Ecologically Sustainable Design (ESD) Report

Project:

14-16 Marshall Avenue, 5-9 Holdsworth Avenue & 2-10 Berry Road, St Leonards NSW 2065

Job Number: 022-2199

Rev 1.1 – 5 May 2023

Eco Engineering Group

SUSTAINABILITY.

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1. Executive Summary

EEG has been engaged by to undertake the required Ecologically Sustainable Design (ESD) assessments and provide a sustainability report for the proposed development at 14-16 Marshall Avenue, 5-9 Holdsworth Avenue & 2-10 Berry Road, St Leonards NSW 2065.

The principles of ecologically sustainable design will be an integral consideration throughout this development. This report summarises the ESD provisions for the development which demonstrate commitment to environmental sustainability.

The sustainability targets for the development will be achieved in an integrated and staged approach through minimising the need for energy consumption (via passive measures) and then consumption optimisation (energy efficiency) and use of renewable resources where required.

The initiatives presented in this report demonstrate a wide range of measures which will result in high levels of environmental performance and also improvement of occupants' health, productivity, comfort, and satisfaction.

Aiming at leading practice in energy and environmental targets, the project architect and building services design team will maximise energy efficiency in an integrated and staged approach as described in Table 1 below.

Table 1. Sustainability Approach.

Load Reduction (Minimising the need for resource consumption e.g., energy, water, and material)	Passive Design
	Building fabric improvements
	Maximise use of natural lighting
	Maximise use of natural ventilation (where possible)
Optimising energy and water consumption	High efficiency Heating, Ventilation and Air Conditioning
	High efficiency lighting
	High efficiency hot water systems
	High efficiency appliances
Use of renewable resources (renewable energy and rainwater harvesting)	Application of Solar Energy or Solar thermal systems where practical
	Rainwater harvesting

Benchmarking and compliance requirements:

The development will meet and outperform the following regulatory sustainability requirements:

- NCC Section J – Outperforming the minimum Energy Efficiency requirements.
- BASIX – Outperforming Energy, Water and Thermal Comfort (Appendix D).
- NatHERS – Achieving a 6.6 Star Average NatHERS Performance (Appendix C)

Sustainability benchmarks beyond the minimum requirements

Although not seeking formal rating certification, where feasible, the design team will also consider the sustainable design principles based on the following sustainability tool.

- Green Star Buildings Tool – Green Building Council of Australian. 5 Star Design Aspiration.

2. Introduction

The design team recognise the importance of sustainable developments in terms of environmental preservation, occupants' health, safety, and wellbeing, as well as in terms of greenhouse gases emissions reduction.

The project architect, consultants and contractors will strive to design and construct the building based on the Environmentally Sustainable Design (ESD) principles which exceed the minimum regulatory NCC Section J requirements.

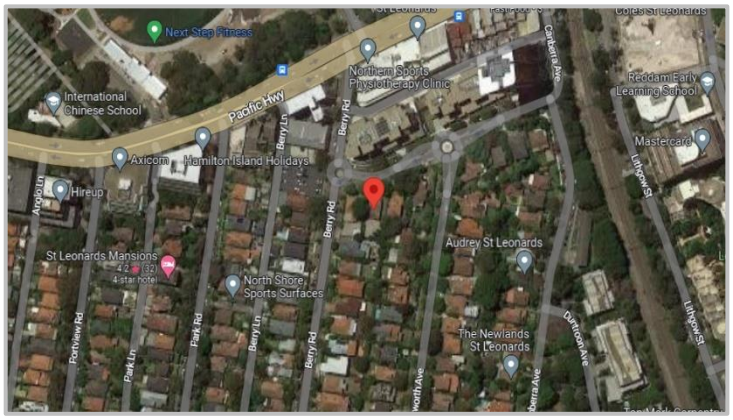


Figure 1. Location – 14-16 Marshall Avenue, 5-9 Holdsworth Avenue & 2-10 Berry Road, St Leonards NSW 2065 – Source: Google Map

The facade and floor plans are designed with the vision to give occupants the very best in terms of passive heating and passive cooling. This, when combined with other energy efficiency strategies (listed later in the report) will lead to low energy demands for the tenancies and base building and therefore lower greenhouse gas emissions during the life of this development.

Natural lighting and natural ventilation will be utilised very effectively throughout the development. In addition to thermal comfort, energy and water efficiency, the proposed building design will provide sustainable and efficient operation to the occupants.

The proposed sustainable design initiatives will not only improve the building services life but are low-cost, low maintenance and reliable, especially when compared to often prohibitively complex and expensive retrofits. Furthermore, the passive design principles will facilitate a low-energy and cost-effective operation for the occupants.

The following are some of the design initiatives which will improve the environmental performance of the development and deliver long term energy efficiency during the life of the building.

- Optimising the size of the mechanical plant to ensure the plant is working at its peak efficiency and minimise the capital cost of the plant.
- Having high efficiency lighting and air conditioning equipment will reduce the energy consumption of the buildings.
- Variable Speed Drives (VSD) controls the speed of pumps, fans, and other mechanical plant to ensure that they are only using as much power as it is needed.
- Commissioning of all services equipment to ensure their correct operation.
- A high-performance façade will limit the heat entering the buildings, reducing air conditioning system sizes and the energy use over the year.
- A mixed mode approach allowing the buildings to be naturally ventilated when outdoor conditions are suitable allowing significant energy reduction by not requiring the air conditioning system to operate at all times.
- Emission reductions and material optimisation.
- Maximise use of non-toxic building materials.
- Maximise use of materials that are recyclable.
- Minimise Waste in Construction.
- Minimise Waste in Operation.
- Renewable Energy generation – Solar PV & Heat Pump technology.

3. Benchmarking

Benchmarking and compliance requirements:

The development will meet and outperform the following regulatory sustainability requirements:

- NCC Section J – Outperforming the minimum Energy Efficiency requirements.
- BASIX – Outperforming Energy, Water and Thermal Comfort (Appendix D).
- NatHERS – Achieving a 6.6 Star Average NatHERS Performance (Appendix C)

Sustainability benchmarks beyond the minimum requirements

Although not seeking formal rating certification, where feasible, the design team will also consider the sustainable design principles based on the following sustainability tool.

- Green Star Buildings Tool – Green Building Council of Australian.

3.1. National Construction Code (NCC) Section J

Section J of the NCC sets regulations for energy efficiencies for all types of buildings with respect to the building's construction, design, and activity.

The objective of the NCC Section J is to reduce the greenhouse gas emissions. Section J requires that a building, including its services, must have features to the degree necessary that facilitate the efficient use of energy.

The NCC offers two compliance methods that differ in complexity and flexibility. The two compliance methods are:

- Deemed-to-Satisfy (DTS) Compliance.
- JV3 – Verification using a referenced building.

To meet the performance requirements J1P1 of Section J of the NCC, compliance with the design and function of the building can be demonstrated with the Deemed-To-Satisfy (DTS) provisions of Section J Parts J3 to J9. Alternatively, achievement of the performance requirements can be demonstrated through Verification Method J1V3.

- Part J3 Elemental provisions for a sole-occupancy unit of a Class 2 building or a Class 4 part of a building
- Part J4 Building Fabric relates to the building fabric and minimum thermal performance for constructions according to climate zone for roofs, ceilings, roof lights, walls, glazing and floors.
- Part J5 Building Sealing details requirements to restrict unwanted infiltration into a building.
- Part J6 Air-Conditioning and Ventilation Systems details requirements to ensure these services are used and use energy in an efficient manner.
- Part J7 Artificial Lighting and Power details requirements for lighting and power to ensure energy is used efficiently by these systems.
- Part J8 Heated Water Supply and Swimming Pool & Spa Pool Plant details hot water supply design requirements.
- Part J9 Facilities for Energy Monitoring and on-site distributed energy resources.

The development will meet and outperform the NCC energy efficiency requirements of Part J. A Section J report will be prepared once the design is further progressed.

3.2. Building and Sustainability Index (BASIX)

The National Construction Code (NCC) Section J deems that developments with a building class of 1 or 2 in NSW should be assessed against the BASIX rating scheme. The BASIX rating scheme investigates the thermal comfort of the building, energy consumption and water consumption.

There are three input sections: Energy, Thermal Comfort, and Water. Each of these three categories is integrated and often influences each other.

New residential developments in NSW must reduce their energy and water use, according to BASIX requirements developed by the Department of Planning, the objectives of the BASIX scheme are relative to an average development in NSW.

- 40% reduction in water consumption,
- 25% reduction in greenhouse gas emissions, depending on building height,
- Minimum thermal performance requirements for heating and cooling loads. The maximum allowable heating and cooling loads for each apartment are dependent on the glazing and floor area.

Achievement of the specified targets is demonstrated through use of a web-based prediction tool. This tool requires input of several aspects of the dwelling's design and produces a BASIX certificate and report listing all of the environmental initiatives proposed and required to achieve the mandatory performance.

A BASIX Certificate is a DA requirement and demonstrates compliance with the NSW Government's sustainability targets. The development will meet and exceed the minimum requirements for all following areas and BASIX Certificate No. 1241743M has been provided.

- Water Efficiency: 41% reduction (minimum requirements under BASIX: 40%)
- Energy Efficiency: 31% reduction (minimum requirements under BASIX: 25%)
- Thermal Comfort: Outperforms the minimum BASIX requirements.

For further information about the BASIX requirements please refer to the BASIX Assessment Report and the BASIX Certificate provided in Appendix D of this report.

3.3. Green Star

Green Star is an environmental rating tool developed by the Green Building Council of Australia (GBCA) that has a holistic approach over a wide range of issues that covers a range of sustainability impact areas. There are various Green Star tools developed to suit a range of different building types including:

- Green Star Buildings.
- Design and As-Built.
- Office Interiors.
- Performance.
- Communities.

Green Star rating tools use Stars to rate performance:

- Legal compliance: The building is compliant with legislation (National Construction Code 2019 or later)
- Good Practice: The building meets the Minimum Expectations of good practice energy and water efficient, good indoor environment quality and built to operate well.
- 4 Star reflects a Best Practice environmental performer. It builds on the Minimum Expectations to deliver a building that is
- either climate positive or a higher performer in energy, water, and health related issues (15 out of 100 points)

- 5 Star demonstrates Australian Excellence by being a high environmental performer that addresses social issues relevant to the building owner (35 out of 100 points)
- 6 Star showcases World Leadership. It has been built to be a highly efficient building fully powered by renewables that addresses a significant number of environmental and social issues, and contributes to the community (70 out of 100 points).

The diagram in Figure 2. below details the ratings awarded by Green Star Buildings.

Figure 2. The ratings awarded by Green Star Buildings.

Green Star rating tools include eight separate environmental impact categories, as shown Figure 3 . and Figure 4 follows.

Figure 3. Environmental impact categories list used in Green Star rating tools.

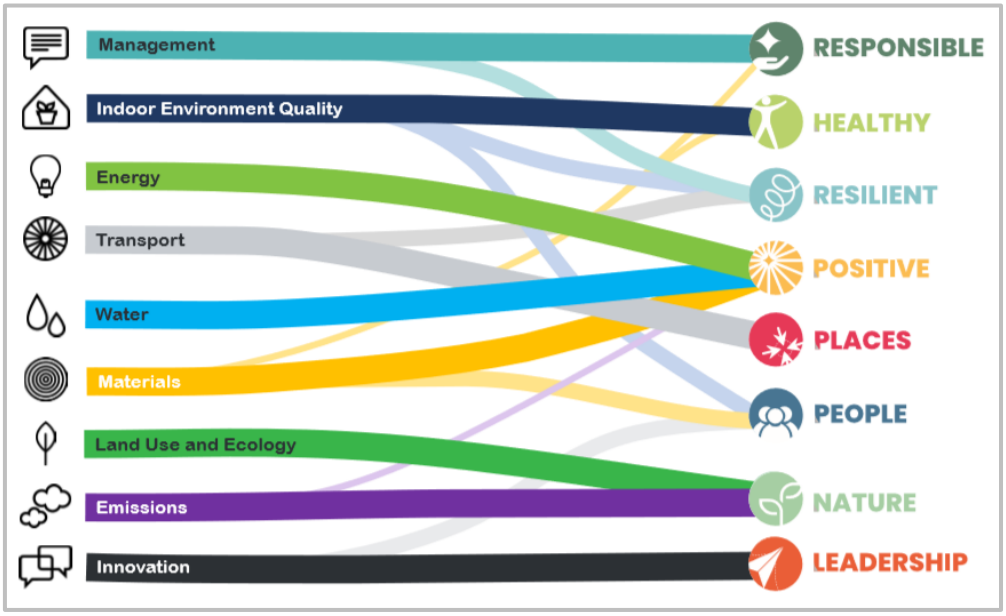
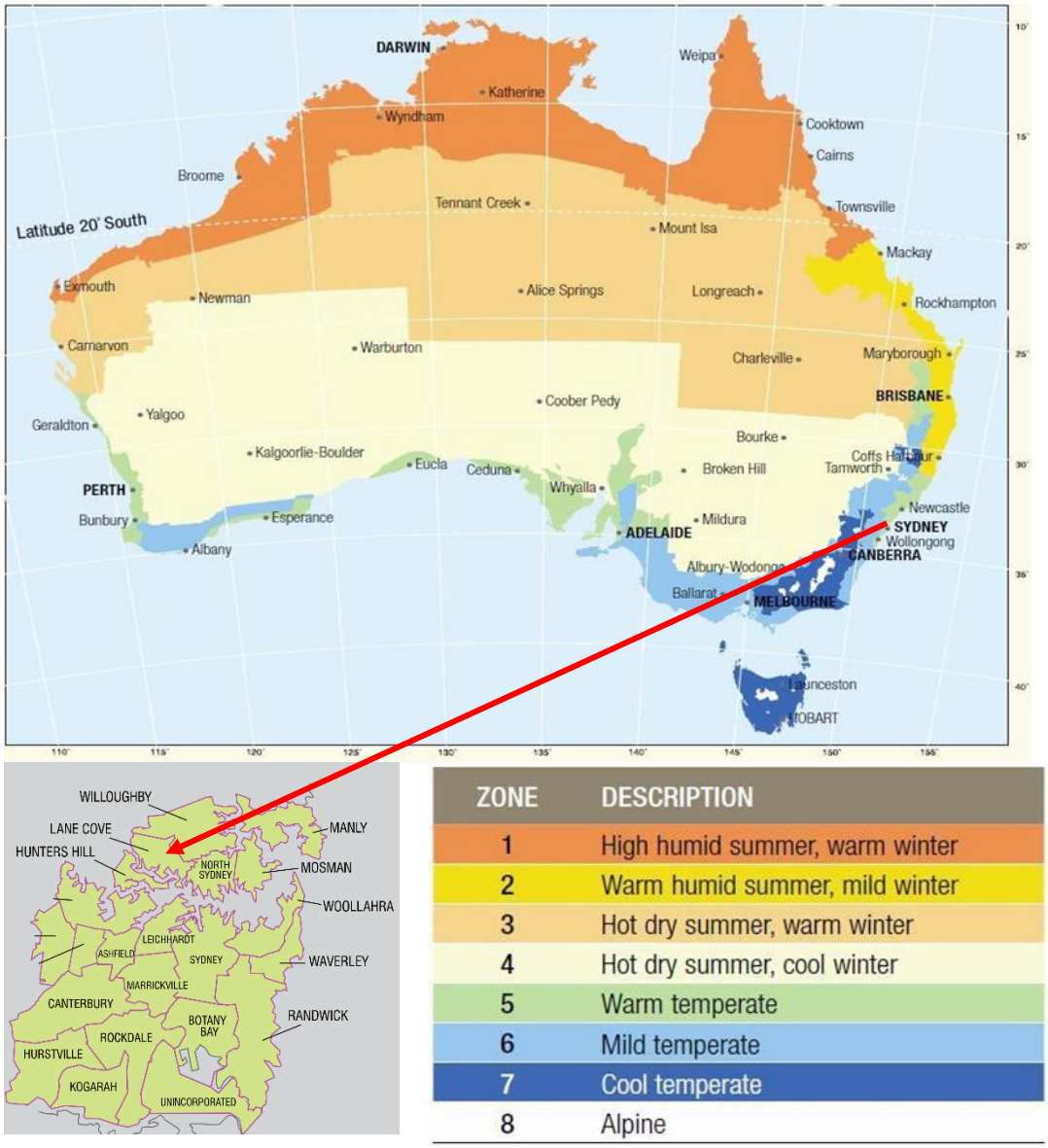


Figure 4. Eight separate environmental impact categories chart used in Green Star rating tools.

Although not seeking formal rating certification, where feasible, the design team will also consider the sustainable design principles based on the following sustainability tool.

4. Development Location

The development will be located in St Leonards NSW which is within the NCC climate zone 5 (warm temperate).



ZONE	DESCRIPTION
1	High humid summer, warm winter
2	Warm humid summer, mild winter
3	Hot dry summer, warm winter
4	Hot dry summer, cool winter
5	Warm temperate
6	Mild temperate
7	Cool temperate
8	Alpine

Figure 5. NCC Climate zone map.

4.1. Information Used in Review

Our review is based on the following preliminary architectural drawings provided by PTW Architects (Table 2).

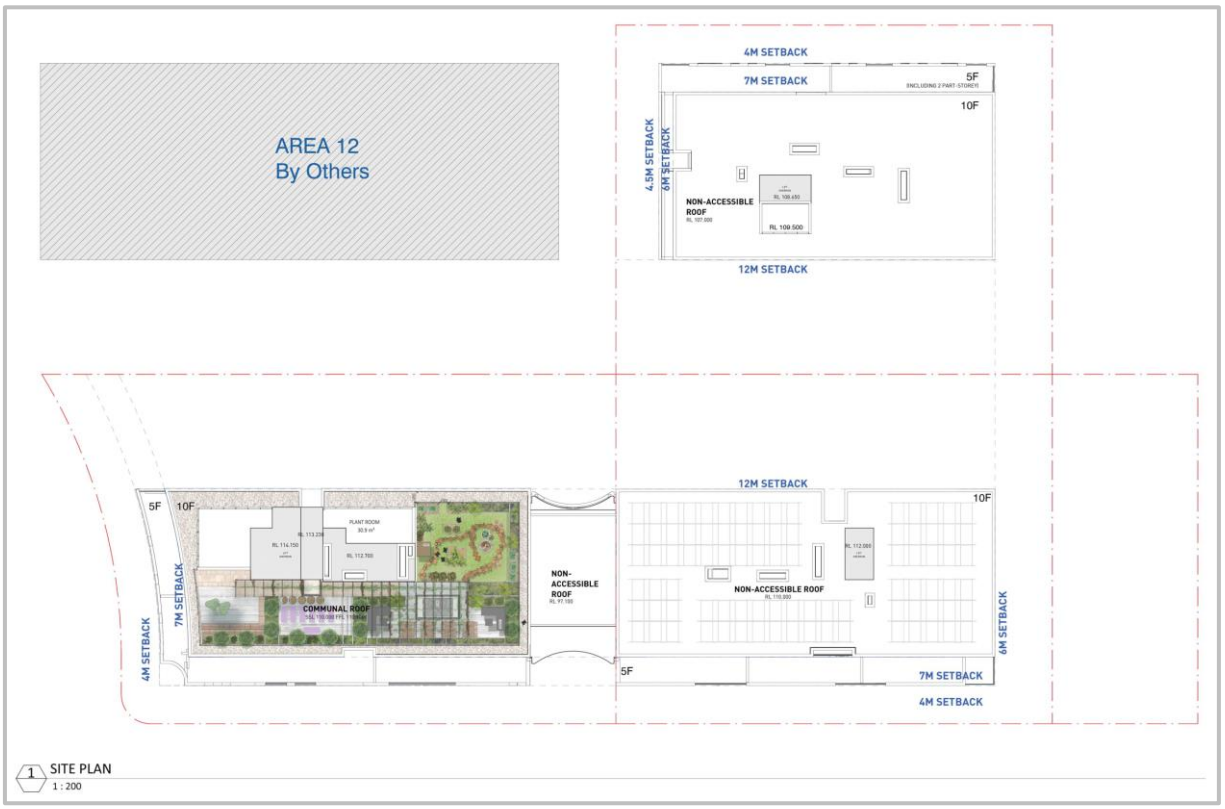
Table 2. Architectural drawing list.

