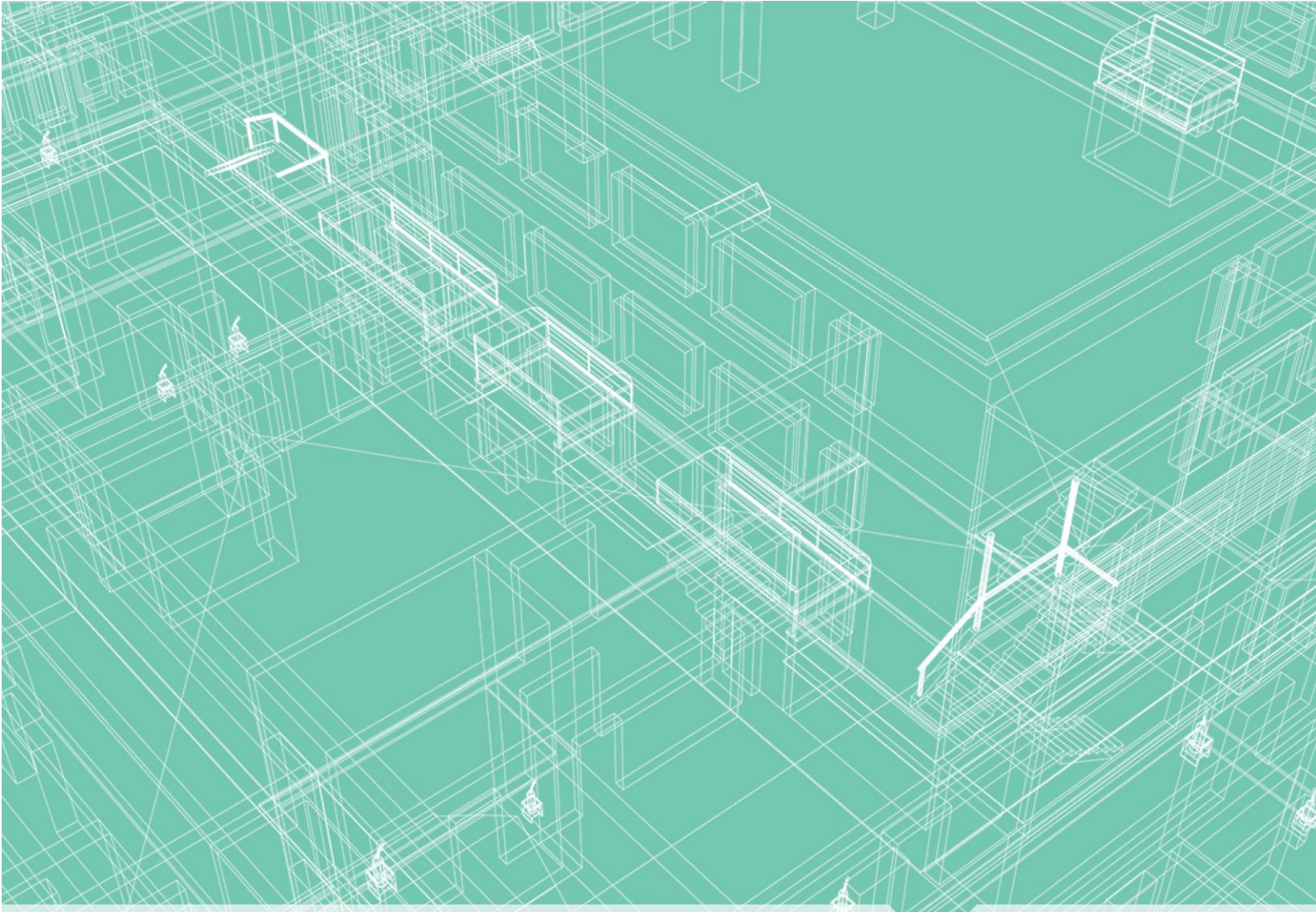

ESD SSDA REPORT

OPAL ST IVES BOTANICA

ESD SERVICES

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DOCUMENT CONTROL SHEET

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Project Name	Opal St Ives Botanica
Description	Ecologically Sustainable Design SSDA Report
Key Contact	Declan Rohr

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1. CONTENTS

2. EXECUTIVE SUMMARY

This report has been prepared by JHA to identify and summarise the Ecologically Sustainable Design (ESD) initiatives that have been considered in the design of the proposed aged care, Opal St. Ives Botanica located at 285-289 Mona Vale Road and 1 Flinders Avenue, St Ives, NSW 2075.

This report demonstrates compliance with the Industry-specific Secretary's Environmental Assessment Requirements (SEARs) for senior housing that apply to the project and has been prepared to accompany a State Significant Development (SSD) application to the NSW Department of Planning, Housing and Infrastructure (DPHI). This report should be read in conjunction with the architectural design drawings and other consultant design reports submitted as part of the application.

The ESD objectives of this project are to encourage a balanced approach to designing new facilities for the project; to be resource-efficient, cost-effective in construction and operation; and to deliver enhanced sustainability benefits concerning impacts on the environment and well-being of residents, patients, staff, and visitors whilst providing the best possible facilities for a constructive environment.

The proposed key ESD commitments for the development are listed below:

- Sufficient exposure to daylight
- Appropriate construction and glazing selection
- Energy-efficient air-conditioning systems with control strategy and thermal comfort tuning
- Energy-efficient lighting systems
- High WELS-rated water fixtures
- On-site photovoltaic system

3. INTRODUCTION

This ESD SSDA Report is submitted to the Department of Planning, Housing and Infrastructure (DPHI) in support of a State Significant Development Application for the proposed development of Opal St Ives Botanica which is an aged care facility located at 285-289 Mona Vale Road and 1 Flinders Avenue, St Ives, NSW 2075. The extent of the site is shown below.

The subject proposal is for the detailed design and construction of the facility and seeks approval for the following:

- Demolition of the existing buildings at the site.
- Construction of a new aged care facility.
- The proposed building provides 148 beds.
- Construction of associated site facilities and services, including pedestrian and vehicular access and basement parking.
- Site landscaping and infrastructure works.

In accordance with Part 8 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) and the State Significant Development Guidelines, the project is to comply with the Industry-specific Secretary's Environmental Assessment Requirements (SEARs) for senior housing. This report has been prepared to respond to the following SEARs:

9. Ecologically Sustainable Development (ESD)	The relevant section of the report
Identify how ESD principles (as defined in section 193 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development.	SECTION 4; Appendix A
Demonstrate how the development will meet or exceed the relevant industry recognized building sustainability and environmental performance standards.	SECTION 5; Appendix B
Demonstrate how the development minimizes greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water-sensitive urban design) and material resources.	SECTION 5; Appendix B

In accordance with the above industry-specific SEARS requirements, the development will implement a holistic and integrated approach to ESD, maximising passive opportunities with the selective application of modern technology where appropriate.

The ESD initiatives outlined within this document have been compiled to exceed the regulation, design tools, and design guidelines of the National Construction Code (NCC) 2022 Section J – Energy Efficiency;

The items listed above of the SEARS requirements are addressed in sections 4, 5, and Appendices of this report.

4. PRINCIPLES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT

The ESD principles as defined in section 193 of the EP&A Regulation have been incorporated into the design and ongoing operation phases of the development as follows:

4.1 THE PRECAUTIONARY PRINCIPLE

The precautionary principle is that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. n applying the precautionary principle, public and private decisions should be guided by

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and;
(ii) an assessment of the risk-weighted consequences of various options.

PROJECT RESPONSE:

This development is being designed in accordance with a wide range of ESD goals that pertain to the design, construction, and operational stages. The development team will ensure that the building minimises the impact on the environment in the areas of energy, water, and materials. The design will incorporate external high-performance glazing and shading devices, together with energy efficiency favoured passive design features to minimise severe or irreversible environmental damages.

In addition to the above, a Climate Adaptation Plan including a Risk Assessment has been undertaken to include the assessment of natural and urban hazards (e.g., flood, storm, heatwaves, bush fires, extreme storms, and other weather events). Increasing resilience to natural hazards has been considered in the development so that associated costs are budgeted. Refer to Appendix A - Climate Adaptation Plan for the details of climate risks identified for this project and the relative responses, actions and responsibilities for high and extreme risks identified.

4.2 INTER-GENERATIONAL EQUITY

The principle of inter-generational equity is that the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

PROJECT RESPONSE:

This development will not cause any significant impact on the health, diversity and productivity of the environment and will provide a community benefit in the form of increased residents, employee capacity, upgraded living, caring, and working facilities. The project will contribute to a lively community environment and add architectural interest to the surrounding area.

4.3 CONSERVATION OF BIOLOGICAL DIVERSITY AND ECOLOGICAL INTEGRITY

The principle of the conservation of biological diversity and ecological integrity is that the conservation of biological diversity and ecological integrity should be a fundamental consideration.

PROJECT RESPONSE:

A Biodiversity Development Assessment Report (BDAR) waiver was issued by the Department of Planning and Environment on 18th January 2023. The waiver states that the development will not likely to have any significant impacts on biodiversity values. Refer to Appendix C for the BDAR waiver issued by the department of planning and environment.

4.4 IMPROVED VALUATION, PRICING, AND INCENTIVE MECHANISMS

The principle of improved valuation, pricing and incentive mechanisms is that environmental factors should be included in the valuation of assets and services, such as

(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement, and,

(ii) the users of goods and services should pay prices based on the full life cycle of the costs of providing the goods and services, including the use of natural resources and assets and the ultimate disposal of waste, and

(iii) established environmental goals should be pursued in the most cost-effective way by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

PROJECT RESPONSE:

The project team has assessed the project against the ESD frameworks that is discussed in Section 5 and Appendix B of this report. The construction material will be selected based on the outcomes of relative cost-benefit analysis with decisions being made based on the whole-of-life costs rather than capital expenditure only. Certified recycled and reused materials, as well as materials with low embodied energy, will be preferred over others.

5. SUSTAINABLE DESIGN FRAMEWORK

5.1 FRAMEWORK

The sustainable design framework for this development aims to incorporate the best practice design initiatives and ESD principles into the development. The ESD initiatives and targets outlined within this framework have been compiled to exceed National Construction Code 2022 Section J.

5.2 BUILDING ENVELOPE

Intelligent design and material selection ensure that thermal comfort is not entirely achieved by mechanical means. Passive design initiatives such as performance glazing, shading and the use of insulation will reduce demand on mechanical air conditioning systems resulting in a reduction in energy consumption and greenhouse gas emissions.

