

ECOLOGICALLY SUSTAINABLE DESIGN STRATEGY

Activity Schedule

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EXECUTIVE SUMMARY

This report outlines St George Community Housing's (SGCH) Ecologically Sustainable Design (ESD) strategy for the proposed development at 11 Gibbons Street in Redfern, NSW. The ESD initiatives identified in this strategy meet and exceed the policy requirements applicable to the development.

As a residential development in NSW, the project must comply with the Building Sustainability Index (BASIX) which stipulates benchmarks for water consumption, thermal comfort and energy use. The development exceeds these benchmarks as identified in the table below and lifts the average dwelling NatHERS rating from 4.5 Stars to 8 Stars.

Policy Requirement	Category	Required Improvement Value	Targeted Improvement Value	Enhanced Outcome (%)
BASIX	Water	40 (min)	41	2.5%
	Thermal Comfort	26 MJ/m ² /annum (cool) 40 MJ/m ² /annum (heat)	12 MJ/m ² /annum (cool) 11 MJ/m ² /annum (heat)	54% (cool) 73% (heat)
	Energy	25 (min)	45	80%

In addition to exceeding these policy requirements, the project is also targeting the following initiatives:

- Onsite renewable energy (Solar PV)
- Improved NatHERS Targets (8 Stars)
- Tenant Energy Education
- Passive Solar Design
- Sustainable Transport Facilities

The combination of these ESD initiatives is estimated to save each dwelling at 11 Gibbons Street approximately \$900 per year in energy related expenses when compared to a typical 2-bedroom apartment in this area. Details of these savings are provided in Appendix A.

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1. INTRODUCTION

1.1 Overview

Northrop Consulting Engineers have been engaged by St George Community Housing (SGCH) to provide an Ecologically Sustainable Design (ESD) Strategy for the proposed development at 11 Gibbons Street in Redfern, NSW. The aim of this strategy is to demonstrate SGCH's commitment to creating sustainable and affordable housing, as well as provide a pathway to compliance with relevant policy requirements.

The proposed development is an 18 storey building containing a mix of one, two and three bedroom apartments totalling 160 dwellings. The development also includes retail, commercial, café, community and office spaces on the ground floor.



Figure 1: SGCH Gibbons Street

The following documents and tools have been referenced in the development of this strategy:

- SGCH – Development & Construction Design Guidelines V3.0
- The NSW Building Sustainability Index (BASIX)
- The National Construction Code 2016

1.2 Limitations

Due care and skill has been exercised in the preparation of this report.

This report is intended as a guide to illustrate the potential BCA section J compliance methods to be considered in the development. It should be read in conjunction with the other design documentation and specific applications may vary during the development of the project. Any products specified or used for the project are to be verified by the contractor as being safe and appropriate for use. Northrop do not take any responsibility for the use of unsafe products.

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2. BASIX

As a residential development in NSW, SGCH Gibbons Street is required to achieve compliance with the Building Sustainability Index (BASIX). BASIX mandates targets for water efficiency, energy efficiency and thermal comfort through both active and passive design measures.

In addition to meeting minimum BASIX compliance, SGCH stipulates essential requirements for potable water, rainwater harvesting and reuse, thermal comfort, and energy efficiency in all of its developments. The result of these initiatives at 11 Gibbons Street is estimated to save tenants approximately \$900 per year in energy related expenses when compared to a typical 2-bedroom apartment in the area. Details of these savings have been provided in Appendix A.

BASIX inputs and SGCH requirements for the Gibbons Street development have been combined and summarised in the following sections.

2.1 Water Efficiency

- 4 Star WELS rated taps
- 4 Star WELS rated WC
- 3 Star WELS (> 4.5 but <= 6 L/min)
- Separate mains potable water connection to each dwelling
- 25kL rainwater tank to collect from 500m² roof area
- Rainwater tank to include first flush device to drain to storm water
- Rainwater used for common area landscape only
- No bladder tanks permitted
- Minimum 2 year warranty to all rainwater reuse pump sets

2.2 Thermal Comfort

For developments in Redfern, the average loads for heating and cooling across all units must not exceed 40.0 MJ/m² and 26.0 MJ/m² respectively, while the maximum heating and cooling load for any unit must not exceed 45.4 MJ/m² and 29.5 MJ/m² respectively. The following building materials are required to achieve these benchmarks and an 8 Star average NatHERS rating (Section 4.3) are given below.

