

Western Sydney University Indigenous Centre of Excellence SSDA - Environmental Sustainability Report

28 NOVEMBER 2025

Prepared for:

WESTERN SYDNEY UNIVERSITY

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Acknowledgement of Country

We acknowledge and pay respect to the Darug Ngurra people as the Traditional Custodians of the land. We pay our respect to their Elders past, present, and emerging, and honour their enduring connection to this land. We acknowledge and hold in high regard their ongoing cultural significance and contributions to the life of this city and its surroundings.

Acknowledgement

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Executive Summary

This report consolidates the Environmentally Sustainability Design attributes associated with the proposed Section 4.55 modification to the the Western Sydney University Indigenous Centre of Excellence. The modification is submitted to reflect design refinements undertaken during detailed design and cost review, including cost-driven adjustments that reduce the extent of some previously proposed ESD measures.

The Western Sydney University Indigenous Centre of Excellence aims to serve as a dynamic hub for Indigenous communities, education, employment, creativity, and research. Located within the Central City District in Rydalmere, the site is identified within the Greater Sydney Region Plan.

The environmentally sustainable design initiatives are outlined within four themes in the design competition brief: Connection to Nature, Health and wellbeing, Passive Design and Resilience, and Sustainable Procurement. These aspects collectively aim to create a building that is environmentally responsible, resilient to a changing climate and promotes occupant health and comfort.

Key strategies and attributes maintained through this modification include:

- Use of mass timber to reduce the embodied energy associated with construction.
- Planning around a courtyard to screen from the road and provide sensory engagement for the users.
- A building facade that provides solidity and insulation from Victoria Road's noise and pollution, as well as varying permeability to time natural light and solar protection on kinder aspects.
- Conserving water through rainwater reuse.
- Resilience to flooding through elevation of the ground floor.
- A zoned approach to air conditioning to suit a range of needs from AA-rated conservation through to mixed mode and transient spaces.
- Using mass timber and locally sourced materials while avoiding harmful substances.

Key ESD changes in this Section 4.55 modification include:

- Deletion of the on-site thermal energy plant; the project will be served by connection to the university's existing gas-fired thermal central plant, with no fossil fuels being used at a later date through the University's future plan to upgrade the central plant to be all-electric.
- Deletion of louvred windows, natural ventilation and mixed mode control to the primary circulation space.
- Deletion of rooftop Photovoltaic panels.
- The previous commitment to eliminate cooling towers has been removed. The project will now utilise the existing cooling towers for heat rejection.
- The project previously targeted 6-star Green Star rating. The modified scheme now target a minimum of 5-star Green Star rating, with the potential to pursue 6-star target subject to cost considerations.
- Refrigerants of GWP < 10 are no longer proposed. The existing chillers will be utilised.

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Document Control

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Section 4.55	28 November 2025	Helda Lim	Ché Wall	

Introduction

1. Introduction

This report documents the Environmentally Sustainable Design strategies and attributes for the proposed Western Sydney University (Western) Indigenous Centre of Excellence to support an SSDA.

1.1. Project Description



Figure 1. Western Sydney University Indigenous Centre of Excellence (Source: JCB)

The Applicant seeks development consent for the construction of a new state-of-the-art Indigenous Centre of Excellence as a new tertiary education facility on campus. The Indigenous Centre of Excellence project is funded by the NSW Government's Western Sydney Infrastructure Grants Program in association with Western Sydney University. The new Indigenous Centre of Excellence will be an important asset for both the University and local community alike, providing a space for the commitment to advancing Indigenous education, leadership, and reconciliation. The Indigenous Centre of Excellence will stand as a symbol of recognition of Indigenous land and the University's relationship with Indigenous communities. The Indigenous Centre of Excellence will represent a celebration of tens of thousands of years of Indigenous

knowledges and histories, a legacy that the University is honoured to nurture and promote through further education opportunities for students and communities.

Through the Indigenous Centre of Excellence, the University will aim to drive positive change, increase Indigenous participation in higher education, and contribute to the preservation and sharing of Indigenous cultures.

This State Significant Development Application (SSDA) specifically seeks detailed approval for the following works:

- Site preparation including demolition of the existing car park, tree removal and installation of inground utility infrastructure services.
- Construction of a three-storey Indigenous Centre of Excellence encompassing:
 - Ground level facilities, including but not limited to; a dedicated arrival area, outdoor amphitheatre, multipurpose court and theatre, and gallery. Associated workspaces, teaching spaces, meeting areas, lounge areas and other amenities are to be provided throughout the ground floor.
 - First floor level comprising meeting space and dedicated educational facilities including learning areas and teaching spaces.
 - Second floor level comprising offices, and collaboration spaces.
 - Roof level plant and services.
- Construction of internal driveway and car parking spaces areas, including:
 - 13 with hardstand area spaces adjacent to the new dedicated arrival zone for the proposed ICoE development
 - 106 temporary replacement P1 spaces proposed in new western car park to the west of Bridge Street, adjacent to the existing oval
 - 181 temporary replacement P1 spaces proposed in new eastern car park on the southern side of Fifth Street
 - Associated land remediation, civil and electrical works.

- Landscaping works to provide outdoor educational and recreational spaces.

This report responds to the SSD-64916225 Secretary's Environmental Assessment Requirement (SEARs) which was issued by the Department of Planning, Housing and Infrastructure on 21 November 2023.

1.2. Site Description and Location

The Western Sydney University South Parramatta Campus is located within the City of Parramatta Local Government Area (LGA).

The site comprises two (2) allotments, which is legally described as Lot 100 in DP 816829 and part Lot 101 in DP 816829. The project site comprises the P1 Car Park in the northern portion of the wider site campus and consists of the grassed area to the south and southwest of the P1 Car Park. The project site is approximately 20,035m² in area and is irregular in shape. It currently comprises of a hardstand area that accommodates approximately 284 car parking spaces and a grassed open space adjoining the Oval to the south. There is an existing single storey Central Energy Plant to the west of the development area which serves the wider campus; it remains outside of the scope of this SSDA.

The site is strategically positioned to the northern boundary of the Western Sydney University (University) South Parramatta Campus, fronting Victoria Road (the A40). The wider campus comprises a significant landholding size of approximately 20ha containing a series of buildings of differing heights and massing forms which are used for educational purposes. The buildings contained within the wider campus site are dissected by a series of open, at grade car parks, internal roads, pathways, and landscaped areas. The Campus sits to the north of the Parramatta River.

The site is located approximately 3km east of the Parramatta CBD, which is an area undergoing a process of significant transformation. It is also located approximately 500m to the Parramatta Light Rail Corridor, with the construction of new Yallamundi Light Rail now completed and awaiting operation by TfNSW.