5.2.1 BUILDING ENVELOPE PERFORMANCE

The building fabric will be designed to meet or exceed the NCC 2022 Section J requirements for the building envelope. Thermal breaks will be incorporated into walls, floors, and roofs where appropriate to ensure a continuous thermal barrier on the building envelope, reducing the flow of thermal energy between conductive materials.

A Section J Part J4 DTS assessment has been carried out to show compliance during the schematic design stage of the project. The indicative results on total construction R-value requirements demonstrating compliance with NCC 2022 Section J are provided below. The detailed assessment will be carried out in Phase 4 Design Development to optimise the configuration to suit the project's needs.

5.2.2 BUILDING FABRIC

The building fabric to aim for about 10% improvement from the NCC 2022 and will be demonstrated by J1V3 modelling, i.e., the J1V3 proposed building performs better than the reference building (modelled to Section J requirement of NCC 2022 as per the credit requirements).

The minimum performance requirements obtained under Section J Deem-to-Satisfy provision, coupled with 10% additional for the development (Class 5 and Class 9c) at the proposed location (Climate Zone 5) as per the NCC 2022 Section J - Energy Efficiency are below. The final values to be confirmed in detailed J1V3 modelling.

Building Elements	Indicative NCC 2022 Requirements
Envelope Roof/Ceiling	Total R-Value of 4.1 (Downwards, Light Colour Roof Solar absorptance of the upper surface of a roof must be not more than 0.40)
Envelope Walls	Total R-Value of 1.6
Envelope Floors (Suspended)	Total R-Value of 2.2 (Downwards)
Envelope Floors (Slab-on-ground)	Total R-Value of 2.2 (Downwards)

Note: The impact of thermal bridging must be considered within the total R-value calculation under NCC2022.

This will necessitate the use of insulation in the walls, floor, and roof for the building fabrics. Insulation reduces heat flow and consequent heat loss in winter and heat gain in summer. This minimises the heating and cooling load demand on the air conditioning systems. Light-coloured roof material with a low solar absorptance (SA) is recommended to be used to isolate more sunlight and reduce summer heat gain. It also has the effect of reducing elevated localised temperatures (the heat island effect) and potentially can improve the efficiency of solar PV panels (if any) as they perform more efficiently in reduced temperatures.

5.2.3 GLAZING

Glazing is a major source of unwanted heat gain in the summer and can cause significant heat loss in the winter due to its low insulation performance. It is thus recommended that windows will be high-performance glazing systems. Performance glazing substantially reduces heat transmission. This particularly reduces heat loss in winter; therefore, internal heat gain from equipment, lighting and people are better contained. Also, performance glazing absorbs the infrared portion of sunlight and reduces the amount of heat transferred into the conditioned space. This will correspond to a reduction of both heating and cooling loads.

The building will be designed to comply with NCC 2022 Section J Energy Efficiency. A Section J Part J4 J1V3 assessment will be carried out to show compliance during the Phase 4 Design Development of the project. Based on the Part J4 DTS pathway, the minimum glazing performance are below. Final values to be confirmed in detailed J1V3 modelling.

Glazing Element	Window Assembly (Glass & Frame)		Description
	Total U-value	Total SHGC	
External Vertical Glazing	3.8	0.28	DGU Performance Tinted or the like

Note: No skylights are proposed.

5.3 SHADING AND DAYLIGHTING

Solar access can enhance indoor environmental quality through access to daylighting and reduce lighting energy consumption. However, excessive solar access and hence, direct solar radiation heat can increase HVAC energy demand and can also cause thermal discomfort. The passive solar heating principle which aims to prevent solar heat gain in the summer and harvest it in the winter for a free source of heating, and the Passive cooling principle which prevents heat from entering the building during the summer months, are strategies that can conveniently take advantage of the site-specific solar access for optimised indoor environmental quality and reduction of HVAC energy demand through the use of tailored shadings.

The proposed buildings have been designed to make the best use of the sun by using external high-performance horizontal eave shading to prevent the high summer sun from entering the building whilst allowing the low winter sun to enter the building for passive heating.

These passive design features allow for enriched daylighting and greater access to external views for occupants. Additional daylighting reduces the reliance on artificial light and benefits alertness, mood, and productivity. External views provide a connection to nature and the building and help to create an environment encouraging constructive experience.

5.4 NATURAL VENTILATION

Adequate natural air movement makes an important contribution to creating a comfortable indoor environment and reducing the need for mechanical ventilation by carrying accumulated heat out and replacing it with cooler external air. This is important during the summer months when heat build-up within spaces can be quickly removed with the availability of a suitable breeze at the site. Natural ventilation will be provided to bedrooms and common areas with external glazed doors to terraces and courtyards.

5.5 ENERGY EFFICIENCY

Each climate zone under the Building Code has different design and conditioning requirements to minimise energy use for heating and cooling. A good balance of heating and cooling reduction techniques is required to create an energy-efficient development.

5.5.1 HEATING, COOLING AND VENTILATION SYSTEMS

The air-conditioning and ventilation systems shall be designed to comply with and exceed the minimum requirements of NCC 2022 Section J6 requirement.

The proposed underground car park will be provided with a mechanical exhaust system that will discharge through the roof. The car park mechanical ventilation system will be controlled via a carbon monoxide (CO) monitoring system, and the car park exhaust fan will also be provided with a variable speed drive (VSD) to optimise energy efficiency.

The occupied spaces like single room, lounge. Dining etc. will be having high-efficiency air conditioning as required.

The air-cooled heat rejection system to be used as this will help minimise the impacts associated with harmful microbes (e.g. Legionella impact).

All bathrooms, laundries, and general exhaust are to be naturally ventilated where possible, with mechanical ventilation required where necessary and provided with switch controls. The design will have a sufficient amount of exhaust fans to ensure the liveability of the residents.

The control of the air conditioning system shall be designed to minimise energy consumption. Further, high-efficiency equipment for the HVAC system will be selected to assist with the energy conservation of the building.

Ductwork systems will be designed to reduce system pressure losses to reduce fan motor power. This includes the selection of equipment for reduced coil and fittings drops and being generous with ductwork sizes to reduce friction losses.

All remote refrigeration plants will have VSD technology which helps to reduce noise and power consumption.

These initiatives will provide significant savings in energy use.

5.5.2 LIGHTING

Lighting will be designed to comply with NCC 2022 Section J7. Also, the Lighting illumination density will be according to NCC2022 Section J7D3. Fittings incorporating the latest lamp technologies will be installed to minimise energy use and provide efficient artificial lighting systems. The proposed development shall be illuminated using LED fittings and be controlled via PIR occupancy sensors.

Lighting in regularly occupied spaces shall be provided with a daylight sensor (PE Cells) to reduce light output or turn off lights when sufficient daylight is provided within the space. For large spaces, perimeter lighting shall be designated in a separate zone to make maximum use of the daylight.

All the external luminaires proposed will be according to AS 4282:1997. This will make sure that the external luminaires do not emit light pollution to the night sky above a given benchmark.

5.5.3 CONTROLS

All HVAC installed shall be controlled by the HVAC group controller. Closed spaces such as storage rooms and cleaners' cupboards are to be provided with a wall switch. For BOH and non-resident areas (not task specific areas) PIR sensors to be provided. Voltage control (dimming) should be provided where appropriate.

5.5.4 ELECTRICITY METERING

Electricity metering and sub-metering shall be specified in accordance with Section J to monitor and manage electricity consumption in the building. Sub-metering is to be provided to distinct locations including laundry, kitchen, mech plant and PV generation.

5.5.5 PHOTOVOLTAICS

Collecting solar energy has been chosen as a key ESD strategy for the project, with an aspirational goal of reducing the building's energy consumption and greenhouse gas emissions from a renewable source via the provision of a roof-mounted photovoltaic system. The project is proposing a minimum 99kW of onsite renewable system which is anticipated to reduce 12% of the building's maximum load demand.

5.6 INDOOR AIR QUALITY (IAQ)

The quality of indoor air has a significant impact on our health and environment. Poor indoor air quality results in adverse health effects such as allergies, asthma, etc. The ventilation system shall be designed to minimise the entry of outdoor pollutants as per ASHRAE Standard 62.1:2013 and should comply with AS1668.2:2012.

5.7 THERMAL COMFORT

The thermal comfort of the occupant is a crucial factor to be considered in an aged care facility. Hence all the regularly occupied spaces that are air-conditioned will be designed to achieve a PMV between -1 to +1 and the resident rooms (bedrooms) to be provided with operable windows that provide access to the outside air.

5.8 VISUAL COMFORT

At least 50% of all the resident rooms (bedrooms) will be designed to have a clear line of sight to high-quality internal and external views. Also, the glazing-to-floor ratio should be at least 25% and external glazing should have high visual light transmission (VLT) to provide sufficient daylight performance for the resident rooms (bedrooms).

5.9 WATER CONSERVATION

The following initiatives are proposed to ensure that significant water saving is achieved.

5.9.1 FITTINGS AND FIXTURES

Water consumption shall be reduced by incorporating water-efficient fixtures and fittings in accordance with the Australian Government's Water Efficiency Labelling Scheme (WELS). The fixtures and fittings to meet the minimum WELS Rating. In addition, flow restrictors or taps with timed flows can be used to minimise water usage. Commercial appliances should perform at similar levels. The final WELS rating is subject to product selection and WHS requirements.