Drawing Title	Drawing Number
Cover Sheet & Drawing List	DA-A110010
Development Information	DA-A110020
Site Analysis	DA-A120010
Demolition Plan	DA-A120020
Site Plan	DA-A130010
Basement 02 Plan	DA-B1B0910
Basement 01 Plan	DA-B1B1010
Ground Floor Plan	DA-B1GRD10
Level 01 Plan	DA-B1L0110
Level 02 Plan	DA-B1L0210
Level 03 Plan	DA-B1L0310
Level 04 Plan	DA-B1L0410
Level 05 Plan	DA-B1L0510
Level 06 Plan	DA-B1L0610
Level 07 Plan	DA-B1L0710
Level 08 Plan	DA-B1L0810
Level 09 Plan	DA-B1L0910
Level 10 Plan	DA-B1L1010
Level 11 Plan	DA-B1L1110
Level 12 Plan	DA-B1L1210
Level 13 Plan	DA-B1L1310
Level13 Plan	DA-B1L1311
Roof Plan	DA-B1L1410
East Elevation	DA-C010010
South Elevation	DA-C020010
West Elevation	DA-C030010
North Elevation	DA-C040010
Green Spine West Elevation	DA-C050010
Green Spine East Elevation	DA-C060010
Perspective 1	DA-C510010
Perspective 2	DA-C510011
Materials And Finishes Board	DA-C910010
Section Building 14-15	DA-D110010
Section Building 13-15	DA-D120010

4.2. Architectural Drawings

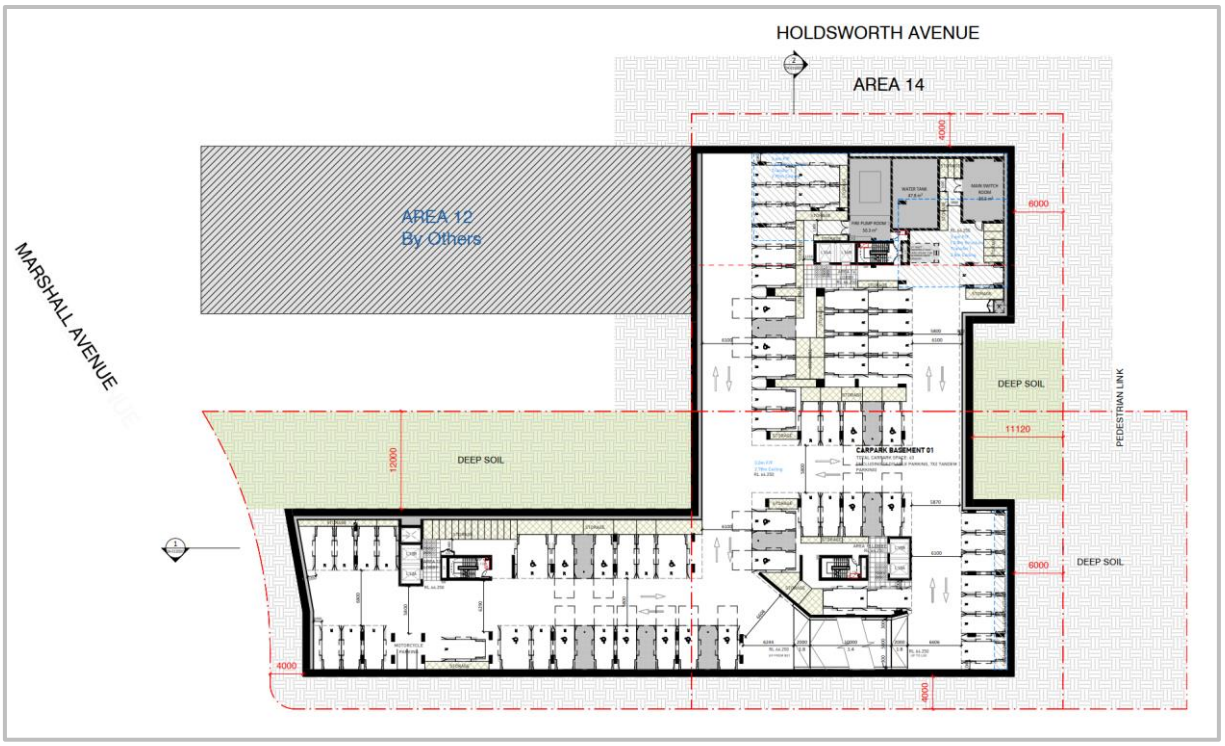
Selected architectural plans and elevations for the proposed development are provided below.

Site Plan

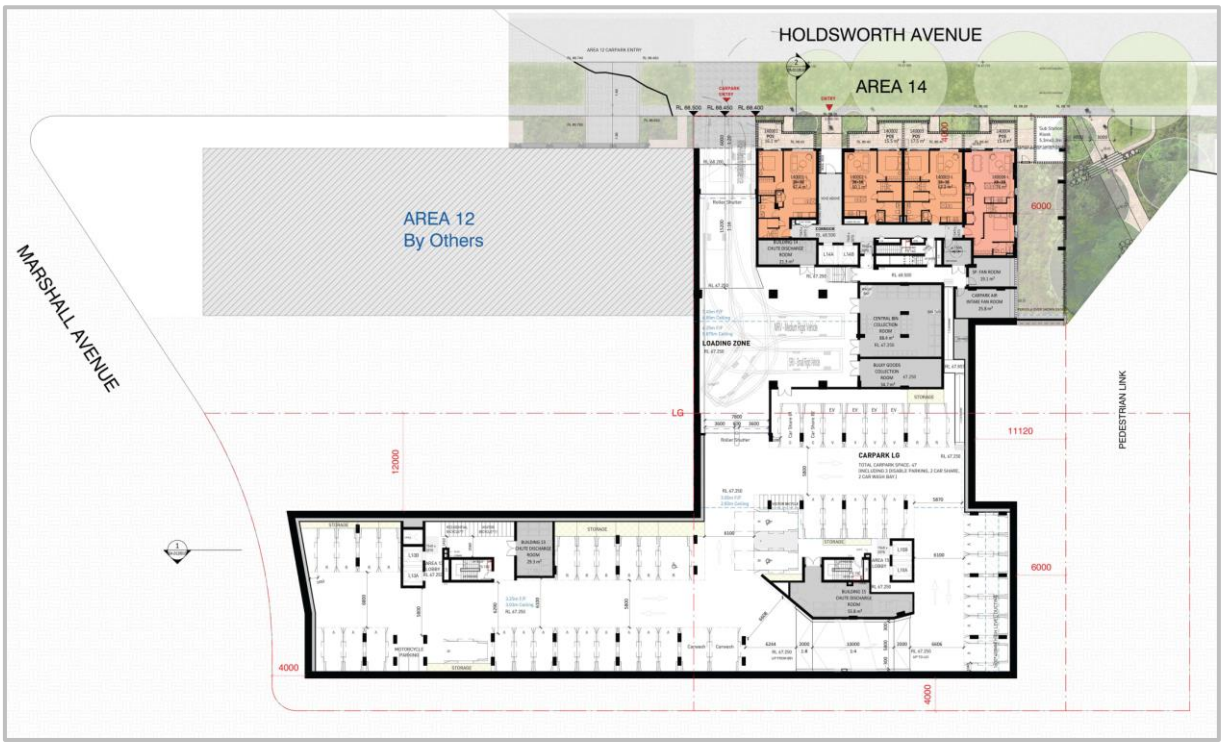


Basement 02 – Floor Plan

Basement 01 – Floor Plan



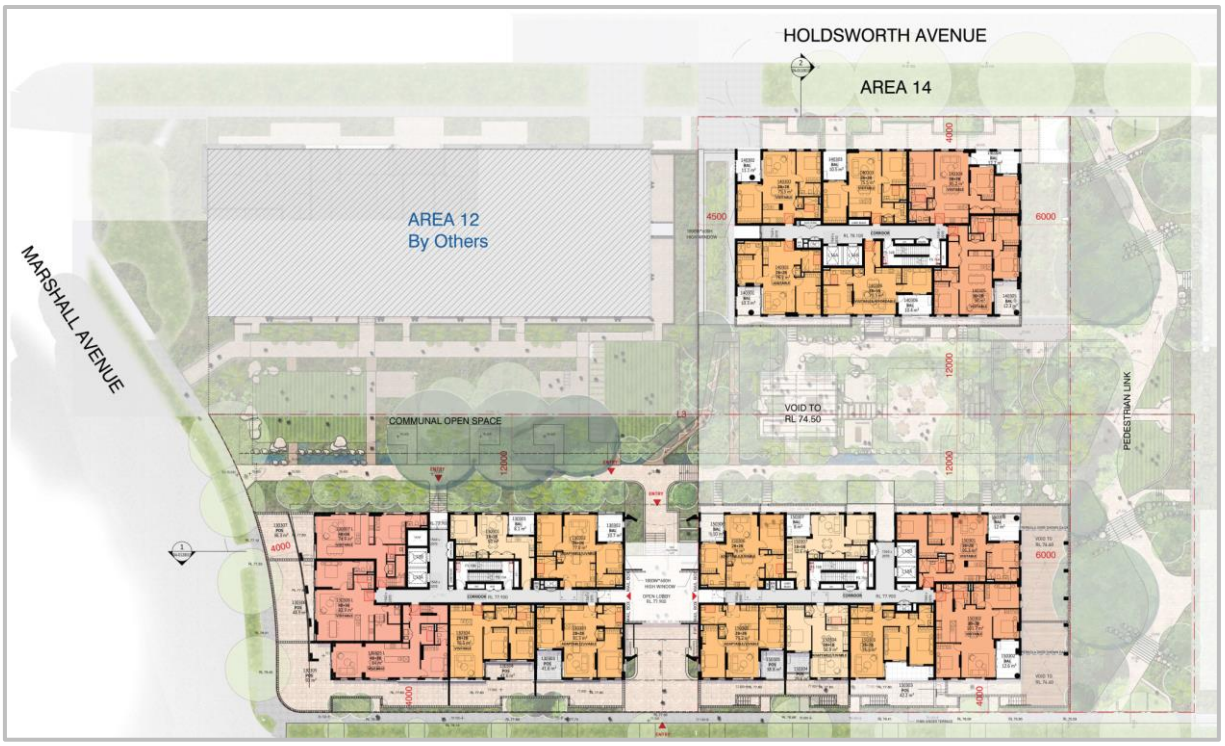
Ground – Floor Plan



Level 01 – Floor Plan

Level 02 – Floor Plan

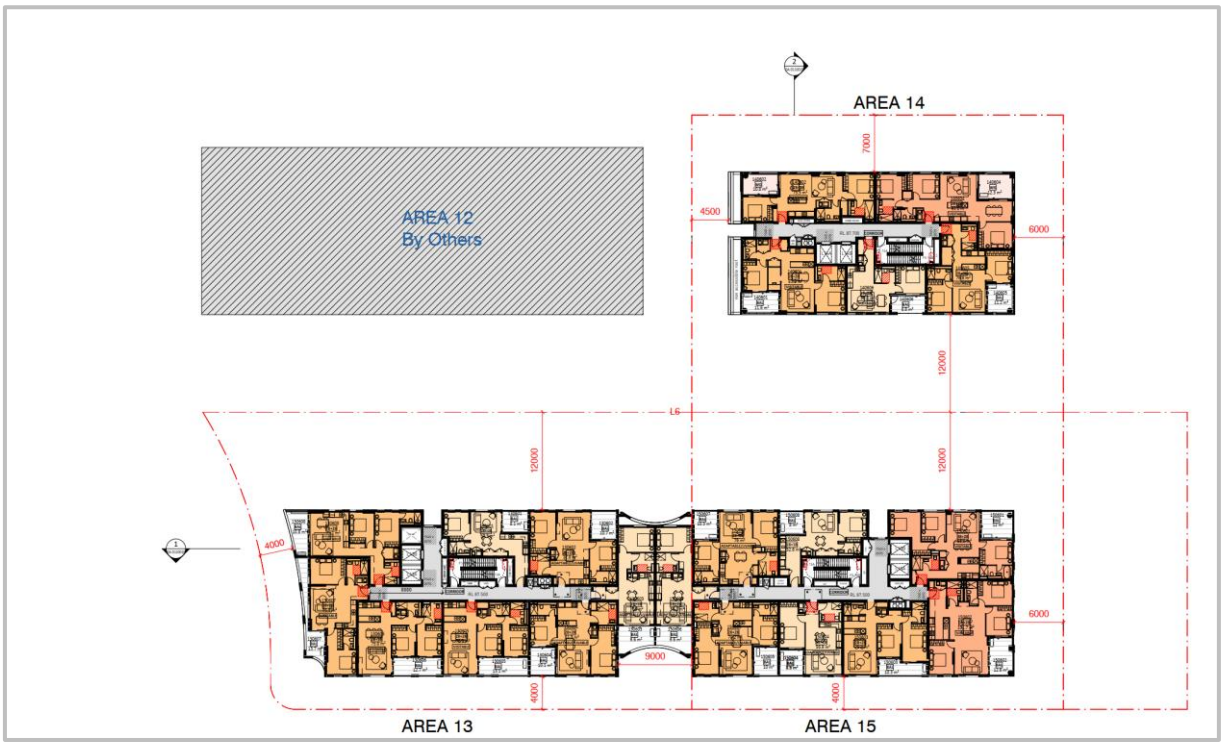
Level 03 – Floor Plan



Level 04 – Floor Plan

Level 05 – Floor Plan

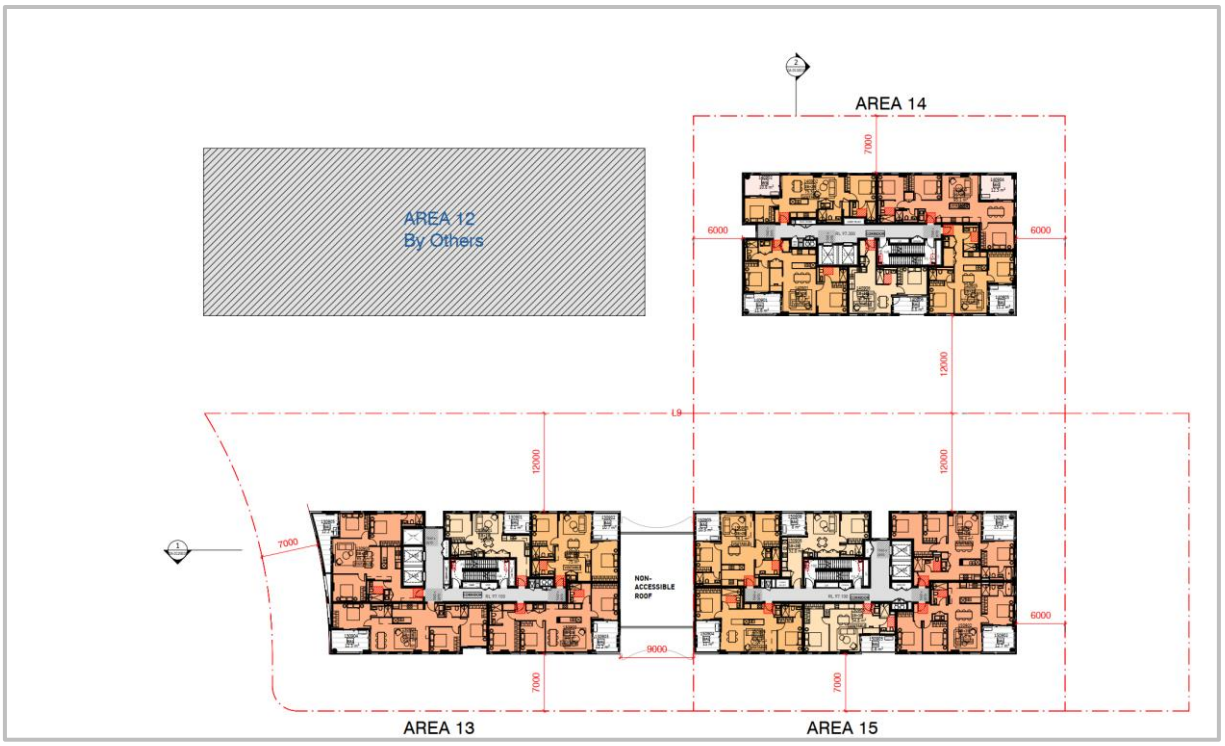
Level 06 – Floor Plan



Level 07 – Floor Plan

Level 08 – Floor Plan

Level 09 – Floor Plan

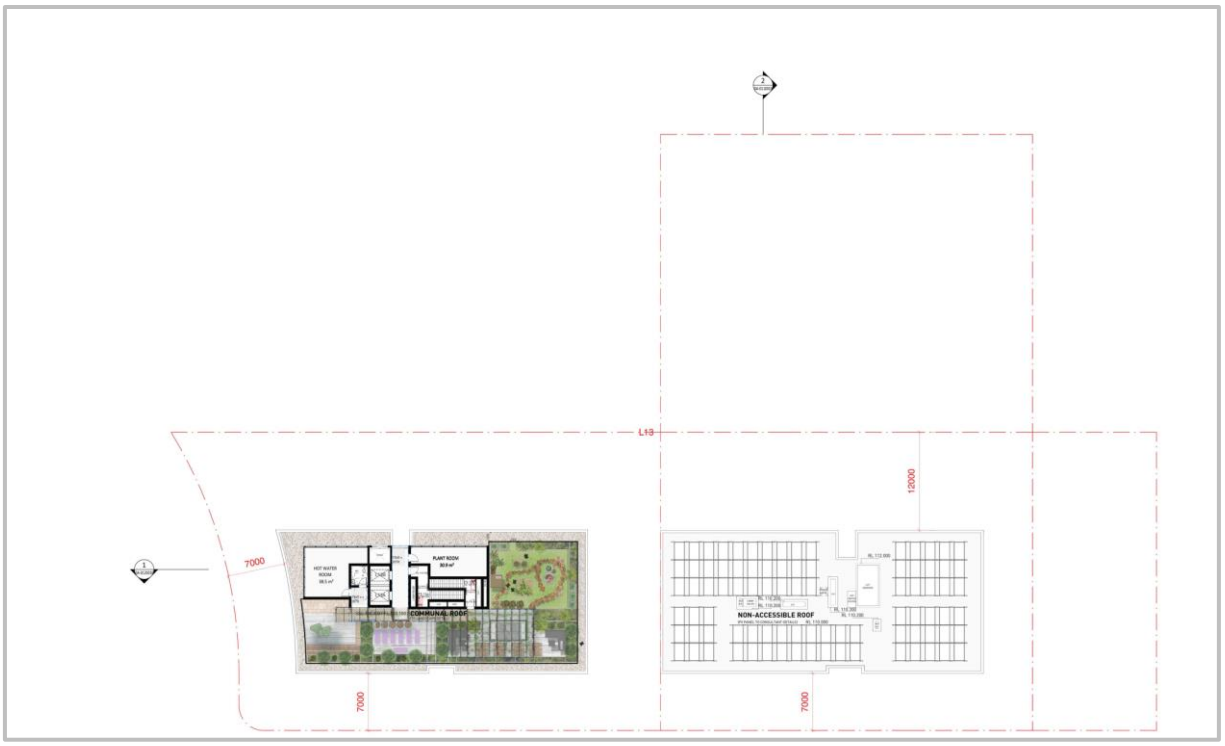


Level 10 – Floor Plan

Level 11 – Floor Plan

Level 12 – Floor Plan

Level 13 – Floor Plan



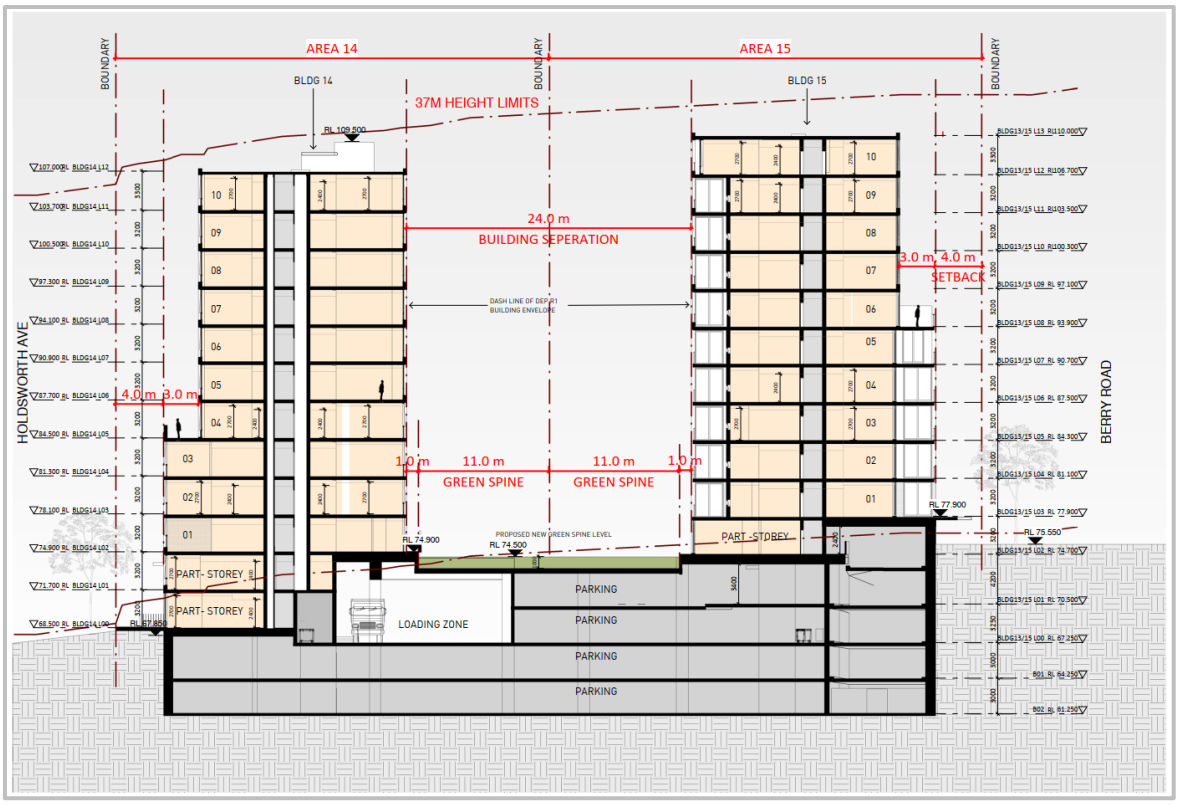
East Elevation

South Elevation

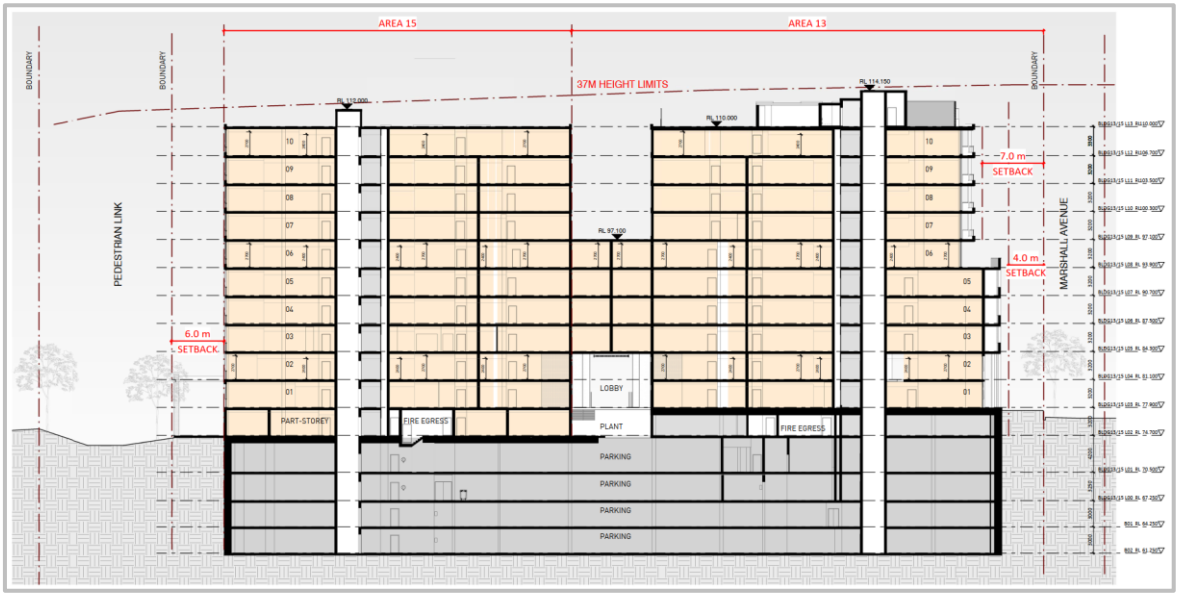
West Elevation

North Elevation

Section BLDG 14-15



Section BLDG 13-15



5. Ecologically Sustainable Design (ESD) Initiatives

The principles of ecologically sustainable development are an integral consideration in design and construction of proposed development and also in assessing its benefits and impacts.
The design team will focus on a wide range of ESD strategies which will result in high levels of environmental performance and an increment on occupant's health, productivity, comfort and satisfaction.

