ESD Assessment and Report

Berry Holdsworth - Mixed-use Development
12-20 Berry Road & 11-19 Holdsworth Avenue
St Leonards South NSW 2065 Australia

Prepared on behalf of
Aqualand St Leonard Development 3 P/L
Prepared by
INTEGRECO CONSULTING

June 2022

Prepared on behalf of
Aqualand St Leonard
Development 3 P/L

Prepared by
INTEGRECO CONSULTING PTY LTD
Project No. 222-N110

INTEGRECO CONSULTING PTY LTD
p: 1300 140 946 or 0422 144 603
e: consulting@integreco.com
po: PO Box 100 Kingsford 2032

REVISION	PREPARED	DRAWINGS
1 (05/04/2022)	MP check JP	Silvester Fuller 21.3.22
2 (07/04/2022)	MP check JP	Silvester Fuller DA 21.03.22
3 (03/05/2022)	MP check JP	Silvester Fuller DA 21.04.22
4 (04/05/2022)	MP check JP	Silvester Fuller DA 21.04.22
5 (08/06/2022)	MP check JP	Silvester Fuller DA 02.06.22
6 (14/06/2022)	MP check JP	Silvester Fuller DA 02.06.22
7 (15/06/2022)	MP check JP	Silvester Fuller DA 14.06.22

Table of Contents

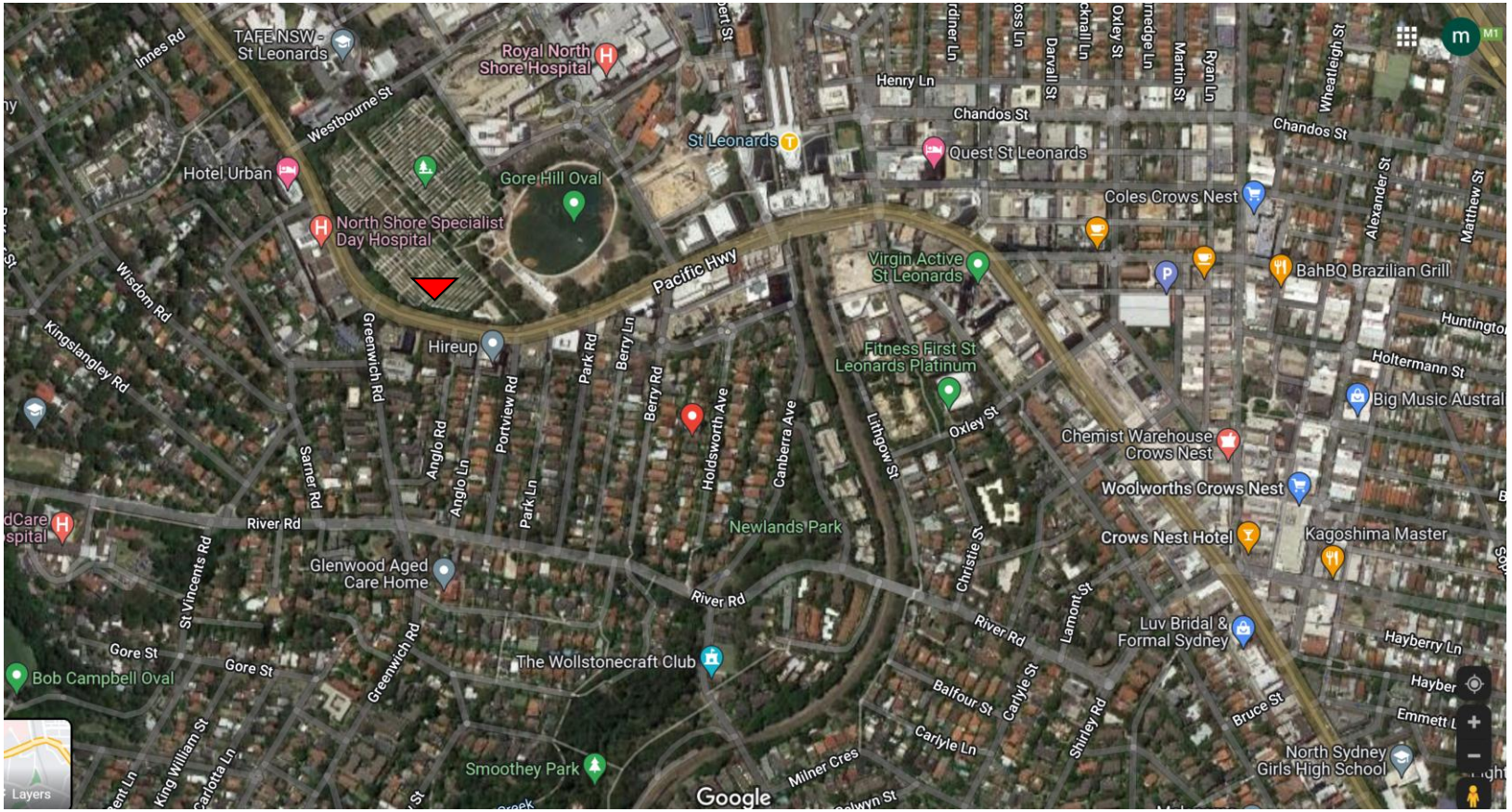
1. Introduction and Summary 4
1.1 Site Location 4
1.2 Sustainability requirements 5
1.3 Summary of ESD initiatives 8
1.4 NatHERS and Thermal Comfort 13
1.5 BASIX water and energy summary 15
1.6 Energy Aspects and EER – Energy Efficiency Report 19
2. Environmentally Sustainable Development Strategy 20
2.1 Governance 20
2.1.1 Commissioning and Tuning 20
2.1.2 Adaptation and Resilience 20
2.1.3 Building Information 21
2.1.4 Metering and Monitoring 21
2.1.5 Construction Environmental Management 21
2.1.6 Operational Waste 21
2.2 Indoor Environmental Quality 22
2.2.1 Indoor Air Quality 22

2.2.2 Acoustic Comfort 22
2.2.3 Visual Comfort 22
2.2.4 Thermal Comfort 22
2.2.5 Reducing Heat Gain 23
2.3 Energy 24
2.3.1 National Construction Code Section J for Energy Efficiency 24
2.3.2 Energy reduction strategies 25
2.4 Transport 26
2.4.1 Active Transport Facilities 26
2.4.2 Walkable Neighbourhood & Public Transport 26
2.4.3 Electric car recharging stations 29
2.5 Water 30
2.5.1 Water strategies 30
2.6 Materials 31
2.6.1 Material Selection 31
2.6.2 Waste minimisation 32
2.7 Land Use & Ecology 33
2.8 Emissions 33
2.8.1 Reduced Peak Discharge to Stormwater 33
2.8.2 Light Pollution 33
2.8.3 Solar Reflectivity 34
2.8.4 Refrigerant impacts 34
2.8.5 Heat Island Effect 35
2.9 Community 35
3. Conclusion 36
4. Appendix A – NatHERS Thermal Comfort Testing Example 37
5. Appendix B – NatHERS and BASIX Certificates 38

1. Introduction and Summary

1.1 Site Location

The site is in St Leonards, NSW, as shown below. The site address is 12-20 Berry Road & 11-19 Holdsworth Avenue, St Leonards 2065.



Site Location – BERRY HOLDSWORTH - 12-20 Berry Road & 11-19 Holdsworth Avenue, St Leonards 2065

The image below shows the context of the site and the surrounding neighborhood, on Holdsworth Ave, St Leonards.

Figure – Site Context Photo - BERRY HOLDSWORTH - 12-20 Berry Road & 11-19 Holdsworth Avenue, St Leonards 2065

1.2 Sustainability requirements

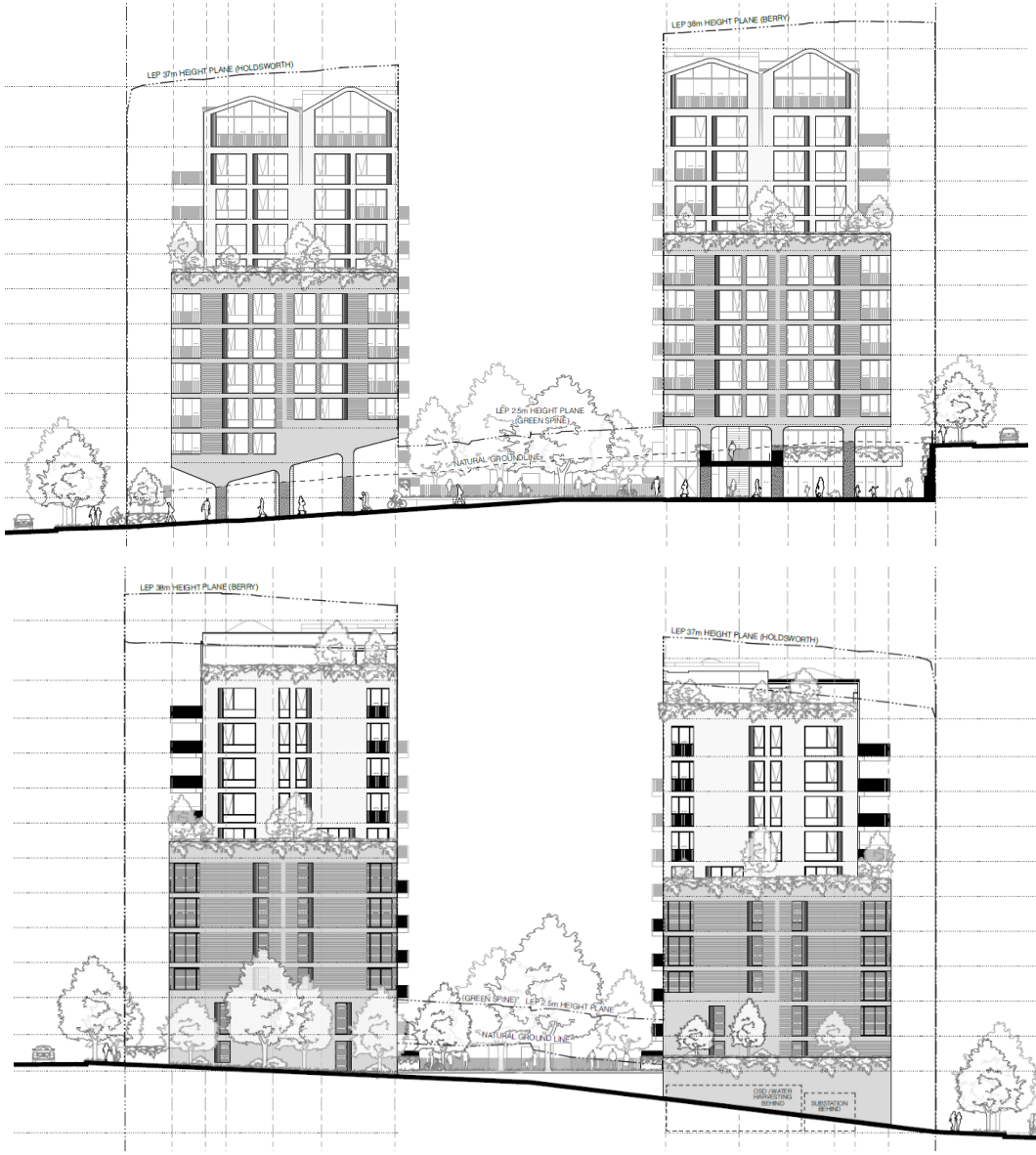
The sustainability requirements for the proposed development include the National Construction Code (NCC) Section J for Energy Efficiency. They also include the guidelines under local council DCPs and planning instruments (St Leonards South DCP, Lane Cove DCP, Lane Cove LEP 2009). The residential component of the design will comply with BASIX for water, energy and NatHERS thermal comfort.

Benchmarking and compliance requirements:
The development will satisfy the following regulatory sustainability requirements:
• NCC 2019 Section J (Energy Efficiency –NCC Section J Report)
• BASIX – Energy, Water and Thermal Comfort
• NatHERS - Minimum 6 Star NatHERS rating in compliance with St Leonards South Precinct sustainability requirements.

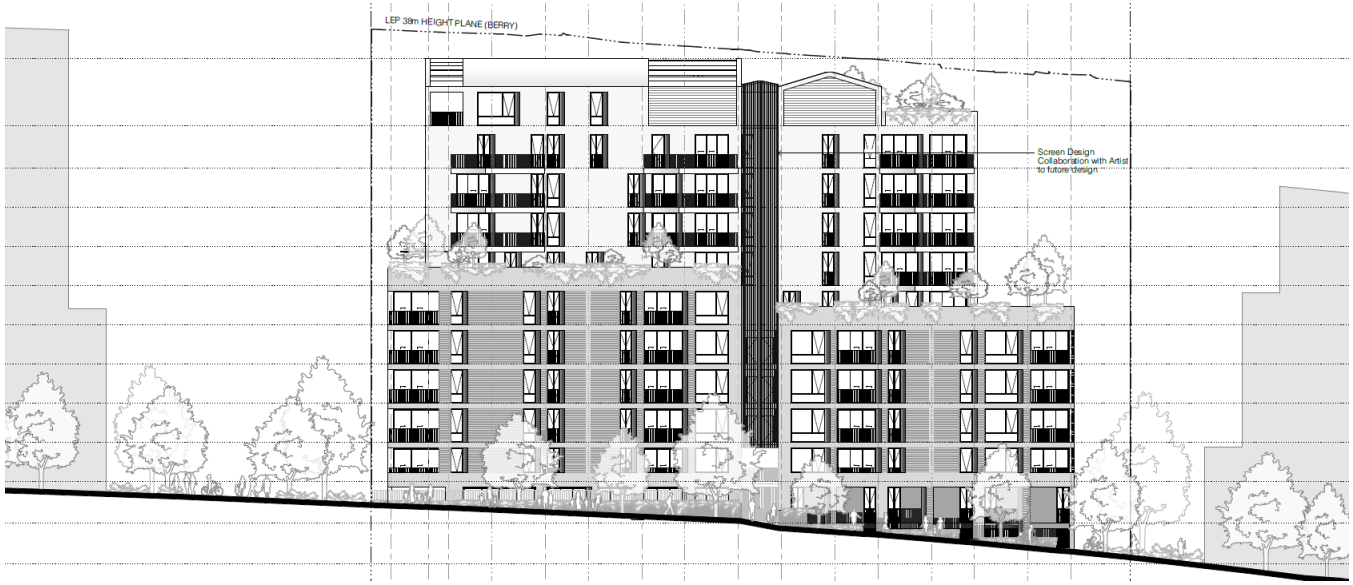
Sustainability targets beyond minimum requirements
Consideration of all sustainable design principles based on the Green Star Design & As Built Tool (by GBCA - Green Building Council of Australia).