Water Fittings/fixtures	Minimum WELS Rating	Highest Available Rating (AS/NZS 6400-2016)
Showerhead rating	3 (>6.0, but <= 7.5L/min)	4
Toilet rating	4	5
Urinals	3	5
Taps and flow controllers	4	6
Dishwashers	5	6
Washing machines	4	6

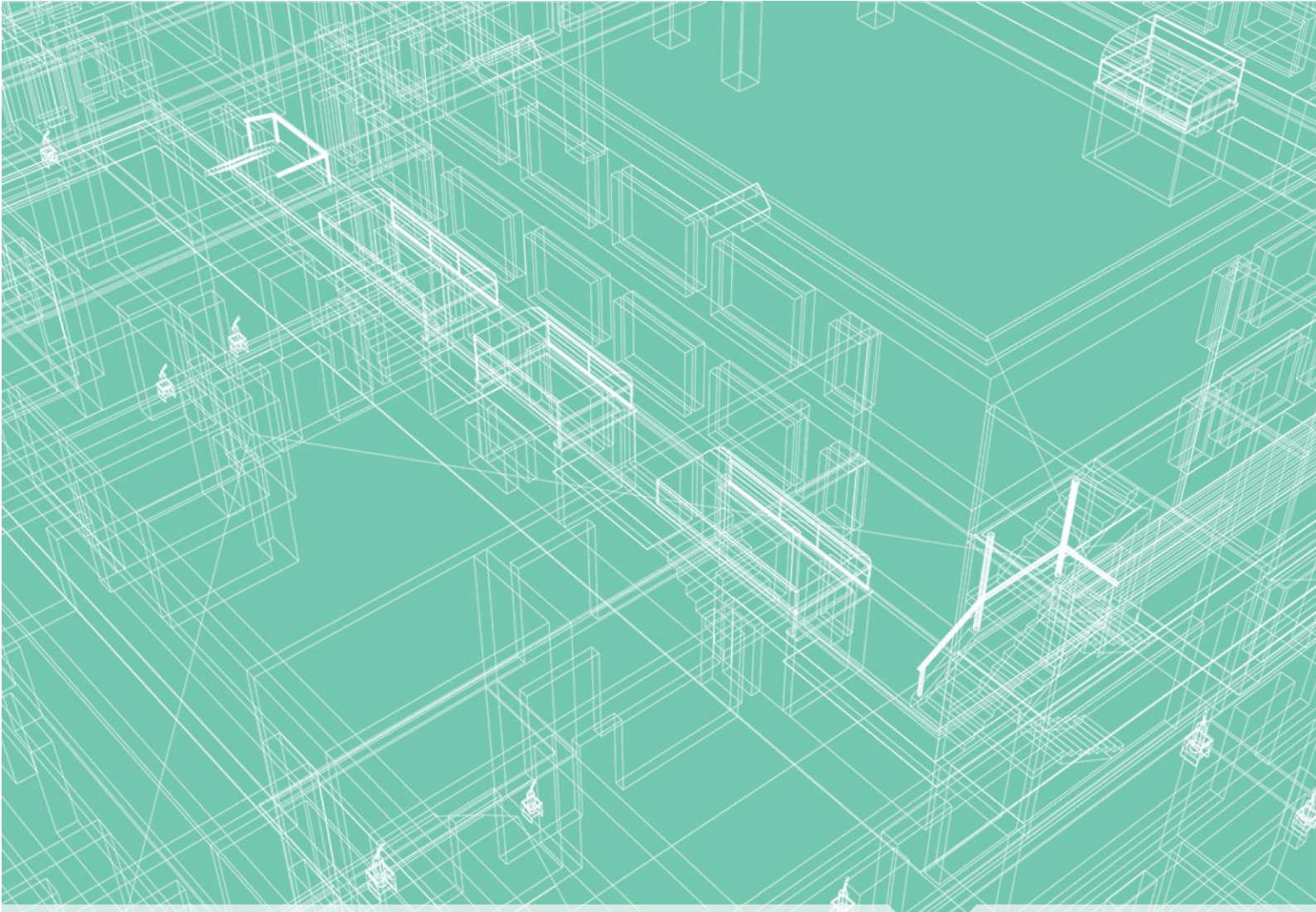
5.9.2 WATER SENSITIVE DESIGN

The project will implement best practices of water-sensitive design by decreasing the total suspended solids in stormwater and by not using water for heat rejection.

5.10 ECOLOGICAL CONSERVATION

The Opal St Ives shall be designed to bring nature and the building together by optimising the use of outdoor space with the provision of sensible separation of uses, such as walking and gathering space, and flexible spaces of varying form and function for outdoor environmental activities, whilst ensuring connectivity throughout the site and the building. For detailed information refer to the landscape architect's report.

6. APPENDIX A: CLIMATE ADAPTATION PLAN



CLIMATE RISK ASSESSMENT REPORT

OPAL ST IVES BOTANICA
CLIMATE ADAPTATION PLAN

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Project Number	220347
Project Name	Opal St. Ives Botanica
Description	Climate Adaptation Plan
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	REV	Rev H	Rev I						
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	DATE								

CONTENTS

EXECUTIVE SUMMARY

JHA Consulting Engineers has been commissioned by Opal Healthcare to prepare Climate Adaptation Plan (CAP) for the proposed development of Opal St Ives Botanica located at 285-289 Mona Vale Road and 1 Flinders Avenue, St Ives, NSW 2075.

The impacts of climate change were assessed across two-time scales (2050 & 2070) and two Representative Concentration Pathways (RCP4.5 & RCP 8.5). Climate Futures matrices were used to determine the key climate projections based on multiple climate variables for this risk assessment. The key climate projections were used to inform the climate risk assessment.

The risk priority levels of the climate risks identified pre- and post-adaptation are summarised below:

Risk rating	2050 Pre-adaptation	2050 Post-adaptation	2070 Pre-adaptation	2070 Post-adaptation
Low	2	3	0	2
Medium	3	2	3	3
High	0	0	2	0
Extreme	0	0	0	0

The results of the climate risk assessment identified two high risks items pre-adaptation. These high risks were mitigated to medium and low risks by the proposed adaptation actions. The responses to high risks are summarised as follows:

1. Higher average surface temperature and less rainfall conditions cause an increase in the frequency and/or severity of bushfire events directly damaging the building. This risk is mitigated by ensuring non-combustible building elements are used in the fabric of the building and by implementing good management practices to remove potential fuel sources around the building once the building is in operation.
2. Higher maximum daily temperature and lower humidity conditions result in higher frequency and/or duration of heatwaves resulting in an insufficient capacity of the HVAC system to maintain thermal comfort. This risk is mitigated by the incorporation of passive thermal principles such as appropriate external shades and thermal insulation and by upgrading the capacity of the HVAC system once the current system has reached the end of its service life.

In summary, all risk items identified as 'high' or 'extreme' are addressed by specific design responses in addition to the two risk items identified in the risk assessment being addressed by specific design responses.

1 INTRODUCTION

This Climate Adaptation Plan (CAP) has been prepared for the proposed development of Opal St Ives Botanica located at 285-289 Mona Vale Road and 1 Flinders Avenue, St Ives, NSW 2075.

The project will be designed to comply with Section 193 (2) & (3) of the EP& A Regulation 2021. Thus, the purpose of the CAP is to provide:

- Details of stakeholder consultation that was undertaken during plan preparation, incorporating their responses (see Section 1.3)
- Summary of the project's characteristics (site, location, climatic characteristics) (see Section 2)
- Assessment of climate change scenarios and impacts on the project using a two-time scale relevant to the project's anticipated lifespan (see Section 3)
- Summary of potential direct and indirect climate change impacts (environmental, social, and economic) (see Section 4)
- Identification of the potential risks for the project and people based on recognised standards (see Section 4)
- A list of actions and responsibilities for 'high' and 'extreme' risks identified (see Section 4)

1.1 PROJECT DESCRIPTION

The proposed development includes the construction of an aged care facility which will be situated at St Ives in the local governing council of Ku-ring-gai, which is 22km North of Sydney CBD.

The proposed development will result in:

- Demolition of the existing buildings at the site.
- Construction of a new aged care facility.
- The proposed building provides 148 beds.
- Construction of associated site facilities and services, including pedestrian and vehicular access and basement parking.
- Site landscaping and infrastructure works.

The site is approximately 9324 sqm in size and is afforded ample access to open space, retail amenities and community facilities. The site is accessed via Mona Vale Rd on the west side and the Flinders Avenue on the eastern side. The site is primarily surrounded by single or double storey dwellings.

Figure 1: Ariel Photo of Site

1.2 REFERENCE DOCUMENTS AND STANDARDS

This CAP will assess potential risks and propose mitigation strategies as necessary in accordance with the following documents and standards:

- Green Star Design and As-Built v1.3 Submission Guidelines;
- ISO 31000-2009 – Risk Management:- Principles and Guidance (adopted in Australia and New Zealand as AS/NZS ISO 31000:2009)
- The AGO's Climate Change Risks and Impacts: A Guide for Government and Business

1.3 STAKEHOLDERS CONSULTATION

As a part of the CAP development process, the stakeholders consulted are listed below.

Stakeholder	Role
Opal Healthcare – Mark Lederer, John Cole-Clark	Client
Midson – Declan Rohr, Emmanuel Ghali, Onofrio Marzulli	Project Management
Formiga 1 – Scott Naylor	PCA
Group GSA – Huy Minh Nguyen, Lisa-Maree Carrigan, Noura Thaha, John Holland, Natalie McEvoy	Architect, Landscape
Ethos Urban – Eliza Arnott, Tom Goode, Daniel West, Sarah Papalia	Urban Planning
Henry & Hymas – Andrew Francis, Nick Heazlewood, Derek Duns, Richaine Cura	Civil, Structural
JHA Consulting Engineers – Jim Hatzimanolis, John Stefani, Jackson Sarcia, Chris Hadjiyiannis, George Koutoulas, Kosma Tzannes, Maurice Bond, Sandeep Koshy, Sushil Pant, Gary Tang, Tarun Thottungal	Electrical, Fire, Hydraulic, Level 3, Mechanical, ESD

2 PROJECT'S CLIMATIC CHARACTERISTICS

Opal St Ives Botanica is located in NCC Climate Zone 5, which is described as warm temperate.

As part of the Greater Sydney region, St Ives enjoys a sunny climate with mild winters and warm summers. The main aims of this zone are to reduce the need for cooling in summer and heating in winter.

2.1 BASELINE CLIMATIC CONDITIONS

The baseline climatic conditions for St Ives are taken from the closest weather station data available from the Bureau of Meteorology. The closest weather station is Macquarie Park (Willandra Village) which is approx. 7km away from the building location.

Weather station details:

- Site name: Macquarie Park (Willandra Village)
- Site number: 066156
- Latitude: - 33.78 °S Longitude: 151.11 °E
- Elevation: 65 m
- Commenced: 1970
- Status: Open

Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	An.
Maximum temperature													
Mean maximum temperature (Degrees C)	27.5	27.3	25.9	23.4	20.3	17.4	17.0	18.5	21.0	23.2	24.7	27.0	22.8
Highest temperature (Degrees C)	41.5	41.4	40.7	33.5	28.5	24.8	26.0	30.1	34.4	39.1	42.0	43.1	43.1
Mean number of days >= 35 Degrees C	1.9	1.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	2.0	6.7
Minimum temperature													
Mean minimum temperature (Degrees C)	16.8	16.9	15.2	12.0	9.3	6.5	5.0	5.7	7.8	10.8	13.0	15.6	11.2
Lowest temperature (°C)	8.5	8.9	6.1	2.5	0.3	-1.7	-3.5	-1.1	0.1	0.9	1.2	6.5	-3.5
Mean number of days <= 2 Degrees C	0.0	0.0	0.0	0.0	0.4	2.6	6.3	4.0	0.5	0.0	0.0	0.0	13.8
Rainfall													
Mean rainfall (mm)	21.3	147.1	152.3	107.8	77.1	112.9	61.1	59.4	57.9	87.9	90.2	83.1	1157.0
Highest rainfall (mm)	369.6	655.4	594.9	562.4	345.4	430.2	376.2	398.6	219.0	305.6	355.6	274.0	2218.7
Mean number of days of rain ≥ 25 mm	1.3	1.5	1.7	1.3	0.7	1.0	0.5	0.6	0.4	0.8	0.9	0.9	11.6
Solar Exposure													
Mean daily solar exposure (MJ/m2)	22.2	19.3	16.2	13.5	10.4	8.7	9.9	13.0	16.7	19.5	21.1	22.7	16.1

2.2 PAST EXTREME EVENTS

Extreme events that have impacted a site in the past are indicative of possible extreme events that will impact the site in the future. The identification of past extreme events will help highlight the climate risks that should be the focus of this risk assessment.