5.1. Integrated Design Approach

The integrated design process is a process by which all of the design variables that affect one another are considered together and resolved in an optimal fashion. Often referred to as holistic design, this approach considers the development as a whole with the emphasis on integrating the different aspects of building's design.

5.2. Greenhouse gas emission reduction

Greenhouse gas emission reduction is achieved in a staged approach:

- First, reduction in overall energy consumption through demand reduction, passive design and energy efficiency, then;
- Reduction in electricity and gas utility consumption by utilising waste products, rainwater harvesting and renewable energy technologies (where feasible).

The integrated response to energy proposed for this project is summarised below:

1. Load Reduction and Passive Design.
2. System Efficiency.
3. Capture Waste.
4. Renewable Energy (where feasible).

Energy consumption will be reduced through the efficient design of lighting, air-conditioning and ventilation systems, as well as energy efficient water heating and renewable energy technologies (where feasible). The development will consider Greenhouse gas emission reduction in design and operation through utilising energy conservation measures suitable for the development.
The following sections of the report outline the sustainability initiatives that will be considered and further developed by the design team during the detailed design stages.

5.3. Management

The initiatives under the management category promote the adoption of environmental principles from project inception, design, and construction phases to the operation of the building and its systems.

This category aims to highlight the importance of a holistic and integrated approach to constructing a building with good environmental performance. The following measures are some of the initiatives targeted within the management category and are subject to further design development. These initiatives aim to reduce environmental impacts at construction and operational stages as well as to maximise building performance at commissioning.

5.3.1. Environmental Ratings and Involvement of a GSAP

Environmental rating schemes such as Green Star (Australia), LEED (US), Living Building Challenge (US) or BREEAM (UK) are used to create a marketable environmental credential based on achievement of a recognised benchmark. Ratings can be useful for marketing to the occupants and for demonstrating ESD achievement for planning submissions.

Green Star is the most recognised rating scheme in Australia, with hundreds of certified buildings, mostly office buildings. The new Green Star – Design and As-Built chosen as an appropriate benchmark for the project.

Green Star includes a range of categories under which credits are available. Points are scored under each credit, and the total score is used to determine a final rating; 45-59 points for 4 Star, indicating Best Practice, 60-74 points for 5 Star, indicating Australian Excellence; and 75 or more points for 6 Star, indicating World Leadership. The categories are as follows:

- Management.
- Indoor environment quality.
- Energy.
- Water.
- Transport.
- Materials.
- Land use and ecology.
- Emissions.
- Innovation.

A Green Star Accredited Professional (GSAP) is involved as part of the design and construction to prepare the necessary ESD guidelines.

5.3.2. Commissioning Clauses

Commissioning of building systems to a high standard, with independent oversight, will ensure that a quality process is followed and provide an outside review of the practicalities of the design. An extended building tuning period should be undertaken following defects liability period to ensure that systems are performing as intended, taking into account different seasonal variables, and that any need for recommissioning is identified and carried out.

To adopt commissioning and handover initiatives that ensure that all building services can operate to optimal design potential, such as:

- Where possible, comprehensive pre-commissioning, commissioning, and quality monitoring to be contractually required to be performed for all building services (BMS, mechanical, electrical and hydraulic).

5.3.3. Building Tuning

After handover, the building owner is expected to implement tuning of all building systems and undertake full re-commissioning 12 months after practical completion.

5.3.4. Building User's Guide

To produce a Building User's / Occupant's Guide, information management that enables building users / occupants to optimise the building's environmental performance during its operation.

5.3.5. Environmental Management Plan

The contractor is expected to adhere to a comprehensive Environmental Management Plan (EMP) for the works. Contractors are recommended to be ISO 14001:2004 certified. Environmental management plans and systems should be implemented to ensure that demolition and construction activities appropriately manage and mitigate environmental impacts.

5.3.6. Waste Management System

To encourage and facilitate effective waste management once the development is in operation, sufficient spatial provision will be made to allow for the effective separation of waste from recycling. Dedicated waste recycling rooms allow space for the separation and storage of recyclable waste during the building's operation, allowing for the following waste streams to be separated:

- Glass.
- Cardboard.

- Paper.
- Organics.
- Plastics.
- Metals.

Waste management solutions are varied and dependant on the extent of commitment of the end user. Recycling, reuse, and composting are examples of waste management options.

5.3.7. Environmental Management and Maintenance

Effective environmental and waste management will be implemented throughout the demolition, construction, and operational stages of this development.

The EMP shall include a Waste Management Plan, specifying recycling targets for demolition and construction waste. It is recommended that construction and demolition contracts stipulate a minimum 90% target for diversion of waste from landfill. This may be achieved through recycling or reuse.

- Identification of appropriate waste sub-contractors for recycling, costs of collection and timing of collection service.
- Participation in waste minimisation training for contractors and sub-contractors.
- Published waste minimisation plan to reduce site waste to landfill.

Provision of separate waste skips for cardboard, timber, metal, soft plastic, polystyrene, insulation, concrete, glass, and bricks.

5.4. Indoor Environmental Quality (IEQ) Initiatives

Indoor Environmental Quality initiatives consider the wellbeing of occupants, addressing factors such as heating, ventilating and air conditioning (HVAC), lighting, indoor air quality and building attributes, all of which contribute to good indoor environmental quality.

The following measures are some of the initiatives targeted within the IEQ category for further consideration and development during detailed design.

- Improvement of outside air rate by providing at a rate greater than AS1668.2 requirements. Air-conditioning system will be installed with carbon dioxide monitoring and control to ensure sufficient outside is delivered to occupants.
- Optimisation of the air quality by improving air change effectiveness
- Maximisation of natural lighting level to the building occupants
- Minimisation of the contribution and levels of Volatile Organic Compounds (VOCs) via the use of low VOC paints, adhesives and sealants, carpets, and flooring.
- All engineered wood products to be used in the development will have low formaldehyde emission.
- High efficiency lighting system with suitable luminance levels to avoid causing discomfort and strain for the occupants. All fluorescent luminaries are to be installed with high frequency ballasts to avoid discomfort caused by low frequency flicker.
- External Views: The design allows unobstructed external views for the majority of occupied spaces.
- Internal noise level at an appropriate level to ensure the occupants' satisfaction and wellbeing.

5.4.1. Thermal Comfort

Thermal comfort can be provided by passive and mechanical means. Passive design initiatives will be considered before the design of the mechanical systems to reduce operational energy costs, with potential reductions in the air conditioning size and ongoing maintenance.

Thermal comfort is a function of the following factors:

- Radiant temperature (45% of net comfort effect).
- Air temperature and humidity (35% of net comfort effect).
- Air movement, clothing, and activity (20% of net comfort effect).

Passive heating and cooling design strategies which will improve occupant thermal comfort include:

- Roof insulation not only reduces heat gain and loss, but will also moderate radiant temperatures from the walls, floor, and ceiling.
- Building facades with high performance glazing and window frames will have a combination of external shading and high-performance glass to reduce heat transfer and radiant temperatures in proximity to the windows.

Indoor areas will be designed to be protected from excessive summer solar radiation, reducing radiant heat loads on the space, but still providing enough daylight during appropriate times of the year to improve comfort levels.

The approximate annual Dry-bulb temperature and comfort range for the site is shown in Figure 6:

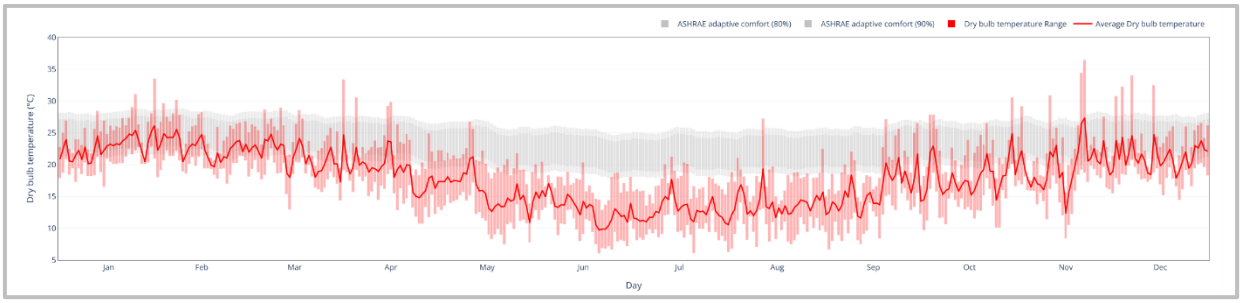


Figure 6. Annual Dry-bulb temperature and comfort range

5.4.2. Effective Daylighting / Natural Lighting

Daylighting is the architectural and services design to allow maximum daylight penetration into a building whilst minimizing heat gain and thereby reducing indoor lighting loads.

The level of natural light in the building is primarily determined by the extent and type of glazing, and the depth of the building floor plate. Extent of glazing must be optimised to allow maximum daylight, views, and winter sun, while minimising uncomfortable glare and excessive solar heat gains in summer. Glazing should be selected with a high Visual Light Transmission to maximise daylight penetration.

Daylighting strategies will be considered to allow effective control of indoor lighting levels whilst minimising power consumption for the building. High level of architectural input regarding design, orientation and external shading will be considered to effectively maximise natural lighting for the building.

Daylighting strategies combined with dimmable lighting systems will allow high control of indoor lighting levels whilst minimising power consumption for the building.

5.4.3. Volatile Organic Compounds (VOC) & Formaldehyde Minimisation

To ensure long term comfort of occupants, all due care will be taken to minimise VOC and formaldehydes used within the building. Maintaining VOC limits below the recommended levels will assist in reducing any potential detrimental impacts on occupant health arising from products which may emit volatile pollutants.

VOCs are commonly found in carpets, paints, adhesives, and sealants uses in construction and extensive exposure to VOC's can cause Sick Building Syndrome effects (eye, nose and skin irritation, headaches lethargy etc.).

Formaldehydes are found within composite wood products and extensive exposure can cause irritation to eyes, nose, and throat, lead to skin ailments and respiratory system ailments such as asthma.

Where possible, contamination of indoor air by common indoor pollutants will be minimised in this development by careful material selection, including:

- Use of low-VOC and water-based paints rather than oil-based paints, stains, or sealants, reducing indoor air contamination and consequent side-effects including sick-building syndrome and respiratory problems.
- Selection of low-VOC carpets and adhesives.
- Selection of low formaldehyde composite wood products, avoiding the carcinogenic effects of formaldehyde off-gassing.

5.5. Energy Conservation Initiatives

It is essential to ensure the building is designed and built to minimise energy consumption and reduce or eliminate greenhouse gas emission to the atmosphere. Energy performance is considered by the design team as a crucial issue.

The energy conservation initiatives aim to reduce the overall energy consumption for the project directly contributing to greenhouse gas emissions and energy production capacity.

Greenhouse reductions are achieved in a staged approach:

- Reduction in overall energy consumption through demand reduction and energy efficiency.
- Reduction in electricity and gas utility consumption by utilising waste products and renewable energy technologies.

Several strategies will be assessed and put in place to minimise energy consumption.

The integrated energy strategies being considered for the development include items which are listed in Table 3 below:

Table 3. The integrated energy strategies.

Load reduction	Passive Design
	Mixed mode AC systems
	Maximise use of natural lighting
	Energy efficient equipment
	Water efficiency in hot water systems
Building Services System Efficiency	High Efficiency in Heating, ventilation, and Air Conditioning
	High efficiency LED
	High efficiency hydraulic services
	High efficiency appliances
Renewable Energy	Solar PV
	Heat Pump for hot water

5.5.1. Passive Design

The development will utilise passive design to minimise the amount of air-conditioning required and therefore significantly reduce the building's energy consumption and greenhouse performance. A building's form, fabric and orientation will have the biggest influence on its thermal comfort and environmental performance. The following factors will be considered in the detailed stages of the design:

- Orientation.
- Shading.

- Structure.
- Insulation.
- Glazing.

Climate data for the site

The following indicative site information data can be used to inform the design team (Figure 7).

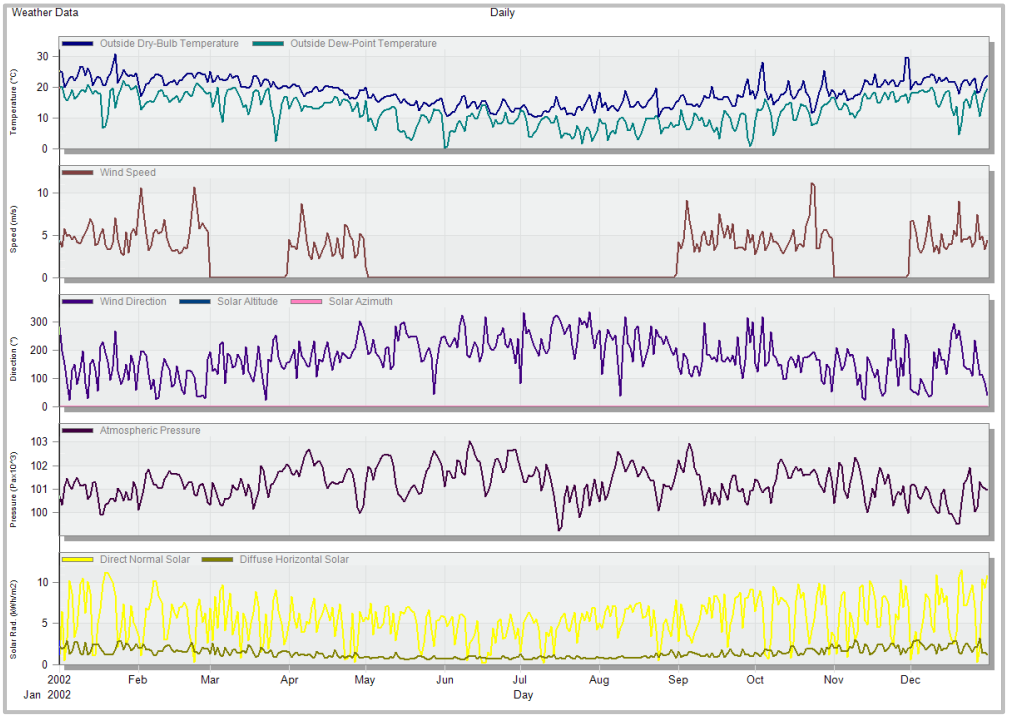


Figure 7. Climate data for the site.

Wind data based on the nearest weather station

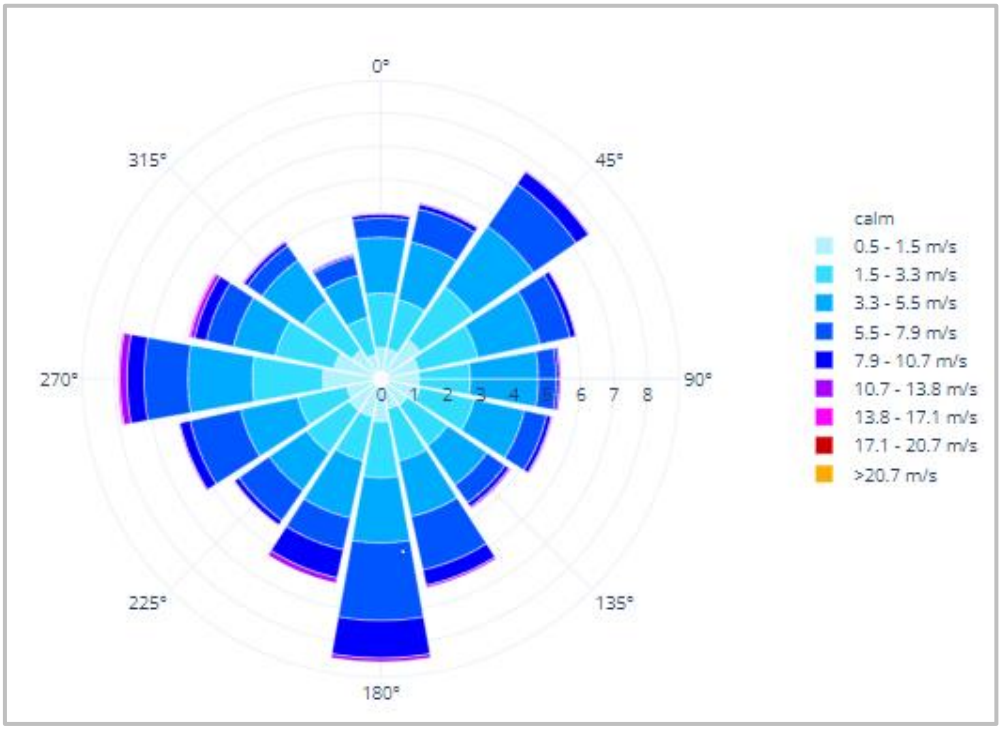


Figure 8. Wind data based on the nearest weather station.

Sun path and temperature chart for the site

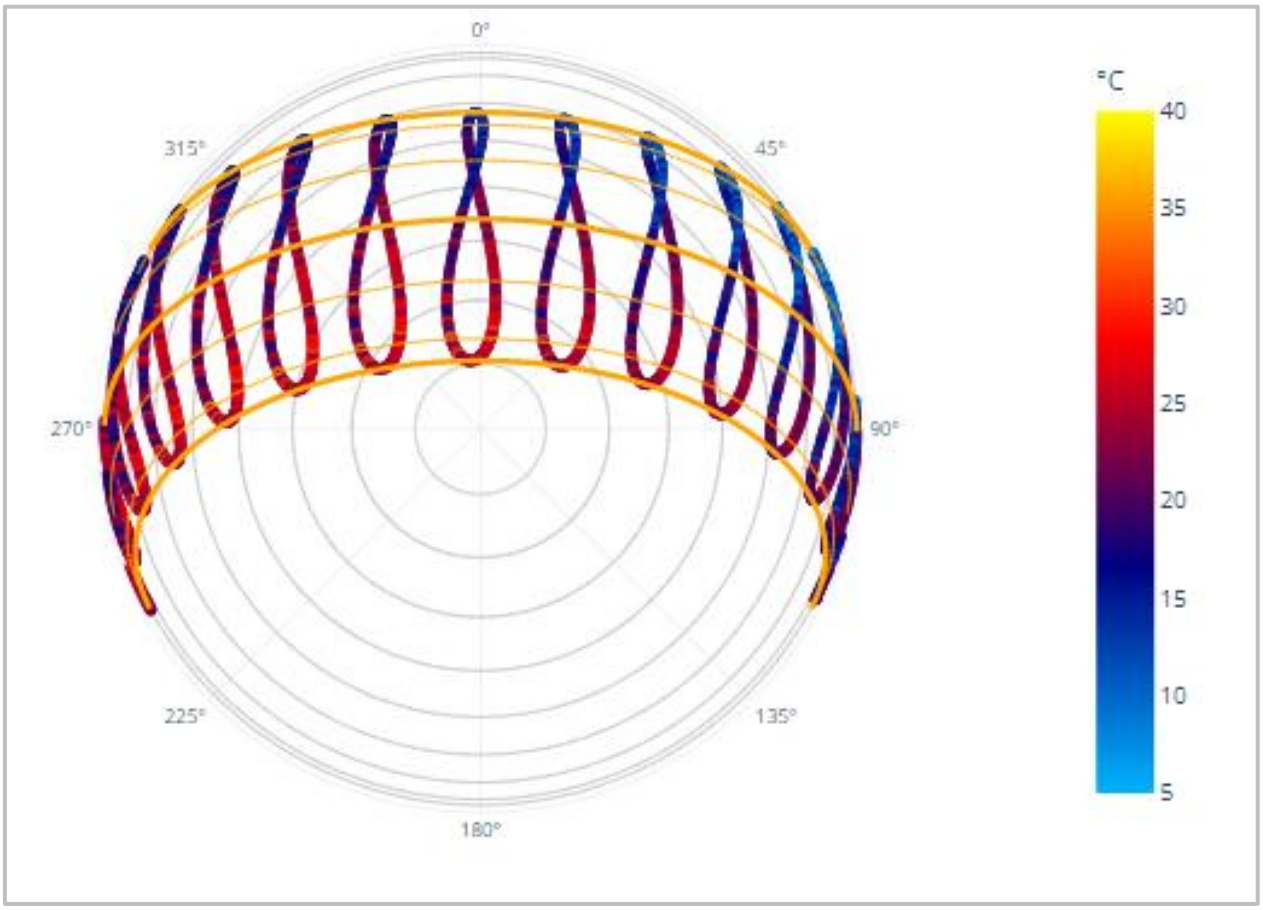


Figure 9. Sun path and temperature chart for the site.

5.5.2. Building Envelope

The building envelope will be designed to reduce heating and cooling requirements through passive design principles. The role of the building envelope is to block solar gains from penetrating the building fabric in summer while optimising daylight and minimising glare. The glazing performance and shading configuration for each orientation will be optimised to ensure that thermal comfort is achieved, and solar gains are adequate for the efficient operation of the mechanical system.

5.5.2.1. Insulation

The building envelope will be treated with the required levels of thermal insulation to reduce heat gains in hot days and to minimise heat losses in cold days through conduction. This will have significant impact on reducing energy consumption.