Response to the Pre-DA Comments by the Panel - Sustainability
Satisfy all Panels questions regarding the Design Excellence and "ecologically sustainable development'' aspects.

Integreco has worked closely with the design team, to ensure compliance with regulations and also a very high level of overall energy-efficiency and environmental sustainability. Importantly, a strong emphasis was placed on the passive efficiency of the building (including passive heating, passive cooling, natural lighting and natural ventilation). The architects have done a superb job to ensure that these passive systems are working effectively, through an intelligent blend of innovative architectural design and low-energy, passive thermal techniques. For example, the use of corner units, building articulation and orientation was used to enhance natural lighting, passive heating and cross ventilation. These techniques are far too often neglected, especially in buildings with too many single-aspect dwellings. The targeted thermal comfort high-rated NatHERS results are a testament to the success of this excellent architectural design (and excellent façade design with some high-quality double glazing and performance frames).



Elevations by SILVESTER FULLER



Images by SILVESTER FULLER

1.3 Summary of ESD initiatives

Some of the main ESD targets suggested by council will be satisfied as follows:

1. An ecologically sustainable design (ESD) consultant was engaged in the design team. Integreco have suggested and tested various suitable and effective ESD initiatives. Integreco have many decades of experience and include engineers, architects and assessors.

2. Design for Climate Resilience - Design for extreme rainfall events; inclusion of landscaping and external shading strategies (and cross ventilation); materials selection (including generous thermal mass) which is cognisant of extreme heat; drought-tolerant landscaping; and buildings/spaces which can cope with extended heatwave conditions. Passive cooling processes were also used cleverly, such as thermal mass, loggias/winter gardens, conservative glass ratios, shading strategies, corner/dual-aspect design, cross-ventilation and generous glazing openings for ventilation.

3. The buildings express a strong commitment to passive design (such as optimal orientation, shading strategies, cross ventilation, thermal, mass, loggias/winter gardens and open plan living). Performance glazing is also proposed for the development (some tinted double glazing in residential and non-residential). Importantly, the intelligent use of facades, rather than ceiling fans should give an optimum summer performance, for the base building. If ceiling fans are added too, then this is just a bonus.

4. To minimise energy use, the residential buildings have many low-energy initiatives, as discussed in the BASIX section. These include: probable PV solar power; generous insulation; performance glazing; shading strategies; energy-efficient appliances; efficient light fittings; light sensors; efficient hot water; and metering systems. Likewise, the non-residential components will also have excellent glazing and façade design to comply with Section J. Generous insulation; performance glazing; shading strategies; energy-efficient HVAC; efficient light fittings; light sensors; efficient hot water; and metering systems are also proposed for the non-residential zones.

5. Waste management plans will be prepared for the construction and the operational phases. These plans will demonstrate the application of principles of the waste management hierarchy of waste: avoid use, reduction, re-use and recycling. In particular high levels of recycling of construction and demolition waste will be targeted (including over 90% of C&D waste).

6. The use of rainwater for irrigation of lawns and planting has been proposed. Furthermore, the use of reticulated, treated water-water has also been considered to accompany the rainwater strategies.

7. Sensible access to public transport, bicycle storage and possible car-sharing have been included. Electric car-charging facilities have also been proposed (with facilities to be added later). Travel information kits for residents and workers will be generated later, to assist with minimising private (petrol) motor-vehicle use and instead utilising the many other sustainable transport options provided. This will help to encourage public transport, walking, bicycles, electric vehicles and carshare schemes (over private motor vehicle use).

Images by SILVESTER FULLER

Some of the other major ESD initiatives for the development include the sustainability items listed below. These are also discussed later in the report, in more detail.

- PV solar power to be considered, with possible roof-top PV (capacity TBC, pending energy scores, whitegoods, roof space, etc)
- Generous natural lighting for apartments and most other interior spaces
- Good natural ventilation in most common zones, including natural ventilation options for most zones
- Excellent natural ventilation in most apartments (for fresh air, passive cooling and night-time flushing)
- Very efficient HVAC including variable speed fans, high efficiency chillers and occupancy sensors
- Consider centralised HVAC, pending energy scores
- High performance thermal comfort using passive heating and passive cooling (using building form, conservative glazing, sensible glass: floor ratios, shading and reveals, high-performance glazing, natural ventilation and thermal mass)
- Efficient heat pump systems for hot water
- Efficient LED lights throughout (synergised with efficiency sensors such as timers, daylight sensors and motion sensors)
- R2.5 or more added insulation to external walls
- R3.0 or more added insulation to external roofs
- High-performance glazing, such as tinting and double glazing, as required
- Operable doors and windows and suitable layouts to assist with natural ventilation
- Generous use of awning windows to assist with cross ventilation and passive cooling (not just one restricted panel per room, which is, tragically, often the case for high-rise or medium rise apartments)
- Sensible use of high-level awning windows (and/or louvers) which can provide close to 90% ventilation. The awning windows with restrictors are limited to around 10% ventilation only, which affects summer passive cooling tremendously.
- Energy-Efficient whitegoods (4 stars or better)
- Energy-Efficient fixtures, fittings, appliances
- Water-efficient fixtures and fittings (5 star taps or better, 4-star toilets and 4-star showers). This is the best rating for toilets (other than toilets with hand basins above the cisterns) and within 1 star of the best taps and showers.
- Water-efficient whitegoods (consider >4 star washing machines and >4-star dishwashers)

- Collection and use of rainwater to reduce potable water use (with 20kL or more of rainwater storage tanks)
- Recycling or reuse (closed loops) of any water required for fire testing.
- Efficient irrigation such as drip irrigation to planters and gardens
- At least 75% use by area of locally indigenous or “one-drop” water-efficient plants
- Very generous planter beds, vertical gardens, hanging gardens and roof-top planters
- Recycling of at least 90% by weight of construction waste
- Generous storage and recycling facilities for operational building waste
- The use of re-usable formwork for internal floors and core walls on site
- Incorporation of precast and sustainable concrete components (using recycled content such as fly ash)
- Manufacture of precast concrete walls in factories (or similar) using re-usable formwork.
- Low-emission paints for all internal flat and low-sheen areas.
- Water-based paints where possible, for internal, gloss or semi-gloss finished items
- Specification of sustainably sourced timber (for timber elements such as skirting boards, architraves and the like).
- BMS (building management systems for energy, water, HVAC, etc)
- Metering and monitoring strategies to ensure operational performance is achieved for water, energy and HVAC
- Motion sensors and time-based controllers (time clocks) for lighting and ventilation
- Generous electric car-charging facilities (note: provisions provided and systems to be retrofitted when needed)
- Abundant and easy access to available public transport, bike paths, bicycle parking, etc.
- Consider all of: PV on roofs, roof-top planters, planting, and light-colour materials to reduce heat island effect
- Reduced operating costs for building users (water, gas, electricity) due to the proposed initiatives for thermal comfort, water and energy

Images by SILVESTER FULLER

1.4 NatHERS and Thermal Comfort

The architects and consultant team have worked hard to achieve a moderately-glazed building with excellent daylighting, ventilation and views, as well as a NatHERS around 6 stars. Currently the design is scoring:

- Average NatHERS rating 6.1 stars
- Average cooling 18 MJ/m2.year (permitted average is 26 MJ/m2.year) – approx. 31% better than allowed target
- Average heating 33 MJ/m2.year (permitted average is 40 MJ/m2.year) – approx. 18% better than allowed target

To achieve these scores, the following materials and construction systems have been proposed:

Thermal Comfort Specifications	
External Walls – brick as shown	Brick veneer + R2.5 + Plasterboard
External Walls – brick rendered for upper volumes	Brick veneer + R2.5 + Plasterboard
External Walls - concrete	Concrete + R2.5 + Plasterboard
External Walls - next to plant	Concrete or block + R2.5 + Plasterboard
Walls next to hallways/lobbies	Hebel and plasterboard + R1.5
Walls next to stairs/lifts	Concrete or Block and plasterboard (treat like a neighbour)
Walls next to neighbour	Concrete or Hebel and plasterboard (treat like a neighbour)
Roofs penthouses (curved roofs)	Plasterboard-lined metal sheet + R5 and foil
Roofs (rooms under plant/balcony/etc)	Plasterboard-lined concrete + R3.0
Roof Colour	Medium (but light colour for curved roof)
Internal Ceilings	Plasterboard + concrete
Floor Insulation Over Basement/Plant	≥ R1.5 subfloor, units above basement/plant
Floor Insulation for Cantilevers	≥ R1.5 subfloor, rooms above open-air

Floor Finishes	Generic as shown: Tiles wet areas & timber elsewhere
Windows – all but problem units (see list)	Windows – Single-glazed and clear
Windows all but list - U-value	≤ 6.7 for awning/bifold, ≤ 6.7 for fixed/sliders
Windows all but list - SHGC	0.57 ± 5% awning/bifold, 0.70 ± 5% fixed/sliders
Windows Double-glazed (see list at bottom of page)	Windows – Double glazed (clear or light tint)
Windows (problem unit list) - U-value	≤ 3.2 for awning/bifold, ≤ 3.1 for fixed/sliders
Windows (problem unit list) - SHGC	0.46 ± 5% awning/bifold, 0.49 ± 5% fixed/sliders
Skylights U-value	≤ 2.7 - tinted double glazing
Skylights SHGC	0.24 ± 5% - tinted double glazing
Window Shading	Shading as per elevations & plans (screens/devices with fixed blades)
Loggias	Modelled as balconies since they are unenclosed
Ceiling fans	Not included
Exhaust Fans	All exhaust with dampers, etc to stop infiltration when off
Exhaust Fans and Insulation	Fans in all unit wet areas (assumed generic penetrations for insulation)
Light fittings and Insulation	Downlights are all LEDs (assumed generic penetrations for insulation)
Weather Stripping	All external doors and windows

UNIT	REQUIRED PERF. GLAZING	UNIT	REQUIRED PERF. GLAZING	UNIT	REQUIRED PERF. GLAZING
b0204 to 0304	Double-glaze living slider+fixed window	b0602 to 0902	Double-glaze living/dining	h0304	Double-glaze living slider+fixed window+hinge door
b0205 to 0405	Double-glaze living slider+fixed window	b0603	Double-glaze sliders	h0401	Double-glaze living south
b0402	Double-glaze living south	b0903	Double-glaze all living	h0501 to 0801	Double-glaze living
b0403	Double-glaze living south	h0102 to 0302	Double-glaze living south	h0502 to 0802	Double-glaze living south
b0404	Double-glaze living slider+fixed window+hinge door	h0103 to 0303	Double-glaze living south	hCL03 to CL05	Double-glaze living zones
b0501	Double-glaze living south	h0104 to 0204	Double-glaze living slider+fixed window	hUG01	Double-glaze living south
b0601 to 0901	Double-glaze all living	h0105 to 0305	Double-glaze living slider+fixed window	Hug02 to UG03	Double-glaze living slider+fixed window

1.5 BASIX water and energy summary

In summary, the BASIX scores scored >40/40 for water and >25/25 for energy. To achieve these scores, the following initiatives were proposed and tested:

BASIX WATER ITEM	PROPOSED FOR "BASE RUN"
Rainwater Tank	20 kL total
Rainwater Tank collection	Non-trafficable roofs (>500m2 at least to feed tanks)
Rainwater Tank use	Rainwater for irrigation + car wash bays
Stormwater Tank	None
Blackwater/Greywater reuse	None
Other reticulated water reuse	Possible for future (but not available now)
Fire Sprinklers	Basement + Buildings (2 systems)
Fire Sprinkler Test Water (2 systems)	Fire test water reused in closed loops
Showers	4 stars ≤ 7.5 L/min (mid-efficiency option in BASIX)
Toilets	≥ 4 stars
Kitchen Taps	≥ 5 stars
Bathroom Taps	≥ 5 stars
On demand hot recirculation	No
Clothes washers	Not supplied
Dishwashers	5 stars WELS
Planting & lawn (respectively)	See BASIX certificate for areas: 2,699 m2 plants + 43 m2 lawn
Planting – low water species	≥75% plants (not lawn) are locally indig. or 1-drop = 2,024 m2
Pools and Spas	1 x residential pool <60 kL
Pools details	Pump with timer + solar heating only + optional pool cover

BASIX ENERGY ITEM	PROPOSED FOR ''BASE RUN''
Heating for Units - central	VRV, electric compressor, air-cooled, medium COP 3.5 to 5.5
Cooling for Units - central	VRV, electric compressor, air-cooled, medium COP 3.5 to 5.5
AC zoning (day/night option)	Used for 1,2,3 bed units (but not 4 bed units)
Bathroom Exhaust	Fan to façade/roof – manual on/off
Laundry Exhaust	Fan to façade/roof – manual on/off
Kitchen Exhaust	Fan to façade/roof – manual on/off
Lighting for Apartments – all rooms	LEDs ≥80% fittings in all unit rooms (dedicated)
Vented fridge-spaces	No (needs ≥ 1 side or top totally open)
Cooking	Induction cooktop & electric oven
Fridges	Not supplied
Clothes washers	Not supplied
Dishwashers	4 stars
Dryers	8-star heat pump dryers all units
PV Solar Power	TBC (not needed to pass)
Lifts	VVVF gearless traction
BMS – Building Management Syst.	Yes
PFC – Power Factor Correction	None
Common washing/drying	None
Clothes lines private	No retractable clotheslines (on balconies/internal)
Hot Water	Heat-pump hot water
Hot Water Piping insulation inside	R1.0 to ringmains and supply risers
Hot Water Piping insulation outside	R1.0 to ringmains and supply risers
Car Park Ventilation	Mech supply/exhaust - with VSD fans and CO monitors
Loading Dock Ventilation	Mech supply/exhaust - with VSD fans and CO monitors
Switch Room Ventilation	Mech supply – continuous (with thermo-sensors)

Substation Room Ventilation	Mech supply - continuous (with thermo-sensors)
Hall/Lobby Ventilation	Mech supply – time clock or BMS
Storage Room Ventilation	Mech supply – time clock or BMS
Plant Room Enclosed Ventilation	Mech supply – link to lights
Plant Room Towers Ventilation	Natural vent
Fan Room Ventilation	Natural vent
Concierge Ventilation	AC with BMS or timer
Community Room Ventilation	AC with BMS or timer
Toilet rooms Ventilation	Mech exhaust - timers
Garbage rooms Ventilation	Mech exhaust - continuous
Lift lights	LEDs (connected to call-button)
Car Park Lights	LEDs, motion sensor + zoning
Basement Lights	LEDs, motion sensor + zoning
Lobbies Lights	LEDs, daylight sensor + zoning
Corridors Lights	LEDs, motion sensor + zoning
Community room Lights	LEDs, motion sensor + zoning
Switch rooms Lights	LEDs, motion sensor
Substation rooms Lights	LEDs, motion sensor
Garbage Rooms Lights	LEDs, motion sensor
Plant rooms Lights	LEDs, motion sensor
Pump rooms Lights	LEDs, motion sensor
Fan rooms Lights	LEDs, motion sensor
Storage room Lights	LEDs, motion sensor
Concierge offices Lights	LEDs, manual on and off

Plan (Upper Ground)
by SILVESTER FULLER

1.6 Energy Aspects and EER – Energy Efficiency Report

The mechanisms for energy assessment will be Section J (for Child Care portions) and BASIX (for residential and common areas). The energy strategies below were implemented. Some of these items were listed previously in this BASIX report.