- Bushfire – In recent years there has been an increase in the number of high fire weather danger days, more severe fire weather and much longer fire seasons in NSW. From the NSW Planning Portal spatial viewer and NSW Rural Fire Service, it is observed that site is not identified as, bushfire-prone land. However, the site is surrounded by bush fire prone land and could be affected by a bush fire (refer to the map below). Source:[https://www.rfs.nsw.gov.au/plan-and-prepare/building-in-a-bush-fire-area/planning-for-bush-fire-protection/bush-fire-prone-land/check-bfpl]. Also, please refer to the "bushfire management plan" for detailed responses and management plans.

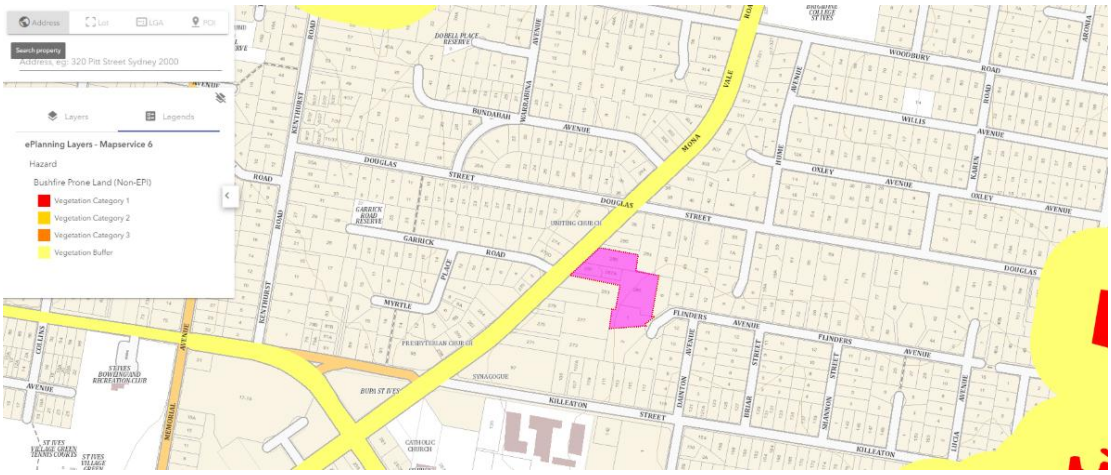


Figure 2: Bushfire Prone Land (Non-EPI); [Source: https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address]

- Heatwaves – A heatwave is defined as three or more days of high maximum and minimum temperatures that are unusual for that location. Over the period 1911–2013, heatwaves in parts of NSW have become longer, hotter and occur more often [Source: AdaptNSW Heatwaves Climate Change Impact Snapshot]. Hotter and more frequent heatwaves will contribute to the risk of bushfires. Research shows a link between excessive heat and childhood emergency department attendances for diseases such as asthma, fever, gastroenteritis, and electrolyte imbalances.

  Studies have shown that staff performance can be impacted by higher temperatures. Warm buildings may decrease interest and alertness, distracting staff, and other workers. In hotter buildings, headaches and heat exhaustion symptoms may develop that can hinder the performance of the staff and badly affect the health of the elderly people. High temperatures may be accompanied by higher levels of humidity and increased humidity can cause drowsiness. Studies have also shown that concentration performance is lower in humid, hot environments. From the below climate projection map, it is understood that St Ives can expect an increase of +0.93°C in daily average temperature during Summer in the near future (2020-39) and an increase of +2.12°C in the far future (2060-79).

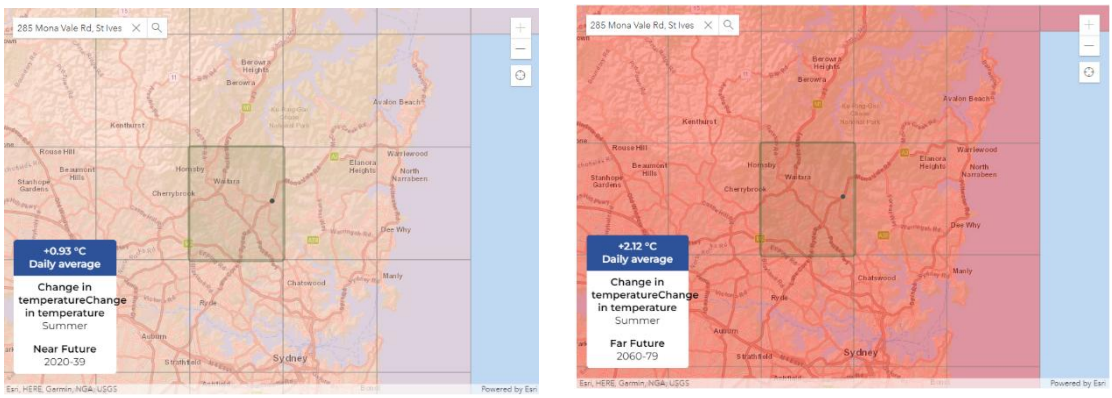


Figure 3: Climate Projection: Change in Daily Temperature (Near Future 2020-39 & Far Future 2060-79); [Source: https://www.climatechange.environment.nsw.gov.au/projections-map:]

- Storms/Gustier Wind – Thunderstorms are the most common type of storm in New South Wales, causing more damage than any other short-duration weather event. They are most likely to hit Sydney from October to March. They can last from 10 minutes to several hours, with very strong winds, heavy rain and hail causing flash flooding, power outages and property damage. Historically, this area has experienced low rainfall intensity for 60minute 1:100yr Storm. Predicted to receive 70.1 mm, or up to 462 mm over 3 days. [Source: Bureau of Meteorology http://www.bom.gov.au/water/designRainfalls/]

- Extended drought periods – The site is identified as the "Non-Drought" area and no historical drought events have been found. [Source: NSW Combined Drought Indicator; https://edis.dpi.nsw.gov.au/]

- Floods/Extreme Rain – The site is not located within Flood Planning Area. The nearest land subject to flooding is around Cowan Creek which is approximately 3.8 km away from the site (refer to the map below).

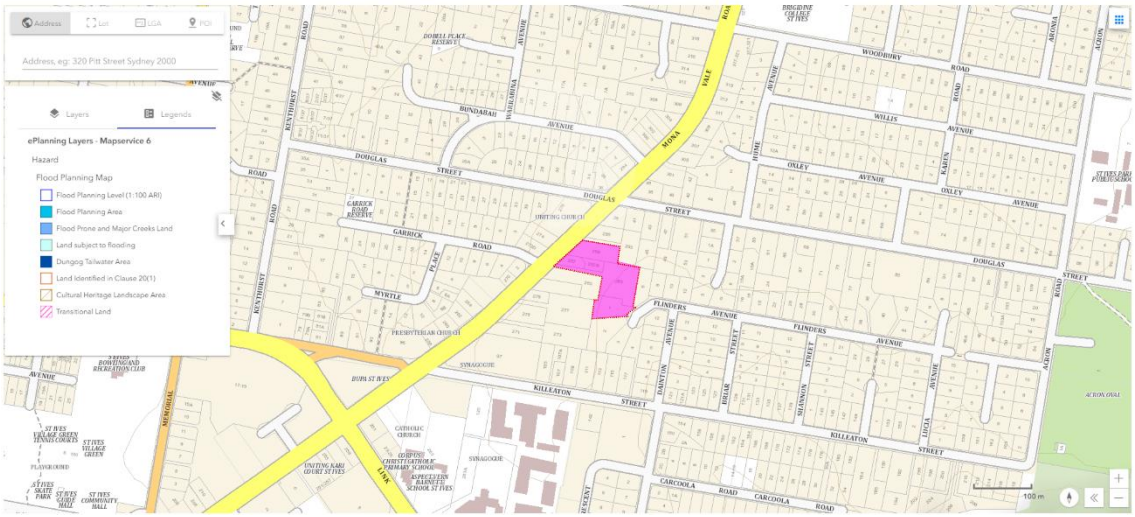


Figure 4: Flood Map - NSW Planning Portal;
[Source: https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address]

2.3 PROJECT-SPECIFIC RISK STATEMENTS

Based on the project's baseline climatic characteristics and past extreme events, the following project-specific climate risk statements are formulated:

1. Hotter and dryer conditions cause an increase in the frequency and/or severity of bushfire and heatwaves events.
2. Higher maximum temperatures and more humid conditions cause an increase in frequency and/or duration of extreme heat days (over 35 °C) and heatwave events.

3 CLIMATE CHANGE SCENARIOS AND IMPACTS

3.1 REGIONAL OVERVIEW

The subject site is located within the East Coast South sub-cluster as defined by the CSIRO and the Australian Government.

Figure 5: East Coast South Sub-cluster

The East Coast south sub-cluster comprises Natural Resource Management (NRM) regions in the central part of the eastern seaboard of Australia. The area encompasses important headwater catchments for a high proportion of Australia's population.

The sub-cluster area has a predominantly sub-tropical climate, with regional variations such as some temperate influences in the south.

Key projection messages for this sub-cluster:

- Average temperatures will continue to increase in all seasons (very high confidence).
- More hot days and warm spells are projected with very high confidence. Fewer frosts are projected with high confidence.
- Temperatures have increased over the past century, with the rate of warming higher since 1960. The mean temperature increased between 1910 and 2013 by around 0.8°C. The recent decades have been the warmest on record for both daily minimum and daily maximum temperatures in the cluster.
- For the near future (2050), the annual average warming across all emissions scenarios is projected to be around 0.5 to 1.3°C above the climate of 1986 – 2005.
- By late in the century (2090), for a high emission scenario (RCP8.5) and projected range of warming is 2.9 to 4.6°C. Under an intermediate scenario (RCP4.5) the projected warming is 1.3 to 2.5°C.
- Decreases in winter rainfall are projected with medium confidence. Other changes are possible but unclear.
- Increased intensity of extreme rainfall events is projected, with high confidence.

