Report:

Preliminary ESD Assessment

Project:

Macquarie Park Village, North Ryde

For:

Stamford Property Group

By:

Inhabit Australasia Pty Ltd.

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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 46% 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-Figure 3.

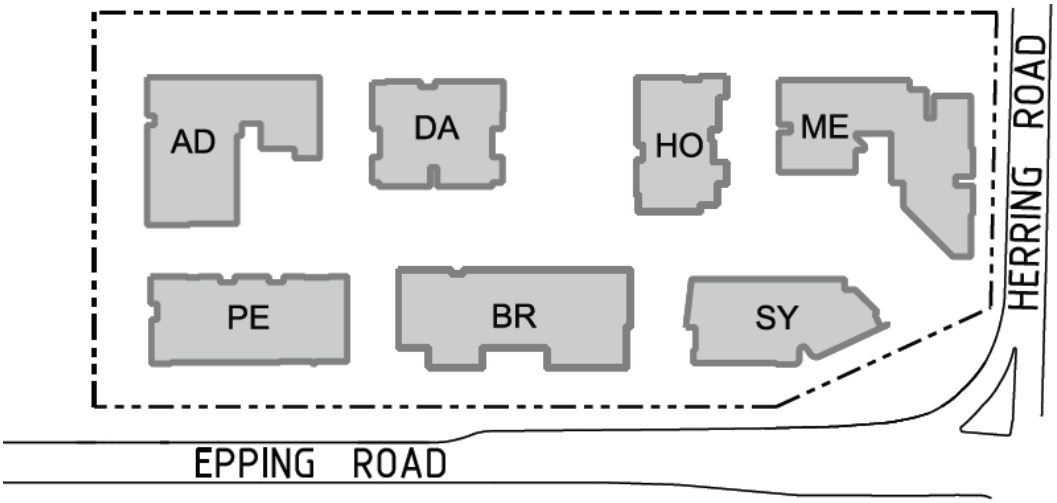

Figure 1 Site Plan

Figure 2 South Elevation

Figure 3 North Elevation

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.

1.4 BASIX/Green Star Comparison

The BASIX and Green Star tools have potential cross overs in areas outlined in Table 1.

Table 1 BASIX Green Star Comparison

BASIX Section	Green Star Credit	Potential Crossovers
Energy	ENE-1	All energy uses that produce greenhouse gas emissions
	ENE-7	BMS to minimises electricity use when spaces are unoccupied
	ENE-11	Use of energy efficient appliances
	IEQ-4	Daylight levels
	IEQ-13	Minimum lighting levels
	IEQ-20 IEQ-21	Natural ventilation to minimise heating at cooling loads
Thermal Comfort	ENE-CON	ENE-Conditional - minimum insulation standards
	IEQ-5	Award points for having an average heating and cooling load of 30MJ/m^2/annum
Water	WAT-1	Fixtures in WAT-1 calculator
	WAT-3	Landscape irrigation
	WAT-4	Heat Rejection Water
	WAT-5	Fire System Water
	WAT-7	Water Efficient Appliance
	WAT-8	Pool and Spa Water Efficiency

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 2.

Table 2 Site Information

Site	
Site Area	22,433m^2
Roof Area	1765 m^2
Car park Area	37,300m^2
Number of Residential Car Spaces	326
Number Non-residential Car Spaces	9

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

Table 3 Energy Design Specifications

Base Building Fixtures	
Heating/Cooling	Reverse cycle VRF/VRV system
Rain Water Tank Volume	300m^3
Pool Volume	99.4m^3
Collector Area Solar Hot Water	
Adelaide	*80m^2*
Perth	*70m^2*
Darwin	*80m^2*
Brisbane	*130m^2*
Lifts	Gearless traction with VVVF motor
Power Factor Correction	Yes
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
Kitchen Exhaust	Exhausted to Roof or Facade
Laundry Exhaust	Exhausted to Roof or Facade
Cook top	Gas
Oven	Electric
Clothes Line	No
AC Zoning	None
Refrigerator	No
Dishwasher	4 star
Clothes Washer	None
Clothes Dryer	2 star

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

Table 4 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 5 contains the material specifications used in the Accurate Models.