Greenhouse-gas reduction and energy-efficiency initiatives include:

- Development has achieved the BASIX Energy Score of 25 (5+ stories).
- Project targeting an average 6.1-star NatHERS rating across the development. This target is above the minimum required to pass BASIX and this contributed towards the energy performance.
- Average cooling load of 18 MJ/m2.year (permitted average is 26 MJ/m2.year) – approx. 31% better than allowed target
- Average heating load of 33 MJ/m2.year (permitted average is 40 MJ/m2.year) – approx. 18% better than allowed target
- PV solar power to be considered for common lighting or other uses
- Lighting throughout the development will use LED technologies throughout (in addition to motion sensors, daylight sensors, etc)
- A building manager will be utilised to undertake a building monitoring, testing and in-house commissioning, upon completion.
- Unit design included effective cross-ventilation, generous insulation, operable glazing and suitable shading strategies. In particular, the corner dwellings, the dual aspect dwellings, the thermal mass and the large openings (awning/sliders) all helped the passive cooling and heating.
- Materials selected (especially concrete) provide thermal mass to control internal temperatures in winter and summer.
- Glazing was carefully tested and chosen to reduce heat loss in winter and maximise passive cooling in summer. Indeed, high-performance glazing is proposed for the development, including tinted double-glazing for some apartments and non-residential zones.
- External walls, floors and roofs/ceilings will contain high efficiency insulation to help reduce reliance on mechanical heating and cooling.

2. Environmentally Sustainable Development Strategy

The project will be designed according to the best practice principles of "Ecologically Sustainable Development" (ESD). This report describes the initiatives relating to governance, indoor environmental quality, energy, water, transport, emissions, ecology, materials and community.

2.1 Governance

The proposed development will establish and maintain strong governance practices. These, in turn, will promote engagement, transparency and resilience to the conditions of a changing climate.

Good environmental management practices will be adopted, including enhanced commissioning, ongoing tuning and the production of building-user information. Best practice construction environmental management processes will also be implemented. Furthermore, waste diversion from landfill will be targeted, through intensive recycling of construction and operational waste, wherever possible. Metering and monitoring strategies will also ensure operational performance can be tracked and optimised, for water, energy and HVAC.

2.1.1 Commissioning and Tuning

Relevant subcontractors will undertake detailed commissioning and building tuning for all major systems in the building. These systems will relate to water, energy and HVAC.

2.1.2 Adaptation and Resilience

Climate change adaptation and resilience have been considered in detail. This "future-proofing" will enable the building to adapt to future climate change challenges and future extreme weather events (with the intention of minimising both risk and disruption to the occupants and the community). The excellent NatHERS and section J results will help energy performance and provide superb passive comfort. Likewise, the generous and innovative gardens will help to minimise heat-island effects.

2.1.3 Building Information

Building operation and maintenance information will be provided for all building systems. Furthermore, this information will be used to educate building occupants and visitors on the sustainability features of the buildings and how to use these features effectively, in order to reduce potential environmental impacts.

2.1.4 Metering and Monitoring

A metering and monitoring strategy will be implemented to track energy and water use. This system will also monitor progress against performance targets and assist with the identification of leaks, faults or excessive consumption. Sub-metering will be provided for all major energy and water uses, supplying data to the Building Management System (BMS). Energy sub-metering will be provided for significant end users. Likewise, water sub-metering will be provided for major water uses such as sprinklers, cooling towers and amenities.

2.1.5 Construction Environmental Management

A Construction Environmental Management Plan (CEMP) will be developed and implemented by the head contractor. This CEMP will assist in managing environmental performance, conditions, and impacts arising from excavation, demolition and construction of the proposed building. The CEMP will be developed in future stages, by the appointed construction team.

2.1.6 Operational Waste

Facilities will be provided for the collection, storage and separation of distinct waste streams for collection by the relevant waste contractors. A Waste Management Plan (WMP) will be provided for building operations. In addition to this, strategies such as well-located recycling facilities (for the childcare portion) will be incorporated, to increase the ease of recycling for building users.

2.2 Indoor Environmental Quality

Indoor Environmental Quality (IEQ) will be improved through consideration of indoor air quality, acoustic conditions, thermal comfort, visual comfort, daylighting and external views. The various IEQ strategies are outlined in more detail below.

2.2.1 Indoor Air Quality

The ventilation system for the building will be designed to comply with ASHRAE Standard 62.1 :2013 in regard to minimum separation distances between pollution sources and outdoor air intakes. Ductwork will also be protected during construction to ensure that it remains free of moisture and debris prior to occupation.

Preference will be given to paints, adhesives, sealants, floor coverings and engineered wood products with low Volatile Organic Compound (VOC) emissions and low formaldehyde emissions. This will help to minimise indoor air contamination and to promote occupant health. For products with potential VOC emissions, priority will be given to Super E0, E0 and/or E1 products, where possible, since these have significantly lower emissions than products with E2 ratings and above.

2.2.2 Acoustic Comfort

The design will consider acoustic comfort in detail, in regard to general noise levels, reverberation and noise separation.

2.2.3 Visual Comfort

Glare control mechanisms such as internal blinds and shading strategies will assist to maximise visual comfort for the occupants. The design has also carefully considered the availability of daylight and external views. Furthermore, artificial lighting has been developed for this development to consider appropriate colour perception and lighting levels, reduced glare from lamps and uniformity.

2.2.4 Thermal Comfort

Very high-performance glazing, along with some external shading features, will be utilised intelligently to improve thermal comfort for all the occupants. Indeed, passive heating, passive cooling and natural ventilation have been carefully considered. To balance daylighting and views with thermal comfort, various performance-glazing products have been proposed (such as the generous use of tinted double-glazing). The final glazing specifications will be based on the detailed "Section J Energy Efficiency Analysis" to ensure that the correct glass is specified for each orientation.

It is also recognised that the Section J DTS approach is quite limited in its acknowledgment of overshadowing from neighbouring buildings and trees. Therefore, the JV3 approach was used to ensure a balance will be made to ensure good thermal comfort, minimal glare and external views.

For example, if the DTS requests dark tinting for overshadowed windows (since that could make rooms unnecessarily dark and less effective with passive heating in winter) then the lightest tint would be selected to still pass the targets.

2.2.5 Reducing Heat Gain

Façade design, window performance and summer heat gain were some of the main issues, from an energy, NatHERS and Section J point of view.

The architects and engineers have done rigorous testing to ensure that the glass (and frame) selections will be performing well, from an energy-use and passive-thermal-comfort perspective. With excellent, low U-values and low SHGCs, the moderately -glazed facades can work efficiently, even in residential and childcare applications. The NatHERS and Design Builder energy tests have indicated massive heat-gain reductions from the refined façade designs (approx. 30% reduction in heat gain compared to standard single glazing and aluminium frames, without reveals).

As part of the façade refinement, the design team have used a variety of main strategies to improve summer performance (and reduce unwanted heat-gain during the warmer months of the year):

- Medium/Dark tinting for most zones, including residential
- Double-glazing and low U-values (for some windows) which reduce the convection and conduction of heat
- Shading strategies (overhangs, reveals, balconies, loggias, wintergardens, etc) in some locations
- Efficient window frames (which are contributing to the excellent U-values)
- Minimal window-frame areas (due to the specific window types and also the curtain wall glazing) and this means much less convection/conduction of heat through the weakest link of the windows: the window frames
- Corner and dual aspect designs for cross ventilation and nigh-time flushing (when combined with sensible window openings)

2.3 Energy

The design will seek to reduce energy consumption and greenhouse gas (GHG) emissions, by combining a well-designed building envelope and high-efficiency systems and services. Furthermore, smart controls and BMS will ensure that the major building services only operate when needed. Passive design principles have also been integrated (as discussed above) to reduce the demand on active systems such as HVAC and artificial lighting.

2.3.1 National Construction Code Section J for Energy Efficiency

The NCC's Section J (National Construction Code) determines the minimum energy performance requirements for all new developments in Australia. The proposed design will meet all the NCC's Section J energy efficiency requirements. A detailed Section J summary report will also be prepared to demonstrate the design strategies to comply with NCC 2019 Section J under a DTS assessment approach.

The DTS Section J analysis will test the performance of the building façade. The detailed Section J report, using the targets from the DTS approach (Deemed-To-Satisfy) will have initiatives for each of the following energy categories:

- Part J0 Energy efficiency
- Part J1 Building fabric
- Part J2 * * * * *
- Part J3 Building sealing
- Part J4 * * * * *
- Part J5 Air-conditioning and ventilation systems
- Part J6 Artificial lighting and power
- Part J7 Heated water supply and swimming pool and spa pool plant
- Part J8 Facilities for energy monitoring

Importantly, the "conditioned" zones will include the apartments, lobbies, and childcare zones (but not back-of-house zones such as plant rooms or fire stairs). Even if air-conditioning is not proposed for some lobbies or some childcare zones, these "habitable" zones will still be classified as "conditioned", for the purpose of the DTS and JV3 analysis. This will ensure that all those high-importance areas have an excellent level of passive thermal comfort.

2.3.2 Energy reduction strategies

The following strategies will be investigated to improve energy efficiency:

- Use of renewable energy sources such as probable PV solar power (rooftops)
- Low carbon hot-water systems (solar or heat pumps). Solar hot water was considered but PV is preferred as a better and more flexible use of roof space.
- Efficient heating, ventilation and cooling (HVAC) systems including:
  - High efficiency chillers
  - Variable speed pumps & fans
  - BMS to monitor and control building systems
  - Childcare ventilation to include efficiency controls such as zoning and occupancy sensors
  - Common area ventilation to include efficiency controls such as zoning, motion sensors and time clock controls
  - Carbon Monoxide sensors and variable VSD fans in basement levels
- Passive systems such as passive heating, passive cooling and natural ventilation, in select areas (through the intelligent use and positioning of thermal mass, window openings, glazing, shading strategies, heat stack effect, etc).
- Efficient lighting, sensors and efficiency controls (with mainly LED lights). This includes internal, external and public domain lighting.

- Some areas with shut-off switches for lights and non-essential power to be turned off when unoccupied.
- Appliances and whitegoods (where installed) will have good energy efficiency ratings.
- Efficient taps, showers and water-consuming whitegoods, which will hence reduce the hot water use, per capita.
- Minimised infiltration through weather stripping for doors and windows, dampers for exhaust fans and compliance with Section J.

Most of the above-mentioned strategies will also contribute to reducing peak electrical demand from the development. This factor is very important when it comes to reducing the stress on the surrounding energy networks and infrastructure.

2.4 Transport

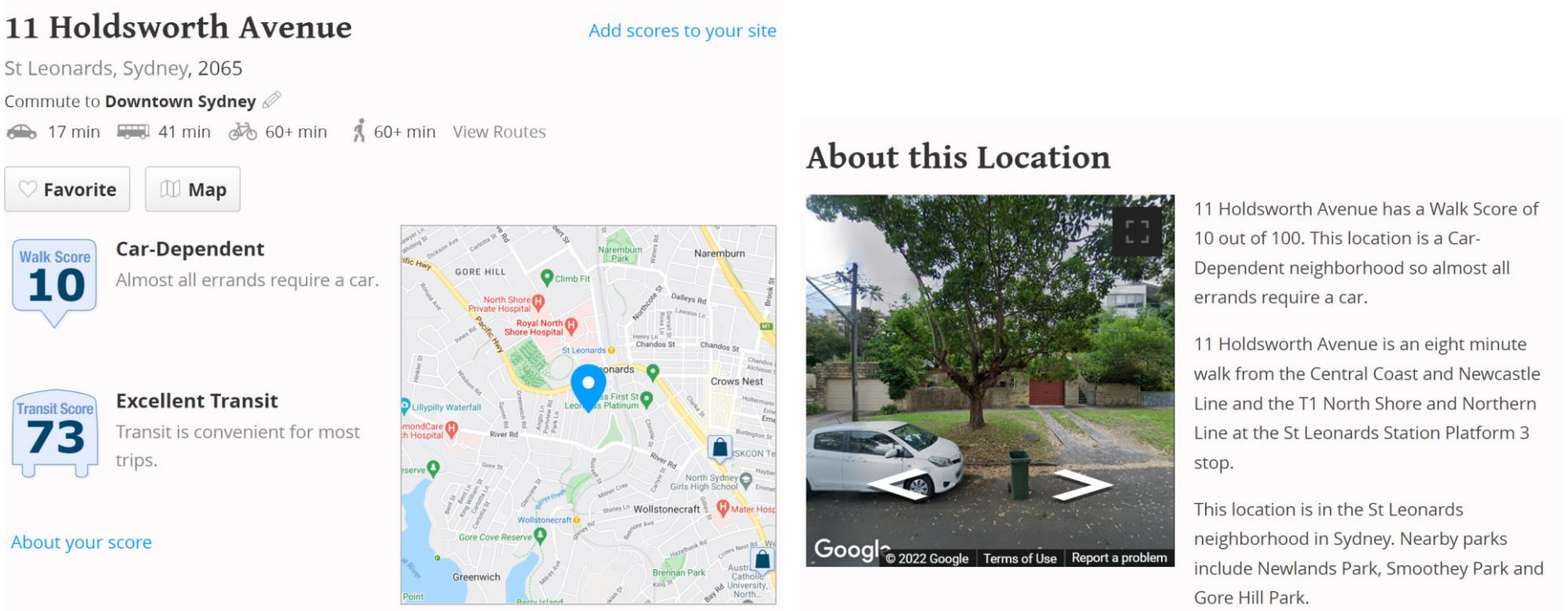
The following alternative transport initiatives are being proposed to improve amenity, to promote occupant health and to reduce transport related GHG emissions:

2.4.1 Active Transport Facilities

Secured bicycle parking and associated facilities has been proposed for patrons and visitors. The location of the site to excellent cycling and bike pathways will be encouraged and promoted for all building users and tenants.