- Mean sea level will continue to rise and the height of extreme sea-level events will also increase (very high confidence).
- A harsher fire-weather climate in the future (high confidence).
- On an annual and decadal basis, natural variability in the climate system can act to either mask or enhance any long-term human induced trend, particularly in the next 20 years and for rainfall.

3.2 REPRESENTATIVE CONCENTRATION PATHWAY

In order to source relevant climate projections, appropriate Representative Concentration Pathway (RCPs) based on the latest Intergovernmental Panel on Climate Change (IPCC) report are chosen. The RCPs provide plausible climate futures that may eventuate over the coming years. There are four pathways: RCP8.5, RCP6, RCP4.5, and RCP2.6, where the numbers of each RCP refer to the amount of radiative forcing produced by greenhouse gases in 2100.

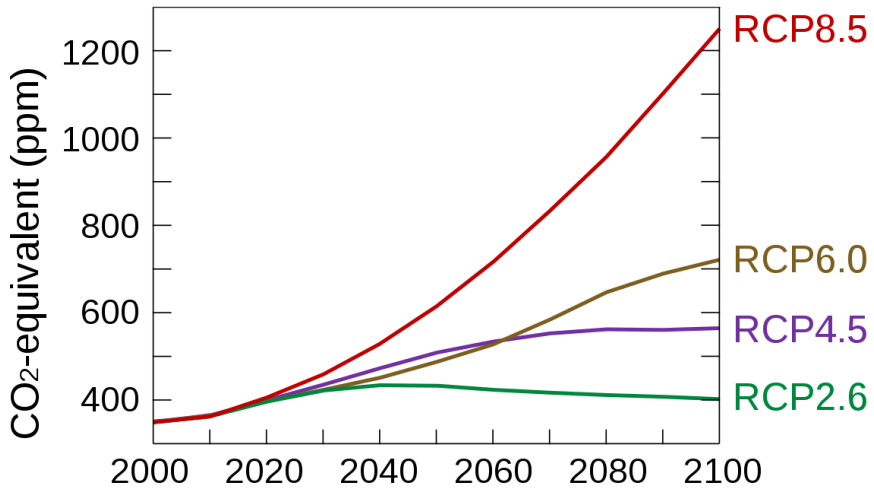


Figure 6: IPCC Representative Concentration Pathway

The RCP 8.5 scenario has been selected as one future climate projection for this assessment as it is the most conservative pathway and because current emissions are tracking close to RCP 8.5. RCP 8.5 reflects a future with less curbing of emissions and a continued increase in fossil fuel use. It is generally taken as the basis for worst-case climate change scenarios.

The RCP 4.5 is chosen to represent a stabilisation pathway in which lower emissions are achieved by the application of some mitigation strategies and technologies. RCP 4.5 reflects a future where emissions peak around 2040, and the CO_2 concentration reaches 540 ppm by 2100.

3.3 PROJECTION TIME SCALE

The lifespan of the project components was considered to determine the appropriate projection time scale. Based on the components design life of an aged care facility, the time series that is selected to understand the future climate impacts across the project's life are 2050 and 2070.

3.4 CLIMATE VARIABLES OF INTEREST

Based on the project's characteristics, the climate variables of interest for this site are:

Events	Variables	Key Cases
Bushfires	Mean surface temperature and rainfall (Summer)	"Best Case": Climate Future with the least increase in mean surface temperature and the least decrease (or most increase) in rainfall (shorthand: "coolest and wettest") "Worst Case": Climate Future with the greatest increase in mean surface temperature and the greatest decrease (or least increase) in rainfall (shorthand: "hottest and driest")
Heatwaves	Maximum daily temperature and humidity (Annual)	"Best Case": Climate Future with the least increase in maximum daily temperature and the least increase (or most decrease) in humidity (shorthand: "coolest and least humid") "Worst Case": Climate Future with the greatest increase in maximum daily temperature and the greatest increase (or least decrease) in humidity (shorthand: "hottest and most humid")

3.5 CLIMATE FUTURE PROJECTIONS

The series of climate futures matrices representing the combination of time periods and greenhouse gas scenarios and classified by the combined changes of the climate variables identified above are provided in the table below. All climate future matrices are sourced from CSIRO and Bureau of Meteorology, Climate Change in Australia website - www.climatechangeinaustralia.gov.au, cited 24/01/2024.

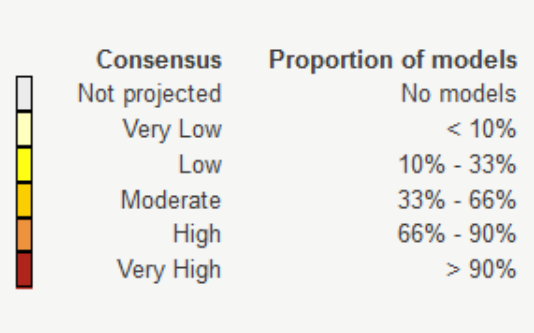
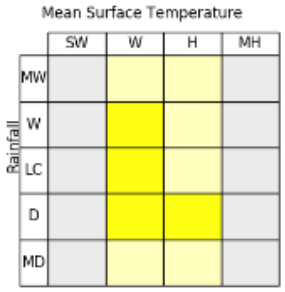
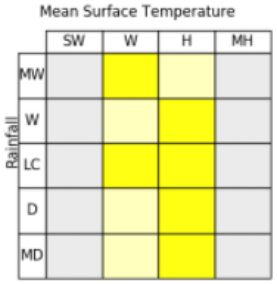
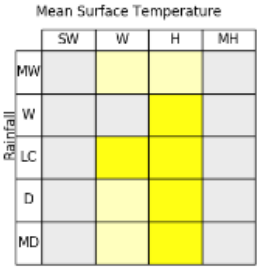
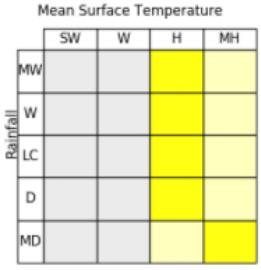


Figure 7: Colour Legend of climate future projection consensus levels

3.5.1 SUMMER MEAN SURFACE TEMPERATURE AND RAINFALL (FOR BUSHFIRES)

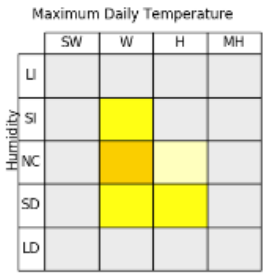
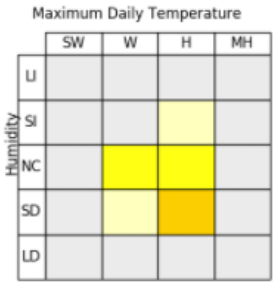
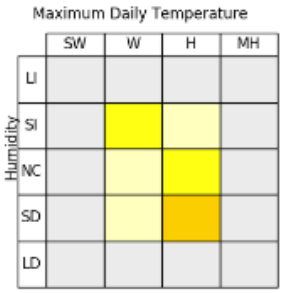
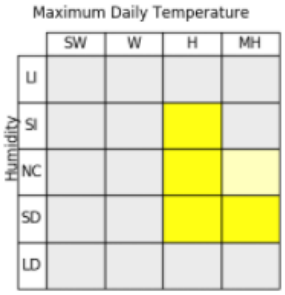
<table>
<tr><td colspan="2" rowspan="2">East Coast Climate Futures</td><td colspan="2">Year</td></tr>
<tr><td>2050</td><td>2070</td></tr>
<tr><td rowspan="2">Emissions Scenarios</td><td>RCP 4.5</td><td> 
</td><td> 
</td></tr>
<tr><td>RCP 8.5</td><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">Keys</td><td>Summer Mean Surface Temperature
SW Slightly Warmer < 0.50
W Warmer 0.50 to 1.50
H Hotter 1.50 to 3.00
MH Much Hotter > 3.00</td><td>Summer Rainfall
MW Much Wetter > 15.00
W Wetter 5.00 to 15.00
LC Little Change -5.00 to 5.00
D Drier -15.00 to -5.00
MD Much Drier < -15.00</td></tr>
</table>

3.5.2 PROJECTED CLIMATE SCENARIOS FOR BUSHFIRES

Case	2050 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best" Coolest and wettest	Warmer and much wetter (Consensus: Very low)	Warmer and much wetter (Consensus: Very Low)	Warmer and much wetter (Consensus: Low)	Hotter and much wetter (Consensus: Low)
"Worst" Hottest and driest	Hotter and much drier (Consensus: Very low)	Hotter and much drier (Consensus: Low)	Hotter and much drier (Consensus: Low)	Much hotter and much drier (Consensus: Low)
"Maximum consensus"	Warmer and wetter to drier, Hotter and Drier (Consensus: Low)	Warmer and Little change, Hotter and wetter to much drier (Consensus: Low)	Warmer and much wetter, Warmer and little change, Hotter and wetter to much drier (Consensus: Low)	Hotter and much wetter to drier, Much hotter and much drier (Consensus: Low)

The projected climate scenarios indicate a summer that will be warmer and hotter in the near future. There is no strong consensus on whether rainfall will become wetter or drier in the near future but the hotter temperature may impact the risks of bushfire events.

3.5.3 ANNUAL MAXIMUM DAILY TEMPERATURE AND HUMIDITY (FOR HEATWAVES)

East Coast Climate Futures		Year	
		2050	2070
Emissions Scenarios	RCP 4.5		
	RCP 8.5		
Keys		Annual Maximum Daily Temperature SW Slightly Warmer < 0.50 W Warmer 0.50 to 1.50 H Hotter 1.50 to 3.00 MH Much Hotter > 3.00	Annual Humidity LI Large Increase > 10.00 SI Small Increase 1.00 to 10.00 NC No Change -1.00 to 1.00 SD Small Decrease -10.00 to -1.00 LD Large Decrease < -10.00

3.5.4 PROJECTED CLIMATE SCENARIOS FOR HEATWAVES

Case	2050 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best" Coolest and wettest	Warmer and small increase (Consensus: Low)	Warmer and small increase (Consensus: Low)	Hotter and small increase, warmer and no change (Consensus: Very low and low)	Hotter and small increase (Consensus: Low)
"Worst" Hottest and driest	Hotter and small decrease (Consensus: Low)	Hotter and small decrease (Consensus: Moderate)	Hotter and small decrease (Consensus: Moderate)	Much hotter and small decrease (Consensus: Low)
"Maximum consensus"	Warmer and no change (Consensus: Moderate)	Hotter and small decrease (Consensus: Moderate)	Hotter and small decrease (Consensus: Moderate)	Hotter and small increase to small decrease, Much hotter and small decrease (Consensus: Low)

The projected climate scenarios indicate the max daily temperature that will be hotter and warmer in the near future and the humidity has no change or small decrease. In these projected scenarios, the risk of heat waves will be increased.