Table 5 Building Envelope Materials

Construction Material used in Model	
Walls	Brick, Reflective Foil, R1 Insulation, Plasterboard
Roof	Plasterboard with R2 Insulation/Concrete Roof- Trafficable R-total 2.8
Glass	Generic uPVC Single Glazed clear glass with U Value=5.75W/m²K, SHGC=0.69 Airlite: Aluminium Composite Sliding Door- Double Glazed: 5mm Evergreen/6mm Air/ 5mm U Value=3.94/m²K, SHGC=0.40 (double storey and top floor apartments)
Floor/Ceiling	Plasterboard, Concrete Slab, Tiles or Carpet (Tiles for wet areas, carpet for living areas)

The material outline in Table 5 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 5.

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

Table 6 Water Design Specification

Base Building	
Area of lawn	220.12m^2
Area of Garden	2549.3m^2
Area of Low Water Use Species	1597.7m^2
Roof Area	1764.8m^2
Impervious Area	4000 m^2
Garden/lawn Irrigated	4893m^2
Planter box area	0m^2
Overflow	not diverted
Alternative water use	2865.4 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	261kL
Swimming Pool	99.4kL
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 7 Water Consumption

BASIX benchmark	90,340L
Estimated consumption	48,784L
Reduction	46%

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 4.