2.4.2 Walkable Neighbourhood & Public Transport

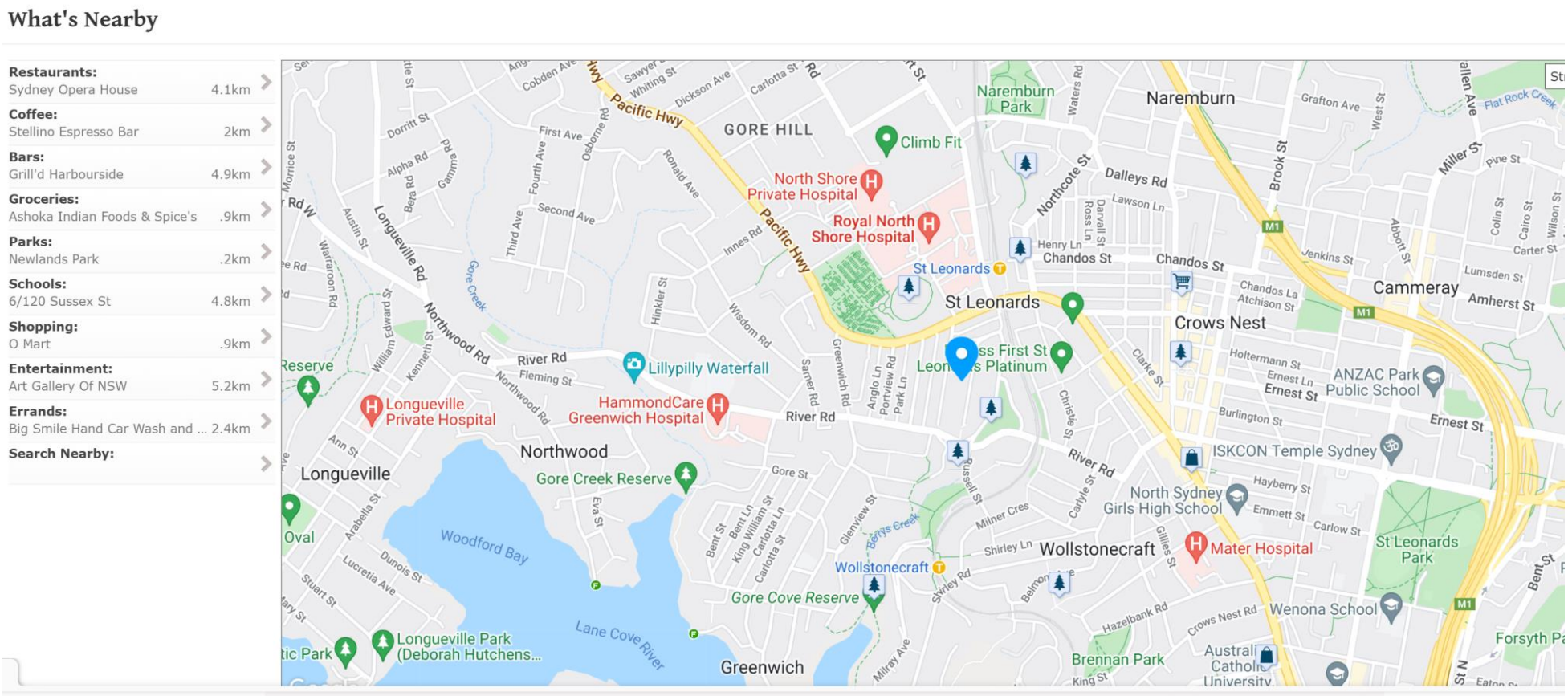
The site is located close to numerous amenities, with a ‘walk score’ of 10% (see below). A score above 90% is considered to be ‘’very walkable’’ so this shows that the site is not extremely convenient for pedestrians. However, a transit score of 73% is very good, due to excellent bus and train services in close proximity.



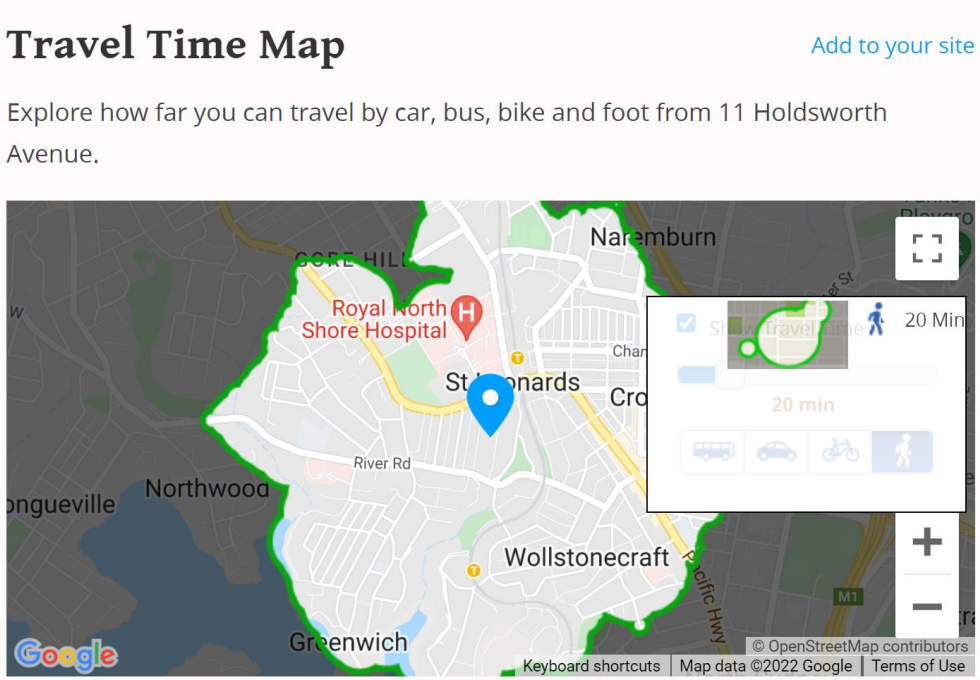
Nevertheless, the project has been designed to optimise connectivity and pedestrian links within the site itself for "enhanced walkability". This will allow access to the numerous features within the site itself. The corner aspect of the site has been taken advantage of and there are now two very vibrant and easily accessed entrance zones to the building (one zone on the north and one on the east).

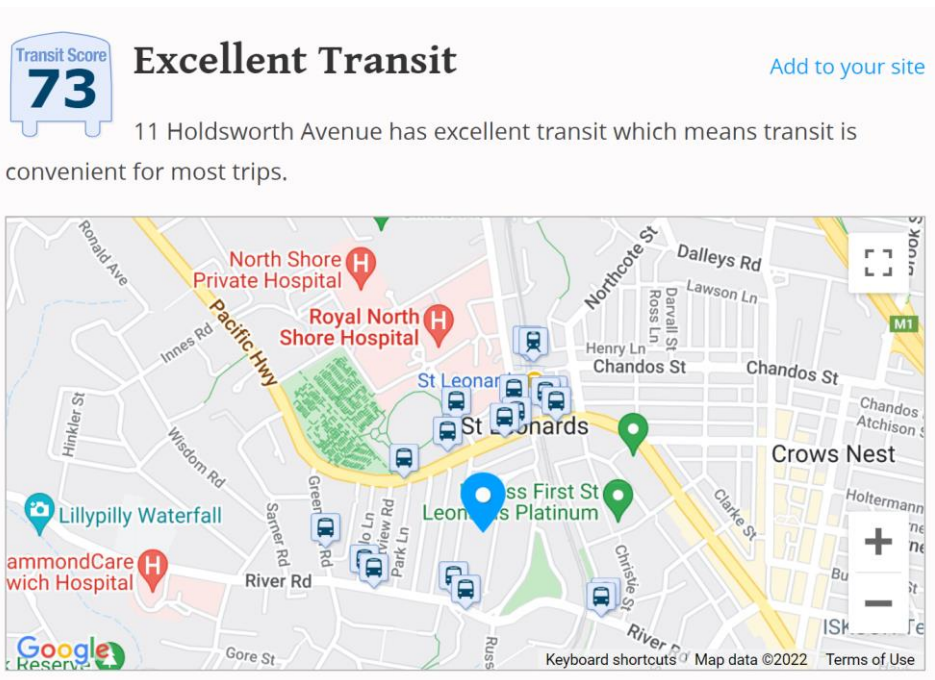
The convenience, aesthetics and safety of the entrance zones have been carefully considered to encourage the building users to walk to places around the site, rather than driving cars.

The map below from Walk Score shows nearby amenities and these were used to calculate the ‘’walk scores’’.



The images below show nearby transport amenities and walking proximities and these were also used to calculate the ‘’walk scores’’.





2.4.3 Electric car recharging stations

To encourage the use of sustainable motor-vehicle transport, electric car charging facilities will be provided within the development. Charging provisions for charging bays will be included, however no actual units will be fitted. These will be easily retrofitted by residents later, if and when they are required. The importance of electric cars cannot be underestimated for mixed-use developments and they will form part of the overall transport strategy (in addition to public transport, bike storage, possible car-sharing, etc).

Travel information kits for residents and workers will be generated later, to assist with minimising private (petrol) motor-vehicle use and instead utilising the many other sustainable transport options provided. This will help to encourage public transport, walking, bicycles, electric vehicles and carshare schemes (over private motor vehicle use).

2.5 Water

Potable water consumption will be minimised for the project by selecting very water-efficient fittings, fixtures and appliances. As a general rule, products will be selected within 1 star of the top star rating (where possible, using the WELS website). For example, toilets can be awarded up to 5 stars, so the architects will try to select products with 4-star ratings or better. Importantly, the top ratings can be very difficult from a cost, availability and/or functional perspective. For example, a 5-star toilet requires a basin above the toilet cistern and this will not suit most designs.

2.5.1 Water strategies

The following strategies will be used to reduce potable water consumptions. These initiatives may change slightly as detailed design is developed.

- Water efficient fittings, fixtures and appliances
- Rainwater harvesting and re-use on the site (20kL of storage for irrigation/water features)
- Recycling or reuse (closed loops) of any water required for fire testing.
- Efficient irrigation such as drip irrigation to planters and gardens
- At least 75% use by area of locally indigenous or “one-drop” water-efficient plants
- Generous deep-soil allocation
- Generous garden areas, planter beds, vertical gardens and roof-top planters

2.6 Materials

2.6.1 Material Selection

Materials used in the building industry are responsible for significant waste generation, resource depletion, GHG emissions and water consumption. To minimise these environmental impacts, the following principles will be considered for material selection on the site:

- Portland cement reduction in concrete mixes by using industrial waste product such as fly ash
- Use of reclaimed water in cement mixes
- Use of manufactured sand in cement mixes
- Selection of responsible steel products sourced from accredited steel makers and fabricators
- Selection of certified timbers, especially those with FSC-certification
- Selection of Best Practice Certified PVC products (or avoidance of PVC)
- Design major building components for longevity, adaptation, disassembly, re-use and recycling
- Local procurement to support the local economy and reduce transport emissions
- Design for robustness - review the design and materials for durability (high-traffic surfaces and high-use fittings).
- Specification of sustainable products, such as those with recycled content or potential for recycling
- Specification of products with third-party certifications (e.g., GECA or GreenTag) or those with EPDs

2.6.2 Waste minimisation

A Waste Minimisation Plan will be prepared by outlining best practice waste management during the design, construction and operation of the project. The proposed waste strategy will:

- Establish waste targets (including minimum construction and demolition waste recycling targets).
- 'Design out' waste: Reduce the amount of materials used in the construction processes, wherever practical
- Implement best practice construction waste management plans and engage with the supply chain.
- Provide infrastructure and clear guidance (for the building users) to maximise waste recycling during operation.
- Recycling will also feature comprehensive recycling

The Contractor will develop a Construction Waste Management Plan (CWMP) which will:

- Recycle at least 90% by weight of construction waste
- Define responsibilities and actions to prevent, reduce and recover waste
- Identify the waste arising from construction and detail waste reuse and recycling routes
- Record waste movements and quantities during construction and benchmark the results against best practice targets

2.7 Land Use & Ecology

The project will enhance existing ecological value by reusing a previously developed site. Consequently, the objective of the landscaping and ecology strategies will be to restore the ecological value of the site and use locally indigenous species (or 1-drop species) around the site (at least 75% of the planting area). This will help to reduce water consumption and also to help biodiversity and the restoration of native flora and fauna in the area.

2.8 Emissions

Emissions to water, soil and the sky will be minimised during construction and operation.

2.8.1 Reduced Peak Discharge to Stormwater

The post-development peak event stormwater discharge from the site will not exceed the pre-development peak event stormwater discharge.

All stormwater discharged from the site will meet pollution reduction targets for total suspended solids, gross pollutants, total nitrogen, total phosphorus, petroleum hydrocarbons and free oils.