- Concrete roof: R3.0 insulation, reflective both sides
- Exposed ceilings: R3.0 insulation
- External walls: Concrete, bulk insulation and plasterboard to achieve a total system R-Value of 3.14
- Party Walls: Concrete panel between plasterboard to achieve total system R-Value of 1.16
- Internal walls: Plasterboard
- Ground floor: Concrete slab on ground
- Unit floor: Concrete (coverings include vinyl in living areas and bedrooms, tile in bathrooms)
- Suspended floors: Concrete, R4.0 insulation

- Western bedroom glazing: Double glazing, U-Value = 3.4 (maximum), SHGC = 0.53 ($\pm 5\%$)¹
- Other glazing: High performance, low-e single glazing, U-Value = 4.3 (maximum), SHGC = 0.47 ($\pm 5\%$)²
- Awning windows 90% openable, double sliding doors 45% openable, triple sliding doors 60% openable
- Draught seals around all external doors

2.3 Energy Efficiency

- 50kW peak roof-top solar PV system to serve common area power loads
- Gearless traction lifts with Variable Voltage & Frequency (VVVF) motor to serve 18 storeys
- No mechanical ventilation exhaust for lobbies and corridors, bicycle storage, NBN rooms
- Mechanical ventilation exhaust for garbage rooms, switch rooms, service rooms, chamber substation and fire stair, interlocked to light
- Mechanical ventilation supply and exhaust for community room
- LED lighting with motion and daylight sensor control for lobbies, hallways and community room
- LED lighting with motion sensor control for service rooms, fire stair, bicycle storage and bin rooms
- LED lighting with manual on-off control for main switch room, chamber substation and fire control room
- LED lighting for lifts connected to call button
- Kitchen, bathroom and laundry ducted to façade or roof with manual on and timer off control
- Ceiling fans in living areas and bedrooms
- Gas bayonet in living area against external wall for future gas appliance flue
- Compact Fluorescent/LED fittings for all internal dwelling areas
- 4.5 Star instantaneous gas hot water system per dwelling
- Gas cooktop and electric oven per dwelling
- Dishwasher, clothes washer, clothes dryer and refrigerators not provided

¹ Glazing required anywhere an Rw value from 42 and 44 (inclusive) has been specified in Acoustic Assessment by Renzo Tonin & Associates

² Glazing required anywhere an Rw value from 29 and 39 (inclusive) has been specified in Acoustic Assessment by Renzo Tonin & Associates