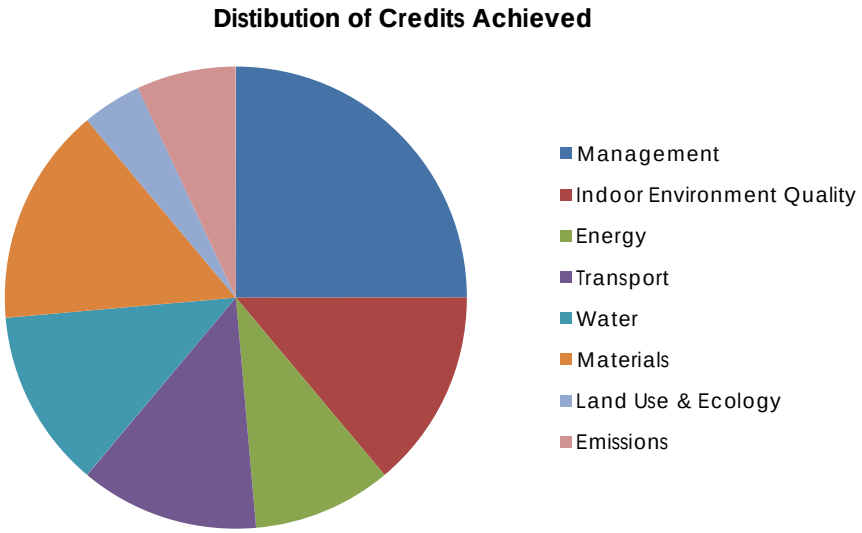

Figure 4 Distribution of Green Star credits across categories

3.2 Summary of Preliminary Green Star Assessment

Category	Title	Credit No.	Points Available	Points Achieved	Points to be Confirmed	Risk
Management						
	Green Star Accredited Professional	Man-1	2	2	0	Low
	Commissioning Clauses	Man-2	2	2	0	Low
	Building Tuning	Man-3	1	1	0	Low
	Independent Commissioning Agent	Man-4	1	1	0	Low
	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	Low
	Metering	Man-16	1	1	0	Low
			1	1	0	Low
			1	1	0	Low
			1	1	0	Low
			2	2	0	Low
		TOTAL	**18**	**18**	**0**	
Indoor Environment Quality						
	Daylight	IEQ-4	2	0	0	High
	Thermal Comfort	IEQ-5	2	1	1	Medium
	Hazardous Materials	IEQ-6	0	NA	0	Achieved
	Internal Noise Levels	IEQ-7	1	0	0	High
			1	0	0	High
	Volatile Organic Compounds	IEQ-8	1	1	0	Medium
			1	1	0	Medium
			1	1	0	Medium
			1	1	0	Medium
	Formaldehyde Minimisation	IEQ-9	1	1	0	Low
	Electric Lighting Levels	IEQ-13	1	1	0	Low
	Private External Space	IEQ-20	1	0	1	High
	Dwelling Ventilation	IEQ-21	2	2	0	High
			1	1	0	Low
	Natural Ventilation	IEQ-22	2	0	0	High
			1	0	0	Low
		TOTAL	**19**	**10**	**2**	
Energy						
	Conditional Requirement	Ene-Con	No	0	0	Medium
	Greenhouse Gas Emissions	Ene-1	20	0	0	Medium
	Unoccupied Areas	Ene-7	1	1	0	Medium
			1	1	0	Low
	Energy Efficient Appliances	Ene-11	2	0	2	High
	Peak Electricity Demand Reduction	Ene-12	2	0	2	High
		TOTAL	**26**	**2**	**4**	
Transport						
	Provision of Car Parking	Tra-1	2	0	0	Low
	Fuel-Efficient Transport	Tra-2	2	1	0	Medium
	Cyclist Facilities	Tra-3	3	2	0	Medium
	Commuting Mass Transport	Tra-4	5	5	0	Low
	Trip Reduction - Mixed Use	Tra-5	2	1	1	Low
		TOTAL	**14**	**9**	**1**	
Water						
	Occupant Amenity Water	Wat-1	5	2	0	Achieved
	Landscape Irrigation	Wat-3	1	1	0	Medium
	Heat Rejection Water	Wat-4	2	2	0	High
	Fire System Water	Wat-5	1	1	0	High
	Water Efficient Appliances	Wat-7	1	1	0	Medium
	Swimming Pool/Spa Water Efficiency	Wat-8	2	2	0	High
		TOTAL	**12**	**9**	**0**	

Materials						
	Recycling Waste Storage	Mat-1	2	1	0	Medium
	Building Re-use	Mat-2	2	0	0	High
			4			High
	Recycled-Content & Re-used Products and Materials	Mat-3	1	0	0	High
	Concrete	Mat-4	3	2	0	Medium
	Steel	Mat-5	2	2	0	Medium
	PVC	Mat-6	2	1	1	Medium
	Timber	Mat-7	1	1	0	Medium
						Medium
	Design for Disassembly	Mat-8	1	1	0	High
	Dematerialisation	Mat-9	2	0	0	High
	Flooring	Mat-11	1	1	0	Select
	Joinery	Mat-12	1	1	1	Select
	Internal Walls	Mat-14	2	0	2	Select
	Universal Design	Mat-15	1	1	0	Medium
		TOTAL	**31**	**11**	**4**	
Land Use & Ecology						
	Conditional Requirement	Eco-Con	Yes	0	0	Low
	Topsoil	Eco-1	0	NA	0	Achieved
	Re-use of Land	Eco-2	1	1	0	Achieved
	Reclaimed Contaminated Land	Eco-3	0	NA	0	Achieved
	Change of Ecological Value	Eco-4	4	0	0	Medium
	Outdoor Communal Facilities	Eco-5	3	2	0	Medium
		TOTAL	**8**	**3**	**0**	
Emissions						
	Refrigerant ODP	Emi-1	1	1	0	Medium
	Refrigerant GWP	Emi-2	2	0	0	High
	Refrigerant Leaks	Emi-3	1	0	0	High
	Insulant ODP	Emi-4	1	0	1	High
	Stormwater	Emi-5	3	0	0	High
	Watercourse Pollution	Emi-5	2	2	0	Medium
			1			High
	Discharge to Sewer	Emi-6	4	0	0	Select
			0			Achieved
	Light Pollution	Emi-7	1	1	0	Medium
	Legionella	Emi-8	1	1	0	Medium
		TOTAL	**17**	**5**	**1**	

Sub-total weighted points: 46 12

Innovation						
	Innovative Strategies & Technologies	Inn-1	2	1	0	High
	Exceeding Green Star Benchmarks	Inn-2	2	0	0	High
	Environmental Design Initiatives	Inn-3	1	0	0	High
		TOTAL	5			