2.8.2 Light Pollution

Outdoor lighting on the project will generally be designed in accordance with AS 4282:1997 and external light pollution will be minimised. The reduction in light pollution will alleviate the risk of impacts on neighbours and wildlife.

2.8.3 Solar Reflectivity

Glass surfaces (and some other cladding materials) can be highly reflective. Various measures will be used to negate this effect and, in particular, low-reflectivity glass will be used, in accordance with council requirements.

The main issues with reflectivity will typically occur at the lower levels, since this is where motorists, pedestrians and public transport operators will be focusing their gaze. This zone of peripheral vision is extremely important for solar reflectance, especially for motorists and train/bus drivers.

Overall, a reflectivity target of 20% is typically adequate to prevent negative issues with solar reflectance. Many councils in Sydney stipulate that the reflectivity index permitted for external glazed elements should not exceed that 20% value.

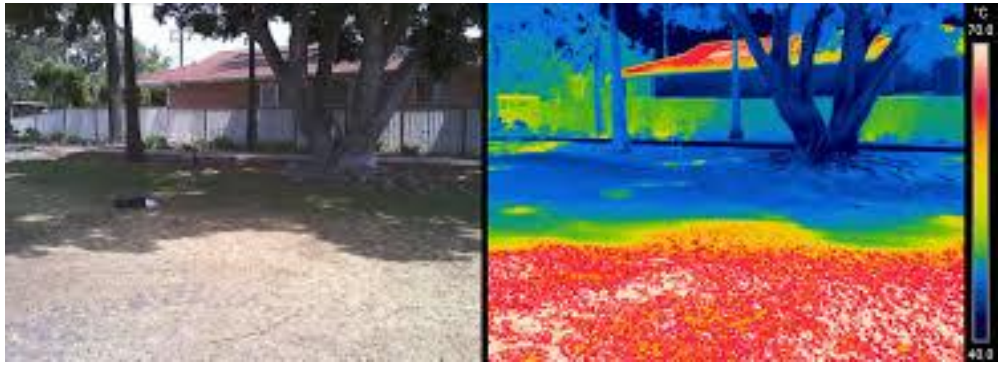
At the higher levels it tends to be other, nearby buildings (or pedestrians) which can be most affected. This is why the 20% target can be targeted, rather a than tougher targets which may apply next to train lines and/or near busy roads. Those particular situations must avoid highly reflective glazing, for obvious safety reasons, and may therefore incur much lower targets, often in the range of 5-8% solar reflectivity.

2.8.4 Refrigerant impacts

Refrigerants will be selected with an Ozone Depletion Potential (ODP) of zero.

2.8.5 Heat Island Effect

Generous roofs terraces, planting, pools and lighter coloured pavements/roofs will all be incorporated intelligently, in order to reduce heat island effect. This is all part of the "future-proofing" strategy which will enable the building to adapt to future climate change challenges and future extreme weather events. The excellent NatHERS and section J results are a testament to the overall energy performance and superb passive comfort (partly through efficient facades and minimal heat-island effects). The generous and innovative gardens will be critical to minimise heat-island effects and the architects have innovatively incorporated these at multiple levels and locations.



2.9 Community

The project will be designed to maximise community benefit. In particular, it will encourage active lifestyles, maintain good pedestrian and cyclist linkages and facilitate ample, safe social interaction. The project will also be designed to minimise other undesirable impacts on the community such as glare and light pollution.

The following strategies will be considered:

- Marketing and education strategies to convey the numerous sustainability practices to wider audiences
- Ensuring that the design and the building materials do not lead to hazardous, undesirable or uncomfortable glare to pedestrians, motorists or occupants of surrounding buildings
- Minimise light spill to the sky.
- Promotion of healthy and active living through various design and education strategies (for example, with cycling storage and facilities)
- Incorporation of crime prevention through environmental design (CPTED)

3. Conclusion

The numerous initiatives outlined in this report demonstrate how the proposed development will incorporate best practice ESD initiatives into its design, construction and ongoing operation. Through a combination of energy, water and other ESD strategies, the project will indeed exceed the minimum requirements for sustainable development.

It is acknowledged that some strategies will need further refinement, during the latter stages of design. Strategies to be explored and refined in the future design stages include:

- Energy-efficient building fabric and services to deliver optimal energy savings
- Energy-efficient windows (glazing and window frames) designed to maximise passive heating and cooling, while also maintaining abundant natural daylighting and access to views
- Careful lighting design (further refinement for both energy efficiency and "indoor environment quality")
- Selection of non-toxic materials, finishes, adhesives and products to improve Indoor Environmental Quality (IEQ)
- Water-efficient fittings, fixtures, whitegoods and appliances
- Water-reuse balance, with an intelligent synergy between the reuse strategies for rainwater and/or reticulated, treated wastewater
- Active transport facilities to encourage healthier living while reducing carbon emissions from transport
- Selective procurement of materials used in construction in terms of environmental and social impact
- Management and governance procedures (which will improve sustainability outcomes during operation).

As detailed earlier, the project will be designed under the guidance of the City of Canada Bay’s Planning Controls (LEP & DCP) well as the NCC's Section J Energy Efficiency targets. Furthermore, the energy testing and calculations suggest that the building will perform very well in relation to energy demands and greenhouse gas emissions.

4. Appendix A – NatHERS Thermal Comfort Testing Example

	Run details for Unit B.08.04 (one of the worst in summer)	Cooling MJ/m2.yr (29.5 target)	Heating MJ/m2.yr (45.4 target)	Star Rating (out of 10 stars)	Cooling Improvement %	Heating Improvement %
1	Base Run	29.4	7.6	7.1	-	-
2	Base + low-E clear	26.6	4.8	7.6	9.5%	36.8%
3	Base + low-E tinted	23.7	6.8	7.7	19.4%	10.5%
4	Base + IGU clear	24.7	2.3	7.9	16.0%	69.7%
5	Base + IGU tinted	21.4	4.2	8	27.2%	44.7%
6	Base + IGU clear (high-end)	23.3	0.9	8.2	20.7%	88.2%
7	Base + IGU tinted (high-end)	16.9	2.5	8.6	42.5%	67.1%
8	Base + shade fixed 50% opaque	21.1	13.6	7.3	28.2%	-78.9%
9	Base + shade adjustable	15	8.6	8.2	49.0%	-13.2%
10	Base + fans bedrooms	26.5	7.6	7.3	9.9%	0.0%
11	Base + fan in living	23.2	7.6	7.6	21.1%	0.0%
12	Base + fans living/beds	20.1	7.6	7.9	31.6%	0.0%
13	Base + tiles in living/dining	27.6	6.2	7.4	6.1%	18.4%
14	Base + glass louvers all	13	10	8.2	55.8%	-31.6%
15	Base + 2x opening size (less fixed)	21.9	8.6	7.6	25.5%	-13.2%
16	Base + reveal concrete ceiling	28.9	6.2	7.3	1.7%	18.4%
17	Base + R1.5 in ceiling spaces	29.1	2.5	7.5	1.0%	67.1%
18	Base + brick all internal wall	28	5.4	7.4	4.8%	28.9%
19	Base + brick all party walls	27.8	6	7.4	5.4%	21.1%

Note: Base run includes R2.5 to external walls, R1.5 to halls and standard clear, single-glazing. This passes BASIX targets and scores 7.1 stars.
Observation: Please note that shading devices can add 1.1 stars, if they are adjustable. The arbitrary items selected above can add 1.9 stars and take it to 9 stars. Double glazing, by itself, can add 1.5 stars (and even more, if the very best products are used with U-values <3).

5. Appendix B – NatHERS and BASIX Certificates

BASIX® Certificate

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

Multi Dwelling

Certificate number: 1296858M

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

Secretary
Date of issue: Wednesday, 15 June 2022
To be valid, this certificate must be lodged within 3 months of the date of issue.

NSW GOVERNMENT | Planning, Industry & Environment

Project summary	
Project name	12-20 Berry Road & 11-19 Holdsworth Avenue
Street address	11-19 Holdsworth Avenue St Leonards South 2065
Local Government Area	Lane Cove Municipal Council
Plan type and plan number	deposited 7259
Lot no.	10
Section no.	-
No. of residential flat buildings	1
No. of units in residential flat buildings	130
No. of multi-dwelling houses	0
No. of single dwelling houses	0

Project score		
Water	✔ 41	Target 40
Thermal Comfort	✔ Pass	Target Pass
Energy	✔ 25	Target 25

Certificate Prepared by
Name / Company Name: Integreco Consulting Pty Ltd
ABN (if applicable): 42630013008

Description of project

Project address	
Project name	12-20 Berry Road & 11-19 Holdsworth Avenue
Street address	11-19 Holdsworth Avenue St Leonards South 2065
Local Government Area	Lane Cove Municipal Council
Plan type and plan number	deposited 7259
Lot no.	10
Section no.	-

Project type	
No. of residential flat buildings	1
No. of units in residential flat buildings	130
No. of multi-dwelling houses	0
No. of single dwelling houses	0

Site details	
Site area (m²)	5015
Roof area (m²)	1051
Non-residential floor area (m²)	451.0
Residential car spaces	161
Non-residential car spaces	19

Common area landscape	
Common area lawn (m²)	43.0
Common area garden (m²)	2699.0
Area of indigenous or low water use species (m²)	2024.0

Assessor details	
Assessor number	DMN/19/1921
Certificate number	0007796400
Climate zone	56
Ceiling fan in at least one bedroom	No
Ceiling fan in at least one living room or other conditioned area	No

Project score		
Water	✔ 41	Target 40
Thermal Comfort	✔ Pass	Target Pass
Energy	✔ 25	Target 25

Description of project

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

Residential flat buildings - Building1, 130 dwellings, 12 storeys above ground

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
b0101	1	61.0	0.0	0.0	0.0
b0106	3	130.0	0.0	0.0	0.0
b0203	2	88.0	5.0	0.0	0.0
b0208	1	61.0	0.0	0.0	0.0
b0305	2	91.0	0.0	0.0	0.0
b0402	2	88.0	5.0	0.0	0.0
b0407	3	130.0	0.0	0.0	0.0
b0504	3	130.0	0.0	0.0	0.0
b0603	1	63.0	0.0	0.0	0.0
b0703	2	87.0	0.0	0.0	0.0
b0803	2	87.0	0.0	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
b0102	2	88.0	5.0	0.0	0.0
b0107	3	130.0	0.0	0.0	0.0
b0204	2	91.0	0.0	0.0	0.0
b0301	1	61.0	0.0	0.0	0.0
b0306	3	130.0	0.0	0.0	0.0
b0403	2	88.0	5.0	0.0	0.0
b0408	1	61.0	0.0	0.0	0.0
b0505	3	130.0	0.0	0.0	0.0
b0604	3	121.0	0.0	0.0	0.0
b0704	2	98.0	0.0	0.0	0.0
b0804	2	98.0	0.0	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
b0103	2	88.0	5.0	0.0	0.0
b0108	1	61.0	0.0	0.0	0.0
b0205	2	91.0	0.0	0.0	0.0
b0302	2	88.0	5.0	0.0	0.0
b0307	3	130.0	0.0	0.0	0.0
b0404	2	91.0	0.0	0.0	0.0
b0501	2	95.0	0.0	0.0	0.0
b0506	1	61.0	0.0	0.0	0.0
b0605	4 or more bedrooms	163.0	0.0	0.0	0.0
b0705	4 or more bedrooms	149.0	0.0	0.0	0.0
b0805	4 or more bedrooms	149.0	0.0	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
b0104	2	91.0	0.0	0.0	0.0
b0201	1	61.0	0.0	0.0	0.0
b0206	3	130.0	0.0	0.0	0.0
b0303	2	88.0	5.0	0.0	0.0
b0308	1	61.0	0.0	0.0	0.0
b0405	2	91.0	0.0	0.0	0.0
b0502	3	116.0	0.0	0.0	0.0
b0601	2	88.0	6.0	0.0	0.0
b0701	2	88.0	6.0	0.0	0.0
b0801	2	88.0	6.0	0.0	0.0
b0901	2	88.0	6.0	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
b0105	2	91.0	0.0	0.0	0.0
b0202	2	88.0	5.0	0.0	0.0
b0207	3	130.0	0.0	0.0	0.0
b0304	2	91.0	0.0	0.0	0.0
b0401	1	61.0	0.0	0.0	0.0
b0406	3	130.0	0.0	0.0	0.0
b0503	2	91.0	0.0	0.0	0.0
b0602	2	87.0	0.0	0.0	0.0
b0702	2	87.0	0.0	0.0	0.0
b0802	2	87.0	0.0	0.0	0.0
b0902	2	87.0	0.0	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
b0903	1	63.0	0.0	0.0	0.0
bCL033	3	124.0	0.0	0.0	0.0
bUG031	1	61.0	0.0	0.0	0.0
h0105	2	91.0	0.0	0.0	0.0
h0202	2	88.0	5.0	0.0	0.0
h0207	3	130.0	0.0	0.0	0.0
h0304	2	91.0	0.0	0.0	0.0
h0401	2	94.0	0.0	0.0	0.0
h0406	1	61.0	0.0	0.0	0.0
h0505	4 or more bedrooms	163.0	0.0	0.0	0.0
h0605	4 or more bedrooms	149.0	0.0	0.0	0.0
h0705	4 or more bedrooms	149.0	0.0	0.0	0.0
h0805	4 or more bedrooms	270.0	0.0	0.0	0.0
hCL051	1	56.0	0.0	0.0	0.0
b0904	4 or more bedrooms	236.0	0.0	0.0	0.0
bCL043	3	124.0	0.0	0.0	0.0
h0101	1	61.0	0.0	0.0	0.0
h0106	3	130.0	0.0	0.0	0.0
h0203	2	88.0	5.0	0.0	0.0
h0208	1	61.0	0.0	0.0	0.0
h0305	2	91.0	0.0	0.0	0.0
h0402	3	116.0	0.0	0.0	0.0
h0501	2	88.0	6.0	0.0	0.0
h0601	2	88.0	6.0	0.0	0.0
h0701	2	88.0	6.0	0.0	0.0
h0801	2	88.0	6.0	0.0	0.0
hCL013	3	145.0	0.0	0.0	0.0
hCL063	3	124.0	0.0	0.0	0.0
b0905	4 or more bedrooms	270.0	0.0	0.0	0.0
bCL053	3	124.0	0.0	0.0	0.0
h0102	2	88.0	5.0	0.0	0.0
h0107	3	130.0	0.0	0.0	0.0
h0204	2	91.0	0.0	0.0	0.0
h0301	1	61.0	0.0	0.0	0.0
h0306	3	130.0	0.0	0.0	0.0
h0403	2	91.0	0.0	0.0	0.0
h0502	2	87.0	0.0	0.0	0.0
h0602	2	87.0	0.0	0.0	0.0
h0702	2	87.0	0.0	0.0	0.0
h0802	2	87.0	0.0	0.0	0.0
hCL023	3	138.0	0.0	0.0	0.0
hCL073	3	145.0	0.0	0.0	0.0
bCL013	3	154.0	0.0	0.0	0.0
bUG011	1	57.0	0.0	0.0	0.0
h0103	2	88.0	5.0	0.0	0.0
h0108	1	61.0	0.0	0.0	0.0
h0205	2	91.0	0.0	0.0	0.0
h0302	2	88.0	5.0	0.0	0.0
h0307	3	130.0	0.0	0.0	0.0
h0404	3	130.0	0.0	0.0	0.0
h0503	1	63.0	0.0	0.0	0.0
h0603	2	87.0	0.0	0.0	0.0
h0703	2	87.0	0.0	0.0	0.0
h0803	1	63.0	0.0	0.0	0.0
hCL031	1	50.0	6.0	0.0	0.0
hLG013	3	124.0	0.0	0.0	0.0
bCL023	3	142.0	0.0	0.0	0.0
bUG021	1	57.0	0.0	0.0	0.0
h0104	2	91.0	0.0	0.0	0.0
h0201	1	61.0	0.0	0.0	0.0
h0206	3	130.0	0.0	0.0	0.0
h0303	2	88.0	5.0	0.0	0.0
h0308	1	61.0	0.0	0.0	0.0
h0405	3	130.0	0.0	0.0	0.0
h0504	3	121.0	0.0	0.0	0.0
h0604	2	98.0	0.0	0.0	0.0
h0704	2	98.0	0.0	0.0	0.0
h0804	4 or more bedrooms	236.0	0.0	0.0	0.0
hCL041	1	56.0	0.0	0.0	0.0
hLG023	3	124.0	0.0	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
hLG03	3	124.0	0.0	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
hUG01	2	88.0	5.0	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
hUG02	2	91.0	0.0	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
hUG03	2	91.0	0.0	0.0	0.0