Figure 2. Western Sydney University Parramatta South Campus locational context (Source: Nearmap/ Ethos Urban)

1.3. Project History

The SSDA was lodged with the NSW Department of Planning, Housing, and Infrastructure (DPHI) in August 2024. The SSDA sought development consent for the construction of a new four (4) storey tertiary educational facility comprising 5,543.3m² of Gross Floor Area (GFA) to accommodate the new Indigenous Centre of Excellence. The SSDA was publicly exhibited by the DPHI from 20 August 2024 until 26 September 2024, with the subsequent request for response to submissions issued on 1 October 2024. Additional matters were raised by DPHI on 16 July 2025 and by Heritage NSW on 28 July 2025.

An Amendment Report and supporting documentation in response to the matters raised by DPHI, Heritage NSW and other agencies, was submitted

on 27 August 2025 in accordance with the Environmental Planning and Assessment Regulation 2021 for WSU Indigenous Centre of Excellence (SSD-64916225).

On 13 October 2025, DPHI provided written correspondence outlining that all agency responses had been received apart from Crown Lands and the Conservation Programs, Heritage and Regulation branch of the NSW Department of Climate Change, Energy, Environment and Water. Notwithstanding, it was requested that a formal submissions report be prepared in response.

Following, the formal written correspondence from DPHI, ongoing liaison has occurred with DPHI and the relevant agencies to respond to the site constraints and matters relayed within the submissions received. The current proposal has been amended accordingly and results in a three (3) storey building, accommodating a site area of approximately 20,035m². The particulars of the project have been expanded upon throughout this report

Report Structure

Secretary's Environmental Assessment Requirements presents SEARs and a summary of responses.

Climate Context outlines the climate conditions that will inform design development.

Sustainable Design Initiatives refers to principles and strategies aimed at integrating sustainability into the design and construction of the project.

Parramatta DCP 2023 provides a review against Parramatta DCP 2023 Part 5.4 Environmental Performance.

SEPP (Sustainable Buildings) 2022 responds to the relevant parts of the SEPP.

Green Star pathway outlines the initial approach to progress a 6-star Green Star Buildings certification.

1.4. Sources of Information

Sources of information relied upon are noted within the body of this document.

1.5. Limitations

This framework has been compiled within the scope and programme provided.

Secretary's Environmental Assessment Requirements

2. Secretary's Environmental Assessment Requirements

The EP & A Regulation outlines four principles of ecologically sustainable development. The project responds to these four principles through the following attributes:

The Precautionary Principle

A do-no-harm approach is being adopted for materials to avoid those materials that impact human and ecological health.

Inter-generational Equity

The project's focus on sustainability, energy efficiency, and passive design strategies helps minimise the building's environmental impact, contributing to maintaining a healthy environment for future generations.

Conservation of Biological Diversity and Ecological Integrity

The project's repurposing of an existing open-deck car park minimises disturbance to existing ecosystems and habitats. Native and drought-tolerant landscaping, measures to manage stormwater runoff, and measures to minimise light pollution will help conserve local biodiversity and ecological integrity.

Improved Valuation, Pricing, and Incentive Mechanisms

Overall, the proposed Western Indigenous Centre of Excellence project addresses the principles of ecologically sustainable development through its commitment to 100% renewable energy purchasing.

Section 9 of the Secretary's Environmental Assessment (SEARs) Requirements, titled "Ecologically Sustainable Development (ESD)". The table below summarises the SEARS and where the project responses can be found:

SEARS Key Issue 9.	Response
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.	Refer above response and to Section 4 - Sustainable Design Initiatives for further details of how ESD principles are incorporated in the design and ongoing operation of the development.
Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards.	The developments is targeting a minimum of 5-star Green Star Buildings rating. The pathway to achieve this is provided in Appendix B .
Demonstrate how the development minimises 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.	Refer to : - Section 4 - Sustainable Design Initiatives - Section 5 - Parramatta DCP 2023. - Section 6 - SEPP (Sustainable Buildings (2022)
If Chapter 3 of SEPP (Sustainable Buildings) 2022 applies: Demonstrate how the development has been designed to address the provisions set out in chapter 3.2(1).	Refer to Section 6 .

Climate Context

3. Climate Context

This section outlines the climatic context that informs the design of the Indigenous Centre of Excellence. Key characteristics of the future climate in Parramatta are described below.

The future climate is derived from CSIRO projections¹ for 2050 under Representative Concentration Pathway (RCP) 8.5. RCP 8.5 represents a high-emission pathway where emissions continue to rise throughout the 21st century, leading to significant warming and increasing average temperatures by approximately 4.5°C by 2100 compared to pre-industrial levels. The pathway provides a worst-case for designing for resilience.

¹ <https://agdatashop.csiro.au/future-climate-predictive-weather>

² <https://andrewmarsh.com/software/sunpath2d-web/>

3.1. Solar radiation

The stereographic diagram below shows the sun's annual path through the sky relative to the site. The orange lines running east-west indicate the sun's path on the 21st of each month, with the winter solstice having the lowest elevation and the summer solstice showing near 80° elevation. The loose figure-of-eight shapes indicate the sun's position at each solar hour.

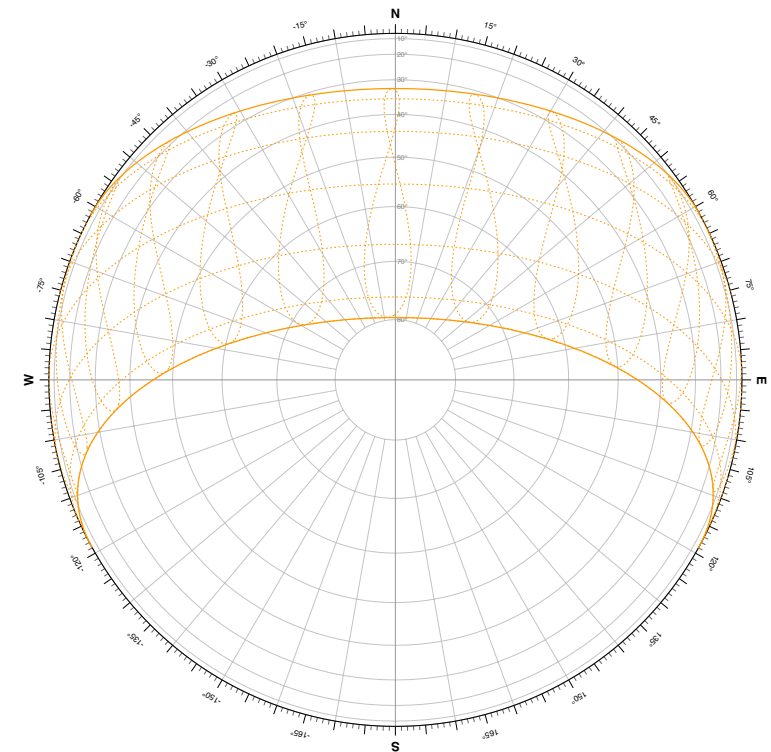


Figure 3. Sunpath diagram for the site. (source: 2D Sun-path/Flux)²

The following diagrams show the cumulative radiation forecast from each part of the sky vault in each season in the calendar year 2050. Both direct and diffuse radiation are included.