4 CLIMATE RISK ASSESSMENT

The qualitative descriptions used in the risk assessment to categorise risks as low, medium, high, and extreme depending on the likelihood and consequence are in accordance with the AGO's Climate Change Risks and Impacts: A Guide for Government and Business. Details of the qualitative descriptions are provided in Appendix A.

4.1 RISK ASSESSMENT TABLE

Climate Variables and Risks	Climate Projections	Potential Climate Impacts	Pre-adaptation Actions						Proposed Adaptation Actions	Post-adaptation Actions						Summary of how measures reduce risk
			2050			2070				2050			2070			
			C	L	Rating	C	L	Rating		C	L	Rating	C	L	Rating	
Hotter and dryer conditions result in higher frequency and/or severity of bushfire and heatwave events.	The projected climate scenarios indicate a summer that will be warmer and hotter in the near future. There is no strong consensus whether rainfall will become wetter or drier in the near future but the hotter temperature may impact the risks of bushfire events.	DIRECT: Increased bushfires risk due to warmer to hotter conditions may cause direct damage to the facilities.	Major	Rare	Low	Major	possible	High	Investigate locations of vulnerability, and remove potential fuel sources surrounding the building such as removing dead vegetation as part of ongoing landscaping/maintenance works. Use of non-combustible construction materials as per regulation. Put in place an evacuation plan in case of a fire-threatening building.	Major	Rare	Low	Major	Unlikely	Medium	The risk and impact of bushfires on the building will be reduced if good management practices are implemented. A properly considered evacuation plan will minimise the risks to occupants of the building.
		DIRECT: Increased bushfires risk due to warmer to hotter conditions may increase exposure to smoke and particulate for residents, staff & visitors, impacting health.	Minor	Possible	Medium	Minor	Possible	Medium	Ensure the building is well sealed to minimise risks of smoke infiltration. Consider pressurised staircase (for future adaptation) and put in place smoke hazard management strategies.	Minor	Unlikely	Low	Minor	Unlikely	Low	The risk and impact of smoke on occupants will be reduced if good management practices are implemented.
		INDIRECT: Increased bushfires risk may damage power infrastructure, disrupting the operation of the facility.	Moderate	Possible	Medium	Moderate	Possible	Medium	Backup generator to provide power to safety-critical services. On-site renewable energy to reduce the maximum demand from the grid. Ensure critical data and information can be accessed offline.	Minor	Possible	Medium	Minor	Possible	Medium	The alternative power supply and ability to access information offline will facilitate the ongoing operation of the facility.

Hotter and dryer conditions resulting in higher frequency and/or duration of heatwaves/ extreme heat-days (over 35 degrees Celsius)	The projected climate scenarios indicate the max daily temperature that will be hotter and warmer in the near future and the humidity has no change or small decrease. In these projected scenarios, the risk of heat waves will be increased.	DIRECT: Extreme heat will increase demand for the HVAC system and may impact the ability of the HVAC system to maintain the thermal comfort of occupants due to capacity constraints.	Moderate	Possible	Medium	Moderate	Likely	High	Incorporate passive thermal design principles in the design and construction of the building such as appropriate levels of shading devices and thermal insulation. Provide light-coloured roofs to reduce heat gains via the roof and help mitigate the urban heat island effect. Provide additional photovoltaic panels to provide renewable electricity to help offset the additional HVAC electricity demand. When replacing HVAC units at the end of service life, consider upsizing the capacity of units in line with the change in climatic conditions. Providing dedicated "Cool outdoor areas" where residents, staff & visitors can take shelter during extremely hot days when the power fails should be explored by the design team. This cool area should utilise passive design principles to moderate temperature during extreme days. Secondly, this cool area should consider ways to harness the cooling power of water to provide additional cooling. For example, provide shaded outdoor areas with drinking fountains as cool shelters during an extreme heat event.	Moderate	Possible	Medium	Moderate	Possible	Medium	The incorporation of passive thermal design principles will help mitigate extreme heat risks in the near future. Appropriate upgrade of HVAC equipment at the end of their service life will help ensure the system will be capable of handling more extreme temperatures in the far future.
		DIRECT: Extreme heat may impact the operation of electrical equipment and infrastructures due to temperature exceeding design limits.	Minor	Unlikely	Low	Minor	Possible	Medium	In the near future, current temperature ratings for electrical equipment should be able to cope with projected temperature increases relevant to the component's design life. In the far future, equipment should be gradually upgraded as required to cope with more extreme conditions.	Minor	Unlikely	Low	Minor	Unlikely	Low	Appropriate upgrade of electrical equipment at the end of their service life will help ensure the system will be capable of handling more extreme temperatures in the far future.

4.2 RESPONSES TO HIGH AND EXTREME RISKS

The risk assessment identified three high risks for the proposed development by 2070 (zero-high risks by 2050). No extreme risks were identified. The responses to high risks are summarised as follows:

1. Higher average surface temperature and less rainfall conditions cause an increase in the frequency and/or severity of bushfire events directly damaging the building. This risk is mitigated by ensuring non-combustible building elements are used in the fabric of the building and by implementing good management practices to remove potential fuel sources around the building once the building is in operation.
2. Higher maximum daily temperature and lower humidity conditions result in higher frequency and/or duration of heatwaves resulting in an insufficient capacity of the HVAC system to maintain thermal comfort. This risk is mitigated by the incorporation of passive thermal principles such as appropriate external shades and thermal insulation and by upgrading the capacity of the HVAC system once the current system has reached the end of its service life.

4.3 RISKS SUMMARY

The table below shows all risk items identified as 'high' or 'extreme' are addressed by specific design responses and at least two risk items identified in the risk assessment are addressed by specific design responses.

Risk rating	2050 Pre-adaptation	2050 Post-adaptation	2070 Pre-adaptation	2070 Post-adaptation
Low	2	3	0	2
Medium	3	2	3	3
High	0	0	2	0
Extreme	0	0	0	0

.

5 CONCLUSION

A Climate Adaptation Plan (CAP) report has been prepared for the proposed development of Opal St Ives Botanica located at 285-289 Mona Vale Road and 1 Flinders Avenue, St Ives, NSW 2075.

In particular, this CAP specifically addressed:

- The details of stakeholder consultation that was undertaken during plan preparation in Section 1.3;
- The project's characteristics in Section 2;
- The assessment of climate change scenarios and impacts on the project in see Section 3;
- The potential direct and indirect climate change impacts in Section 4;
- The potential risks for the project and people in Section 4; and
- The actions to reduce 'high' and 'extreme' risks are identified in Section 4.

The impacts of climate change were assessed across two-time scales (2050 & 2070) and two Representative Concentration Pathways (RCP4.5 & RCP 8.5). Climate Futures matrices were used to determine the key climate projections based on multiple climate variables for this risk assessment. The key climate projections were used to inform the climate risk assessment.

The results of the climate risk assessment identified two high risks items pre-adaptation. These high risks were mitigated to medium and low risks by the proposed adaptation actions.

APPENDIX A – RISK ASSESSMENT FRAMEWORK

The following risk assessment framework is used to determine consequence and likelihood ratings. Based on these ratings, the risk rating has been determined.

Consequence Criteria

Consequence descriptor	Adaptive capacity (see Note 1)	Infrastructure, service	Social/cultural	Governance	Financial (see Note 2)	Environmental (see Note 3)	Economy (see Note 4)
Insignificant	No change to the adaptive capacity	No infrastructure damage, little change to service	No adverse human health effects	No changes to management required	Little financial loss or increase in operating expenses	No adverse effects on natural environment	No effects on the broader economy
Minor	Minor decrease to the adaptive capacity of the asset. Capacity easily restored	Localized infrastructure service disruption No permanent damage. Some minor restoration work required Early renewal of infrastructure by 10–20% Need for new/modified ancillary equipment	Short-term disruption to employees, customers or neighbours Slight adverse human health effects or general amenity issues	General concern raised by regulators requiring response action	Additional operational costs Financial loss small, <10%	Minimal effects on the natural environment	Minor effect on the broader economy due to disruption of service provided by the asset
Moderate	Some change in adaptive capacity. Renewal or repair may need new design to improve adaptive capacity	Limited infrastructure damage and loss of service Damage recoverable by maintenance and minor repair Early renewal of infrastructure by 20–50%	Frequent disruptions to employees, customers or neighbours. Adverse human health effects	Investigation by regulators Changes to management actions required	Moderate financial loss 10–50%	Some damage to the environment, including local ecosystems. Some remedial action may be required	High impact on the local economy, with some effect on the wider economy

(*continued*)

Consequence descriptor	Adaptive capacity (see Note 1)	Infrastructure, service	Social/cultural	Governance	Financial (see Note 2)	Environmental (see Note 3)	Economy (see Note 4)
Major	Major loss in adaptive capacity. Renewal or repair would need new design to improve adaptive capacity	Extensive infrastructure damage requiring major repair Major loss of infrastructure service Early renewal of infrastructure by 50–90%	Permanent physical injuries and fatalities may occur Severe disruptions to employees, customers or neighbours	Notices issued by regulators for corrective actions Changes required in management. Senior management responsibility questionable	Major financial loss 50–90%	Significant effect on the environment and local ecosystems. Remedial action likely to be required	Serious effect on the local economy spreading to the wider economy
Catastrophic	Capacity destroyed, redesign required when repairing or renewing asset	Significant permanent damage and/or complete loss of the infrastructure and the infrastructure service Loss of infrastructure support and translocation of service to other sites Early renewal of infrastructure by >90%	Severe adverse human health effects, leading to multiple events of total disability or fatalities Total disruptions to employees, customers or neighbours Emergency response at a major level	Major policy shifts Change to legislative requirements Full change of management control	Extreme financial loss >90%	Very significant loss to the environment. May include localized loss of species, habitats or ecosystems Extensive remedial action essential to prevent further degradation. Restoration likely to be required	Major effect on the local, regional and state economies

NOTES:

1 Adaptive capacity relates to the ability of the infrastructure element and/or organization to adapt/change/cope with change in the climate change variable.

2 Financial loss will be relative to the infrastructure element being considered (i.e. a single building, coastal town, rail system). Dollar values need to include replacement cost for the infrastructure item and financial loss/costs relating to the loss of the service provided by the infrastructure item.

3 While the term 'environment' can include both man-made and natural systems, in this Standard 'environment' is limited to the natural environment outside the asset being considered.

4 Economy refers to the local economy (e.g. town or region), the state economy, or the economy of Australia as a whole. Significance of this measure will depend on the asset being considered.