Dwelling no.	No. of bedrooms	Conditioned floor area (m²)	Unconditioned floor area (m²)	Area of garden & lawn (m²)	Indigenous species (min area m²)
hUG04	3	130.0	0.0	0.0	0.0

Description of project

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

Common areas of unit building - Building1

Common area	Floor area (m²)
Car park area (No. 1)	8129.0
Lift car (No.3)	-
Substation room (No.1)	19.0
Plant or service rooms	382.0
Roof VRV condenser rooms	60.0
Ground floor lobby type (No. 1)	192.0

Common area	Floor area (m²)
Lift car (No.1)	-
Lift car (No.4)	-
Garbage rooms and chute rooms	439.0
Fan rooms lower	169.0
Concierge area (No. 1)	32.0
Hallway/lobby type (No. 1)	1219.0

Common area	Floor area (m²)
Lift car (No.2)	-
Switch and NBN room (No. 1)	38.0
Community rooms	243.0
Roof Plant or service rooms	221.0
Store rooms area (No. 1)	135.0

Schedule of BASIX commitments

1. Commitments for Residential flat buildings - Building1
    (a) Dwellings
        (i) Water
        (ii) Energy
        (iii) Thermal Comfort
    (b) Common areas and central systems/facilities
        (i) Water
        (ii) Energy

2. Commitments for multi-dwelling houses

3. Commitments for single dwelling houses

4. Commitments for common areas and central systems/facilities for the development (non-building specific)
        (i) Water
        (ii) Energy

Schedule of BASIX commitments

The commitments set out below regulate how the proposed development is to be carried out. It is a condition of any development consent granted, or complying development certificate issued, for the proposed development, that BASIX commitments be complied with.

1. Commitments for Residential flat buildings - Building1

(a) Dwellings

(i) Water	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) The applicant must comply with the commitments listed below in carrying out the development of a dwelling listed in a table below.			
(b) The applicant must plant indigenous or low water use species of vegetation throughout the area of land specified for the dwelling in the "Indigenous species" column of the table below, as private landscaping for that dwelling. (This area of indigenous vegetation is to be contained within the "Area of garden and lawn" for the dwelling specified in the "Description of Project" table).	✔	✔	
(c) If a rating is specified in the table below for a fixture or appliance to be installed in the dwelling, the applicant must ensure that each such fixture and appliance meets the rating specified for it.		✔	✔
(d) The applicant must install an on demand hot water recirculation system which regulates all hot water use throughout the dwelling, where indicated for a dwelling in the "HW recirculation or diversion" column of the table below.		✔	✔
(e) The applicant must install: (aa) a hot water diversion system to all showers, kitchen sinks and all basins in the dwelling, where indicated for a dwelling in the "HW recirculation or diversion" column of the table below; and (bb) a separate diversion tank (or tanks) connected to the hot water diversion systems of at least 100 litres. The applicant must connect the hot water diversion tank to all toilets in the dwelling.		✔ ✔	✔ ✔
(e) The applicant must not install a private swimming pool or spa for the dwelling, with a volume exceeding that specified for it in the table below.	✔	✔	
(f) If specified in the table, that pool or spa (or both) must have a pool cover or shading (or both).		✔	
(g) The pool or spa must be located as specified in the table.	✔	✔	
(h) The applicant must install, for the dwelling, each alternative water supply system, with the specified size, listed for that dwelling in the table below. Each system must be configured to collect run-off from the areas specified (excluding any area which supplies any other alternative water supply system), and to divert overflow as specified. Each system must be connected as specified.	✔	✔	✔

	Fixtures					Appliances		Individual pool				Individual spa		
Dwelling no.	All shower-heads	All toilet flushing systems	All kitchen taps	All bathroom taps	HW recirculation or diversion	All clothes washers	All dish-washers	Volume (max volume)	Pool cover	Pool location	Pool shaded	Volume (max volume)	Spa cover	Spa shaded
All dwellings	4 star (> 4.5 but <= 6 L/min)	4 star	5 star	5 star	no	-	-	-	-	-	-	-	-	-

	Alternative water source							
Dwelling no.	Alternative water supply systems	Size	Configuration	Landscape connection	Toilet connection (s)	Laundry connection	Pool top-up	Spa top-up
None	-	-	-	-	-	-	-	-

(ii) Energy	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) The applicant must comply with the commitments listed below in carrying out the development of a dwelling listed in a table below.			
(b) The applicant must install each hot water system specified for the dwelling in the table below, so that the dwelling's hot water is supplied by that system. If the table specifies a central hot water system for the dwelling, then the applicant must connect that central system to the dwelling, so that the dwelling's hot water is supplied by that central system.	✔	✔	✔
(c) The applicant must install, in each bathroom, kitchen and laundry of the dwelling, the ventilation system specified for that room in the table below. Each such ventilation system must have the operation control specified for it in the table.		✔	✔
(d) The applicant must install the cooling and heating system/s specified for the dwelling under the "Living areas" and "Bedroom areas" headings of the "Cooling" and "Heating" columns in the table below, in/for at least 1 living/bedroom area of the dwelling. If no cooling or heating system is specified in the table for "Living areas" or "Bedroom areas", then no systems may be installed in any such areas. If the term "zoned" is specified beside an air conditioning system, then the system must provide for day/night zoning between living areas and bedrooms.		✔	✔
(e) This commitment applies to each room or area of the dwelling which is referred to in a heading to the "Artificial lighting" column of the table below (but only to the extent specified for that room or area). The applicant must ensure that the "primary type of artificial lighting" for each such room in the dwelling is fluorescent lighting or light emitting diode (LED) lighting. If the term "dedicated" is specified for a particular room or area, then the light fittings in that room or area must only be capable of being used for fluorescent lighting or light emitting diode (LED) lighting.		✔	✔

(ii) Energy	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(f) This commitment applies to each room or area of the dwelling which is referred to in a heading to the "Natural lighting" column of the table below (but only to the extent specified for that room or area). The applicant must ensure that each such room or area is fitted with a window and/or skylight.	✔	✔	✔
(g) This commitment applies if the applicant installs a water heating system for the dwelling's pool or spa. The applicant must:			
(aa) install the system specified for the pool in the "Individual Pool" column of the table below (or alternatively must not install any system for the pool). If specified, the applicant must install a timer, to control the pool's pump; and		✔	
(bb) install the system specified for the spa in the "Individual Spa" column of the table below (or alternatively must not install any system for the spa). If specified, the applicant must install a timer to control the spa's pump.		✔	
(h) The applicant must install in the dwelling:			
(aa) the kitchen cook-top and oven specified for that dwelling in the "Appliances & other efficiency measures" column of the table below;		✔	
(bb) each appliance for which a rating is specified for that dwelling in the "Appliances & other efficiency measures" column of the table, and ensure that the appliance has that minimum rating; and		✔	✔
(cc) any clothes drying line specified for the dwelling in the "Appliances & other efficiency measures" column of the table.		✔	
(i) If specified in the table, the applicant must carry out the development so that each refrigerator space in the dwelling is "well ventilated".		✔	

	Hot water	Bathroom ventilation system		Kitchen ventilation system		Laundry ventilation system	
Dwelling no.	Hot water system	Each bathroom	Operation control	Each kitchen	Operation control	Each laundry	Operation control
All dwellings	central hot water system 1	individual fan, ducted to façade or roof	manual switch on/off	individual fan, ducted to façade or roof	manual switch on/off	individual fan, ducted to façade or roof	manual switch on/off

	Cooling		Heating		Artificial lighting						Natural lighting	
Dwelling no.	living areas	bedroom areas	living areas	bedroom areas	No. of bedrooms &/or study	No. of living &/or dining rooms	Each kitchen	All bathrooms/ toilets	Each laundry	All hallways	No. of bathrooms &/or toilets	Main kitchen
b0904, b0905, h0804, h0805	central cooling system 1	central cooling system 1	central heating system 1	central heating system 1	4 (dedicated)	2 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	yes
b0605, b0705, b0805, h0505, h0605, h0705	central cooling system 1	central cooling system 1	central heating system 1	central heating system 1	4 (dedicated)	2 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	no
b0104, b0105, b0602, b0702, b0703, b0704, b0802, b0803, b0804, b0902, h0502, h0602, h0603, h0604, h0702, h0703, h0704, h0802	central cooling system 1 (zoned)	central cooling system 1 (zoned)	central heating system 1 (zoned)	central heating system 1 (zoned)	2 (dedicated)	2 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	yes

	Cooling		Heating		Artificial lighting						Natural lighting	
Dwelling no.	living areas	bedroom areas	living areas	bedroom areas	No. of bedrooms &/or study	No. of living &/or dining rooms	Each kitchen	All bathrooms/ toilets	Each laundry	All hallways	No. of bathrooms &/or toilets	Main kitchen
b0204, b0205, b0304, b0305, b0404, b0405, b0501, b0503, h0104, h0105, h0204, h0205, h0304, h0305, h0401, h0403, hUG02, hUG03	central cooling system 1 (zoned)	central cooling system 1 (zoned)	central heating system 1 (zoned)	central heating system 1 (zoned)	2 (dedicated)	2 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	no

	Cooling		Heating		Artificial lighting						Natural lighting	
Dwelling no.	living areas	bedroom areas	living areas	bedroom areas	No. of bedrooms &/or study	No. of living &/or dining rooms	Each kitchen	All bathrooms/ toilets	Each laundry	All hallways	No. of bathrooms &/or toilets	Main kitchen
b0102, b0103, b0202, b0203, b0302, b0303, b0402, b0403, b0601, b0701, b0801, b0901, h0102, h0103, h0202, h0203, h0302, h0303, h0501, h0601, h0701, h0801, hUG01	central cooling system 1 (zoned)	central cooling system 1 (zoned)	central heating system 1 (zoned)	central heating system 1 (zoned)	2 (dedicated)	2 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	1	no

	Cooling		Heating		Artificial lighting						Natural lighting	
Dwelling no.	living areas	bedroom areas	living areas	bedroom areas	No. of bedrooms &/or study	No. of living &/or dining rooms	Each kitchen	All bathrooms/ toilets	Each laundry	All hallways	No. of bathrooms &/or toilets	Main kitchen
b0101, b0108, b0201, b0208, b0301, b0308, b0401, b0408, b0506, b0603, b0903, bUG01, bUG02, bUG03, h0101, h0108, h0201, h0208, h0301, h0308, h0406, h0503, h0803, hCL03, hCL04, hCL05	central cooling system 1 (zoned)	central cooling system 1 (zoned)	central heating system 1 (zoned)	central heating system 1 (zoned)	1 (dedicated)	2 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	no
All other dwellings	central cooling system 1 (zoned)	central cooling system 1 (zoned)	central heating system 1 (zoned)	central heating system 1 (zoned)	3 (dedicated)	2 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	no

	Individual pool		Individual spa		Appliances & other efficiency measures							
Dwelling no.	Pool heating system	Timer	Spa heating system	Timer	Kitchen cooktop/oven	Refrigerator	Well ventilated fridge space	Dishwasher	Clothes washer	Clothes dryer	Indoor or sheltered clothes drying line	Private outdoor or unsheltered clothes drying line
All dwellings	-	-	-	-	induction cooktop & electric oven	-	no	4 star	-	8 star	no	no