Insulation reduces the heat transfer between the internal and external conditions. Adequate insulation will be allowed for the ceilings, floors, and walls to reduce the heating and cooling load of the building and to reduce the ongoing operational costs. This has a twofold saving through a smaller mechanical system capacity along with operating energy consumption reduction.

All insulations installed are required to meet NCC and AS/NZ 4859.1 and the builder is required to ensure compliance, during construction.

5.5.2.2. Glazing and Window Framing

Adequate performance glass will be provided to reduce excessive heat gains in hot conditions, reducing the frequency of air conditioning use.

The following glazing parameters will be considered:

- U-Value: a measure of how much heat is passed through the glass.
- Solar Heat Gain Coefficient (SHGC)
- Visible Light Transmission (VLT): the percentage of visible light transmitted by the glass.

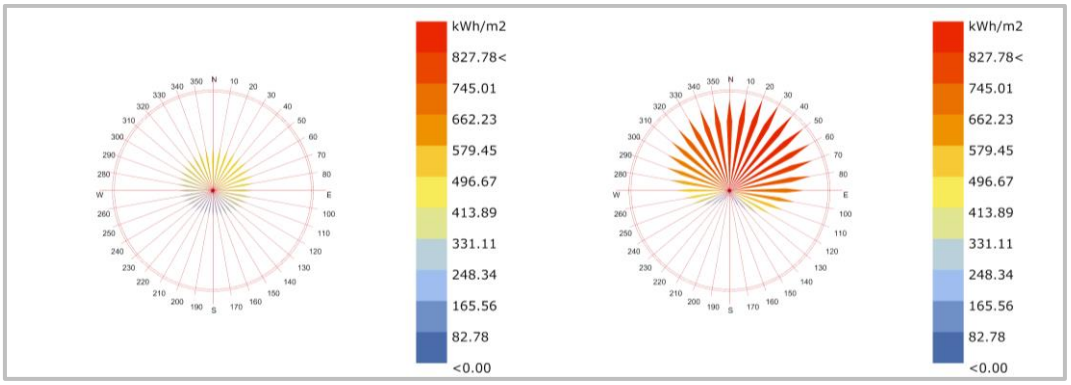
Where possible, the glazing will have a low SHGC to avoid heat gains in the summer, and a low U-value to reduce losses in the winter through the glass. The performance of the proposed glazing systems (glass and frame) is required to comply with NFRC100-2001 conditions and using the tested AFRC values.

Consideration will be given to incorporating effective shading features into the design to avoid the necessity for low shading coefficients in the glass, which usually also decrease the visible light transmission (VLT) of the glass. To maximise the natural daylight within the building, VLT should be as high as possible.

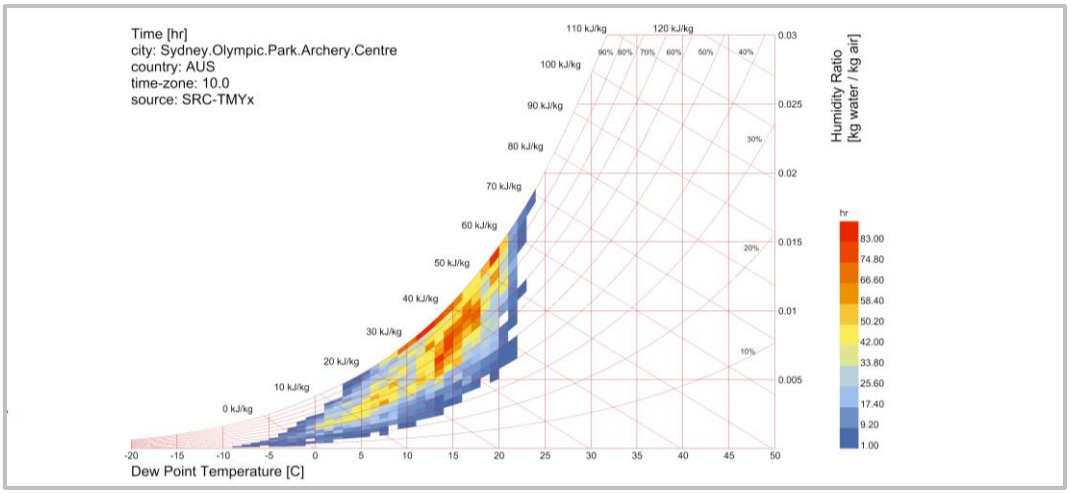
Glazing properties will be specified in conjunction with the shading arrangement on each orientation to control solar loads imposed on the mechanical systems, ensuring thermal comfort, optimising daylight penetration, and preventing glare. This strategy will effectively minimise direct solar loads whilst maximising daylight penetration and access to views.

To reduce heat losses in cold days, especially at night, the use of blinds will limit the contact between the internal air and the glass, therefore reducing heat losses by conduction.

Solar Radiation Rose



Psychrometric Chart



5.5.3. Energy Efficient Systems and Services

The mechanical and electrical design for the buildings will be developed to minimise the need for plant equipment and will be designed to be responsive to the immediate climatic conditions. Energy consumption will be reduced through the efficient design of lighting, air-conditioning, hot water, and ventilation systems. The following energy efficiency initiatives will be further investigated and where feasible incorporated in the building services design.

5.5.3.1. Efficient Artificial Lighting

Lighting efficiency is important in maintaining low energy consumption for reuse projects. Lighting consumption for a facility such as this could account between 15-25% of the estimated energy use of the facility.

High efficiency lighting and effective control initiatives such as daylight and movement sensors will be considered to reduce artificial lighting energy consumption and allow maximum advantage to be taken of natural lighting.

Lighting power density is required to meet AS1680 and NCC requirements. Energy efficiency for the internal lighting throughout the building is required to be in accordance with NCC energy efficiency requirements and the following.

- High quality LED lighting.
- Lighting control system based on smart zoning, occupancy profiles and operational hours, dimming controls and timers.

Photoelectric (PE) / Photodiode sensors or similar controls to detect when external lighting should switch on and off to reduce the energy consumption associated with external lighting where possible.

No external lighting is to be installed such that any direct light beam results into the night sky either generated from within the site. The path of any direct light's angle of incidence that is directed to the sky must be obstructed by a non-transparent surface and the lighting design and is to comply with AS4282 'Control of the Obtrusive Effects of Outdoor Lighting.

5.5.3.2. Efficient Heating, Ventilation & Air-Conditioning (HVAC)

Heating and cooling of the building accounts for a large portion of the building's energy use throughout the year. Selection of highly efficient HVAC equipment with high performance levels not only minimises energy consumption, but also reduces operational energy costs.

The design of the mechanical services will be to industry Best Practise Standards. An emphasis will be placed on providing low energy Heating Ventilation Air Conditioning (HVAC) systems and strategies. To ensure the energy efficient performance of HVAC systems specified and installed mechanical plant will be of high quality and supplied by leading industry manufacturers.

The energy efficiency of HVAC system is required to meet the minimum requirements of the National Construction Code (NCC), Green Star provisions where feasible and relevant Australian Standards including but not limited to AS1668.1, AS1668.2, AS 1682 and AS3666.

The following energy initiatives will be further considered in the detailed design phase:

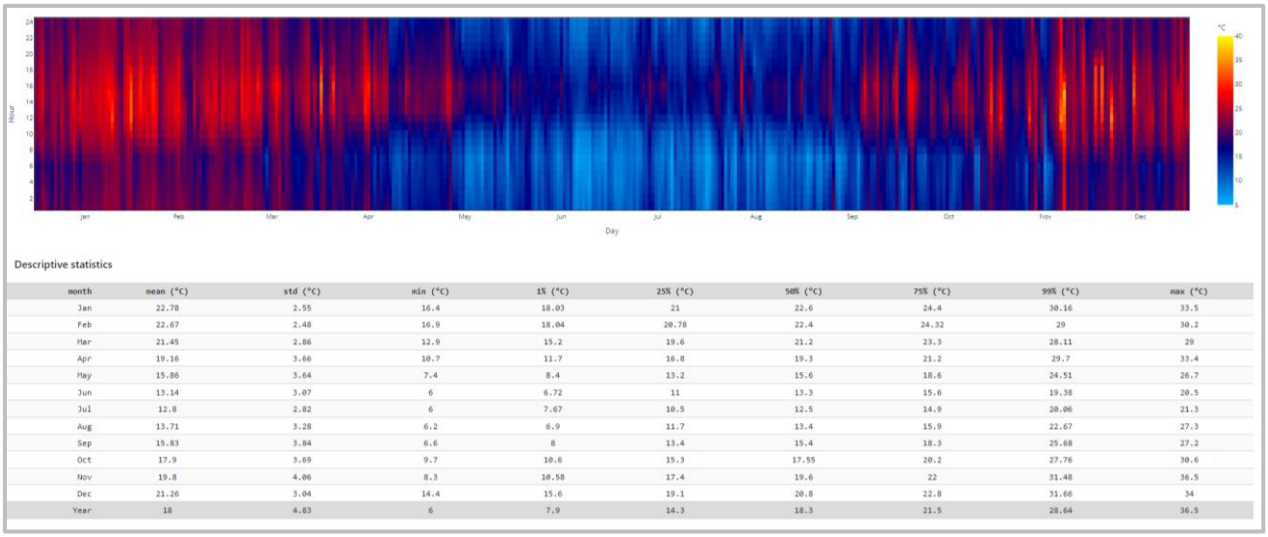
- The air conditioning strategy is optimized to reduce energy consumption and maximize efficiency. For example, by moderating the amount of fresh air relative to the number of people in the space, through the use of CO2 detectors. The system will be zoned to increase the flexibility in the use of different spaces and reduce overall consumption.
- Variable speed drives will be provided to fans and pumps where feasible.
- Full outside air cycle will be provided to all air handling systems.
- Building commissioning and building tuning to be undertaken to ensure that the building systems function as required to achieve energy efficiency design targets.

- All refrigerant plant will be specified such that the refrigerant type has Zero Ozone Depletion Potential (ODP).

Common area ventilation systems are to include variable speed modes where appropriate and are to be linked to light switches where feasible to limit the extent of operation and improve energy efficiency of these areas.

The Mechanical services will be designed to satisfy the minimum Green Star and NABERS requirements.

Heatmap Chart based on the data from the nearest weather station is depicted in Figure 10 below:

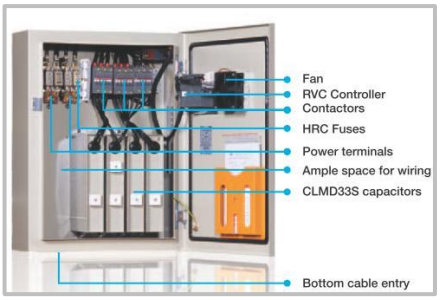


Descriptive statistics

month	mean (°C)	std (°C)	min (°C)	1% (°C)	25% (°C)	50% (°C)	75% (°C)	99% (°C)	max (°C)
Jan	22.78	2.55	16.4	18.03	21	22.6	24.4	30.16	33.5
Feb	22.67	2.48	16.9	18.04	20.78	22.4	24.32	29	30.2
Mar	21.45	2.86	12.9	15.2	19.6	21.2	23.3	28.11	29
Apr	19.16	3.66	10.7	11.7	16.8	19.3	21.2	29.7	33.4
May	15.86	3.64	7.4	8.4	13.2	15.6	18.6	24.51	26.7
Jun	13.14	3.07	6	6.72	11	13.3	15.6	19.38	20.5
Jul	12.8	2.82	6	7.67	10.5	12.5	14.9	20.06	21.3
Aug	13.71	3.28	6.2	6.9	11.7	13.4	15.9	22.67	27.3
Sep	15.83	3.84	6.6	8	13.4	15.4	18.3	25.68	27.2
Oct	17.9	3.69	9.7	10.6	15.3	17.55	20.2	27.76	30.6
Nov	19.8	4.06	8.3	10.58	17.4	19.6	22	31.48	36.5
Dec	21.26	3.04	14.4	15.6	19.1	20.8	22.8	31.66	34
Year	18	4.03	6	7.9	14.3	18.3	21.5	28.64	36.5

Figure 10. Heatmap Chart.

5.5.3.3. Power Factor Correction



To reduce maximum kVA demand on the electricity grid and lower the demand charges, power factor correction units will be provided at the main switch board(s) in accordance with the NSW Installation and Service Rules.

The power factor correction units proposed will improve the power to a factor of 0.98 or higher.

5.5.3.4. Monitoring & reporting

To enable effective monitoring and tracking of energy and water consumption, sub-metering will be considered for systems with major energy use, to help identify areas of inefficiency with potential for improvement.

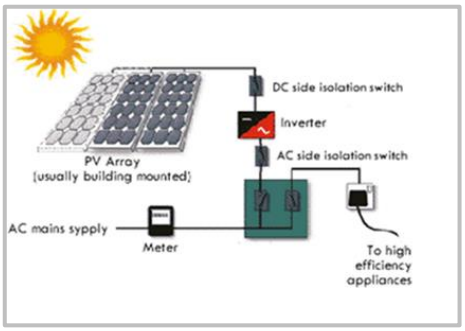
Metering is to be provided throughout the building and central services for all major building plant and equipment. An effective monitoring system is to be provided to monitor energy and water consumption throughout the building as required.

Ongoing reporting may allow the manager of the facility to set goals for energy consumption reductions and attributed energy costs to particular uses. By monitoring energy, losses and wastage can be identified, therefore improving the overall performance of the building in operation. This initiative is subject to further design development and review.

5.5.3.5. Hot Water Systems

High efficiency heat pump hot water systems will be used to provide the Hot Water demands for the buildings.

5.5.4. Renewable Energy – Solar Photovoltaic (PV) System



Photovoltaic (solar PV) is a common and widely accepted technology to generate electricity onsite. The generated electricity can be harnessed and used to power any number of devices. It is proposed that the PV panels are mounted on the roof where they will be out of sight and produce the optimum energy output.
PV modules have a very long lifetime with many manufacturers guaranteeing an output of at least 80% of manufactured capacity for 20 years. Another benefit of PV is that it can be installed in various system sizes and the modular design of the systems allows retrofitting of additional panels if required in the future.

There are generally three types of solar panels available: mono-crystalline (proposed for this development), poly-crystalline and amorphous. Each of these have their advantages and disadvantages and efficiencies range from 6% for amorphous to 19% for mono-crystalline

A 52.2 kW Solar PV system has been nominated for the development. The expected renewable energy generation by the overall 52.2 kW system is approx. 66.5 MWh per annum.

5.5.4.1. Solar PV - System Components

The Photovoltaic (PV) system may consist of the following main components or of equal capacity.

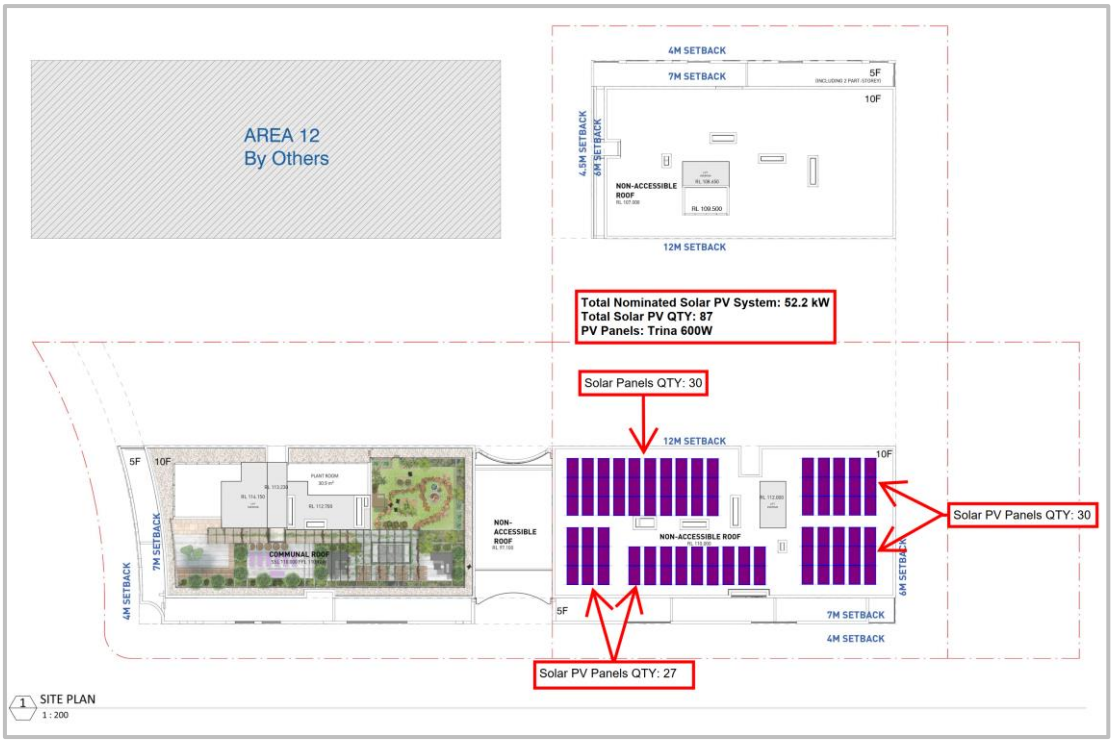
Total nominal power: **52.2 kW**

Approx. roof space requirements: **326 m^2**

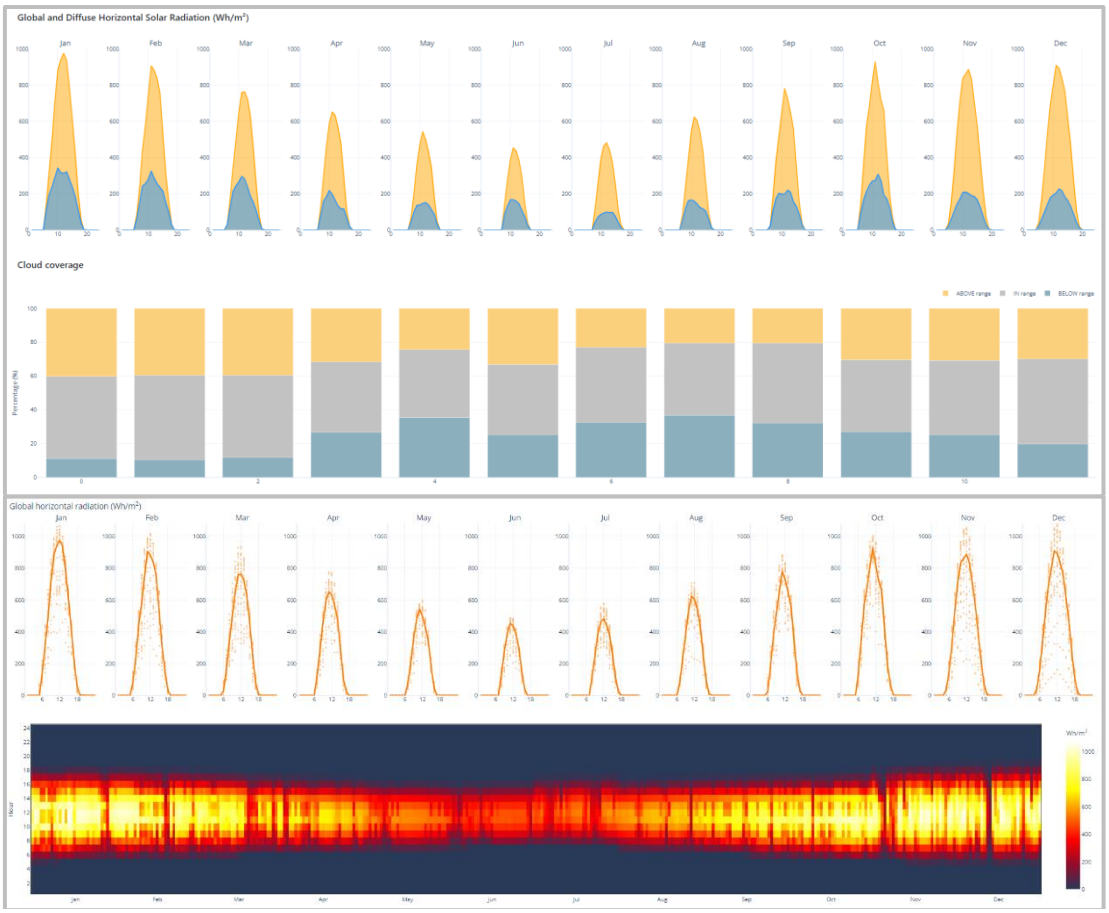
Components	Brand, Model & Quantity
PV Inverter	Sungrow 50kW - SG50CX - Quantity: 1
PV Panels	Trina Vertex 600 W - TSM-DEG20C.20 Quantity: 87
Battery storage (if required)	Tesla Powerpack or other similar systems
PV mounting frame and system balance	Quantity: depending on the requirements and final design

The exact sizing, configuration and final design will be completed during the design stage. Please refer to Appendices A, B, C, D & E for technical data sheets of the proposed PV panels (Trina) and grid-connected inverter (Sungrow).

5.5.4.1.1. Roof Plan with approx. Solar PV Space, which is shown in the architectural drawing:



5.5.4.1.2. Solar Ration and Cloud Coverage for the site:



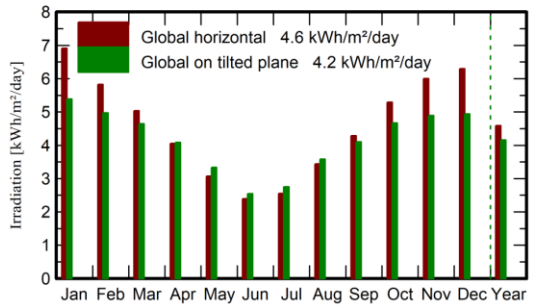
5.5.4.1.3. Solar PV - Projected energy generation based on 52.2 kW system:

Grid system presizing

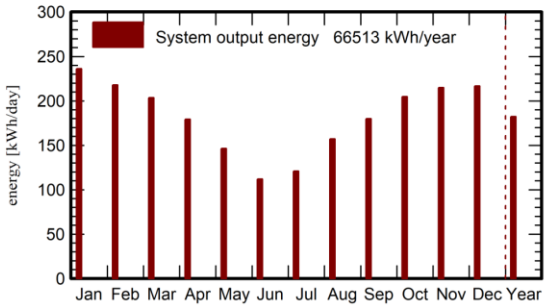
System summary

Nominal power	52.2 kWp	Total area	326 m²
Module type	Standard	Supports for modules	Flat roof
Technology	Monocrystalline cells	Ventilation property	Free air circulation

Meteo and incident energy



System output



	Horizontal global kWh/m²/day	Coll. plane kWh/m²/day	System output kWh/day	System output kWh
Jan.	6.91	5.38	236.2	7322
Feb.	5.83	4.97	218.0	6103
Mar.	5.03	4.64	203.6	6311
Apr.	4.05	4.09	179.3	5380
May	3.07	3.33	146.2	4531
June	2.39	2.55	111.8	3353
July	2.55	2.75	120.7	3742
Aug.	3.44	3.58	157.1	4870
Sep.	4.28	4.10	179.9	5396
Oct.	5.29	4.66	204.6	6343
Nov.	6.00	4.89	214.7	6442
Dec.	6.30	4.94	216.8	6720
Year	4.59	4.15	182.2	66513

5.6. Transport sustainability measures

The use of transport (both private and commercial) is a major contributor to environmental pollution and the excessive consumption of natural resources. The following sustainable transport principles are recommended.