Lat: -33.92°, Lng: 150.99°, TZ: +10:00
Date: 02 Dec 2050
Time: 10:30

Wh/m2
5000.00
2500.00
0.00

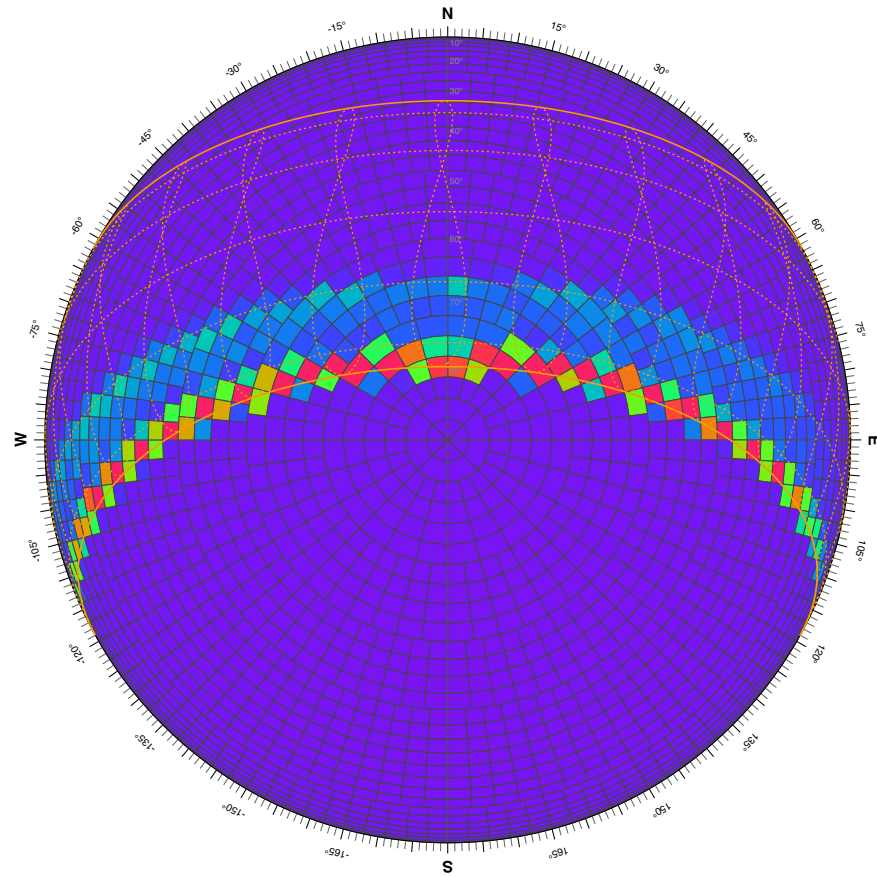


Figure 4. Cumulative radiation - Summer. (source CSIRO/CIE Sky Generator³/Flux)

Lat: -33.92°, Lng: 150.99°, TZ: +10:00
Date: 02 Dec 2050
Time: 10:30

Wh/m2
5000.00
2500.00
0.00

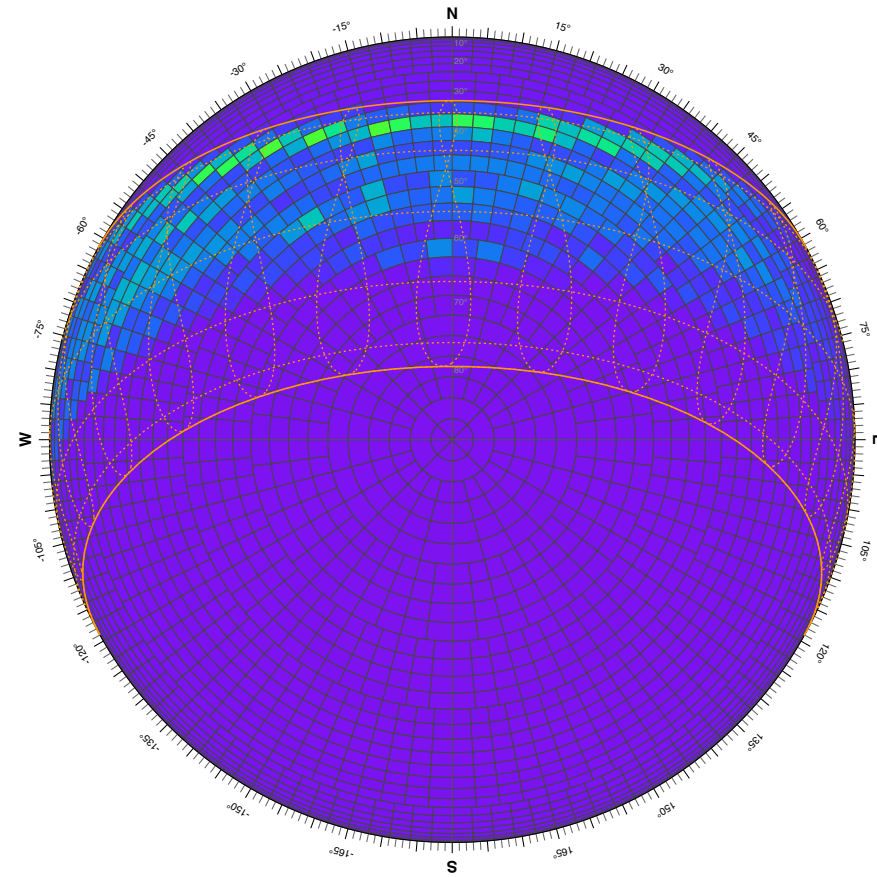


Figure 5. Cumulative radiation - Autumn. (source CSIRO/CIE Sky Generator/Flux)