Risk	
Achieved	6
Low	32
Medium	57
High	41

Green Star Points Requirements	
4 Star	45 Weighted Points
5 Star	60 Weighted Points

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
- 46% 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 8 Adelaide Accurate Results

# of Apartments	Apartment Number	# of Bedrooms	Heating	Total Cooling	Conditioned Floor Area	Unconditioned Floor Areas	Star Rating
4	ADG01, AD101, AD201, AD301	1	16.8	23.5	55.1	0	6.9
4	ADG02, AD102, AD202, AD302	2	8.2	22.5	71.1	0	7.6
4	ADG03, AD103, AD203, AD303	2	17	19.3	72.3	6.6	7.2
3	ADG04, AD104, AD204	1	10.2	23.1	58.2	0	7.4
3	ADG05, AD105, AD205	1	9.2	30.9	58.2	0	6.9
6	ADG06, AD106, AD206, AD501, AD602, AD702, AD309	2	6.2	13.1	81.5	0	8.6
21	ADG07, ADG08, ADG09,AD107, AD108, AD109,AD207, AD208, AD209, AD309, AD502, AD503, AD504, AD603, AD604, AD605, AD703, AD704, AD705, DA309, AD 310, AD311,AD312	1	2.9	19.4	58.2	0	8.3
9	ADG10, AD110, AD210, AD310, AD505, AD606, AD706, , AD313	2	3.4	19.9	76.6	4	8.2
9	ADG11, AD111, AD211, AD311, AD506, AD111, AD607, AD707, AD314	2	27.3	24.1	63.2	0	5.9
1	AD303	2	26.6	32.9	68.2	6.4	5.4
3	AD304, AD305, AD306	1	18	41	54.9	0	5.4
2	AD307, AD308	1	8.8	38.1	54.9	0	6.3
2	AD601, AD701	2	35.6	15.1	83.8	0	6
1	AD801	2	47.2	16.1	83.8	0	4.9
1	AD802	2	26.3	12.6	81.5	0	6.6
3	AD803, AD804, AD805	1	18.9	21.9	58.2	0	6.3
1	AD806	2	20	17.2	76.6	4	6.8
1	AD807	2	42.3	30.3	63.2	0	4.3

5.2 Perth

Table 9 Perth Accurate Results

# of Apartments	Apartment Number	# of Bedrooms	Heating	Total Cooling	Conditioned Floor Area	Unconditioned Floor Areas	Star Rating
18	PE204, PE304, PE504, PE604, PE704, PE804, PE205, PE305, PE505, PE605, PE705, PE805, PE207, PE307, PE507, PE607, PE707, PE807	1	2.9	19.4	58.2	0	8.3
1	PEG01	2	5.7	38.9	67.1	7	6.5
6	PEG02, PEG03, PEG04, PEG07, PEG08, PEG09	1	0.2	38.6	55.2	0	7
1	PEG05	1	1.3	31.6	55.2	0	7.4
1	PEG06	1	1.3	31.6	55.2	0	7.4
1	PEG10	2	6.6	31.8	67.1	7	7
6	PE201, PE301, PE501, PE601, PE701, PE801	2	29.6	13.2	66.2	0	6.7
6	PE202, PE302, PE502, PE602, PE702, PE802	2	19.2	18.9	64.4	0	7.1
6	PE203, PE303, PE503, PE603, PE703, PE803	2	4	15.6	89.1	0	8.5
7	PE206, PE306, PE506, PE606, PE706, PE806, PE902	1	5.9	27.7	51.5	0	7.4
6	PE208, PE308, PE508, PE608, PE708, PE808	2	9	17.8	26.8	4.2	7.9
6	PE209, PE309, PE509, PE609, PE709, PE809	2	20.2	14.6	34.8	0	7.3
6	PE210, PE310, PE510, PE610, PE710, PE810	2	28.3	12.1	66.2	0	6.9
1	PE901	2	27.3	21.9	86.8	0	6.1
1	PE903	2	14	15.3	76.8	0	7.7
1	PE904	2	37.3	14.8	89.8	0	5.9
1	PE1001	2	44.9	28.5	86.8	0	4.4
1	PE1002	1	22.3	36.2	51.5	0	5.1
1	PE1003	2	31.1	19.3	76.8	0	5.6
1	PE1004	2	48.3	19.5	90.1	0	4.9