- Improve amenity for active transport users (pedestrians and cyclists), with attention paid to the needs of specific user groups likely to have a greater reliance on active transport such as youths, office employees, and nearby community groups.
- Promote nearby cyclist facilities to enhance the uptake of cyclists to the site.
- Integrate transport initiatives into community engagement and communication strategies.

Given the site location of the development, the occupants will be able to take advantage of local public transport networks and available facilities around the site such as retail shops.
The following measures are some of the initiatives recommended to reduce dependence on motorised vehicles, encouraging walking, cycling and the use of mass public transport.

- **Cyclist facilities:** provision of bicycle racks; where possible adequately sized and fully equipped secure cyclist facilities with change room and showers are to be provided to promote the use of cycling to work.
- **Public Transport:** The building is close to public transport with a number of bus routes served; building occupants are encouraged to use mass transport to travel to work.
- **Trip Reduction:** The development is located adjacent to several local amenities, reducing the need for trips.
- **Fuel efficient vehicles:** encouraging the use of more fuel-efficient vehicles by providing adequate parking spaces at prime parking spot solely dedicated for use by small cars, car-pool participants or other alternative fuel vehicles and EV charging points.

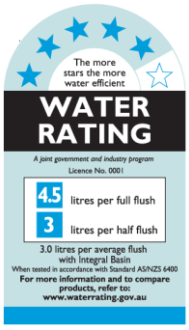
5.7. Water Conservation and Management Initiatives

The water conservation category aims to reduce the overall water potable consumption and provide effective mechanisms for recycling of water uses on site.

The approach to water efficiency for the development will focus on reducing water demand through conservation measures and water reuse systems. Water conservation strategies proposed for this project include:

- Reducing the potable water consumed within the development through demand management.
- Substituting mains water required to meet this demand by utilising alternative sources such as rainwater.

5.7.1. Demand Management



Strategies to minimise consumption include water-efficient fittings and fixtures, water-efficient appliances and low-water use air-conditioning and irrigation systems. In order to reduce the overall water consumption for this development, the following initiatives will be considered.

All water fixtures to be installed to the building are to be water efficient and where possible outperform the minimum requirements. The following criteria are provided as a guide and subject to further design development (Table 4).

Table 4. Surplus design criteria.

Water Fixtures	Hand wash basins – 6 Star WELS;
	Kitchen taps (where provided) – 6 Star WELS
	Showerheads (where provided) – 4 Star WELS or higher
	Toilets – 4 Star WELS or higher
Appliances	Dishwashers (where provided) – 4 Star WELS or higher
Air Conditioning	Minimise use of water-cooled systems
Landscape Irrigation (where applicable)	Native and water efficient species
	Sub-surface irrigation
	Rainwater usage for landscape

5.7.2. Landscape Selection

The use of native, drought-resistant planting will be considered to reduce water consumption used in irrigation. Sub-soil irrigation systems should be considered where non-native species are selected.

The landscape design shall enhance Biodiversity in terms of Landscape Area and Diversity of Species

5.7.3. Rainwater collection and recycling

In order to reduce the impacts of stormwater runoff from the site, the following stormwater management strategies will be considered:

- Rainwater captures from rooftops for reuse in building reducing stormwater runoff as well as mains potable water use.
- The use of permeable surfaces to be considered where suitable, allowing stormwater to seep directly into the earth and reducing stormwater flows off-site.

Collecting rainwater from roof runoff is a common way to recycle water. In addition to saving potable water, it allows preparation for times of low rainfall, so landscapes will be maintained throughout the year. It also reduces loads on storm water systems because roof runoff is not flushed into the drains. Rainwater will be collected from roof runoff and piped to storage tanks and will be used on site.

Ultra-violet (UV) treatment is the disinfection process of passing water by a special light source. Immersed in the water in a protective transparent sleeve, the special light source emits UV waves that can inactivate harmful microorganisms. This method of treatment is growing in popularity because it does not require the addition of chemicals.
Harvested water will be considered to supplement non-potable water uses such as common area landscape irrigation.

This strategy will assist to significantly reduce the potable water consumption for the facility.

5.7.4. Water consumption monitoring and reporting

Where practical, it is recommended that all major water uses within the building to be provided with water meters. This includes central services, rainwater tanks, irrigation systems, potable water, non-potable water sources.

Water monitoring will assist to identify abnormal usage patterns usually associated with leaks, helping to reduce the considerable water lost in this way. In addition, it would also allow to measure and verify the impact of any water efficiency measures implemented in the facilities.

5.8. Materials

This category aims to reduce the consumption of natural resources and encourage the reuse of materials. The various environmental and human health impacts arising from building materials are reduced when special attention is given to the selection of ecologically preferable materials.
To minimise the environmental impact of the development, preference will be given to environmentally responsible materials during the selection process, according to the following principles:

- Avoidance of ecologically sensitive products (such as scarce minerals and old-growth forest).
- Selection of materials with a low embodied energy and high recycled content.
- Low toxicity material selection.
- Low impact on the indoor environment.
- Durability, flexibility, and recyclability.
- Emissions in manufacture and composition, including greenhouse gases and ozone depleting substances.
- Waste reduction.
- Provisions for appropriate recycling storage space that facilitates recycling.

The targeted initiatives will reduce embodied energy and environmental impacts caused by the whole life cycle of building materials.

5.8.1. Reuse and Conservation of materials

Where possible reuse the building material to conserve embodied energy and water. By conserving the building fabric or structure the waste volumes are significantly reduced for the development.

5.8.2. New Materials

Material specifications for the project will consider elements of sustainability that relate to the following factors of durability, embodied energies, renewable sources content, ease of manufacturing, ability to be recycled / reused / reconditioned, maintenance, local availability, VOC content, emission production, affordability, and toxicity.
Where feasible the materials specified for this project are to consider the above environmental measures through a comparison between different product types and manufacturers where possible. The design team is to adopt this approach in assessing suppliers and products for the development.

Interiors finishes will consider the concentration of Volatile Organic Compounds with products for adhesives, paints, carpets, and floor sealants. The design team will work with suppliers and contractors to identify opportunities to reduce the level of VOC's within products and finishes.

5.8.3. Materials with Ozone Depletion Potential

Selection of insulation will be targeted to minimise Ozone Depletion Potential (ODP).

5.8.4. Operational Waste Minimisation

To encourage and facilitate effective waste management once the facility is in operation, sufficient spatial provision will be made to allow for the effective separation of waste from recycling. Dedicated waste recycling rooms allow space for the separation and storage of recyclable waste during the building's operation, allowing for the following waste streams to be separated:

- Glass.
- Cardboard.
- Paper.
- Organics.

- Plastics.
- Metals.

Waste management solutions are varied and dependant on the extent of commitment of the end user. Recycling, reuse, and composting are examples of waste management options.
The following waste streams have currently been identified:

- Office waste.
- Paper and cardboard.
- Plastics.
- PET bottles and containers, cans, and glass.
- Compostable material.
- Grease and fats.
- Cigarette butts.
- Light tubes.
- Toxic or hazardous materials.
- Foam.
- Cleaning products and other substances going down drains.
- Composting of organic waste from the restaurant, for re-use within the Greenhouse.

5.8.5. Timber

Where possible, timber will be supplied from sustainable sources including Forestry Stewardship Council (FCS) certified plantation timbers and recycled products. No timber (either solid or veneer form) will be sourced from rainforests or old-growth forests.

5.8.6. PVC Minimisation

PVC is being phased out in the European Union, as there is widespread evidence to its harmful environmental impact, particularly during disposal or fire. PVC is used in almost all electrical and data cabling and for drainage pipework. Alternatives to PVC products will be used where feasible:

- HDPE and polypropylene pipe work instead of PVC pipe for water supply and drainage systems.
- Linoleum and other natural products instead of vinyl floor coverings.
- Composite materials for electrical cabling.

5.9. Land Use and Ecology

This initiative refers to improvements through Reuse of Land or Change of Ecological Value. The site has been previously built on, and is not a Greenfield. The new development will aim to enhance permeable area and vegetation improving the ecological value of the site.

5.10. Emissions

In addition to the reduction in greenhouse emissions as a result of lower on-site energy usage, emissions to land, air and water will be minimised. The following measures are some of the initiatives targeted within the emissions category:

- Where available, thermal insulation products should be selected which have a low Ozone Depletion Potential in their manufacture and composition, reducing the impacts of insulation on the atmosphere.
- Where feasible, refrigerants will have an Ozone Depletion Potential of zero; and integrated refrigerant leak detection will ensure early identification of leaks.
- Estimated wastewater discharge to sewer will be significantly reduced relative to a standard building through the implementation of water efficiency measures.

- Watercourse Pollution: Design that minimises stormwater run-off to and the pollution of the natural watercourses.
- Light Pollution: No light beam will be directed upwards or outside the building. External lighting will be in accordance with AS 4282-1997. This will assist to minimise interference and disturbance to neighbouring properties and wildlife.

6. Climate Change Adaptation

6.1. NARCliM Climate Change Projections

The information provided in this section of the report follows the climate change projections based on the NSW and ACT Regional Climate Modelling (NARCliM) project. NARCliM is a multi-agency research partnership between the NSW and ACT governments and the Climate Change Research Centre at the University of NSW. NSW Government funding comes from the Office of Environment and Heritage (OEH), Sydney Catchment Authority, Sydney Water, Hunter Water, NSW Office of Water, Transport for NSW, and the Department of Primary Industries.

Climate change projections are presented for the near future (2030) and far future (2070), compared to the baseline climate (1990–2009). The projections are based on simulations from a suite of twelve climate models run to provide detailed future climate information for NSW and the ACT.

The climate change projections are made for the following 5 parameters:

1. Temperature extremes.
2. Hot days.
3. Cold nights.
4. Rainfall.
5. Fire weather.

Reference: https://climatechange.environment.nsw.gov.au/
NSW Office of Environment and Heritage (OEH)

6.1.1. Temperature

St Leonards NSW is expected to experience an increase in all temperature variables (average, maximum and minimum) for the near future and the far future

- Maximum temperatures are projected to increase by 0.7°C in the near future and up to 1.9°C in the far future. Spring will experience the greatest change in maximum temperatures, increasing by up to 2.2°C in the far future. Increased maximum temperatures are known to impact human health through heat stress and increasing the number of heatwave events.
- Minimum temperatures are projected to increase by 0.6°C in the near future up to 2°C in the far future. Increased overnight temperatures (minimum temperatures) can have a considerable effect on human health.

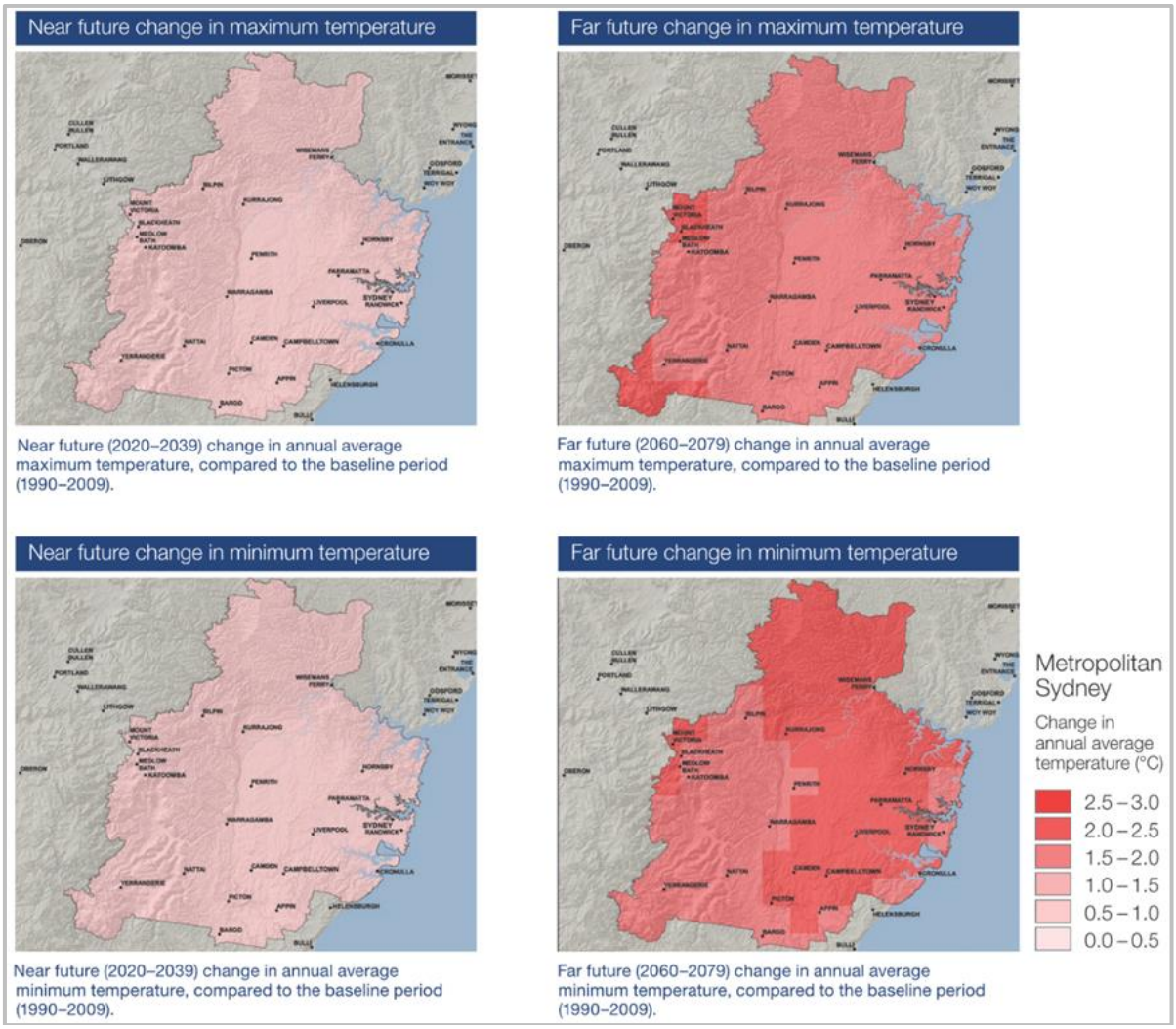


Figure 11. Annual average temperature – Sydney variation map.

6.1.2. Hot days (days per year above 35°C)

Currently St Leonards NSW experiences fewer than 10 days above 35°C each year due to its proximity to the coast. Seasonal changes are likely to have considerable impacts on bushfire danger, infrastructure development and native species diversity.

- The facility is expected to experience more hot days in the near future and in the far future.
- These increases in hot days are projected to occur mainly in spring and summer although in the far future hot days are also extending into autumn.

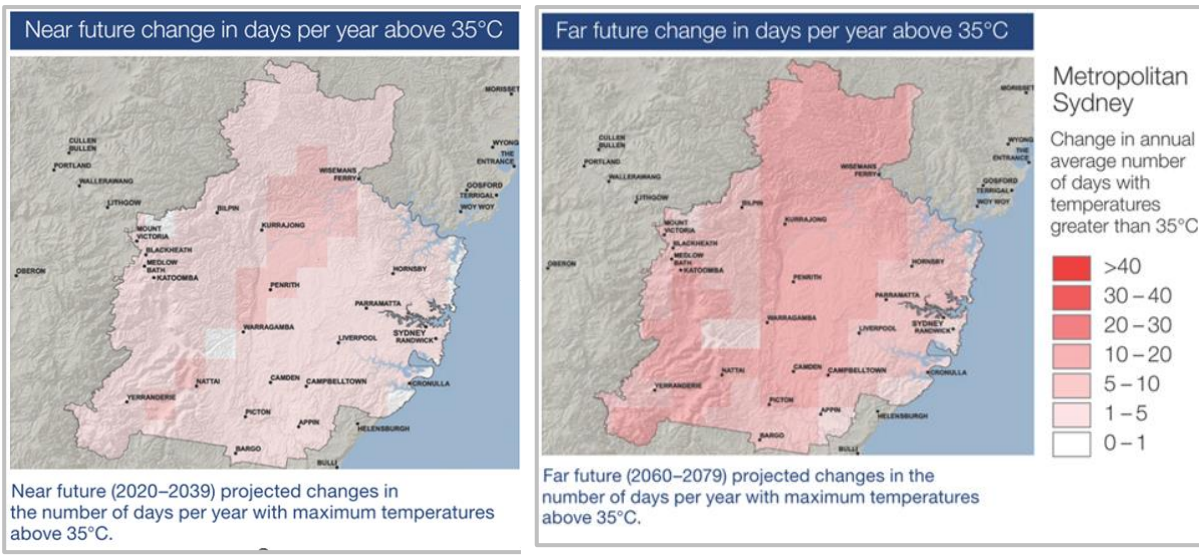


Figure 12. Change in annual average number of days with temperatures greater than 35°C – Sydney variation map.

6.1.3. Cold nights (days per year below 2°C)

Most of the emphasis on changes in temperatures from climate change has been on hot days and maximum temperatures, but changes in cold nights are equally important in the maintenance of our natural ecosystems and agricultural/horticultural industries. For example, some common temperate fruit species require sufficiently cold winters to produce flower buds.

- The greatest decreases are projected to occur in the south-west and in the Blue Mountains, with decreases of up to 20 nights by 2030 and more than 40 fewer cold nights by 2070.
- NARCliM projections suggest that St Leonards NSW will not see a considerable decrease in cold nights (see the white areas in the map).

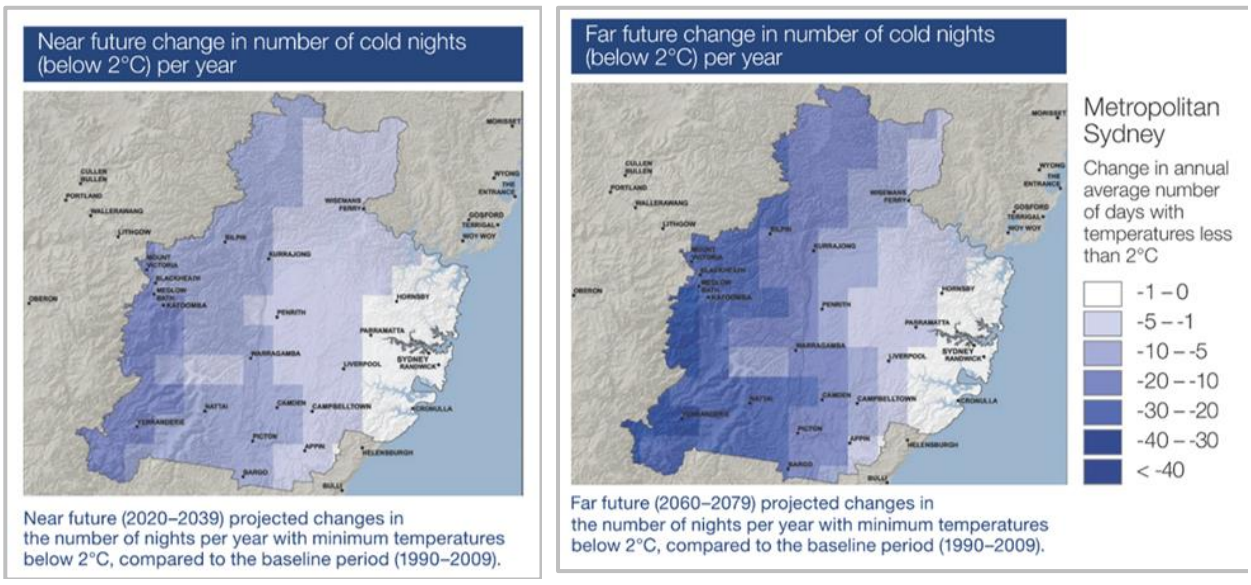


Figure 13. Change in annual average number of days with temperature less than 2°C – Sydney variation map.

6.1.4. Rainfall

Changes in rainfall patterns have the potential for widespread impacts. Seasonal shifts can often impact native species' reproductive cycles as well as impacting agricultural productivity, for example crops that are reliant on winter rains for peak growth. The majority of models (8 out of 12) agree that autumn rainfall will increase in the near future and the far future (7 out of 12). Rainfall is projected to increase in autumn.

