	78.5	7.41	22.3	50.7	4.6
1309	2	75.8	4.41	28	17.3	6.4
1310	2	55.9	5.6	18.8	32.9	5.9