5.3 Darwin

Table 10 Darwin Accurate Results

# of Apartments	Apartment Number	# of Bedrooms	Heating	Total Cooling	Conditioned Floor Area	Unconditioned Floor Areas	Star Rating
14	DAG03, DAG04, DA103, DA104, DA203, DA204, DA303, DA304, DA503, DA504, DA603, DA604, DA703, DA704	1	2.9	19.4	58.2	0	8.3
2	DA803, DA804	1	18.9	21.9	58.2	0	6.3
1	DAG01	1	5.8	40.3	43.8	0	6.4
6	DA101, DA201, DA301, DA501, DA601, DA701	2	7.3	41	76.1	0	6.2
7	DAG02, DA102, DA202, DA302, DA502, DA602, DA702	1	6.7	19.2	58.2	0	8
7	DAG05, DA105, DA205, DA305, DA505, DA605, DA705	2	9.8	21.1	49.4	8.8	7.6
4	DAG06, DA106, DA206, DA306	1	5.6	39.6	43.8	0	6.4
7	DAG07, DA107, DA207, DA307, DA507, DA606, DA706	2	19.4	33.2	74.5	0	5.9
7	DAG08, DA108, DA208, DA308, DA508, DA607, DA707	2	45	35.1	70.1	0	4.3
1	DA506	1	25.7	40.2	43.8	0	5
1	DA802	1	28.4	16.3	58.2	0	6.1
1	DA805	2	32.6	18.8	49.4	8.8	5.7
1	DA801	1	24.3	33.4	70.1	0	4.7
1	DA806	2	34.4	32.3	74.5	0	4.9
1	DA807	2	45.5	26.7	70.1	0	4.7

5.4 Brisbane

Table 11 Brisbane Building Results

# of Apartments	Apartment Number	# of Bedrooms	Heating	Total Cooling	Conditioned Floor Area	Unconditioned Floor Areas	Star Rating
1	BRG01	2	5.7	38.9	67.1	7	6.5
1	BRG02	1	1.3	31.6	55.2	0	7.4
1	BRG10	1	1.3	31.6	55.2	0	7.4
1	BRG11	2	6.6	31.8	67.1	7	7
18	BR1203, BR1303, BR1503, BR1603, BR1703, BR1803, BR1903, BR11003, BR11103, BR11203, BR2204, BR2304, BR2504, BR2604, BR2704, BR2804, BR2904, BR21004,	2	29.6	13.2	66.2	0	6.7
5	BRG04, BRG05, BRG06, BRG07, BRG08	2	19.2	18.9	64.4	0	7.1
20	BR1206, BR1306, BR1506, BR1606, BR1706, BR1806, BR1906, BR11006, BR11106, BR11206, BR2201, BR2301, BR2501, BR2601, BR2701, BR2801, BR2901, BR21001, BR21101, BR21201	1	5.9	27.7	51.5	0	7.4
3	BR11301, BR11305, BR21303	1	22.3	36.2	51.5	0	5.1
1	BRG03	2	2.4	25.9	85.6	0	7.8
1	BRG09	2	2.4	25.8	85.6	0	7.8
10	BR1201, BR1301, BR1501, BR1601, BR1701, BR1801, BR1901, BR11001, BR11101, BR11201	1	7	18.9	64.9	0	8
18	BR1202, BR1302, BR1502, BR1602, BR1702, BR1802, BR1902,	2	13.7	8.3	78.4	0	8.3