Likelihood Criteria

Rating	Descriptor	Recurrent or event risks	Long term risks
Almost certain	Could occur several times per year	Has happened several times in the past year and in each of the previous 5 years *or* Could occur several times per year	Has a greater than 90% chance of occurring in the identified time period if the risk is not mitigated
Likely	May arise about once per year	Has happened at least once in the past year and in each of the previous 5 years *or* May arise about once per year	Has a 60–90% chance of occurring in the identified time period if the risk is not mitigated
Possible	Maybe a couple of times in a generation	Has happened during the past 5 years but not in every year *or* May arise once in 25 years	Has a 40–60% chance of occurring in the identified time period if the risk is not mitigated
Unlikely	Maybe once in a generation	May have occurred once in the last 5 years *or* May arise once in 25 to 50 years	Has a 10–30% chance of occurring in the future if the risk is not mitigated
Rare	Maybe once in a lifetime	Has not occurred in the past 5 years *or* Unlikely during the next 50 years	May occur in exceptional circumstances, i.e. less than 10% chance of occurring in the identified time period if the risk is not mitigated

Risk Priority Levels

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	L	M	H	E	E
Likely	L	M	M	H	E
Moderate	L	L	M	H	E
Unlikely	L	L	M	M	H
Very unlikely	L	L	L	M	M

LEGEND:
E = Extreme risk, requiring immediate action.
H = High risk issue requiring detailed research and planning at senior management level.
M = Moderate risk issue requiring change to design standards and maintenance of assets.
L = Low risk issue requiring action through routine maintenance of assets.

APPENDIX B – CLIMATE RISK INTERVENTIONS REGISTER

PROJECT	220347 Opal St Ives Botanica
REVISION	Rev I - 06/11/2024
AUTHOR	Tarun Sebastian Thottungal

Climate Risks	Climate Projection	Climate Impact	Proposed Adaptation Actions	Responsible Parties	Responsible Parties Comments/Confirmations
Bushfire Hotter and dryer conditions result in higher frequency and/or severity of bushfire events	The projected climate scenarios indicate that summer will be warmer and hotter in the near future. There is no strong consensus whether rainfall will become wetter or drier in the near future but the hotter temperature may impact the risks of bushfire events.	Increased bushfires risk due to warmer to hotter conditions may cause direct damage to the facilities.	Investigate locations of vulnerability, and remove potential fuel sources surrounding the building such as removing dead vegetation as part of ongoing landscaping/maintenance works. Use of non-combustible construction materials as per regulation. Put in place an evacuation plan in case of a fire-threatening building.	Bushfire Consultant Architect Landscape	
		Increased bushfires risk due to warmer to hotter conditions may increase exposure to smoke and particulate for residents, staff & visitors impacting health.	Ensure the building is well sealed to minimise risks of smoke infiltration. Consider pressurised staircase (for future adaptation) and put in place smoke hazard management strategies.	Bushfire Consultant Services Consultant	
		Increased bushfires risk may damage power infrastructure, disrupting the operation of the facility.	Backup generator to provide power to safety-critical services. On-site renewable energy to reduce the maximum demand from the grid. Ensure critical data and information can be accessed offline.	Bushfire Consultant Services Consultant SINSW	
Heatwave Hotter and dryer conditions resulting in higher frequency and/or duration of heatwaves/ extreme heat-days (over 35 degrees Celsius)	The projected climate scenarios indicate the max daily temperature that will be hotter and warmer in the near future and the humidity has no change or small decrease. In these projected scenarios, the risk of heat waves will be increased.	Extreme heat will increase demand for the HVAC system and may impact the ability of the HVAC system to maintain the thermal comfort of occupants due to capacity constraints.	Incorporate passive thermal design principles in the design and construction of the building such as appropriate levels of shading devices and thermal insulation. Provide light-coloured roofs to reduce heat gains via the roof and help mitigate the urban heat island effect. Provide additional photovoltaic panels to provide renewable electricity to help offset the additional HVAC electricity demand. When replacing HVAC units at the end of service life, consider upsizing the capacity of units in line with the change in climatic conditions. Providing dedicated “Cool outdoor areas” where residents, staff & visitors can take shelter during extremely hot days when the power fails should be explored by the design team. This cool area should utilise passive design principles to moderate temperature during extreme days. Secondly, this cool area should consider ways to harness the cooling power of water to provide additional cooling. For example, provide shaded outdoor areas with drinking fountains as cool shelters during an extreme heat event.	ESD Architect Landscaping Services Consultant	
		Extreme heat may impact the operation of electrical equipment and infrastructures due to temperature exceeding design limits.	In the near future, current temperature ratings for electrical equipment should be able to cope with projected temperature increases relevant to the component's design life. In the far future, equipment should be gradually upgraded as required to cope with more extreme conditions.	SINSW Services Consultant	JHA Mech 2/11/22 - air conditioning plant sizing takes into account temperature extremes obseved in the most recent 5 years, and has a level of safety built in to accommodate further rises.

7. APPENDIX B: ESD SCHEDULE

ESD SCHEDULE - St Ives Botanica Care Community

Revision: REV I | 06/11/2024

ESD Initiatives						Responsible Parties															
Framework	No.	initiative Criteria	Initiative Requirement	ESD Consultant Comments	Project Team Comments/Status	**Lead**	OPAL	PM / HC	ESD	Architect	Landscape	Mechanical	Electrical	Hydraulic	Fire Service	Acoustic	VT	Waste	Civil	Procurement	UFD
Adaptation and Resilience	1	Implementation of a Climate Adaptation Plan	Prepare a project-specific Climate Adaptation Plan (CAP) and implement recommendations into the design and construction.	ESD to provide Climate adaptation plan. Service to provide design response to the proposed action items.	***27/10/2022 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Climate Adaptation plan has been issued as suitable for SSDA submission. **05/12/2022 Completed by Architect - Noura Thaha <NThaha@groupgsa.com>** Courtyard design enables biophilic design creating micro climate and improving comfort level. Material palette and landscape design reflects the microclimate. ***25/01/2024 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Climate Adaptation planis updated as suitable for SSDA submission	ESD			•	•		•	•	•							
Indoor Air Quality	2	Ventilation System Attributes	• Minimise outdoor air pollutants • Design HVAC for ease of maintenance • Clean prior to occupation ASHRAE Standard 62.1:2013 is referenced	Mechanical consultant to ensure HVAC system is compliant with this initiative.	***02/11/2022 Completed by Mech - Maurice Bond <Maurice.Bond@jhaengineers.com.au>*** Design to ASHRAE instead of AS1668.2 will impact some separations from exhaust discharges, should be easily achieved.	Mechanical						•									
	3	Exhaust or Elimination of Pollutants	Sources of pollutants (printing, photocopying, cooking and vehicle) compliant with minimum emissions standards or be exhausted directly to outside. Should be in accordance with AS 1668.2:2012	Mechanical to ensure compliance with this initiative.	***02/11/2022 Completed by Mech - Maurice Bond <Maurice.Bond@jhaengineers.com.au>*** Can be achieved ***10/02/2023 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Laundry to be equipped for exhaust fans meeting the initiative requirement.	Mechanical	•	•				•								
Lighting Comfort	4	Minimum Lighting Comfort	Lights are Flicker-free lights and min Colour Rendering Index (CRI) of 80	Electrical consultant to ensure compliance with this initiative.		Electrical		•		•			•								
	5	Surface Illuminance	For all resident rooms: Surface reflectance for ceiling of at least 0.75; Ceiling area has an average surface illuminance of at least 30% of the lighting levels on the working plane.	A white finish ceiling is required to meet this initiative. Architect and Electrical consultant to ensure.	***05/12/2022 Completed by Architect - Noura Thaha <NThaha@groupgsa.com>*** Ceiling soffit to residential areas will be white	Architect		•		•			•								
Visual Comfort	6	Glare Reduction	Reduce glare through a combination of blinds, screens, fixed devices, or other means to provide glare reduction to the viewing façade and skylights.	Architect to ensure compliance with this initiative.	***05/12/2022 Completed by Architect - Noura Thaha <NThaha@groupgsa.com>*** Materials with low reflectively used for façade ***24/01/2024 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Architect to ensure that the blinds must have a visual light transmittance (VLT) of <= 10%.	Architect		•		•										
	7	Views	At least 50% of the all resident rooms to have a clear line of sight to a high quality internal or external view.	Avoid narrow deep rooms. At least 50% of the regularly occupied spaces should be within 8m of the window if possible. Architect to ensure compliance with this initiative.	***05/12/2022 Completed by Architect - Noura Thaha <NThaha@groupgsa.com>*** Well considered room size , least than 8m deep. Windows with 4.5m depth.	Architect			•	•										
	8	Daylight	All external glazing to have a min visual light transmittance (VLT) of 0.45. At least 50% of all resident rooms (Bedrooms) should receive a high level of daylight.	For all resident rooms (Bedrooms), ensure at least 25% glazing to floor ratio to get efficient daylight intake if possible. Architect to ensure compliance with this initiative.	***05/12/2022 Completed by Architect - Noura Thaha <NThaha@groupgsa.com>*** 25 % glazing to floor ratio will be achieved for resident rooms. ***10/02/2023 Completed by Opal - Mark Lederer <Mark.Lederer@opalhealthcare.com.au>*** The initiative requirement only applies to resident rooms (bedrooms) and does not apply to supporting spaces and BOH.	Architect			•	•										
Thermal Comfort	9	Thermal Comfort PMV	Achieve PMV between -1 and +1 in regularly occupied spaces.	ESD consultant to undertake PMV modelling (J1V3) to ensure compliance with this initiative.	***27/10/2022 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** PMV modelling (J1V3) to be done during DD.	ESD			•	•		•								
	10	Operable Windows	At least 75% of all resident rooms (Bedrooms) to have operable windows that provide access to outdoor air.	Architect to ensure compliance with this initiative.	***05/12/2022 Completed by Architect - Noura Thaha <NThaha@groupgsa.com>*** ALL habitable areas and lobby will have windows ***10/02/2023 Completed by Opal - Mark Lederer <Mark.Lederer@opalhealthcare.com.au>*** The proposed glazing to each bedroom is a sliding door suite. ***10/02/2023 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Sliding doors to bedrooms are accepted.	Architect				•		•								