(iii) Thermal Comfort	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) The applicant must attach the certificate referred to under "Assessor details" on the front page of this BASIX certificate (the "Assessor Certificate") to the development application and construction certificate application for the proposed development (or, if the applicant is applying for a complying development certificate for the proposed development, to that application). The applicant must also attach the Assessor Certificate to the application for a final occupation certificate for the proposed development.			
(b) The Assessor Certificate must have been issued by an Accredited Assessor in accordance with the Thermal Comfort Protocol.			
(c) The details of the proposed development on the Assessor Certificate must be consistent with the details shown in this BASIX Certificate, including the details shown in the "Thermal Loads" table below.			
(d) The applicant must show on the plans accompanying the development application for the proposed development, all matters which the Thermal Comfort Protocol requires to be shown on those plans. Those plans must bear a stamp of endorsement from the Accredited Assessor, to certify that this is the case.	✔		
(e) The applicant must show on the plans accompanying the application for a construction certificate (or complying development certificate, if applicable), all thermal performance specifications set out in the Assessor Certificate, and all aspects of the proposed development which were used to calculate those specifications.		✔	
(f) The applicant must construct the development in accordance with all thermal performance specifications set out in the Assessor Certificate, and in accordance with those aspects of the development application or application for a complying development certificate which were used to calculate those specifications.		✔	✔
(g) Where there is an in-slab heating or cooling system, the applicant must: (aa) Install insulation with an R-value of not less than 1.0 around the vertical edges of the perimeter of the slab; or (bb) On a suspended floor, install insulation with an R-value of not less than 1.0 underneath the slab and around the vertical edges of the perimeter of the slab.	✔	✔	✔
(h) The applicant must construct the floors and walls of the development in accordance with the specifications listed in the table below.	✔	✔	✔

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
b0101	40.8	19.6
b0102	39.4	18.3
b0103	43.6	17.8
b0104	44.9	24.3
b0105	44.8	20.9
b0106	30.3	15.6
b0107	27.8	19.5
b0108	19.5	18.1
b0201	43.3	19.0
b0202	42.8	14.6
b0203	43.0	17.2
b0204	41.9	12.0
b0205	42.5	9.5
b0206	29.0	16.0
b0207	30.5	17.2
b0208	22.7	17.6
b0301	43.0	20.5
b0302	42.3	15.0
b0303	42.5	18.0
b0304	41.7	12.2
b0305	42.3	10.0
b0306	32.9	13.6
b0307	30.9	17.2
b0308	22.9	19.0
b0401	42.6	21.4
b0402	39.1	14.3
b0403	39.8	18.5

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
b0404	45.2	18.9
b0405	42.4	10.4
b0406	32.5	13.5
b0407	30.8	17.5
b0408	23.1	19.7
b0501	34.4	22.7
b0502	32.9	13.1
b0503	45.2	17.2
b0504	34.4	15.1
b0505	33.6	19.2
b0506	22.0	23.9
b0601	36.2	15.4
b0602	26.0	27.8
b0603	26.7	26.3
b0604	22.9	14.8
b0605	23.3	26.0
b0701	35.6	15.5
b0702	26.4	27.5
b0703	23.7	28.4
b0704	15.3	27.4
b0705	26.2	16.3
b0801	34.2	15.6
b0802	26.6	27.2
b0803	24.0	28.4
b0804	15.5	26.7
b0805	26.1	16.7
b0901	42.1	17.0

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
b0902	32.2	27.1
b0903	17.7	29.1
b0904	17.0	22.2
b0905	25.2	28.9
bCL01	42.2	21.9
bCL02	34.5	10.4
bCL03	34.6	13.1
bCL04	21.8	10.7
bCL05	24.1	11.1
bUG01	43.3	16.9
bUG02	35.5	15.4
bUG03	18.9	18.0
h0101	42.9	19.9
h0102	30.0	21.4
h0103	33.4	13.2
h0104	44.5	10.9
h0105	43.8	8.9
h0106	26.4	19.8
h0107	28.7	15.3
h0108	23.1	17.0
h0201	44.6	18.6
h0202	32.5	16.5
h0203	31.9	13.2
h0204	43.3	11.2
h0205	43.8	9.6
h0206	30.2	17.6
h0207	31.3	13.1

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
h0208	25.1	16.1
h0301	41.6	22.4
h0302	38.5	20.1
h0303	39.0	15.6
h0304	45.2	14.8
h0305	43.5	9.8
h0306	30.4	17.6
h0307	31.7	12.9
h0308	25.2	16.4
h0401	36.8	19.4
h0402	41.2	11.6
h0403	44.9	21.0
h0404	34.9	19.6
h0405	33.7	13.7
h0406	23.6	20.0
h0501	37.5	14.3
h0502	36.8	23.5
h0503	9.2	19.6
h0504	24.4	20.5
h0505	22.4	20.8
h0601	37.0	14.7
h0602	34.9	24.1
h0603	27.3	22.2
h0604	15.9	29.5
h0605	27.3	12.0
h0701	36.1	15.0
h0702	34.6	24.2

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
h0703	27.0	22.4
h0704	15.8	29.4
h0705	27.1	12.4
h0801	43.3	16.4
h0802	44.8	27.4
h0803	19.2	25.0
h0804	22.0	29.5
h0805	20.1	22.5
hCL01	25.6	5.3
hCL02	37.6	4.7
hCL03	40.9	15.6
hCL04	37.6	14.3
hCL05	36.1	16.7
hCL06	16.9	10.9
hCL07	34.4	6.4
hLG01	33.7	11.1
hLG02	24.2	10.6
hLG03	28.1	10.7
hUG01	41.7	20.2
hUG02	40.8	12.3
hUG03	39.8	10.0
All other dwellings	29.6	19.6

(b) Common areas and central systems/facilities

(i) Water	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) If, in carrying out the development, the applicant installs a showerhead, toilet, tap or clothes washer into a common area, then that item must meet the specifications listed for it in the table.		✔	✔
(b) The applicant must install (or ensure that the development is serviced by) the alternative water supply system(s) specified in the "Central systems" column of the table below. In each case, the system must be sized, be configured, and be connected, as specified in the table.	✔	✔	✔
(c) A swimming pool or spa listed in the table must not have a volume (in kLs) greater than that specified for the pool or spa in the table.	✔	✔	
(d) A pool or spa listed in the table must have a cover or shading if specified for the pool or spa in the table.		✔	
(e) The applicant must install each fire sprinkler system listed in the table so that the system is configured as specified in the table.		✔	✔
(f) The applicant must ensure that the central cooling system for a cooling tower is configured as specified in the table.		✔	✔

Common area	Showerheads rating	Toilets rating	Taps rating	Clothes washers rating
All common areas	4 star (> 4.5 but <= 6 L/min)	4 star	5 star	no common laundry facility

Central systems	Size	Configuration	Connection (to allow for...)
Central water tank - rainwater or stormwater (No. 1)	20000.0	To collect run-off from at least: - 500.0 square metres of roof area of buildings in the development - 0.0 square metres of impervious area in the development - 0.0 square metres of garden/lawn area in the development - 0.0 square metres of planter box area in the development (excluding, in each case, any area which drains to, or supplies, any other alternative water supply system).	- irrigation of 2742.0 square metres of common landscaped area on the site - car washing in 1 car washing bays on the site
Pool (No. 1)	Volume: 60.0 kLs	Location: Building1 Pool shaded: no	-

Central systems	Size	Configuration	Connection (to allow for...)
Fire sprinkler system (No. 1)	-	So that fire sprinkler test water is contained within the fire sprinkler system for re-use, rather than disposed.	-
Fire sprinkler system (No. 2)	-	So that fire sprinkler test water is contained within the fire sprinkler system for re-use, rather than disposed.	-
Central cooling system (No. 1)	-	Private water meter on make-up line connected to building management system. Conductivity controller installed in the cooling tower.	-

(ii) Energy	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) If, in carrying out the development, the applicant installs a ventilation system to service a common area specified in the table below, then that ventilation system must be of the type specified for that common area, and must meet the efficiency measure specified.		✔	✔
(b) In carrying out the development, the applicant must install, as the "primary type of artificial lighting" for each common area specified in the table below, the lighting specified for that common area. This lighting must meet the efficiency measure specified. The applicant must also install a centralised lighting control system or Building Management System (BMS) for the common area, where specified.		✔	✔
(c) The applicant must install the systems and fixtures specified in the "Central energy systems" column of the table below. In each case, the system or fixture must be of the type, and meet the specifications, listed for it in the table.	✔	✔	✔

	Common area ventilation system		Common area lighting		
Common area	Ventilation system type	Ventilation efficiency measure	Primary type of artificial lighting	Lighting efficiency measure	Lighting control system/BMS
Car park area (No. 1)	ventilation (supply + exhaust)	carbon monoxide monitor + VSD fan	light-emitting diode	zoned switching with motion sensor	No
Lift car (No.1)	-	-	light-emitting diode	connected to lift call button	No
Lift car (No.2)	-	-	light-emitting diode	connected to lift call button	No
Lift car (No.3)	-	-	light-emitting diode	connected to lift call button	No
Lift car (No.4)	-	-	light-emitting diode	connected to lift call button	No
Switch and NBN room (No. 1)	ventilation supply only	thermostatically controlled	light-emitting diode	motion sensors	No
Substation room (No.1)	ventilation supply only	thermostatically controlled	light-emitting diode	motion sensors	No

	Common area ventilation system		Common area lighting		
Common area	**Ventilation system type**	**Ventilation efficiency measure**	**Primary type of artificial lighting**	**Lighting efficiency measure**	**Lighting control system/BMS**
Garbage rooms and chute rooms	ventilation exhaust only	-	light-emitting diode	motion sensors	No
Community rooms	air conditioning system	time clock or BMS controlled	light-emitting diode	zoned switching with motion sensor	No
Plant or service rooms	ventilation supply only	interlocked to light	light-emitting diode	motion sensors	No
Fan rooms lower	no mechanical ventilation	-	light-emitting diode	motion sensors	No
Roof Plant or service rooms	no mechanical ventilation	-	light-emitting diode	motion sensors	No
Roof VRV condenser rooms	no mechanical ventilation	-	light-emitting diode	motion sensors	No
Concierge area (No. 1)	air conditioning system	time clock or BMS controlled	light-emitting diode	manual on / manual off	No
Store rooms area (No. 1)	ventilation supply only	time clock or BMS controlled	light-emitting diode	motion sensors	No
Ground floor lobby type (No. 1)	ventilation supply only	time clock or BMS controlled	light-emitting diode	zoned switching with motion sensor	No
Hallway/lobby type (No. 1)	ventilation supply only	time clock or BMS controlled	light-emitting diode	zoned switching with motion sensor	No

Central energy systems	Type	Specification
Central hot water system (No. 1)	electric heat pump - air sourced	Piping insulation (ringmain & supply risers): (a) Piping external to building: R1.0 (~38 mm); (b) Piping internal to building: R1.0 (~38 mm)
Central cooling system (No. 1)	variable refrigerant volume units	Energy source: electric driven compressor Heat rejection method: air cooled condenser Unit efficiency (min): medium - COP 3.5 - 5.5
Central heating system (No. 1)	variable refrigerant volume units	Energy source: electric driven compressor + air sourced evaporator Unit efficiency: medium - COP 3.5 - 5.5
Lift (No. 1)	gearless traction with V V V F motor	Number of levels (including basement): 16
Lift (No. 2)	gearless traction with V V V F motor	Number of levels (including basement): 16
Lift (No. 3)	gearless traction with V V V F motor	Number of levels (including basement): 15

Central energy systems	Type	Specification
Lift (No. 4)	gearless traction with V V V F motor	Number of levels (including basement): 15
Pool (No. 1)	Heating source: no heating	Pump controlled by timer: yes

4. Commitments for common areas and central systems/facilities for the development (non-building specific)

(b) Common areas and central systems/facilities

(i) Water	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) If, in carrying out the development, the applicant installs a showerhead, toilet, tap or clothes washer into a common area, then that item must meet the specifications listed for it in the table.		✔	✔
(b) The applicant must install (or ensure that the development is serviced by) the alternative water supply system(s) specified in the "Central systems" column of the table below. In each case, the system must be sized, be configured, and be connected, as specified in the table.	✔	✔	✔
(c) A swimming pool or spa listed in the table must not have a volume (in kLs) greater than that specified for the pool or spa in the table.	✔	✔	
(d) A pool or spa listed in the table must have a cover or shading if specified for the pool or spa in the table.		✔	
(e) The applicant must install each fire sprinkler system listed in the table so that the system is configured as specified in the table.		✔	✔
(f) The applicant must ensure that the central cooling system for a cooling tower is configured as specified in the table.		✔	✔

Common area	Showerheads rating	Toilets rating	Taps rating	Clothes washers rating
All common areas	4 star (> 4.5 but <= 6 L/min)	4 star	5 star	no common laundry facility

(ii) Energy	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
(a) If, in carrying out the development, the applicant installs a ventilation system to service a common area specified in the table below, then that ventilation system must be of the type specified for that common area, and must meet the efficiency measure specified.		✔	✔
(b) In carrying out the development, the applicant must install, as the "primary type of artificial lighting" for each common area specified in the table below, the lighting specified for that common area. This lighting must meet the efficiency measure specified. The applicant must also install a centralised lighting control system or Building Management System (BMS) for the common area, where specified.		✔	✔
(c) The applicant must install the systems and fixtures specified in the "Central energy systems" column of the table below. In each case, the system or fixture must be of the type, and meet the specifications, listed for it in the table.	✔	✔	✔

Central energy systems	Type	Specification
Other	Building management system installed?: yes	-

Notes

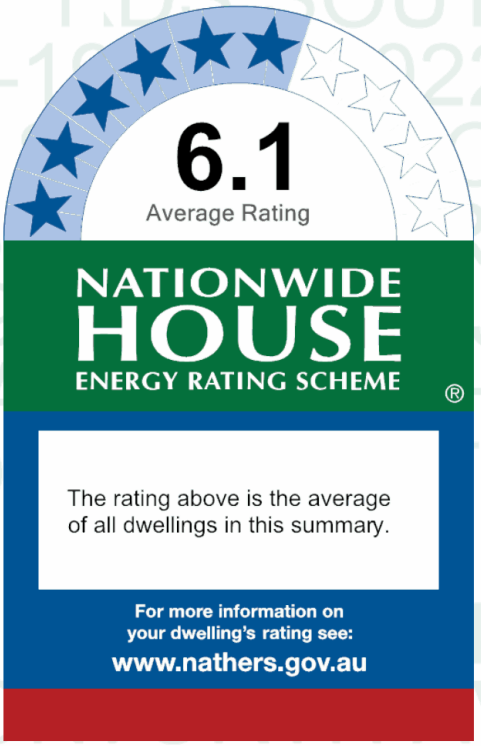
1. In these commitments, "applicant" means the person carrying out the development.
2. The applicant must identify each dwelling, building and common area listed in this certificate, on the plans accompanying any development application, and on the plans and specifications accompanying the application for a construction certificate / complying development certificate, for the proposed development, using the same identifying letter or reference as is given to that dwelling, building or common area in this certificate.
3. This note applies if the proposed development involves the erection of a building for both residential and non-residential purposes (or the change of use of a building for both residential and non-residential purposes). Commitments in this certificate which are specified to apply to a "common area" of a building or the development, apply only to that part of the building or development to be used for residential purposes.
4. If this certificate lists a central system as a commitment for a dwelling or building, and that system will also service any other dwelling or building within the development, then that system need only be installed once (even if it is separately listed as a commitment for that other dwelling or building).
5. If a star or other rating is specified in a commitment, this is a minimum rating.
6. All alternative water systems to be installed under these commitments (if any), must be installed in accordance with the requirements of all applicable regulatory authorities. NOTE: NSW Health does not recommend that stormwater, recycled water or private dam water be used to irrigate edible plants which are consumed raw, or that rainwater be used for human consumption in areas with potable water supply.