	BR11002, BR11102, BR11202, BR2205, BR2305, BR2505, BR2605, BR2705, BR2805,						
10	BR1204, BR1304, BR1504, BR1604, BR1704, BR1804, BR1904, BR11004, BR11104, BR11204	1	19.3	30.7	50.9	0	6.1
10	BR1205, BR1305, BR1505, BR1605, BR1705, BR1805, BR1905, BR11005, BR11105, BR11205	2	10.6	23.8	74	0	7
10	BR2202, BR2302, BR2502, BR2602, BR2702, BR2802, BR2902, BR21002, BR21102, BR21202	2	9.3	32.9	74	0	6.7
10	BR2203, BR2303, BR2503, BR2603, BR2703, BR2803, BR2903, BR21003, BR21103, BR21203	1	21.5	19.4	55.8	0	6.8
10	BR2206, BR2306, BR2506, BR2606, BR2706, BR2806,	1	3.2	14.9	65.9	0	8.7
2	BR11302, BR21302	2	29.4	9	78.4	0	7
1	BR11303	2	47.9	32.5	80.4	5.5	4.3
1	BR11304	2	49.4	32.2	77.3	0	4.2
1	BR21301	2	30.5	38.4	80.2	0	4.8

6.0 Appendix 2-BASIX/ Green Star Comparison

The materials and products specified throughout the report attain the minimum BASIX requirements.

As the building is aiming to achieve a 4 star Green Star rating, many of the items that are required for BASIX compliance will be required to be improved upon to gain Green Star certification. The preliminary Green Star assessment suggests that potentially the following improvements listed in Table 1 may be required to achieve a 4 star rating.

Table 12 BASIX/ Green Star Comparison

Fixture	BASIX	Green Star Requirement to achieve 4 stars	Green Star Credit
Heating/Cooling	reverse cycle VRF/VRV system	Highest MEPS available Affects ENE-1 Points	ENE-1, ENE-12
Rain Water Tank Volume	300m^3	3800kL	WAT-1
Pool Volume	99.4m^3	NA	WAT-8
Collector Area Solar Hot Water *Adelaide* *Perth* *Darwin* *Brisbane*	 *80m^2* *70m^2* *80m^2* *130m^2*	 Effect ENE-1 Points	ENE-1
Lifts	Gearless traction with VVVF motor	Effects ENE-1 Points	ENE-1
Power Factor Correction	Yes	NA	NA
BMS System	Yes	Yes	ENE-7
Energy Dwelling Fixtures			
Ventilate Fridge Space	No	No	N/A
Dedicate LED/Fluorescent Fitting	Yes	Effect ENE-1 Points	ENE-1, IEQ-13
Bathroom Exhaust	Exhausted to Roof or Facade	Yes	N/A
Kitchen Exhaust	Exhausted to Roof or Facade	Yes	IEQ-21
Laundry Exhaust	Exhausted to Roof or Facade	Yes	N/A
Cook top	Gas	Effect ENE-1 Points	ENE-1, ENE-12
Oven	Electric	Effect ENE-1 Points	ENE-1, ENE-12
Clothes Line	Yes	Not covered in green star	ENE-11
AC Zoning	None	No	No
Refrigerator	None	3 star (Highest star available)	ENE-11
Dishwasher	4 star	4 star (Highest star available)	ENE-11
Clothes Washer	None	5 star (Highest star available)	ENE-11
Clothes Dryer	2 star	6 stars (Highest star available)	ENE-11

Water Dwelling Fixtures		A	B	
Shower Heads	3 star 7.5-9L/min	7.5L/min[1]	9L/min[1]	WAT-1
Toilets	4 star	4 star[1]	4 star[1]	WAT-1
Kitchen Taps	4 star	4 star[1]	6 star[1]	WAT-1
Bathroom Taps	4 star	4 star[1]	5 star[1]	WAT-1
Hot Water Demand Reticulation or Diversion	No	No		N/A
Clothes Washer	None	4 star (Highest star available)		WAT-7
Dishwasher	3 star	3 star (Highest star available)		WAT-7

[1]Please note option in column A or second column B will achieve compliance, Column B is the preferred option by AECOM to achieve compliance.

To achieve the 4 star rating a minimum of 45 weighted points is required. If a 4 star rating is to be achieved we would recommend that the development aims to achieve 50 weighted points to ensure that there is a buffer in case the Green Building Council does not award all the points that Stamford pursues.

The results from the preliminary Green Star assessment can be found in table 5.2 Based on the current design the developments has pursued 46 weighted points and as such the concept plans are on target to achieve a 4 star Green Star rated building.