Energy	11	Building Fabric & Glazing	Building Fabric 10 % improvement on Total R-value from NCC2022 Section J Part J4 DTS provision. Glazing Target a reasonable glazing to façade ratio. Utilise double glazing where practical.	Architect should target a glazing to façade ratio of 30-35%. ESD consultant to undertake J1V3 modelling to ensure compliance.	***27/10/2022 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Reasonable initiatives, J1V3 to be carried out during DD.	ESD		•	•	•		•	•	•							
	13	On-site Renewable Energy	On-site renewable energy should provide at least 10% of energy usage.	Electrical consultant to ensure compliance with this initiative. Project is proposing minimum 99 kW of onsite PV generation.	***02/12/2022 Completed by Opal - Mark Lederer <Mark.Lederer@opalhealthcare.com.au>*** Minimum 99kW, larger system subject to approvals provided ***10/02/2023 Completed by Midson - Onofrio Marzulli <omarzulli@midsongroup.com.au>*** Discussions with JHA Elec on 10/2/23 - JHA advise that 99kW system will undertake 12% of the energy generation for the facility. ***10/02/2023 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** 99kW gives us 12% offset on project's maximum demand (indicative) which meets the initiative for 10% reduction.	Electrical			•			•									
Transport	14	Electric Vehicle Infrastructure	Dedicated EV parking and future provision for charging infrastructure to be provided.	Electrical consultant to ensure compliance with this initiative.	***02/12/2022 Completed by Opal - Mark Lederer <Mark.Lederer@opalhealthcare.com.au>*** Provide infrastructure for future use. Installation of battery and EV charging in the future. ***10/02/2023 Completed by Midson - Onofrio Marzulli <omarzulli@midsongroup.com.au>*** Opal instructions are to allow the infrastructure up to the car space, including nominating the spaces. But the system will not be activated for now. Allow for data point per nominated space for future electricity purchase transactions. ***10/02/2023 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Proposal accepted.	Traffic	•	•												
	15	Walkable Neighbourhoods	Provide at least 8 amenities within 400m of the project site area. Available amenity categories include: grocery, food and beverage, retail, bank services, education, recreation, public facilities and outdoor facilities.	Architect to check compliance with this initiative.	***10/02/2023 Completed by Opal - Mark Lederer <Mark.Lederer@opalhealthcare.com.au>*** Most residents in the care community do not walk outside of the boundary, this seems nice to have but in reality unusable. More suited for RV development. ***10/02/2023 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Amenities within the site can be counted towards initiative compliance. JHA to carry out site amenity analysis in DD.	Architect			•	•									
Water	16	Sanitary Fixture Efficiency	All the fixtures and water using appliances meet minimum WELS rating: - Taps 4 Star - Toilets 4 Star Dual Flush - Urinals 3 Star - Showers 3 Star (>6.0 but <7.5 L/min) - Washing Machines 4 Star - Dishwashers 5 Star Commercial appliances should perform at similar levels.	Architect to ensure compliance with this initiative.	***05/12/2022 Completed by Architect - Noura Thaha <NThaha@groupgsa.com>*** Opal to confirm ***10/02/2023 Completed by Opal - Mark Lederer <Mark.Lederer@opalhealthcare.com.au>*** check with UFD ***10/02/2023 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** The initiatives requirement should be readily achievable for the project. Will confirm details in later stage ***24/01/2024 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Commercial appliance with no WELS rating must be provided with flow rate per wash and anticipated usage cycles per year. ***13/03/2024 Completed by Opal - John Cole-Clark <John.Cole-Clark@opalhealthcare.com.au>*** WELS rating requirement are already in our hydraulics brief	Architect		•		•										•
	17	Heat Rejection	No water to be used for heat rejection.	Mechanical consultant to ensure compliance with this initiative.	***02/11/2022 Completed by Mech - Maurice Bond <Maurice.Bond@jhaengineers.com.au>*** No water source heat rejection proposed	Mechanical						•									
	19	Pollution Reduction Targets	Exceeding stormwater pollution reduction targets.(% of the typical urban annual load) ● Total Suspended Solids (TSS) 80% ● Gross Pollutants 85% ● Total Nitrogen (TN) 30% ● Total Phosphorus (TP) 30%	Civil consultant to ensure compliance with this initiative.		Civil		•		•								•			
	20	Support Effective Handwashing	All sinks where handwashing is expected (e.g., kitchens, bathrooms, break rooms and wellness rooms), meet the following requirements: Water does not splash outside the sink when the faucet is fully open; The sink basin is at least 23 cm across in the smallest dimension. The water column is at least 7.5 cm away from any edge of the sink.	Architect to ensure compliance with this initiative.	***05/12/2022 Completed by Architect - Noura Thaha <NThaha@groupgsa.com>*** Capable of compliance	Architect		•		•											

Hygiene Support	21	Provide Handwashing Supplies and Signage	All sinks where handwashing is expected (e.g., kitchens, bathrooms, break rooms and wellness rooms), meet the following requirements: Fragrance-free liquid hand soap dispensed through either sealed dispensers equipped with disposable soup cartridges or dispensers with detachable and closed containers for soup refill. Provide paper towels or hand dryers equipped with a HEPA filter. Provide clear signage displaying steps for proper hand washing.	Architect to ensure compliance with this initiative.	***05/12/2022 Completed by Architect - Noura Thaha <NThaha@groupgsa.com>*** Capable of compliance	Architect	•	•		•													
Food Offering	22	Provide Fruits and Vegetables	Daily food offered includes at least two varieties of fruits (containing no added sugar) and at least two varieties of non-fried vegetables.	Client to ensure compliance with this initiative.		OPAL	•																
	23	Support Mindful Eating	Dedicated eating spaces that contain tables and chairs to accommodate at least 25% of regular occupants at peak occupancy. Provides protection from environmental elements (e.g., direct sunlight, rain, wind) or is in a climate-controlled space. Accommodates a variety of seating types, including small group (up to 4 people) and large group (more than 4 people) seating.	Architect to ensure compliance with this initiative.	***05/12/2022 Completed by Architect - Noura Thaha <NThaha@groupgsa.com>*** Dining areas provided . Lounge rooms allow for natural light and access to outdoor terrace/balcony.	Architect				•													
	24	Label Food Allergens	Foods and beverages are sold or provided by (or under contract with) the project owner and all foods and beverages are clearly labelled at point-of-decision on packaging, menus or signage to indicate if they contain the following common food allergens: (a) Peanut. (b) Fish. (c) Shellfish. (d) Soy. (e) Milk. (f) Egg. (g) Wheat. (h) Tree nuts. (i) Gluten.	Client to ensure compliance with this initiative.		OPAL	•																
Well-being	25	Support Visual Ergonomics	Where practical, computer monitors provided can be positioned by the user (monitor height, viewing angle, horizontal distance), through one or more of the following: 1. Monitors with built-in height and angle adjustment. 2. Monitor stands or arms that allow height, angle and horizontal adjustment. Where practical, laptops meet one of the following requirements: 1. The laptop is paired with an external keyboard, mouse and stand such that the laptop screen can be positioned by the user (height, viewing angle, horizontal distance). 2. The laptop is used with an external monitor that meets requirements above.	Client to ensure compliance with this initiative.	***10/02/2023 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Ensure compliance when practical.	Architect				•													
	26	Provide Chair Adjustability	Where practical, height adjustable chairs for seating at workstations.	Client to ensure compliance with this initiative.	***10/02/2023 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Ensure compliance when practical.	Architect				•											•		
	27	Prohibit Smoking	Smocking to be allowed only in dedicated areas. Smoking and the use of e-cigarettes is prohibited outdoors at ground level within 7.5 m of all entrances, Signage should be present to clearly communicate the ban.	Client to ensure compliance with this initiative.	***10/02/2023 Completed by ESD - Tarun Thottungal <Tarun.Sebastian@jhaengineers.com.au>*** Dedicated area to be provided for smoking. Architect to confirm.	Opal	•			•													

8. APPENDIX C: BDAR WAIVER

Our ref: SSD-48028209

Ms Eliza Arnott
Principal Planner
Ethos Urban

--via email--
earnott@ethosurban.com

18 January 2023

Subject: Opal St Ives Care Community, Residential Aged Care Facility (SSD-48028209) – Request to waive the need for a BDAR under the *Biodiversity Conservation Act 2016*

Dear Ms Arnott,

I refer to your correspondence dated 6 December 2022 requesting the issue of a waiver from the requirement for a Biodiversity Development Assessment Report (BDAR) to be submitted as part of the state significant development (SSD) application for the Opal St Ives Seniors Living Development (SSD-48028209).

Section 7.9(2) of the *Biodiversity Conservation Act 2016* (BC Act) provides the following in relation to an application for SSD:

> *"Any such application is to be accompanied by a biodiversity development assessment report unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values."*

The authority of the *"Planning Agency Head"* to determine whether a proposed development is *"not likely to have any significant impact on biodiversity values"* has been delegated to Team Leaders within the Planning and Assessment Division of the Department of Planning and Environment (the Department).

Accordingly, I have reviewed the application of the test of significance under sections 1.5 and 7.3 of the BC Act and clause 1.4 of the Biodiversity Conservation Regulation 2017 and considered the information provided in the report prepared by Narla Environment Pty Ltd. I have determined that the development is not likely to have any significant impacts on biodiversity values and that the application does not need to be accompanied by a BDAR. A waiver under section 7.9 is therefore granted for the proposed development (SSD-48028209).

The delegated *Environment Agency Head* in the Biodiversity and Conservation Division of the Department's Environment and Heritage Group has also granted a waiver in a letter dated 12 January 2023 and a copy of that approval is attached.

This waiver is issued in respect of the proposed development detailed in a request for the Secretary's Environmental Assessment Requirements (SEARs), dated 8 September 2022. Amendments to the development may require a further waiver to be sought and issued.

Should you have any enquiries regarding the above matter, please contact Manwella Hawell at Manwella.hawell@dpie.nsw.gov.au.

Yours sincerely,

Gabriel Wardenburg
Team Leader, State Significant Acceleration

as delegate of the Planning Secretary

Determination under section 7.9(2) of the Biodiversity Conservation Act 2016

I, Sarah Burke, A/Director Greater Sydney, of the Department of Planning and Environment, under section 7.9(2) of the *Biodiversity Conservation Act 2016*, determine that the proposed development is not likely to have any significant impact on biodiversity values. Therefore, a Biodiversity Development Assessment Report is not required.

Proposed development means the development as described in the BDAR Waiver request report (DOC22/1116610) and Schedule 1. If the proposed development changes so that it is no longer consistent with this description, a further waiver request is required.

S Burke

12/01/2023

Sarah Burke
A/Director
Greater Sydney
Environment and Heritage Group
Department of Planning and Environment

Date

SCHEDULE 1 – Description of the proposed development

The proposed development comprises 145 residential care beds including single rooms and suites. The proposal will be set across 3 levels with basement car parking access off Mona Vale Road. It will include various areas of outdoor communal open space.

Figure 1: Proposed site plan - Opal St Ives Care Community, SSD 48028209

Appendix A. Level 2 Drawing (Group GSA 2022).

Figure 2: - Existing structures and tree retention value plan - Opal St Ives Care Community, SSD 48028209