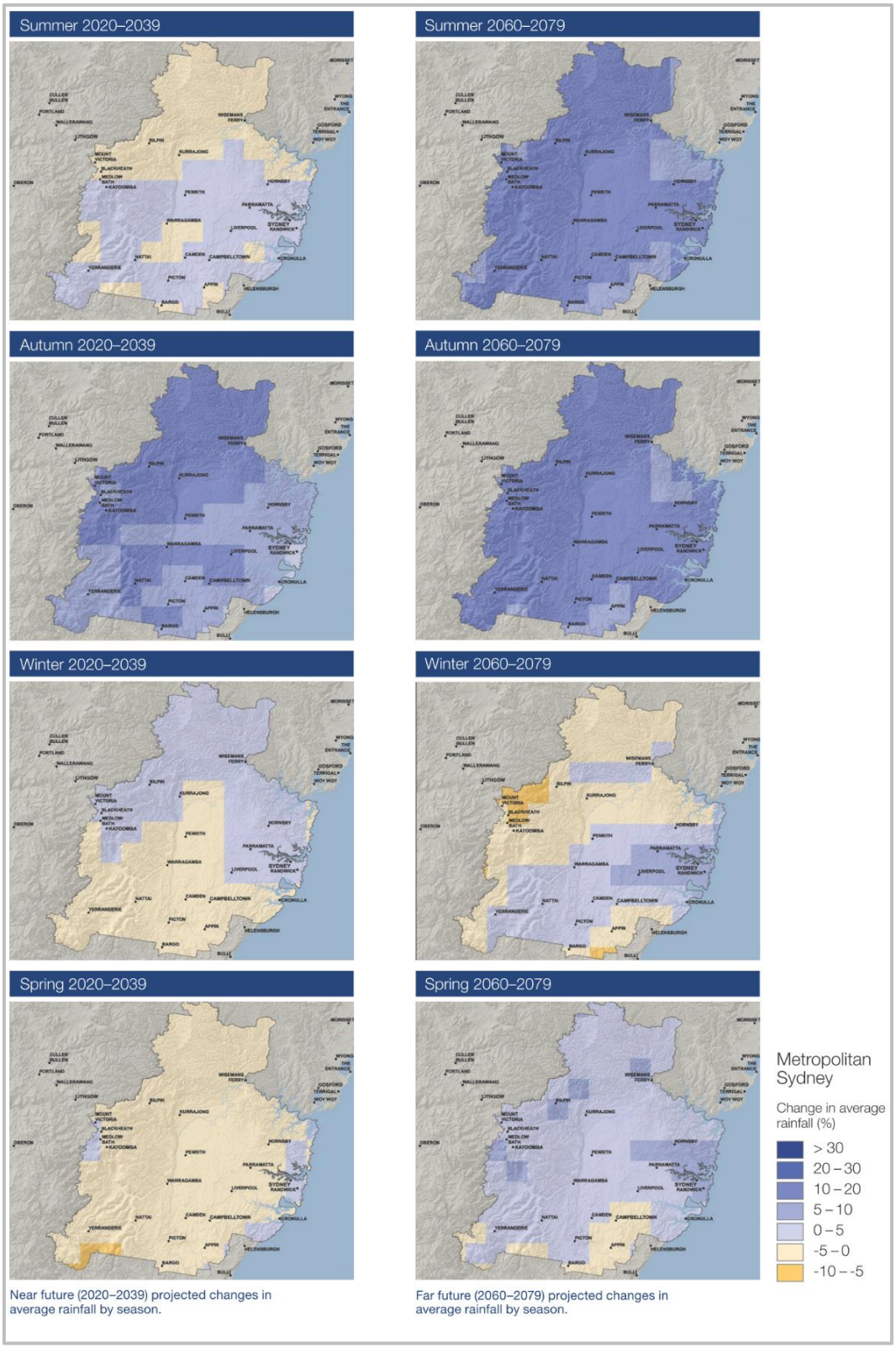


Figure 14. Change in average rainfall (%) – Sydney variation map.

6.1.5. Fire weather

The Bureau of Meteorology issues Fire Weather Warnings when the FFDI (Forest Fire Danger Index) is forecast to be over 50. High FFDI values are also considered by the Rural Fire Service when declaring a Total Fire Ban.

Projected regional climate changes

- Metropolitan Sydney is expected to experience an increase in average and severe fire weather in the near future and the far future.
- The increases are projected mainly in summer and spring in the far future. These changes are projected in prescribed burning periods (spring) and the peak fire risk season (summer).
- The majority of models (7 out of 12) project an increase of severe fire weather in spring in the near future, with a greater confidence in the increase in the far future.

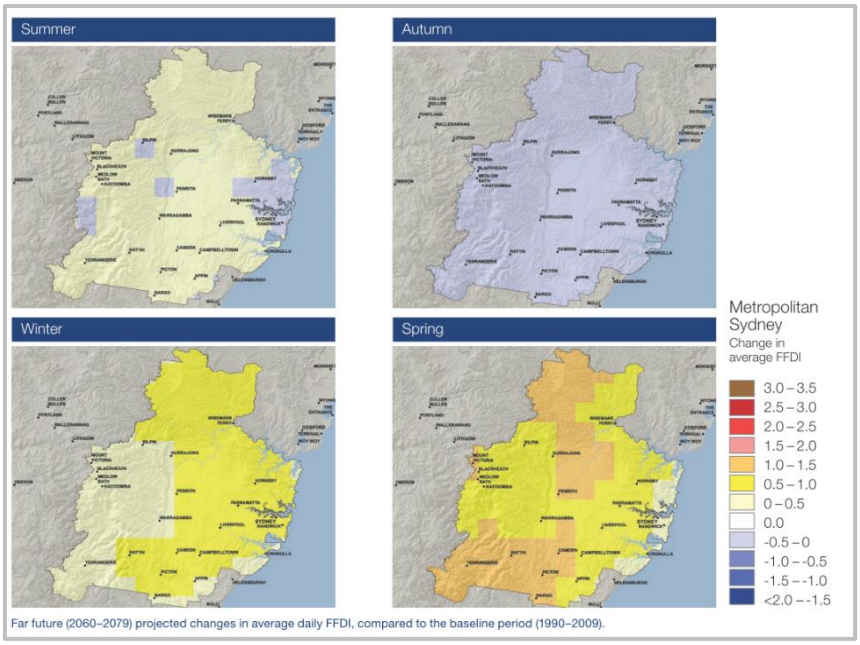


Figure 15. Change in average FFDI – Sydney variation map.

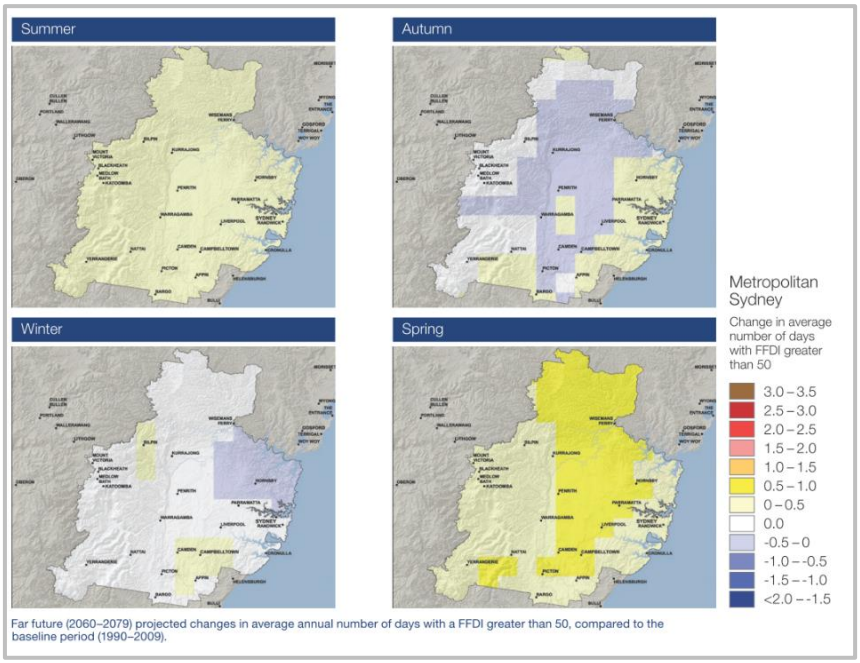


Figure 16. Change in average number of days with FFDI greater than 50 – Sydney variation map.

6.2. Climate Change Adaptation Plan

The climate change adaptation plan (CCAP) follows the ISO31000 Risk Management Process.

The plan involves three key steps to develop risks and mitigation strategies collaboratively with key project stakeholders.

1. Review of the development and context.

2. Risk analysis.
3. Mitigation Strategies.

6.2.1. Risk Assessment Framework

To assess risks systematically, a likelihood scale was used to determine how likely a risk was to occur, followed by consequence assessment. The first stage of the assessment is to define the likelihood of a given risk. The likelihood level can be described as the frequency or probability for a risk to occur.

Table 5. Risk likelihood matrix.

Likelihood	**Almost Certain** expected in most circumstances.
	Likely will probably occur in most circumstances.
	Possible might occur at some time.
	Unlikely could occur at some time.
	Rare may occur, only in exceptional circumstances.

Table 6. Example Consequence Scale and Success Criteria (AGO 2007).

	Public Safety	Local Economy and Growth	Community and Lifestyle	Environment and Sustainability	Financial /Time Program/Budgets
Catastrophic	Large numbers of serious injuries or loss of life	Precinct decline leading to widespread business failure	The area is considered very unattractive, moribund, and unable to support its community	Major widespread loss of environmental amenity and progressive irrecoverable environmental damage	Loss or increased cost of 50% or greater of annual budget.
Major	Isolated instances of serious injuries or loss of lives	Precinct stagnation such that businesses are unable to thrive	Severe and widespread decline in services and quality of life within the community	Severe loss of environmental amenity and a danger of continuing environmental damage	Loss or increased cost of 25%-50% of annual budget.
Moderate	Small numbers of injuries	Significant general reduction in precinct economic performanc e	General applicable decline in services	Isolated but significant instances of environmental damage that might be reversed with intensive efforts	Loss or increased cost of 10%-25% of annual budget
Minor	Serious near misses or minor injuries	Isolated areas in precinct decline	Isolated but noticeable examples of decline in services	Minor instances of environmental damage that could be reversed	Loss or increased cost of 5% to 10% of annual budget

Insignificant	Appearance of a threat but no actual harm	Minor shortfall to forecast growth	There would be minor areas in which the region was unable to maintain its current services	No environmental damage	Loss or increased cost of less than 5% of annual budget

Risk likelihood and consequence were then combined using the risk assessment matrix in Table below, leading to the systematic development of a risk rating used to prioritise risk management strategies.

Table 7. Example Risk matrix:

Show	Matrix Score				
Risk Rating Number + Name	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Medium	High	High	Critical	Critical
Likely	Medium	Medium	High	Critical	Critical
Possible	Low	Medium	Medium	High	Critical
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Medium	High

Risk management strategies listed in Table 8 aim to reduce risk levels by reducing either likelihood or consequence of the risk, or both. The objective is to develop cost-effective options for treating/controlling each identified risk and minimise its impact to the project.

Table 8. Risk management.

Show	Matrix Score				
Risk Rating Number + Name	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Medium	High	High	Critical	Critical
Likely	Medium	Medium	High	Critical	Critical
Possible	Low	Medium	Medium	High	Critical
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Medium	High

6.2.2. Risk Assessment outcomes

Climate variable	Risk Statement	Likelihood	Consequence	Level of Risk	Adaptation actions	Residual Likelihood	Residual Consequence	Residual level of Risk
Increase in hot days	Accelerated structural material fatigue and degradation of facades leading to increased maintenance and repair costs	Rare	Catastrophic	High	Select materials which have a higher temperature tolerance if required. Review material datasheets for in-service temperature range and allow for increase in peak temperatures.	Rare	Moderate	Low
Increase in hot days	Brownouts/ Blackouts leading to failure of critical electrical equipment	Possible	Major	High	Ensure that existing plans to add to backup generation based on demand is followed through. Consider use of Solar Energy with Battery Energy Storage Systems (BESS).	Possible	Minor	Medium
Increased rainfall variability	Parapet roof retains water due to blockage in syphonic drainage system leading to structural failure.	Possible	Major	High	Check the design includes overflow outlets in parapet. Add to design if required.	Rare	Major	Medium
Increased rainfall variability	Parapet roof retains water due to insufficient capacity in the syphonic drainage system leading to structural failure.	Possible	Major	High	Overflow systems in place in the form of overflow slots. The capacity of these can be increased if required to allow for increased rainfall intensity.	Rare	Major	Medium

Climate variable	Risk Statement	Likelihood	Consequence	Level of Risk	Adaptation actions	Residual Likelihood	Residual Consequence	Residual level of Risk
Increased rainfall variability	Onsite Water Detention Tank (OSD) cannot deal with increased flows leading to overflow and flooding of basement.	Possible	Major	High	If necessary, overflow system to be provided. Hydraulic engineers to check if systems can manage the increased flows and implement further measures if required.	Rare	Major	Medium
Increased rainfall variability	Overland flow of water leads to pooling around electrical infrastructure, causing electrical failure and power outage.	Possible	Catastrophic	Critical	Primary storm water drainage system to be designed to cater for a minimum of a 100-year storm. System to also have full backup of either piped overflow or overland flow designed to a higher storm intensity. Introduce operational management plan to include measures to account for residual risk. Consider other feasible mitigation measure as required.	Rare	Major	Medium
Increased intensity of storm events	Mechanical plant on the roof (if any) are damaged by extreme hail event leading to failure of ventilation system.	Possible	Major	High	Consider options for protecting the mechanical plant in design. Implement if required.	Rare	Major	Medium

Climate variable	Risk Statement	Likelihood	Consequence	Level of Risk	Adaptation actions	Residual Likelihood	Residual Consequence	Residual level of Risk
Increased intensity of storm events	Severe hail blocking roof drains causing increased water ingress into building envelope and potential structural impacts, leading to increased maintenance costs	Possible	Major	High	Screen outlets with hail guards. Planned overflow slots should allow rain to overflow for all but the most severe hail events.	Rare	Major	Medium
Increased intensity of storm events	Airborne debris causing damage to exterior building elements and increased maintenance costs.	Possible	Major	High	Check wind load thresholds in engineering for façade and glazing. If required, adopt heat treated glazing for greater impact strength.	Rare	Major	Medium
Increased intensity of storm events	Wind driven rain penetrates podium level and retail spaces creating slip hazards for public circulation spaces.	Likely	Moderate	High	Consider in design and highlight risk for building managers. Include wet weather management plan in facilities management contract.	Rare	Moderate	Low
Increased fire weather	Smoke ingress into facility via HVAC system causing increased health risks for the occupants.	Almost certain	Major	Critical	Evacuation plan to be developed by FM company, including use of link to nearby hospitals for particularly vulnerable occupants. Consider use of non-latching outside air smoke detectors to shut down outside air systems in the event of a bushfire situation.	Almost certain	Insignificant	Medium

6.2.3. Recommendations

Many of the potential risks to the building are already addressed by existing design features of the building or are being explored as an immediate consequence of this process. All those identified through the workshop and subsequent discussions as requiring additional action are set out in table below, along with responsibility for those actions.

This information should be added to the overall project risk register, with actions implemented and recorded, and subsequently reported in the Green Star documentation.

Summary of adaptation actions required to achieve revised risk rating is presented in Table 9:

Table 9. Adaptation Actions Required to Achieve Revised Risk Rating.

Risk Statement	Initial Risk	Residual Risk	Action requiring implementation	Design / Operations	Proposed Responsibility
Brownouts/Blackouts leading to failure of critical electrical equipment.	High	Medium	Backup generator in place. Overall generator capacity can be increased to deal with the loads. Solar PV with Battery Energy Storage System (BESS).	Design and operations	Electrical Engineer
Accelerated structural material fatigue and degradation of façades, leading to increased maintenance and repair costs	High	Low	Review material datasheets for in-service temperature range and allow for a nominal tolerance on peak temperatures based on today's values. Select materials which have a higher temperature tolerance if required.	Design	Façades Engineer, Structural Engineer
Water restrictions during prolonged droughts leading to inability to deliver core services.	High	Low	Develop a Drought Management Plan. Water restrictions would likely be signposted well in advance. Consider alternative water supply.	Operations	Facilities Manager
Parapet roof retains water due to blockage in symphonic drainage system leading to structural failure.	High	Medium	Check the design includes overflow outlets in parapet. Add to design if required.	Design	Hydraulic Engineer
Parapet roof retains water due to insufficient capacity in the symphonic drainage system leading to structural failure.	High	Medium	Check whether capacity of overflow slots and drainage system is sufficient to allow for increased rainfall intensity. Increase either/both if required.	Design	Hydraulic Engineer, Architect

Onsite Water Detention Tank (OSD) cannot deal with increased flows leading to overflow and flooding of basement.	High	Medium	Ensure secondary overflow system provided and check if systems can manage increased flows. Implement further measures if required.	Design	Civil Engineer
Overland flow of water leads to pooling around electrical infrastructure, causing electrical failure and power outage.	Critical	Medium	Primary storm water drainage system to be designed to cater for a minimum of a 100- year storm. System to also have full backup of either piped overflow or overland flow designed to a higher storm intensity. Consider other feasible mitigation measures as required.	Design	Hydraulic Engineer, Architect, Electrical Engineer
Mechanical plant on the roof (if any) are damaged by extreme hail event leading to failure of ventilation system.	High	Medium	Consider options for protecting the mechanical plant in design. Implement if required.	Design	Mechanical Engineer
Severe hail blocking roof drains causing increased water ingress into building envelope and potential structural impacts, leading to increased maintenance costs	High	Medium	Screen outlets with hail guards.	Design	Hydraulic Engineer

Airborne debris causing damage to exterior building elements and increased maintenance costs - particularly discussed potential increase in wind loadings due to CC.	High	Medium	Check wind load thresholds in engineering for façade and glazing. Adopt heat treated glazing for greater impact strength if required.	Design	Façades Engineer, Structural Engineer
Wind driven rain penetrates podium level and retail spaces creating slip hazards for public circulation spaces.	High	Low	Consider in design and highlight risk for building managers. Include wet weather management plan in facilities management contract.	Design and operations	Architects and Facilities Manager
Smoke ingress into facility via HVAC system causing increased employee health risks	Critical	Medium	Evacuation plan to be developed by FM company, including use of link to nearby hospitals for particularly vulnerable occupants. Consider use of non-latching outside air smoke detectors to shut down outside air systems in the event of a bushfire situation.	Design and operations	Mechanical Engineer, Facilities Manager, Owner

7. Disclaimer

This report is prepared using the information described above and inputs from other consultants. Whilst EEG has endeavoured to ensure the information used is accurate, no responsibility or liability to any third party is accepted for any loss or damage arising out of the use of this report by any third party. Any third party wishing to act upon any material contained in this report should first contact EEG for detailed advice which will take into account that party's particular requirements.

Computer performance assessment provides an estimate of building performance. This estimate is based on a necessarily simplified and idealised version of the building that does not and cannot fully represent all the intricacies of the building once built. As a result, simulation results only represent an interpretation of the potential performance of the building. No guarantee or warrantee of building performance in practice can be based on simulation results alone. EEG and its employees and agents shall not be liable for any loss arising because of, any person using or relying on the Report and whether caused by reason or error, negligent act or omission in the report. The draft BASIX assessment has been prepared indicatively and using the limited architectural and building services design with the view to conduct a detailed assessment once the design is further developed.

Performance of the completed building may be significantly affected by the quality of construction; the quality of commissioning, ongoing management of the building, and the way the building is operated, monitored and maintained.

APPENDIX A - TECHNICAL DATASHEETS FOR SAMPLE PV PANELS (600 W)

Vertex

BIFACIAL DUAL GLASS MONOCRYSTALLINE MODULE

PRODUCT: TSM-DEG20C.20

PRODUCT RANGE: 580-600W

600W	0~+5W	21.2%
MAXIMUM POWER OUTPUT	POSITIVE POWER TOLERANCE	MAXIMUM EFFICIENCY

High customer value

- Lower LCOE (Levelized Cost of Energy), reduced BOS (Balance of System) cost, shorter payback time
- Lowest guaranteed first year and annual degradation;
- Designed for compatibility with existing mainstream system components
- Higher return on Investment

High power up to 600W

- Up to 21.2% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection

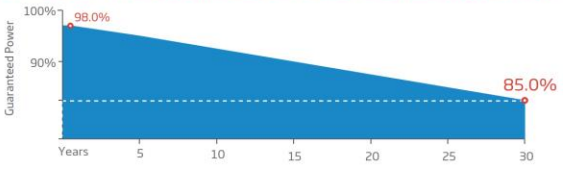
High reliability

- Minimized micro-cracks with innovative non-destructive cutting technology
- Ensured PID resistance through cell process and module material control
- Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity areas
- Mechanical performance up to 5400 Pa positive load and 2400 Pa negative load

High energy yield

- Excellent IAM (Incident Angle Modifier) and low irradiation performance, validated by 3rd party certifications
- The unique design provides optimized energy production under inter-row shading conditions
- Lower temperature coefficient (-0.34%) and operating temperature
- Up to 25% additional power gain from back side depending on albedo

Trina Solar's Vertex Bifacial Dual Glass Performance Warranty



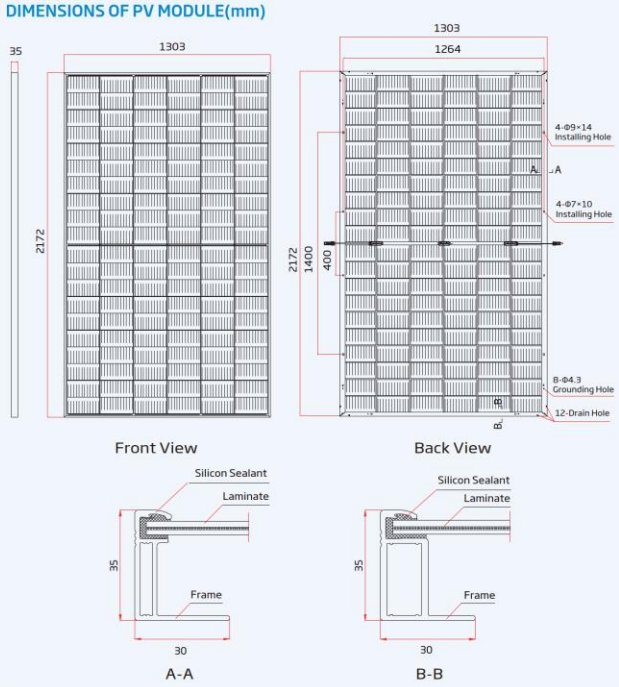
Comprehensive Products and System Certificates

IEC61215/IEC61730/IEC61701/IEC62716/UL61730
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO14064: Greenhouse Gases Emissions Verification
ISO45001: Occupational Health and Safety Management System

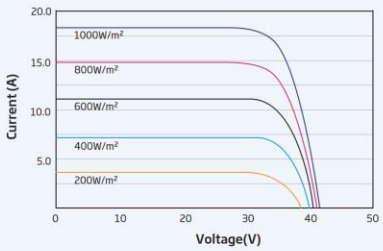
Trinasolar

Vertex BIFACIAL DUAL GLASS MONOCRYSTALLINE MODULE

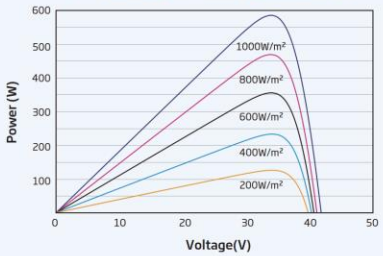
DIMENSIONS OF PV MODULE(mm)



I-V CURVES OF PV MODULE(590 W)



P-V CURVES OF PV MODULE(590 W)



ELECTRICAL DATA (STC)

Peak Power Watts-PMAX (Wp)*	580	585	590	595	600
Power Tolerance-PMAX (W)			0 ~ +5		
Maximum Power Voltage-VMPP (V)	33.8	34.0	34.2	34.4	34.6
Maximum Power Current-IMPP (A)	17.16	17.21	17.25	17.30	17.34
Open Circuit Voltage-VOC (V)	40.9	41.1	41.3	41.5	41.7
Short Circuit Current-ISC (A)	18.21	18.26	18.31	18.36	18.42
Module Efficiency η m (%)	20.5	20.7	20.8	21.0	21.2

STC: Irrdiance 1000W/m2, Cell Temperature 25°C, Air Mass AM1.5. *Measuring tolerance: ±3%.