³ <https://drajmarsh.bitbucket.io/cie-sky.html>

Lat: -33.92°, Lng: 150.99°, TZ: +10:00
Date: 02 Dec 2050
Time: 10:30

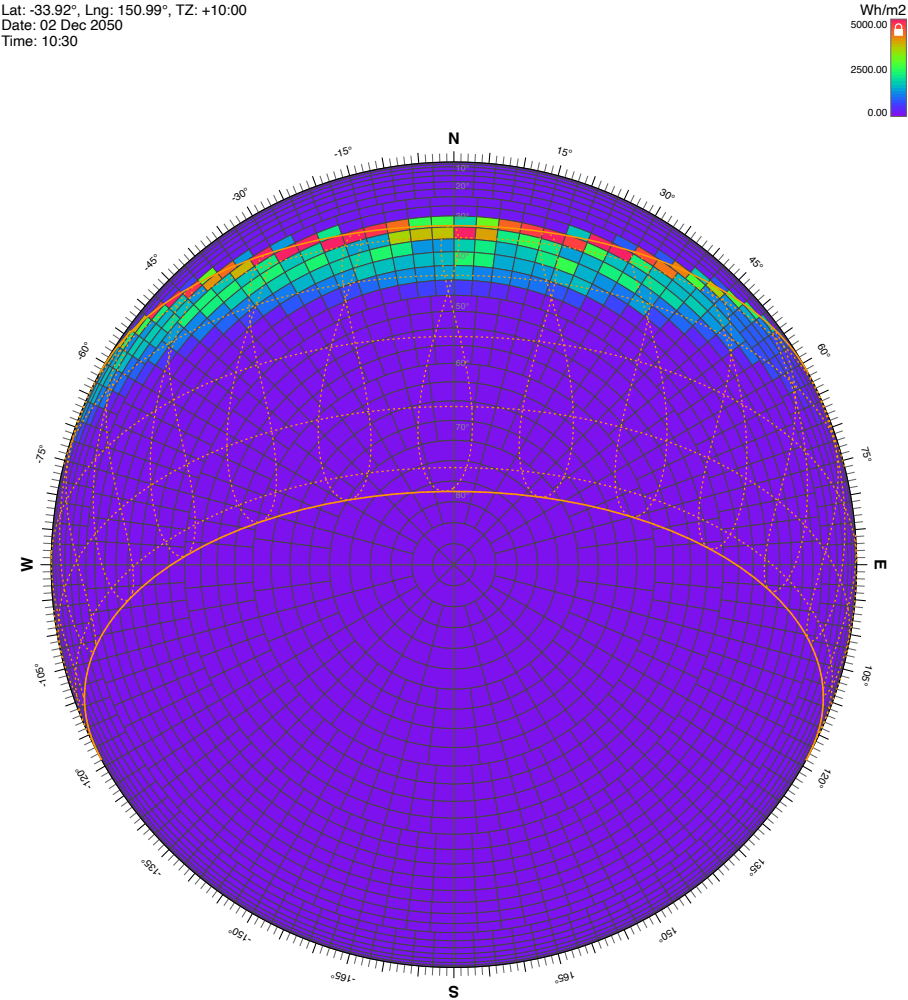


Figure 6 Cumulative radiation - Winter.(source CSIRO/CIE Sky Generator/Flux)

Lat: -33.92°, Lng: 150.99°, TZ: +10:00
Date: 02 Dec 2050
Time: 10:30

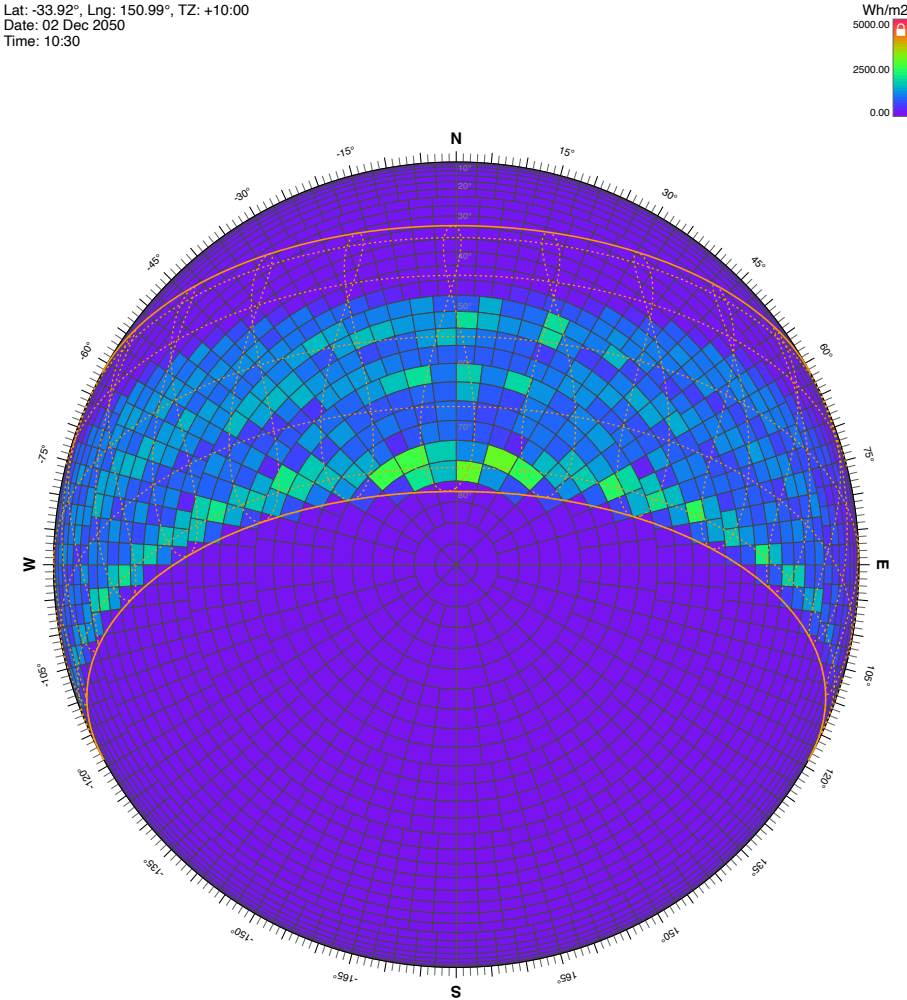


Figure 7. Cumulative radiation - Spring. (source CSIRO/CIE Sky Generator/Flux)

3.2. Wind

The wind environment is relevant to natural ventilation, uncontrolled air infiltration, and the comfort of outdoor spaces and landscapes supporting the building. The seasonal distribution of wind direction and velocities over a 24-hour daily period of future climate is shown below.