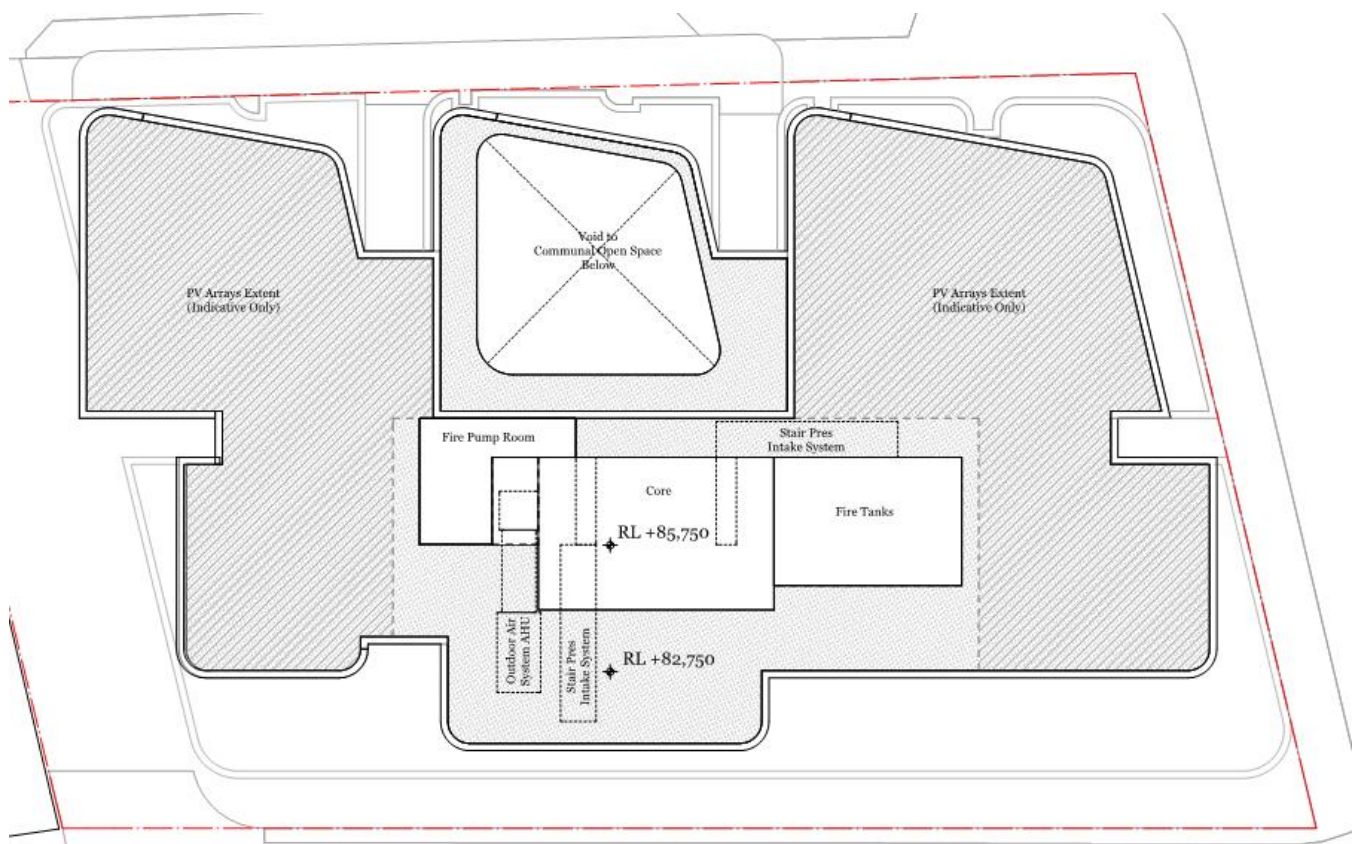
4. ESD INITIATIVES

4.1 On-Site Renewable Energy

The Gibbons Street development is aiming to reduce carbon emissions from the building's operational energy through the inclusion of an on-site solar PV system.

On site renewable energy will be produced from a solar PV array of up to 50kW installed on the roof the Gibbons Street development. Architects DKO have made provisions for approximately 430m² of unobstructed roof space to house the system. With a predominately north orientation, a 50kW system is expected to have an average annual electricity production of 71.3 MWh.

Power generated by the solar PV system will primarily feed a central outdoor air system which is essential for the ventilation of individual units. Excess solar PV generated power will be used to offset common area power loads including lighting, lifts and pumps.



4.2 Improved NatHERS Targets

In previous developments, SGCH has demonstrated leadership in moving beyond ESD code compliance by targeting an average NatHERS rating of 7 Stars across all dwellings. The Gibbons Street development will improve upon this benchmark by striving to target an 8 Star average NatHERS rating across all dwellings. By targeting a higher NatHERS rating, heating and cooling loads for individual units will be lowered to result in improved thermal comfort, lower emissions and lower energy costs for tenants. The following table contrasts the building requirements for a typical 7 Star average and 8 Star average unit.

Building Element		Properties	
		7 Star Average	8 Star Average
External Walls		R2.0 Insulation	$R_t=3.14$
Roof		R3.0 Insulation	R3.0 Insulation
Exposed Floor		R3.0 Insulation	R4.0 Insulation
Glazing	Western Bedrooms	High performance single glazing	Double Glazing
	All Other	High performance single glazing	High performance, low-e, single glazing

4.3 Energy Education

While pursuing a high NatHERS rating has significant benefits from an ESD perspective, building tenants have an important role to play to ensure they benefit from living in energy efficient homes. SGCH will aim to provide prospective tenants with information around energy efficient lifestyle habits through brochures and/or workshops. This initiative will promote awareness around energy efficiency, create a sense of community and provide tenants with the tools to keep their energy bills to a minimum. Information could include but may not be limited to:

- Selecting energy efficient appliances and fittings, including light bulbs
- Effective use of heating and cooling appliances
- Maximising natural ventilation

4.4 Passive Solar Design

Passive solar design principals have been incorporated into the SGCH Gibbons Street development to further reduce heating and cooling loads on individual units without compromising on daylight levels. Large balcony overhangs create effective horizontal shading devices which exclude summer sun, while careful orientation still allows afternoon winter sun to penetrate the dwellings.