Electrical characteristics with different power bin (reference to 10% Irradiance ratio)

Total Equivalent power -PMAX (Wp)	621	626	631	637	642
Maximum Power Voltage-VMPP (V)	33.8	34.0	34.2	34.4	34.6
Maximum Power Current-IMPP (A)	18.36	18.41	18.46	18.51	18.55
Open Circuit Voltage-VOC (V)	40.9	41.1	41.3	41.5	41.7
Short Circuit Current-ISC (A)	19.48	19.54	19.59	19.65	19.71
Irradiance ratio (rear/front)			10%		

Power Bifaciality:70±5%.

ELECTRICAL DATA (NOCT)

Maximum Power-PMAX (Wp)	439	443	447	451	454
Maximum Power Voltage-VMPP (V)	31.5	31.7	31.9	32.0	32.2
Maximum Power Current-IMPP (A)	13.93	13.97	14.01	14.06	14.10
Open Circuit Voltage-VOC (V)	38.5	38.7	38.9	39.1	39.3
Short Circuit Current-ISC (A)	14.68	14.72	14.76	14.80	14.84

NOCT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline
No. of cells	120 cells
Module Dimensions	2172×1303×35 mm (85.51×51.30×1.38 inches)
Weight	35.3 kg (77.8 lb)
Front Glass	2.0 mm (0.08 inches), High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	EVA/POE
Back Glass	2.0 mm (0.08 inches), Heat Strengthened Glass (White Grid Glass)
Frame	35mm(1.38 inches) Anodized Aluminium Alloy
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm² (0.006 inches²), Portrait: 280/280 mm(11.02/11.02 inches) Length can be customized
Connector	MC4 EVO2 / TS4*

*Please refer to regional datasheet for specified connector.

TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43°C (±2°C)
Temperature Coefficient of PMAX	- 0.34%/°C
Temperature Coefficient of VOC	- 0.25%/°C
Temperature Coefficient of ISC	0.04%/°C

MAXIMUMRATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC (IEC)
	1500V DC (UL)
Max Series Fuse Rating	35A

WARRANTY

12 year Product Workmanship Warranty
30 year Power Warranty
2% first year degradation
0.45% Annual Power Attenuation

(Please refer to product warranty for details)

PACKAGING CONFIGUREATION

Modules per box: 25/36 pieces
Modules per 40' container: 549 pieces

Trinasolar

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

Version number: TSM_EN_2021_B

www.trinasolar.com

APPENDIX B - TECHNICAL DATASHEETS FOR SAMPLE PV INVERTERS

SG50CX Premium

SUNGROW
Clean power for all

Multi-MPPT String Inverter for 1000 Vdc System

AU

HIGH YIELD

- Up to 5 MPPTs with max. efficiency 98.7%
- Compatible with bifacial module
- Built-in PID recovery function

SMART O&M

- Touch free commissioning and remote firmware upgrade
- Smart IV curve scanning *
- Fuse free design with smart string current monitoring

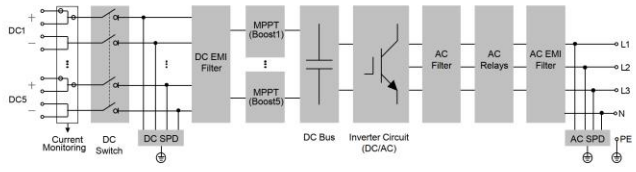
SAVED INVESTMENT

- Compatible with Al and Cu AC cables
- DC 2 in 1 connection enabled
- Cable free communication with optional WLAN

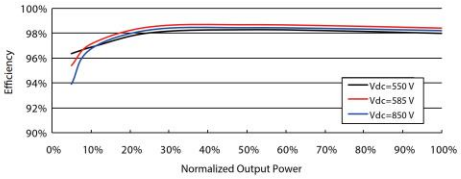
PROVEN SAFETY

- IP66 and C5 anti-corrosion grade
- Quick arc-fault circuit interrupter
- Satisfied global safety and grid code

CIRCUIT DIAGRAM



EFFICIENCY CURVE



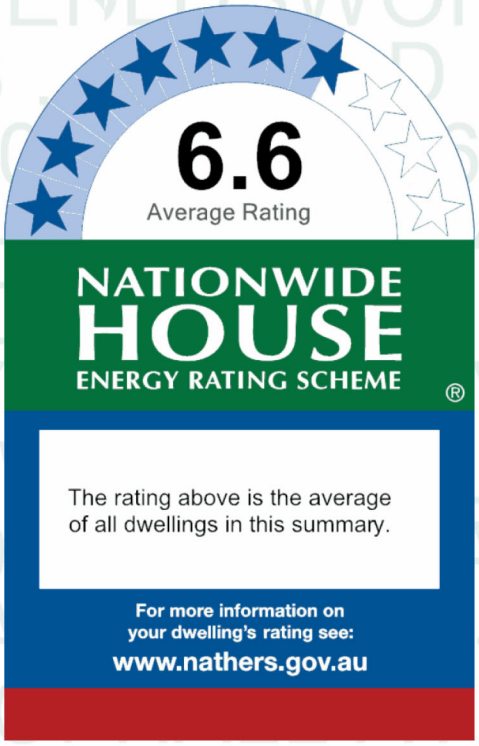
Type designation	SG50CX
Input (DC)	
Max. PV input voltage	1100 V **
Min. PV input voltage / Start-up input voltage	200 V / 250 V
Nominal PV input voltage	585 V
MPP voltage range	200 – 1000 V
No. of independent MPP inputs	5
No. of PV strings per MPPT	2
Max. PV input current	130 A
Max. DC short-circuit current	200 A
Output (AC)	
AC output power	50 kVA
Max. AC output current	80.5 A
Nominal AC voltage	3 / N / PE, 230 / 400 V
AC voltage range	312 – 528 V
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz
Harmonic (THD)	< 3 % (at nominal power)
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading – 0.8 lagging
Feed-in phases / AC connection	3 / 3-PE
Efficiency	
Max. efficiency / European efficiency	98.7 % / 98.4 %
Protection and function	
DC reverse polarity protection	Yes
AC short-circuit protection	Yes
Leakage current protection	Yes
Grid monitoring	Yes
Ground fault monitoring	Yes
DC switch	Yes
AC switch	No
PV string monitoring	Yes
Q at night function	Yes
PID recovery function	Yes
Arc fault circuit interrupter (AFCI)	Optional
DC terminal protective cover	Yes
Surge protection	DC Type I+II / AC Type II
General Data	
Dimensions (W * H * D)	782 * 645 * 310 mm
Weight	62 kg
Topology	Transformerless
Degree of protection	IP66
Night power consumption	≤2 W
Operating ambient temperature range	-30 to 60 ℃ (> 45 ℃ derating)
Allowable relative humidity range	0 – 100 %
Cooling method	Smart forced air cooling
Max. operating altitude	4000 m (> 3000 m derating)
Display	LED, Bluetooth+APP
Communication	RS485 / WLAN / Optional: Ethernet
DC connection type	MC4 (Max. 6 mm²)
AC connection type	OT or DT terminal (Max.70 mm²)
Compliance	IEC 62109, IEC 61727, IEC 62116, IEC 60068, IEC 61683, IEC 61000-6-3, AS/NZS 4777.2:2015
Grid Support	Q at night function, LVRT, HVRT,active & reactive power control and power ramp rate control

APPENDIX C – NATHERS CERTIFICATE

If any changes are required to this NatHERS certificate , please contact EEG with following details:
Project reference: 14-16 Marshall Ave, St Leonards NSW - Contact number: 0430 108 801

Nationwide House Energy Rating Scheme — Class 2 summary
NatHERS Certificate No. 0008592050

Generated on 24 Apr 2023 using BERS Pro v4.4.1.5d (3.21)



Property

Address 14-16,5-9,2-10 14-16 Marshall Ave, 5-9 Holdsworth Ave, 2-10 Berry Road , St Leonards , NSW , 2065

Lot/DP -

NatHERS climate zone 56

Accredited assessor

Conor Horwood

Enviiro

conor.horwood@enviiro.com.au

1300100368

Accreditation No. DMN/16/1757

Assessor Accrediting Organisation Design Matters National

Verification

To verify this certificate, scan the QR code or visit hstar.com.au/QR/Generate?p=WqWnXePVF . 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
0008590929	130301	45.1	23.4	68.5	4.9
0008591331	130302	29.1	18	47.1	6.3
0008590820	130303	19.9	19.3	39.2	6.9
0008591919	130304	21.2	27.8	49	6.2
0008591927	130305	16.7	26.4	43.1	6.7

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
0008591935	130306	22.7	22.1	44.8	6.5
0008591943	130307	12.6	25.9	38.6	7
0008590937	130401	45.1	23.3	68.4	4.9
0008591018	130402	32.8	14.7	47.5	6.3
0008590812	130403	15.8	17.4	33.2	7.4
0008590655	130404	17.5	23.6	41.1	6.8
0008590911	130501	45.1	23.3	68.4	4.9
0008591000	130502	30.2	16.1	46.4	6.4
0008590507	130503	33.3	25.4	58.6	5.4
0008590804	130504	16.4	16.9	33.3	7.4
0008590648	130505	18	22.7	40.8	6.9
0008590614	130506	18	22.7	40.8	6.9
0008590549	130507	10	23.9	33.9	7.4
0008590572	130508	28.9	18.6	47.5	6.3
0008590903	130601	44.7	19.8	64.5	5.1
0008590994	130602	30.4	16.6	47	6.3
0008590499	130603	33.6	26.3	60	5.4
0008590796	130604	16.8	16.9	33.7	7.4
0008590630	130605	18.4	22.2	40.7	6.9
0008590606	130606	18.4	22.2	40.7	6.9
0008590531	130607	10.3	23.8	34.1	7.3
0008590564	130608	29.6	18.1	47.7	6.3
0008590895	130701	44.2	20.4	64.6	5.1
0008590986	130702	30.5	16.1	46.6	6.4
0008590481	130703	33.8	25.9	59.8	5.4
0008590788	130704	17.1	16.9	34	7.4
0008590622	130705	18.9	22.2	41.1	6.8
0008590598	130706	18.9	22.2	41.1	6.8
0008590523	130707	10.7	23.5	34.1	7.3
0008590556	130708	30.1	18.4	48.4	6.2
0008590887	130801	43.6	22.2	65.9	5
0008590978	130802	30.4	17.4	47.8	6.3
0008590473	130803	39.3	24.7	64.1	5.1
0008590374	130804	7.6	18.8	26.5	7.9
0008590366	130805	15.2	17.2	32.4	7.4
0008590358	130806	9	15.6	24.6	8.1
0008590879	130901	42.7	22.3	65	5.1
0008590960	130902	31.2	18.3	49.5	6.1
0008590242	130903	22.4	28.9	51.3	5.9
0008590200	130904	14.8	15.7	30.5	7.6

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
0008590341	130905	8.6	16.6	25.2	8.1
0008590861	131001	41.4	22.9	64.3	5.1
0008590952	131002	30.9	18.4	49.3	6.1
0008590234	131003	22.5	28.5	51	6
0008591950	131004	15	15.2	30.2	7.6
0008590333	131005	8.5	17.7	26.3	7.9
0008590853	131101	40.1	23.7	63.8	5.1
0008590945	131102	30.5	19	49.5	6.1
0008590226	131103	22.6	28.6	51.1	5.9
0008590192-01	131104	15.2	15	30.2	7.6
0008590325	131105	7.9	18.3	26.2	7.9
0008592016	131201	20	27.8	47.7	6.3
0008590218	131202	26.6	24.4	51	5.9
0008590184	131203	18.6	13.3	31.9	7.5
0008590317	131204	7.3	17	24.2	8.1
0008555369-01	140001	43.5	6.2	49.6	6.1
0008591893	140002	20.8	21.1	41.9	6.8
0008591885	140003	29.1	20	49.1	6.2
0008591877	140004	35.2	18.8	53.9	5.8
0008591869	140005	27	14	41.1	6.8
0008591828	140201	25.4	18.4	43.8	6.6
0008591976	140202	10.7	17.3	28	7.8
0008591851	140203	12.5	17.7	30.1	7.7
0008591844	140204	10.4	23.3	33.7	7.4
0008591836	140205	27.3	24.4	51.7	5.9
0008591703	140301	22.3	20.8	43.1	6.7
0008591810	140302	11	17.9	28.9	7.8
0008591794	140303	12.9	17.2	30.1	7.7
0008591778	140304	10.7	23	33.7	7.4
0008591752	140305	29.4	22.4	51.8	5.9
0008591737	140306	31.1	19.4	50.5	6
0008591695	140401	26.5	18.9	45.4	6.4
0008591802	140402	14.1	13.1	27.2	7.9
0008591786	140403	16	12.3	28.3	7.8
0008591760	140404	13.1	19.1	32.2	7.4
0008591745	140405	33.2	16.3	49.5	6.1
0008591729	140406	35.3	16.7	52	5.9
0008591687	140501	27	19.8	46.8	6.3
0008591679	140502	5.2	28.1	33.3	7.4
0008591661	140504	11.7	20.9	32.6	7.4
0008591984	140505	33.8	16	49.8	6.1
0008591711	140506	35.5	17.9	53.4	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
0008591653	140601	24.2	10.9	35.1	7.3
0008591497	140602	11.9	25	36.9	7.1
0008591455	140604	29.6	18.6	48.2	6.2
0008591554-01	140605	38.4	16.4	54.8	5.7
0008591588	140606	29.4	19	48.4	6.2
0008591646	140701	24.2	11	35.3	7.3
0008591505	140702	12.3	24.6	36.9	7.2
0008591448	140704	30.1	18.4	48.5	6.2
0008591547	140705	38.5	17.5	55.9	5.6
0008591596	140706	29	20.3	49.4	6.1
0008591638	140801	24.1	11.8	35.9	7.2
0008591489	140802	12.7	24.1	36.7	7.2
0008591430	140804	30.7	18.2	48.9	6.2
0008591539	140805	37.2	18.2	55.4	5.7
0008591604	140806	26.9	22	48.9	6.2
0008591620	140901	23.9	12.6	36.5	7.2
0008591471	140902	12.9	23.5	36.4	7.2
0008591422	140904	31.1	18.2	49.2	6.1
0008591521	140905	34.7	19.6	54.4	5.8
0008591570	140906	25.2	24	49.3	6.1
0008591612	141001	23.4	13.9	37.4	7.1
0008591463	141002	13.3	23.4	36.7	7.2
0008591414	141004	31.6	17.9	49.5	6.1
0008591513	141005	32.7	21.6	54.3	5.8
0008591562	141006	23.1	26.5	49.6	6.1
0008590838	141101	21	20	40.9	6.8
0008590846	141102	16.7	15.9	32.6	7.4
0008591992	141103	44.1	13.4	57.5	5.5
0008591380	150201	42	20	62	5.3
0008591406	150202	28.5	20.1	48.6	6.2
0008591398	150203	24.9	18.9	43.8	6.6
0008591364	150204	19.5	19.7	39.2	6.9
0008591372	150205	15.6	28.9	44.4	6.5
0008591257	150301	27.7	19.5	47.2	6.3
0008591307	150302	22.7	24.6	47.3	6.3
0008591315	150303	12.5	29.1	41.6	6.8
0008591323	150304	13.6	17	30.6	7.6
0008590697	150305	11.4	13.6	25	8.1
0008591349	150306	13.8	21.6	35.5	7.3
0008591356	150307	27.3	18.4	45.7	6.4
0008591240	150401	31.9	16.2	48.1	6.2
0008591299	150402	26.6	18.2	44.8	6.5

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
0008590770	150403	15.6	23.2	38.8	7
0008590739	150404	17.6	14.9	32.5	7.4
0008590689	150405	10.6	11.4	22	8.3
0008591091	150406	17.2	15.8	32.9	7.4
0008591166	150407	32.4	15.3	47.7	6.3
0008591232	150501	32.3	16.9	49.3	6.1
0008591281	150502	27.2	17.6	44.8	6.5
0008590762	150503	16.1	22.9	39.1	6.9
0008590721	150504	18.2	14.4	32.6	7.4
0008590671	150505	10.6	11.4	22	8.3
0008590515	150506	29.2	24.5	53.7	5.8
0008591083	150507	16.8	15.4	32.2	7.4
0008591158	150508	33	15.2	48.2	6.2
0008591224	150601	32.5	18.1	50.6	6
0008591273	150602	27.7	17.1	44.8	6.5
0008590754	150603	16.5	22.9	39.4	6.9
0008590713	150604	18.8	14.5	33.2	7.4
0008592008	150605	11.3	10.5	21.8	8.4
0008590465	150606	29.5	25.6	55.2	5.7
0008591075-01	150607	17.1	15.3	32.4	7.4
0008590580	150608	33.1	15.9	49	6.2
0008591216	150701	32.3	19.6	51.9	5.9
0008591265	150702	28.2	16.8	45	6.5
0008590747	150703	16.9	22.7	39.7	6.9
0008590705	150704	19.3	14.1	33.4	7.4
0008590663	150705	11.7	10.5	22.1	8.3
0008590457	150706	29.7	25.7	55.5	5.7
0008591067	150707	17.4	15.1	32.5	7.4
0008591141	150708	33.2	16.9	50	6.1
0008591208	150801	31.3	20.5	51.9	5.9
0008590432	150802	27.5	25.3	52.8	5.9
0008590390	150803	11	29.4	40.3	6.9
0008590382	150804	8.3	19.4	27.7	7.9
0008590440	150805	35.1	22.4	57.5	5.5
0008591059	150806	17.5	15	32.6	7.4
0008591133	150807	31.6	19.5	51.2	5.9
0008591190	150901	29.2	22.3	51.6	5.9
0008590424	150902	28	24.9	52.9	5.9
0008590309	150903	40.5	29.3	69.8	4.8
0008590275	150904	28	17.3	45.3	6.4
0008591042	150905	16.8	15.1	31.9	7.5
0008591125	150906	31.5	20.8	52.2	5.9

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
0008591182	151001	28.4	22.8	51.2	5.9
0008590416	151002	28.3	24.8	53.1	5.9
0008590291	151003	40.9	29.5	70.3	4.8
0008590267	151004	28.3	16.8	45.1	6.4
0008591034	151005	16.7	15	31.7	7.5
0008591117	151006	30.9	20.7	51.6	5.9
0008591174	151101	25.7	23.7	49.4	6.1
0008590408	151102	28.6	24.5	53.1	5.8
0008590283	151103	41.3	29.1	70.4	4.8
0008590259	151104	28.3	16.7	45	6.4
0008591026	151105	16.7	15.2	31.9	7.5
0008591109	151106	30.4	20.9	51.3	5.9
0008592024	151201	26.4	25.7	52.1	5.9
0008592032	151202	25	26	51	5.9
0008592040	151203	14	24	38	7.1
0008591968-01	151204	24.1	22.3	46.4	6.4
Average		24.28	19.80	44.09	6.57

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.