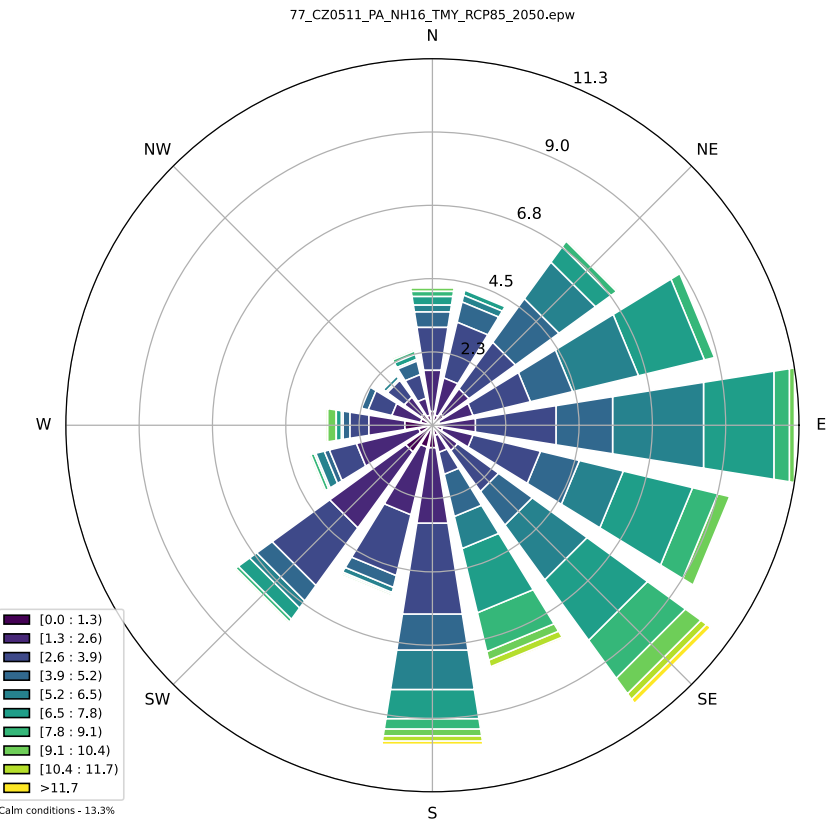


Figure 8. Summer wind rose.

The length of the bars indicates the frequency of wind from any direction, and the colour of the bar segment indicates the wind speed. The size of the segment indicates the frequency of the speed range.

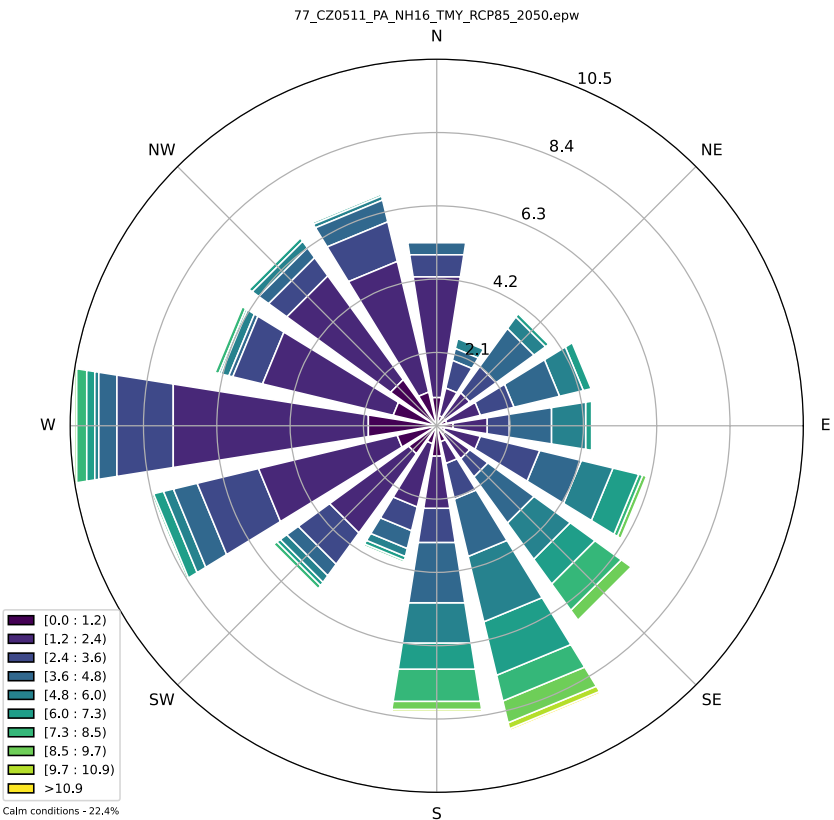


Figure 9. Autumn wind rose.

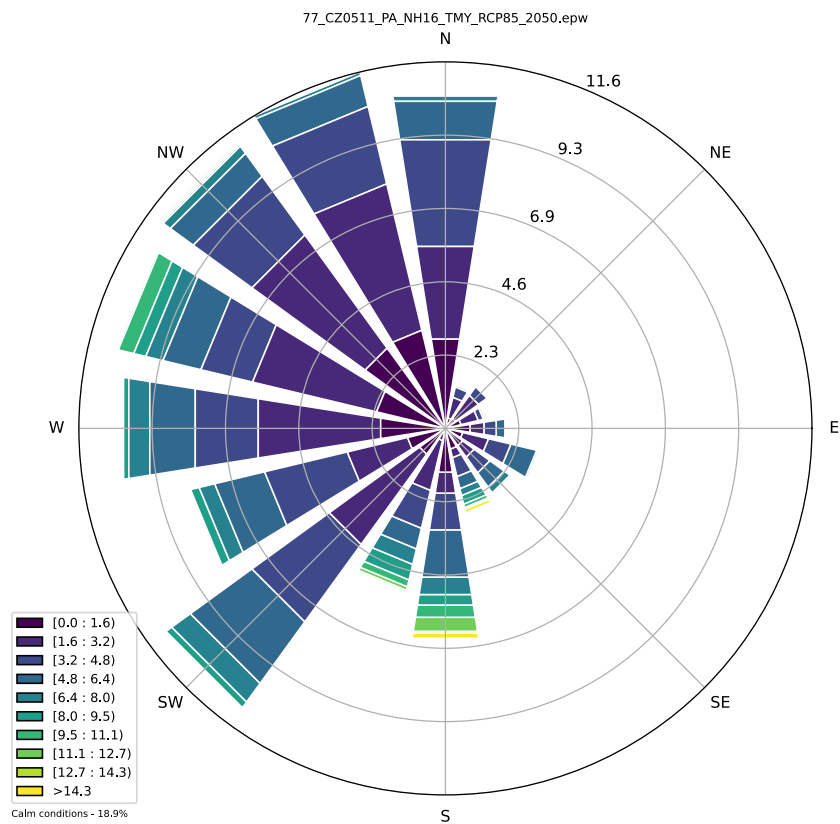


Figure 10. Winter wind rose.