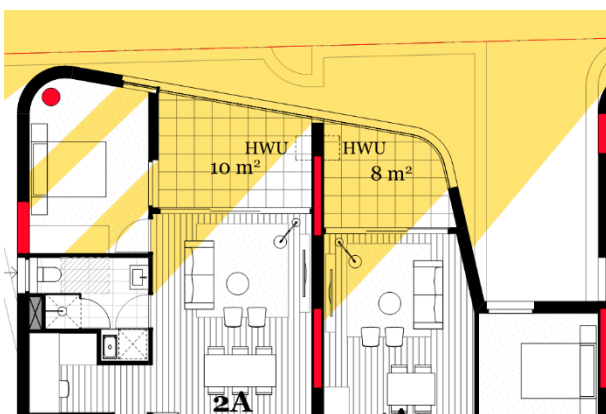


Figure 4: Afternoon Winter Sun Access

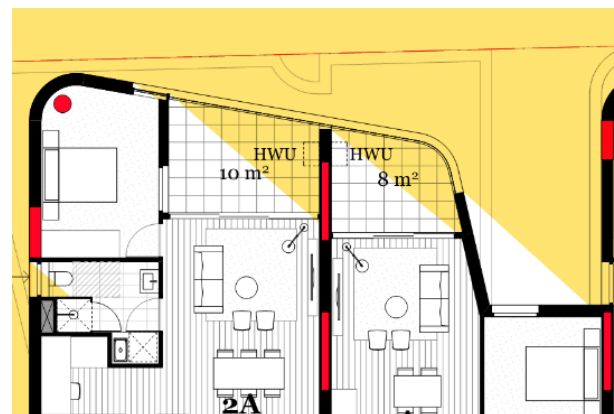


Figure 3: Afternoon Summer Sun Shading

4.5 Sustainable Transport

Occupant transport is large contributor to a building's overall environmental footprint. The proximity of Redfern Train Station gives the Gibbons Street development the highest Green Star Accessibility Rating, meaning more than 15% of the Greater Sydney population can reach the site within 45 minutes or less. To encourage the uptake

of active transport methods and improve the accessibility of the site, 96 enclosed and secure bicycle parking spaces will be provided on the ground floor of the development. To further their commitment to low-emissions transport, SGCH is also providing no vehicle parking at the Gibbons Street development.

5. CONCLUSION

Through revision of current designs for SGCH Gibbons Street, a strategy has been provided to outline how the development can meet and exceed ESD policy requirements for new developments in NSW.

The level of improvement targeted upon existing ESD policy requirements reinforce SGCH's commitment to environmental, social and economic sustainability. In addition, these initiatives are estimated to save each dwelling at 11 Gibbons Street up to \$900 per year in energy related expenses when compared to a typical 2 bedroom apartment in the Sydney area.

APPENDIX A – ENERGY SAVINGS CALCULATIONS

The high NatHERS rating (average 8 Star) of units coupled with other SGCH sustainability initiatives, including energy efficient lighting and appliances, will provide tenants at 11 Gibbons Street significant savings on energy related expenses.

The following table compares energy related expenses between a typical two-bedroom (70m²) apartment in Sydney assuming an electricity and gas cost of \$0.28/kWh and \$0.04c/MJ respectively.

	4.5 Star (Code Compliant) Unit		8 Star Unit	
	Consumption/Year	Cost/Year	Consumption/Year	Cost/Year
Heating & Cooling ³	1458 kWh	\$408	484 kWh	\$136
Lighting	926 kWh ⁴	\$259	463 kWh ⁵	\$130
Hot Water ⁶	4532 kWh	\$1269	18,746 MJ	\$750
Total		\$1937		\$1015
Saving	N/A		\$922	

³ Consumption determined in BERS Pro

⁴ Determined from 5W/m² lighting power density from NCC Section J Part J6

⁵ Determined from 2.5W/m² lighting power density using LED fittings as specified by SGCH

⁶ Determined by *Rheem* Running Cost Calculator