APPENDIX D – BASIX CERTIFICATE

BASIX® Certificate

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

Multi Dwelling

Certificate number: 1241743M

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: Tuesday, 25 April 2023
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	14-16 Marshall Ave, St Leonards NSW 2065
Street address	14-16 Marshall Avenue St Leonards NSW 2065
Local Government Area	Lane Cove Municipal Council
Plan type and plan number	deposited 1234
Lot no.	1234
Section no.	-
No. of residential flat buildings	3
No. of units in residential flat buildings	187
No. of multi-dwelling houses	0
No. of single dwelling houses	0

Project score		
Water	✔ 41	Target 40
Thermal Comfort	✔ Pass	Target Pass
Energy	✔ 31	Target 25

If any changes to this BASIX certificate are required, please contact EEG with following details:
- Project reference: 14-16 Marshall Avenue, St Leonards NSW 2065
- Contact number: 0430 108 801

Certificate Prepared by
Name / Company Name: Eco Engineering Group
ABN (if applicable): 11153980842

Description of project

Project address	
Project name	14-16 Marshall Ave, St Leonards NSW 2065
Street address	14-16 Marshall Avenue St Leonards NSW 2065
Local Government Area	Lane Cove Municipal Council
Plan type and plan number	deposited 1234
Lot no.	1234
Section no.	-

Project type	
No. of residential flat buildings	3
No. of units in residential flat buildings	187
No. of multi-dwelling houses	0
No. of single dwelling houses	0

Site details	
Site area (m²)	5874
Roof area (m²)	2476
Non-residential floor area (m²)	-
Residential car spaces	248
Non-residential car spaces	-

Common area landscape	
Common area lawn (m²)	125.0
Common area garden (m²)	1556.0
Area of indigenous or low water use species (m²)	1302.0

Assessor details	
Assessor number	BDAV/16/1757
Certificate number	0008592050
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	✔ 31	Target 25

Description of project

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

Residential flat buildings - Area 13, 60 dwellings, 11 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)
13031	1	49.0	5.0	0.0	0.0
13032	2	70.0	7.0	0.0	0.0
13033	2	72.0	7.0	7.6	0.0
13034	2	70.0	4.0	7.2	0.0
13035	4 or more bedrooms	142.0	5.0	10.8	0.0
13036	4 or more bedrooms	143.0	4.0	0.0	0.0
13037	4 or more bedrooms	127.0	6.0	0.0	0.0
13041	1	49.0	5.0	0.0	0.0
13042	2	70.0	7.0	0.0	0.0
13043	2	72.0	7.0	0.0	0.0
13044	2	70.0	4.0	0.0	0.0
13051	1	49.0	5.0	0.0	0.0
13052	2	70.0	7.0	0.0	0.0
13053	1	50.0	6.0	0.0	0.0
13054	2	72.0	7.0	0.0	0.0
13055	2	70.0	4.0	0.0	0.0
13056	2	70.0	4.0	0.0	0.0
13057	2	70.0	7.0	0.0	0.0
13058	2	73.0	6.0	0.0	0.0
13061	1	49.0	5.0	0.0	0.0
13062	2	70.0	7.0	0.0	0.0
13063	1	50.0	6.0	0.0	0.0
13064	2	72.0	7.0	0.0	0.0
13065	2	70.0	4.0	0.0	0.0
13066	2	70.0	4.0	0.0	0.0
13067	2	70.0	7.0	0.0	0.0
13068	2	73.0	6.0	0.0	0.0
13071	1	49.0	5.0	0.0	0.0
13072	2	70.0	7.0	0.0	0.0
13073	1	50.0	6.0	0.0	0.0
13074	2	72.0	7.0	0.0	0.0
13075	2	70.0	4.0	0.0	0.0
13076	2	70.0	4.0	0.0	0.0
13077	2	70.0	7.0	0.0	0.0
13078	2	73.0	6.0	0.0	0.0
13081	1	49.0	5.0	0.0	0.0
13082	2	70.0	7.0	0.0	0.0
13083	1	50.0	6.0	0.0	0.0
13084	3	92.0	6.0	0.0	0.0
13085	3	99.0	6.0	0.0	0.0
13086	3	85.0	6.0	0.0	0.0
13091	1	49.0	5.0	0.0	0.0
13092	2	70.0	7.0	0.0	0.0
13093	3	88.0	6.0	0.0	0.0
13094	3	89.0	5.0	0.0	0.0
13095	3	85.0	6.0	0.0	0.0
13101	1	49.0	5.0	0.0	0.0
13102	2	70.0	7.0	0.0	0.0
13103	3	88.0	6.0	0.0	0.0
13104	3	89.0	5.0	0.0	0.0
13105	3	85.0	6.0	0.0	0.0
13111	1	49.0	5.0	0.0	0.0
13112	2	70.0	7.0	0.0	0.0
13113	3	88.0	6.0	0.0	0.0
13114	3	89.0	5.0	0.0	0.0
13115	3	85.0	6.0	0.0	0.0
13121	4 or more bedrooms	120.0	6.0	0.0	0.0
13122	3	88.0	6.0	0.0	0.0
13123	3	89.0	5.0	0.0	0.0
13124	3	85.0	6.0	0.0	0.0

Residential flat buildings - Area 14, 55 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)
14001	3	128.0	6.0	0.0	0.0
14002	3	108.0	8.0	0.0	0.0
14003	3	110.0	8.0	0.0	0.0
14004	4 or more bedrooms	130.0	4.0	0.0	0.0
14005	2	103.0	4.0	0.0	0.0
14021	3	85.0	8.0	0.0	0.0
14022	2	66.0	7.0	0.0	0.0
14023	2	73.0	3.0	0.0	0.0
14024	3	89.0	4.0	0.0	0.0
14025	3	106.0	0.0	0.0	0.0
14031	2	67.0	6.0	0.0	0.0
14032	2	66.0	7.0	6.6	0.0
14033	2	73.0	3.0	3.8	0.0
14034	3	89.0	4.0	74.0	0.0
14035	3	93.0	0.0	73.0	0.0
14036	2	63.0	8.0	0.0	0.0
14041	2	67.0	6.0	0.0	0.0
14042	2	66.0	7.0	0.0	0.0
14043	2	73.0	3.0	0.0	0.0
14044	3	89.0	4.0	0.0	0.0
14045	3	93.0	0.0	0.0	0.0
14046	2	63.0	8.0	0.0	0.0
14051	2	67.0	6.0	0.0	0.0
14052	3	92.0	6.0	0.0	0.0
14054	4 or more bedrooms	103.0	5.0	0.0	0.0
14055	2	93.0	0.0	0.0	0.0
14056	2	63.0	8.0	0.0	0.0
14061	2	78.0	3.0	0.0	0.0
14062	2	68.0	6.0	0.0	0.0
14064	3	90.0	4.0	0.0	0.0
14065	2	69.0	6.0	0.0	0.0
14066	1	45.0	5.0	0.0	0.0
14071	2	78.0	3.0	0.0	0.0
14072	2	68.0	6.0	0.0	0.0
14074	3	90.0	4.0	0.0	0.0
14075	2	69.0	6.0	0.0	0.0
14076	1	45.0	5.0	0.0	0.0
14081	2	78.0	3.0	0.0	0.0
14082	2	68.0	6.0	0.0	0.0
14084	3	90.0	4.0	0.0	0.0
14085	2	69.0	6.0	0.0	0.0
14086	1	45.0	5.0	0.0	0.0
14091	2	78.0	3.0	0.0	0.0
14092	2	68.0	6.0	0.0	0.0
14094	3	90.0	4.0	0.0	0.0
14095	2	69.0	6.0	0.0	0.0
14096	1	45.0	5.0	0.0	0.0
14101	2	78.0	3.0	0.0	0.0
14102	2	68.0	6.0	0.0	0.0
14104	3	90.0	4.0	0.0	0.0
14105	2	69.0	6.0	0.0	0.0
14106	1	45.0	5.0	0.0	0.0
14111	4 or more bedrooms	132.0	5.0	0.0	0.0
14112	4 or more bedrooms	115.0	4.0	0.0	0.0
14113	4 or more bedrooms	124.0	5.0	0.0	0.0

Residential flat buildings - Area 15, 72 dwellings, 11 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)
15021	1	56.0	4.0	0.0	0.0
15031	3	88.0	6.0	0.0	0.0
15036	2	70.0	7.0	0.0	0.0
15044	1	50.0	6.0	0.0	0.0
15052	3	94.0	5.0	0.0	0.0
15057	2	70.0	7.0	0.0	0.0
15064	1	50.0	6.0	0.0	0.0
15071	3	88.0	6.0	0.0	0.0
15076	1	50.0	6.0	0.0	0.0
15083	1	59.0	7.0	0.0	0.0
15091	3	88.0	6.0	0.0	0.0
15096	1	49.0	5.0	0.0	0.0
15105	2	70.0	7.0	0.0	0.0
15114	2	67.0	7.0	0.0	0.0
15123	4 or more bedrooms	107.0	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)
15022	2	72.0	6.0	0.0	0.0
15032	3	94.0	5.0	16.0	0.0
15037	1	49.0	5.0	0.0	0.0
15045	2	72.0	7.0	0.0	0.0
15053	2	70.0	4.0	0.0	0.0
15058	1	49.0	5.0	0.0	0.0
15065	2	72.0	7.0	0.0	0.0
15072	3	94.0	5.0	0.0	0.0
15077	2	70.0	7.0	0.0	0.0
15084	2	71.0	6.0	0.0	0.0
15092	3	89.0	5.0	0.0	0.0
15101	3	88.0	6.0	0.0	0.0
15106	1	49.0	5.0	0.0	0.0
15115	2	70.0	7.0	0.0	0.0
15124	4 or more bedrooms	125.0	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)
15023	2	79.0	6.0	0.0	0.0
15033	2	70.0	4.0	2.2	0.0
15041	3	88.0	6.0	0.0	0.0
15046	2	70.0	7.0	0.0	0.0
15054	1	50.0	6.0	0.0	0.0
15061	3	88.0	6.0	0.0	0.0
15066	1	50.0	6.0	0.0	0.0
15073	2	70.0	4.0	0.0	0.0
15078	1	49.0	5.0	0.0	0.0
15085	1	50.0	6.0	0.0	0.0
15093	1	49.0	7.0	0.0	0.0
15102	3	89.0	5.0	0.0	0.0
15111	3	88.0	6.0	0.0	0.0
15116	1	49.0	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)
15024	1	58.0	6.0	0.0	0.0
15034	1	50.0	6.0	2.6	0.0
15042	3	94.0	5.0	0.0	0.0
15047	1	49.0	5.0	0.0	0.0
15055	2	72.0	7.0	0.0	0.0
15062	3	94.0	5.0	0.0	0.0
15067	2	70.0	7.0	0.0	0.0
15074	1	50.0	6.0	0.0	0.0
15081	3	88.0	6.0	0.0	0.0
15086	2	70.0	7.0	0.0	0.0
15094	2	67.0	7.0	0.0	0.0
15103	1	49.0	7.0	0.0	0.0
15112	3	89.0	5.0	0.0	0.0
15121	4 or more bedrooms	115.0	4.0	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)
15025	1	57.0	0.0	0.0	0.0
15035	2	72.0	7.0	3.3	0.0
15043	2	70.0	4.0	0.0	0.0
15051	3	88.0	6.0	0.0	0.0
15056	1	50.0	6.0	0.0	0.0
15063	2	70.0	4.0	0.0	0.0
15068	1	49.0	5.0	0.0	0.0
15075	2	72.0	7.0	0.0	0.0
15082	3	89.0	5.0	0.0	0.0
15087	1	49.0	5.0	0.0	0.0
15095	2	70.0	7.0	0.0	0.0
15104	2	67.0	7.0	0.0	0.0
15113	1	49.0	7.0	0.0	0.0
15122	3	87.0	7.0	0.0	0.0

Description of project

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

Common areas of unit building - Area 13

Common area	Floor area (m²)
Lift car (No.1)	-

Common area	Floor area (m²)
Lift car (No.2)	-

Common areas of unit building - Area 14

Common area	Floor area (m²)
Lift car (No.3)	-

Common area	Floor area (m²)
Lift car (No.4)	-

Common areas of unit building - Area 15

Common area	Floor area (m²)
Lift car (No.6)	-

Common area	Floor area (m²)
Lift car (No.7)	-

Common areas of the development (non-building specific)

Common area	Floor area (m²)
Car park area	11023.8
Plant or service room	288.1

Common area	Floor area (m²)
Switch room	45.5
Ground floor lobby type	143.5

Common area	Floor area (m²)
Garbage room	252.4
Hallway/lobby type	1456.0

Schedule of BASIX commitments

1. Commitments for Residential flat buildings - Area 13
    - (a) Dwellings
        - (i) Water
        - (ii) Energy
        - (iii) Thermal Comfort
    - (b) Common areas and central systems/facilities
        - (i) Water
        - (ii) Energy

2. Commitments for Residential flat buildings - Area 14
    - (a) Dwellings
        - (i) Water
        - (ii) Energy
        - (iii) Thermal Comfort
    - (b) Common areas and central systems/facilities
        - (i) Water
        - (ii) Energy

3. Commitments for Residential flat buildings - Area 15
    - (a) Dwellings
        - (i) Water
        - (ii) Energy
        - (iii) Thermal Comfort
    - (b) Common areas and central systems/facilities
        - (i) Water
        - (ii) Energy

4. Commitments for multi-dwelling houses

5. Commitments for single dwelling houses

6. 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 - Area 13

(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	3 star (> 4.5 but <= 6 L/min)	4 star	5 star	5 star	no	no washing machine taps	4 star	-	-	-	-	-	-	-

	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	interlocked to light	individual fan, ducted to façade or roof	manual switch on/off	individual fan, ducted to façade or roof	interlocked to light

	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
13035, 13036, 13037, 13121	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	4 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-
13084, 13093, 13103, 13113	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	3 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-
13055, 13056, 13057, 13066, 13067, 13076, 13077, 13078	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	2 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-
13085, 13086, 13094, 13095, 13104, 13105, 13114, 13115, 13122, 13123, 13124	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	3 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-

	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
13031, 13041, 13051, 13053, 13061, 13063, 13071, 13073, 13081, 13083, 13091, 13101, 13111	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-
All other dwellings	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	2 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-

	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	-	-	-	-	gas cooktop & electric oven	-	-	3 star	-	3 star	-	-

(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)
13031	45.1	23.4
13032	29.1	18.0
13033	19.9	19.3
13034	21.2	27.8

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
13035	16.7	26.4
13036	22.7	22.1
13037	12.6	25.9
13042	32.8	14.7
13043	15.8	17.4
13044	17.5	23.6
13052	30.2	16.1
13053	33.3	25.4
13054	16.4	16.9
13057	10.0	23.9
13058	28.9	18.6
13061	44.7	19.8
13062	30.4	16.6
13063	33.6	26.3
13064	16.8	16.9
13067	10.3	23.8
13068	29.6	18.1
13071	44.2	20.4
13072	30.5	16.1
13073	33.8	25.9
13074	17.1	16.9
13077	10.7	23.5
13078	30.1	18.4
13081	43.6	22.2
13082	30.4	17.4
13083	39.3	24.7
13084	7.6	18.4

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
13085	15.2	17.2
13086	9.0	15.6
13091	42.7	22.3
13092	31.2	18.3
13093	22.4	28.9
13094	14.8	15.7
13095	8.6	16.6
13101	41.4	22.9
13102	30.9	18.4
13103	22.5	28.5
13104	15.0	15.2
13105	8.5	17.7
13111	40.1	23.7
13112	30.5	19.0
13113	22.6	28.6
13114	15.2	15.0
13115	7.9	18.3
13121	20.0	27.8
13122	26.6	24.4
13123	18.6	13.3
13124	7.3	17.0
13041, 13051	45.1	23.3
13055, 13056	18.0	22.7
13065, 13066	18.4	22.2
All other dwellings	18.9	22.2

(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	no common facility	no common facility	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.	✔	✔	✔

	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**
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

Central energy systems	Type	Specification
Central hot water system (No. 1)	gas-fired storage (manifolded)	Piping insulation (ringmain & supply risers): (a) Piping external to building: R0.6 (~25 mm); (b) Piping internal to building: R0.6 (~25 mm)
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

2. Commitments for Residential flat buildings - Area 14

(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	3 star (> 4.5 but <= 6 L/min)	4 star	5 star	5 star	no	no washing machine taps	4 star	-	-	-	-	-	-	-

	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 2	individual fan, ducted to façade or roof	interlocked to light	individual fan, ducted to façade or roof	manual switch on/off	individual fan, ducted to façade or roof	interlocked to light

	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
14004, 14054, 14111, 14112, 14113	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	4 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-
14066, 14076, 14086, 14096, 14106	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-
14001, 14002, 14003, 14021, 14024, 14025, 14034, 14035, 14044, 14045, 14052, 14064, 14074, 14084, 14094, 14104	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	3 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-
All other dwellings	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	2 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-

	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	-	-	-	-	gas cooktop & electric oven	-	-	3 star	-	3 star	-	-

(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)**
14001	43.5	6.2
14002	20.8	21.1
14003	29.1	20.0
14004	35.2	18.8
14005	27.0	14.0
14021	25.4	18.4
14022	10.7	17.3
14023	12.5	17.7
14024	10.4	23.3
14025	27.3	24.4
14031	22.3	20.8
14032	11.0	17.9
14033	12.9	17.2
14034	10.7	23.0
14035	29.4	22.4
14036	31.1	19.4
14041	26.5	18.9
14042	14.1	13.1
14043	16.0	12.3
14044	13.1	19.1
14045	33.2	16.3
14046	35.3	16.7
14051	27.0	19.8
14052	5.2	28.1
14054	11.7	20.9
14055	33.8	16.0
14056	35.5	17.9

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
14061	24.2	10.9
14062	11.9	25.0
14064	29.6	18.6
14065	38.4	16.4
14066	29.4	19.0
14071	24.2	11.0
14072	12.3	24.6
14074	30.1	18.4
14075	38.5	17.5
14076	29.0	20.3
14081	24.1	11.8
14082	12.7	24.1
14084	30.7	18.2
14085	37.2	18.2
14086	26.9	22.0
14091	23.9	12.6
14092	12.9	23.5
14094	31.1	18.2
14095	34.7	19.6
14096	25.2	24.0
14101	23.4	13.9
14102	13.3	23.4
14104	31.6	17.9
14105	32.7	21.6
14106	23.1	26.5
14111	21.0	20.0
14112	16.7	15.9

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
All other dwellings	44.1	13.4

(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	no common facility	no common facility	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.	✔	✔	✔

	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**
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

Central energy systems	Type	Specification
Central hot water system (No. 2)	gas-fired storage (manifolded)	Piping insulation (ringmain & supply risers): (a) Piping external to building: R0.6 (~25 mm); (b) Piping internal to building: R0.6 (~25 mm)
Lift (No. 3)	gearless traction with V V V F motor	Number of levels (including basement): 14
Lift (No. 4)	gearless traction with V V V F motor	Number of levels (including basement): 14

3. Commitments for Residential flat buildings - Area 15

(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	3 star (> 4.5 but <= 6 L/min)	4 star	5 star	5 star	no	no washing machine taps	4 star	-	-	-	-	-	-	-

	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 3	individual fan, ducted to façade or roof	interlocked to light	individual fan, ducted to façade or roof	manual switch on/off	individual fan, ducted to façade or roof	interlocked to light

	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
15121, 15123, 15124	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	4 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-
15031, 15032, 15041, 15042, 15051, 15052, 15061, 15062, 15071, 15072, 15081, 15082, 15091, 15092, 15101, 15102, 15111, 15112, 15122	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	3 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-

	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
15021, 15024, 15025, 15034, 15037, 15044, 15047, 15054, 15056, 15058, 15064, 15066, 15068, 15074, 15076, 15078, 15083, 15085, 15087, 15093, 15096, 15103, 15106, 15113, 15116	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-
All other dwellings	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	1-phase airconditioning 4 Star (old label)	2 (dedicated)	1 (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	yes (dedicated)	0	-

	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	-	-	-	-	gas cooktop & electric oven	-	-	3 star	-	3 star	-	-

(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)**
15021	42.0	20.0
15022	28.5	20.1
15023	24.9	18.9
15024	19.5	19.7
15025	15.6	28.9
15031	27.7	19.5
15032	22.7	24.6
15033	12.5	29.1
15034	13.6	17.0
15035	11.4	13.6
15036	13.8	21.6
15037	27.3	18.4
15041	31.9	16.2
15042	26.6	18.2
15043	15.6	23.2
15044	17.6	14.9
15046	17.2	15.8
15047	32.4	15.3
15051	32.3	16.9
15052	27.2	17.6
15053	16.1	22.9
15054	18.2	14.4
15056	29.2	24.5
15057	16.8	15.4
15058	33.0	15.2
15061	32.5	18.1
15062	27.7	17.1

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
15063	16.5	22.9
15064	18.8	14.5
15065	11.3	10.5
15066	29.5	25.6
15067	17.1	15.3
15068	33.1	15.9
15071	32.3	19.6
15072	28.2	16.8
15073	16.9	22.7
15074	19.3	14.1
15075	11.7	10.5
15076	26.7	25.7
15077	17.4	15.1
15078	33.2	16.9
15081	31.3	20.5
15082	27.5	25.3
15083	11.0	29.4
15084	8.3	19.4
15085	35.1	22.4
15086	17.5	15.0
15087	31.6	19.5
15091	29.2	22.3
15092	28.0	24.9
15093	40.5	29.3
15094	28.0	17.3
15095	16.8	15.1
15096	31.5	20.8

	Thermal loads	
Dwelling no.	**Area adjusted heating load (in mJ/m²/yr)**	**Area adjusted cooling load (in mJ/m²/yr)**
15101	28.4	22.8
15102	28.3	24.8
15103	40.9	29.5
15104	28.3	16.8
15105	16.7	15.0
15106	30.9	20.7
15111	25.7	23.7
15112	28.6	24.5
15113	41.3	29.1
15114	28.3	16.7
15115	16.7	15.2
15116	30.4	20.9
15121	26.4	25.7
15122	25.0	26.0
15123	14.0	24.0
15124	24.1	22.3
All other dwellings	10.6	11.4

(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	no common facility	no common facility	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.	✔	✔	✔

	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**
Lift car (No.6)	-	-	light-emitting diode	connected to lift call button	No
Lift car (No.7)	-	-	light-emitting diode	connected to lift call button	No

Central energy systems	Type	Specification
Central hot water system (No. 3)	gas-fired storage (manifolded)	Piping insulation (ringmain & supply risers): (a) Piping external to building: R0.6 (~25 mm); (b) Piping internal to building: R0.6 (~25 mm)
Lift (No. 6)	gearless traction with V V V F motor	Number of levels (including basement): 15
Lift (No. 7)	gearless traction with V V V F motor	Number of levels (including basement): 15

6. 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	no common facility	no common facility	5 star	no common laundry facility

Central systems	Size	Configuration	Connection (to allow for...)
Central water tank - rainwater or stormwater (No. 1)	15000.0	To collect run-off from at least: - 1980.0 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 126.6 square metres of common landscaped area on the site - car washing in 2 car washing bays on the site
Fire sprinkler system (No. 1)	-	-	-

Central systems	Size	Configuration	Connection (to allow for...)
Fire sprinkler system (No. 2)	-	-	-

(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	ventilation (supply + exhaust)	carbon monoxide monitor + VSD fan	light-emitting diode	motion sensors	No
Switch room	ventilation supply only	thermostatically controlled	light-emitting diode	manual on / manual off	No
Garbage room	ventilation exhaust only	-	light-emitting diode	motion sensors	No
Plant or service room	ventilation supply only	thermostatically controlled	light-emitting diode	manual on / manual off	No
Ground floor lobby type	ventilation supply only	time clock or BMS controlled	light-emitting diode	time clock and motion sensors	No
Hallway/lobby type	ventilation supply only	time clock or BMS controlled	light-emitting diode	time clock and motion sensors	No

Central energy systems	Type	Specification
Alternative energy supply	Photovoltaic system	Rated electrical output (min): 52.2 peak kW

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).