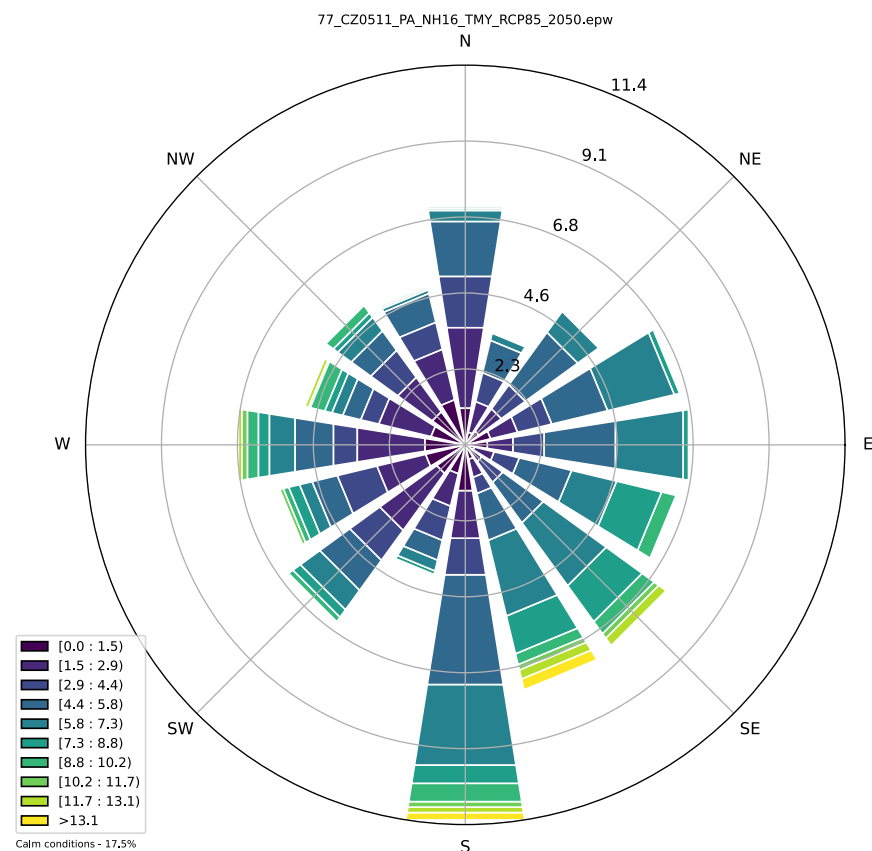


Figure 11. Spring wind rose.

3.3. Temperature and humidity of air

Air conditioning will be the single most significant component of energy consumption, and the energy demand will be significantly influenced by the temperature and humidity of the outdoor air required for ventilation. The gallery's air conditioning will also depend on conditioned outdoor air to maintain a positive pressure in the space and reduce the risk of unconditioned air infiltration. The following diagrams plot projected future coincident humidity and temperature through the year.