Legend

1. Commitments identified with a "✔" in the "Show on DA plans" column must be shown on the plans accompanying the development application for the proposed development (if a development application is to be lodged for the proposed development).
2. Commitments identified with a "✔" in the "Show on CC/CDC plans and specs" column must be shown in the plans and specifications accompanying the application for a construction certificate / complying development certificate for the proposed development.
3. Commitments identified with a "✔" in the "Certifier check" column must be certified by a certifying authority as having been fulfilled. (Note: a certifying authority must not issue an occupation certificate (either interim or final) for a building listed in this certificate, or for any part of such a building, unless it is satisfied that each of the commitments whose fulfilment it is required to monitor in relation to the building or part, has been fulfilled).

Nationwide House Energy Rating Scheme — Class 2 summary
NatHERS Certificate No. 0007796400

Generated on 14 Jun 2022 using BERS Pro v4.4.0.6 (3.21)



Property

Address 11-19 Holdsworth Avenue , St Leonards South , NSW , 2065

Lot/DP 10/7259

NatHERS climate zone 56

Accredited assessor

Martin Pinson

INTEGRECO

consulting@integreco.com

0422144603

Accreditation No. DMN/19/1921

Assessor Accrediting Organisation Design Matters National

Verification

To verify this certificate, scan the QR code or visit hstar.com.au/QR/Generate?p=WhPVImYix . When using either link, ensure you are visiting hstar.com.au

Summary of all dwellings

Certificate number and link	Unit Number	Heating load (MJ/m^2/p.a.)	Cooling load (MJ/m^2/p.a.)	Total load (MJ/m^2/p.a.)	Star rating
0007792070-01	b 0101	40.8	19.6	60.3	5.4
0007792088-01	b 0102	39.4	18.3	57.7	5.5
0007792096-01	b 0103	43.6	17.8	61.3	5.3
0007792104-01	b 0104	44.9	24.3	69.2	4.8
0007792112-01	b 0105	44.8	20.9	65.7	5

Continued Over

National Construction Code (NCC) requirements

The NCC's requirements for NatHERS-rated buildings are detailed in 3.12.0(a)(i) and 3.12.5 of the NCC Volume Two. For apartments the requirements are detailed in J0.2 and J5 to J8 of the NCC Volume One.

In NCC 2019, these requirements include minimum star ratings and separate heating and cooling load limits that need to be met by buildings and apartments through the NatHERS assessment. Requirements additional to the NatHERS assessment that must also be satisfied include, but are not limited to: insulation installation methods, thermal breaks, building sealing, water heating and pumping, and artificial lighting requirements. The NCC and NatHERS Heating and Cooling Load Limits (Australian Building Codes Board Standard) are available at www.abcb.gov.au.

State and territory variations and additions to the NCC may also apply.

Summary of all dwellings (continued)

Certificate number and link	Unit Number	Heating load (MJ/m^2/p.a.)	Cooling load (MJ/m^2/p.a.)	Total load (MJ/m^2/p.a.)	Star rating
0007792120-01	b 0106	30.3	15.6	46	6.4
0007792138-01	b 0107	27.8	19.5	47.3	6.3
0007792146-01	b 0108	19.5	18.1	37.6	7.1
0007792153-01	b 0201	43.3	19	62.3	5.2
0007792161-01	b 0202	42.8	14.6	57.4	5.5
0007792179-01	b 0203	43	17.2	60.2	5.4
0007792187-01	b 0204	41.9	12	53.9	5.8
0007792195-01	b 0205	42.5	9.5	52	5.9
0007792203-01	b 0206	29	16	45.1	6.4
0007792211-01	b 0207	30.5	17.2	47.7	6.3
0007792229-01	b 0208	22.7	17.6	40.3	6.9
0007792237-01	b 0301	43	20.5	63.5	5.2
0007792245-01	b 0302	42.3	15	57.3	5.6
0007792252-01	b 0303	42.5	18	60.5	5.3
0007792260-01	b 0304	41.7	12.2	53.9	5.8
0007792278-01	b 0305	42.3	10	52.3	5.9
0007792286-01	b 0306	32.9	13.6	46.5	6.4
0007792294-01	b 0307	30.9	17.2	48.1	6.2
0007792302-01	b 0308	22.9	19	41.9	6.8
0007792310-01	b 0401	42.6	21.4	64	5.1
0007792328-01	b 0402	39.1	14.3	53.4	5.8
0007792336-01	b 0403	39.8	18.5	58.3	5.4
0007792344-01	b 0404	45.2	18.9	64.1	5.1
0007792351-02	b 0405	42.4	10.2	52.6	5.9
0007792369-01	b 0406	32.5	13.5	46	6.4
0007792377-01	b 0407	30.8	17.5	48.3	6.2
0007792385-01	b 0408	23.1	19.7	42.8	6.7
0007792393-01	b 0501	34.4	22.7	57.1	5.6
0007792401-04	b 0502	32.9	13.1	46.1	6.4
0007792419-01	b 0503	45.2	17.2	62.5	5.2
0007792427-01	b 0504	34.4	15.1	49.5	6.1
0007792435-01	b 0505	33.6	19.2	52.8	5.9
0007792443-01	b 0506	22	23.9	46	6.4
0007792450-01	b 0601	36.2	15.4	51.6	5.9
0007796410-02	b 0602	26	27.8	53.8	5.8
0007792468-01	b 0603	26.7	26.3	53	5.9
0007792476-01	b 0604	22.9	14.8	37.7	7.1
0007792484-01	b 0605	23.3	26	49.2	6.1
0007792492-01	b 0701	35.6	15.5	51.1	5.9
0007792500-01	b 0702	26.4	27.5	53.9	5.8

Certificate number and link	Unit Number	Heating load (MJ/m /p.a.)	Cooling load (MJ/m /p.a.)	Total load (MJ/m /p.a.)	Star rating
0007792518-01	b 0703	23.7	28.4	52.1	5.9
0007792526-01	b 0704	15.3	27.4	42.7	6.7
0007792534-01	b 0705	26.2	16.3	42.4	6.7
0007792542-01	b 0801	34.2	15.6	49.8	6.1
0007792559-01	b 0802	26.6	27.2	53.8	5.8
0007792567-01	b 0803	24	28.4	52.4	5.9
0007792575-01	b 0804	15.5	26.7	42.3	6.7
0007792583-01	b 0805	26.1	16.7	42.7	6.7
0007792591-01	b 0901	42.1	17	59	5.4
0007792609-01	b 0902	32.2	27.1	59.3	5.4
0007792617-01	b 0903	17.7	29.1	46.8	6.3
0007796865	b 0904	17	22.2	39.2	6.9
0007796873	b 0905	25.2	28.9	54.1	5.8
0007792625-01	b CL01	42.2	21.9	64.1	5.1
0007792633-01	b CL02	34.5	10.4	44.9	6.5
0007792641-01	b CL03	34.6	13.1	47.7	6.3
0007792658-01	b CL04	21.8	10.7	32.6	7.4
0007792666-01	b CL05	24.1	11.1	35.2	7.3
0007792674-01	b UG01	43.3	16.9	60.2	5.4
0007792682-01	b UG02	35.5	15.4	51	6
0007792690-01	b UG03	18.9	18	36.9	7.2
0007792708-01	H 0101	42.9	19.9	62.8	5.2
0007792716-01	H 0102	30	21.4	51.4	5.9
0007792724-01	H 0103	33.4	13.2	46.6	6.4
0007792732-01	H 0104	44.5	10.9	55.4	5.7
0007792740-01	H 0105	43.8	8.9	52.7	5.9
0007792757-01	H 0106	26.4	19.8	46.2	6.4
0007792765-01	H 0107	28.7	15.3	44.1	6.6
0007792773-01	H 0108	23.1	17	40.1	6.9
0007792781-01	H 0201	44.6	18.6	63.2	5.2
0007792799-01	H 0202	32.5	16.5	49	6.2
0007792807-01	H 0203	31.9	13.2	45.1	6.4
0007792815-01	H 0204	43.3	11.2	54.6	5.7
0007792823-01	H 0205	43.8	9.6	53.3	5.8
0007792831-01	H 0206	30.2	17.6	47.8	6.3
0007792849-01	H 0207	31.3	13.1	44.4	6.5
0007792856-01	H 0208	25.1	16.1	41.2	6.8
0007792864-01	H 0301	41.6	22.4	64	5.1
0007792872-01	H 0302	38.5	20.1	58.6	5.4
0007792880-01	H 0303	39	15.6	54.6	5.7
0007792898-01	H 0304	45.2	14.8	59.9	5.4
0007792906-01	H 0305	43.5	9.8	53.2	5.8

Certificate number and link	Unit Number	Heating load (MJ/m /p.a.)	Cooling load (MJ/m /p.a.)	Total load (MJ/m /p.a.)	Star rating
0007792914-01	H 0306	30.4	17.6	48.1	6.2
0007792922-01	H 0307	31.7	12.9	44.6	6.5
0007792930-01	H 0308	25.2	16.4	41.6	6.8
0007792948-01	H 0401	36.8	19.4	56.2	5.6
0007792955-01	H 0402	41.2	11.6	52.7	5.9
0007792963-01	H 0403	44.9	21	65.9	5
0007792971-01	H 0404	34.9	19.6	54.5	5.7
0007792989-01	H 0405	33.7	13.7	47.4	6.3
0007792997-01	H 0406	23.6	20	43.6	6.6
0007793003-01	H 0501	37.5	14.3	51.8	5.9
0007793011-01	H 0502	36.8	23.5	60.2	5.4
0007793029-01	H 0503	9.2	19.6	28.8	7.8
0007793037-01	H 0504	24.4	20.5	44.9	6.5
0007793045-01	H 0505	22.4	20.8	43.2	6.7
0007793052-01	H 0601	37	14.7	51.8	5.9
0007793060-01	H 0602	34.9	24.1	59	5.4
0007793078-01	H 0603	27.3	22.2	49.5	6.1
0007793086-01	H 0604	15.9	29.5	45.4	6.4
0007793094-01	H 0605	27.3	12	39.4	6.9
0007793102-01	H 0701	36.1	15	51.1	5.9
0007793110-01	H 0702	34.6	24.2	58.7	5.4
0007793128-01	H 0703	27	22.4	49.4	6.1
0007793136-01	H 0704	15.8	29.4	45.2	6.4
0007793144-01	H 0705	27.1	12.4	39.6	6.9
0007793151-01	H 0801	43.3	16.4	59.7	5.4
0007793169-01	H 0802	44.8	27.4	72.1	4.7
0007793177-01	H 0803	19.2	25	44.3	6.6
0007796857	H 0804	22	29.5	51.4	5.9
0007796840	H 0805	20.1	22.5	42.6	6.7
0007796170	H CL01	25.6	5.3	30.9	7.6
0007796188	H CL02	37.6	4.7	42.2	6.7
0007796196	H CL03	40.9	15.6	56.5	5.6
0007796204	H CL04	37.6	14.3	51.9	5.9
0007796212	H CL05	36.1	16.7	52.7	5.9
0007796220	H CL06	16.9	10.9	27.9	7.8
0007796238	H CL07	34.4	6.4	40.8	6.8
0007796246	H LG01	33.7	11.1	44.9	6.5
0007796253	H LG02	24.2	10.6	34.9	7.3
0007796261	H LG03	28.1	10.7	38.8	7
0007793185-01	H UG01	41.7	20.2	61.9	5.3
0007793193-01	H UG02	40.8	12.3	53.1	5.9
0007793201-01	H UG03	39.8	10	49.8	6.1

Certificate number and link	Unit Number	Heating load (MJ/m /p.a.)	Cooling load (MJ/m /p.a.)	Total load (MJ/m /p.a.)	Star rating
0007793219-01	H UG04	29.6	19.6	49.2	6.2
Average		32.74	17.70	50.44	6.08

Explanatory Notes

About this report

This summary rating is the average rating of all NCC Class 2 dwellings in a development. The individual dwellings' ratings are a comprehensive, dynamic computer modelling evaluation of a home, using the floorplans, elevations and specifications to estimate the energy load. It addresses the building layout, orientation and fabric (i.e. walls, windows, floors, roofs and ceilings), but does not cover the water or energy use of appliances, or energy production of solar panels. For more details about an individual dwelling's assessment, refer to the individual dwelling's NatHERS Certificate (accessible via link).

Accredited Assessors

To ensure the NatHERS Certificate is of a high quality, always use an accredited or licenced assessor. NatHERS accredited assessors are members of a professional body called an Assessor Accrediting Organisation (AAO). AAOs have specific quality assurance processes in place, and continuing professional development requirements, to maintain a high and consistent standard of assessments across the country.

Any questions or concerns about this report should be directed to the assessor in the first instance. If the assessor is unable to address these questions or concerns, the AAO specified on the front of this certificate should be contacted.

Disclaimer

The format of the NatHERS Certificate was developed by the NatHERS Administrator. However the content, input and creation of the NatHERS Certificate is by the assessor. It is the responsibility of the assessor who prepared this certificate to use NatHERS accredited software correctly and follow the NatHERS Technical Notes to produce a NatHERS Certificate.