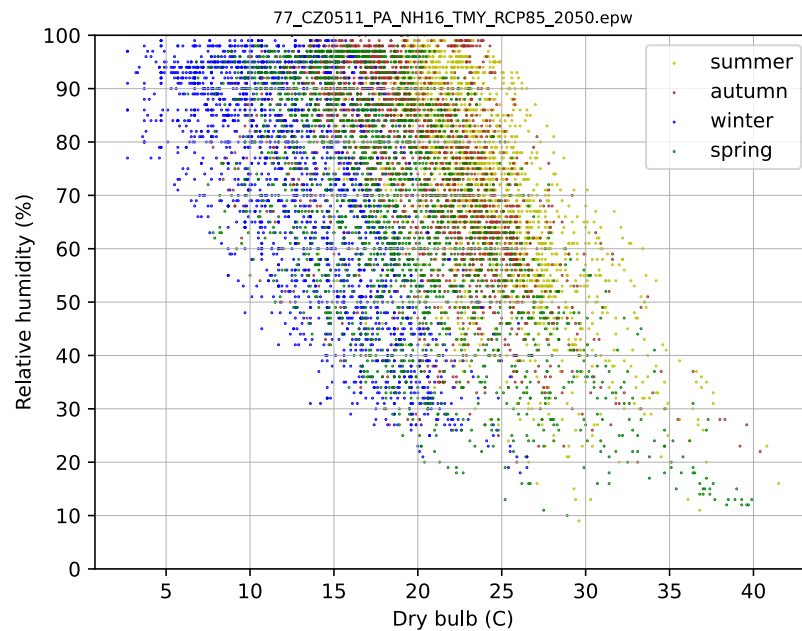


Figure 12. Coincident air temperature and relative humidity - all hours

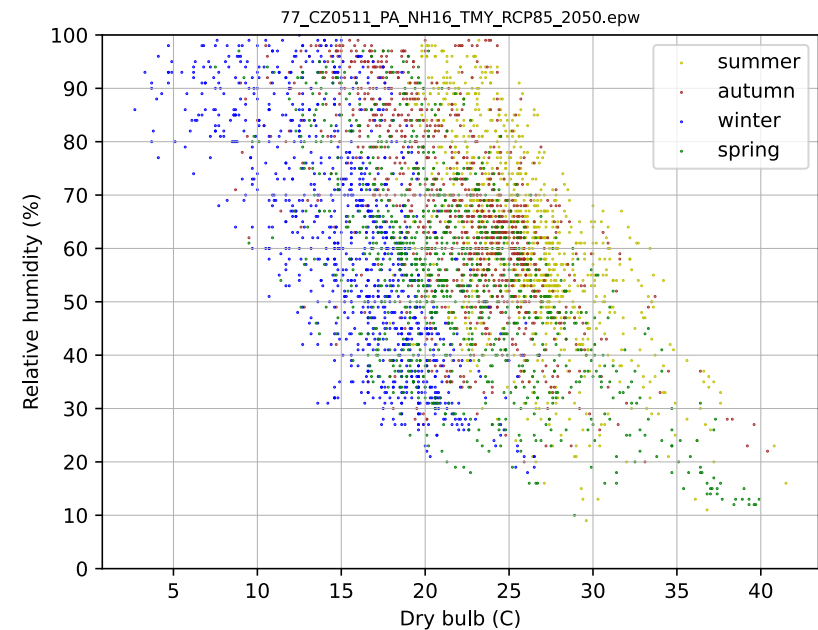


Figure 13. Coincident air temperature and relative humidity - daytime hours

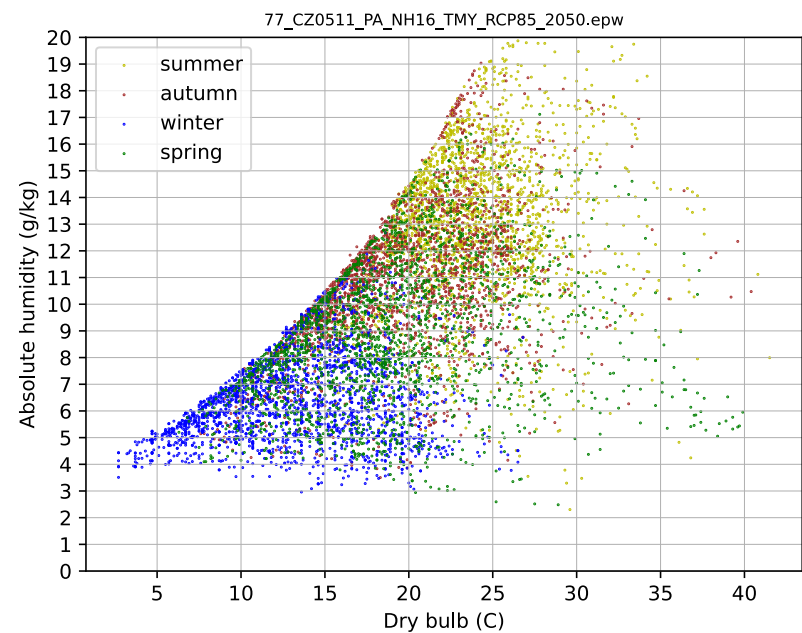


Figure 14. Coincident air temperature and absolute humidity - all hours

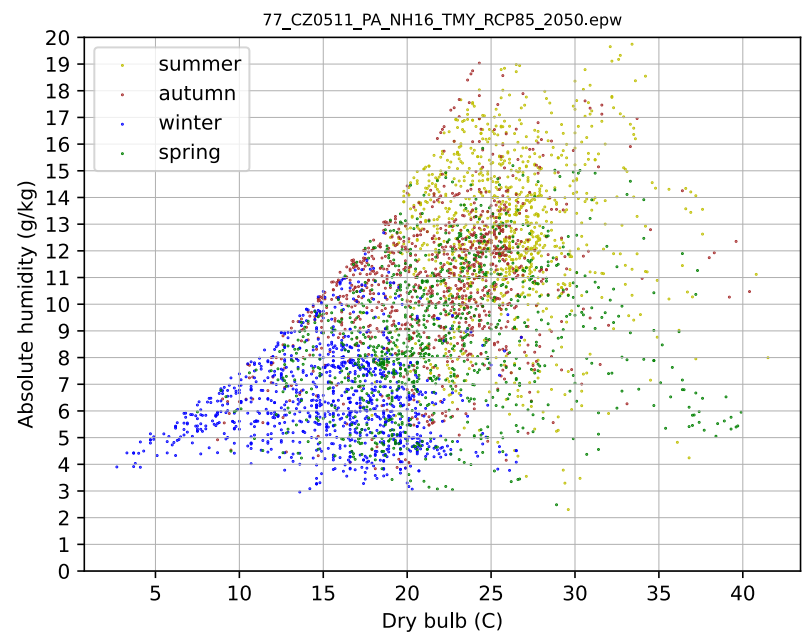


Figure 15. Coincident air temperature and absolute humidity - daytime hours

3.4. Rainfall

Rainfall projections are unavailable in CSIRO's future annual weather years, so statistical analysis has been performed on historical records to determine a reference year for the design and assessment of rainwater harvesting.

58 years of recorded weather data was statistically analysed to determine 'typical' years for rain events in each season. The four reference seasons were chosen as the most typical based on the sum of percentiles representing the 75th, 85th, and 95th percentile thresholds. This can be seen in the graph below.

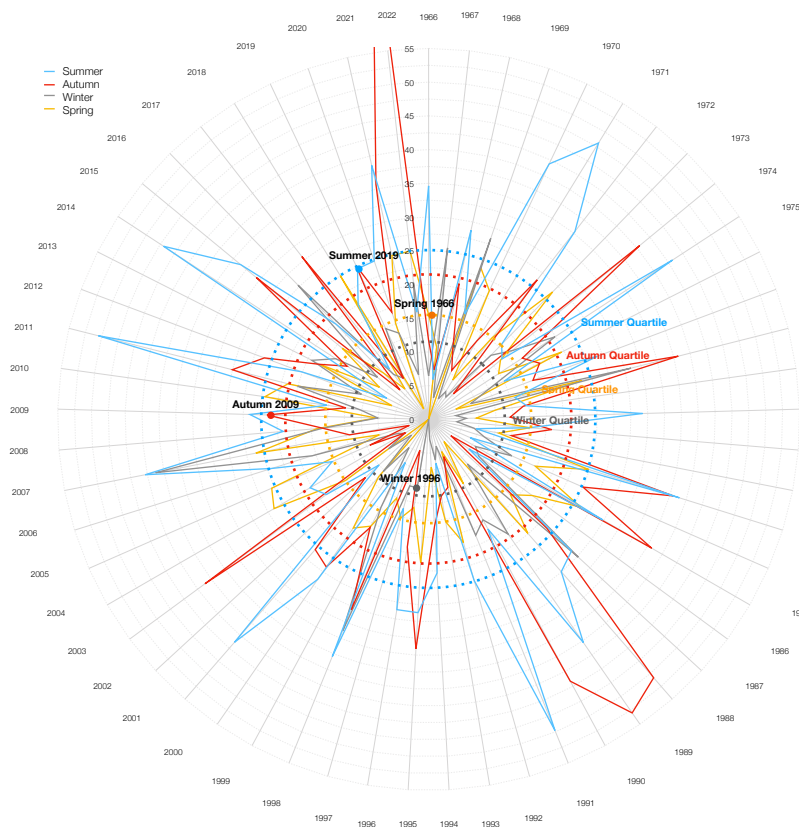


Figure 16. Typical rain years based on percentile thresholds (source BOM/Flux)

The final reference year combines the four representative seasons.

The annual reference rainfall calculated is 985mm. The sizing of the rainwater tanks must balance the lost potential for reusing rainwater due to tank overflow and the limited ability to collect water during dry days. The figure below shows broad flows predicted from approximately 1,500 sqm roof collection area under the reference year's rainfall, consistent daily water demand for toilets, approximately 5,000 sqm of irrigation, and the briefed rainwater storage tank of 100 kL.

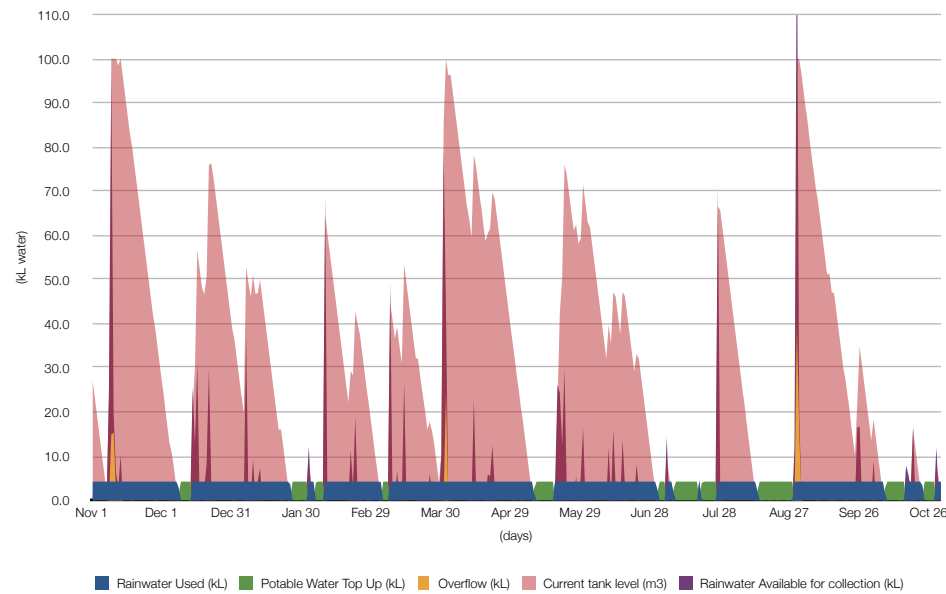


Figure 17. Daily water and reuse water balance over a typical rain year.

Sustainable Design Initiatives

4. Sustainable Design Initiatives

The initiatives described below are developed from a first-principles approach to satisfy the university's environmentally sustainable design brief for the project. The quality of the brief and the team's understanding of environmental imperative and design have led to an approach integral to the building form and planning. The team has focussed on high-value initiatives and has avoided a bolt-on approach to sustainability.

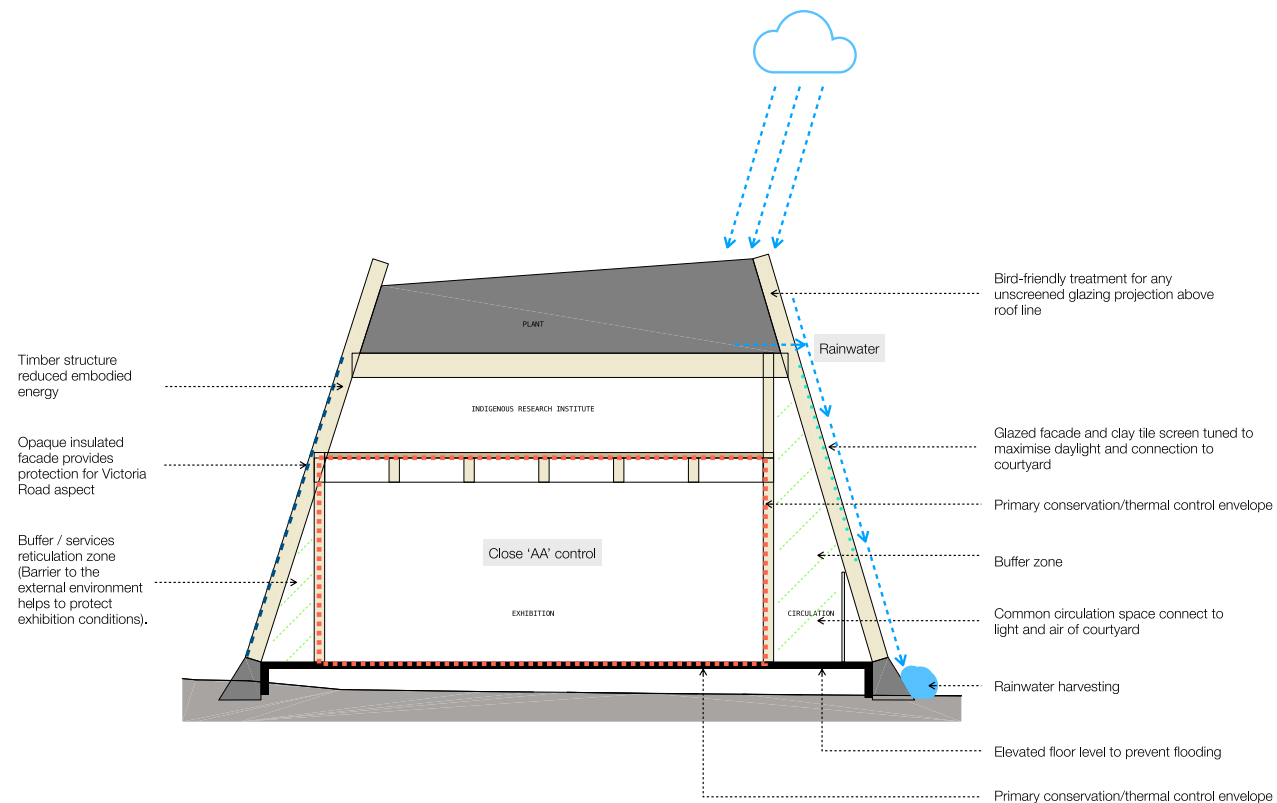


Figure 18. Illustration of environmental design initiatives

4.1. Connection to Nature



Figure 19. Clay tile facade screening (Source: JCB)

The facade is crucial to promoting a connection with nature from within the buildings. It incorporates an innovative clay tile facade that transitions from solid to highly permeable to suit the external environment and the needs of the internal uses.

The clay tile facade screen provides flexibility to provide dense shading where solar protection is required and allows a more open outlook where visual connection to the landscape or sky is more important.

Screening orientated towards the central courtyard will be more permeable, allowing for a multi-sensory connection between inside and out.

In addition to the role of the facade in providing a connection to nature, upward views from public areas through the facade give a connection to the sky.

Finding the right balance between maximising the connection to the outside, necessary solar protection, and natural light takes time and will progress as the design develops. The following image illustrates the testing of solar exposure of the original DA, which provided the primary guidance for the minimum shading required from the screen. The retesting will be progressed in design development to inform the optimum solar shading.

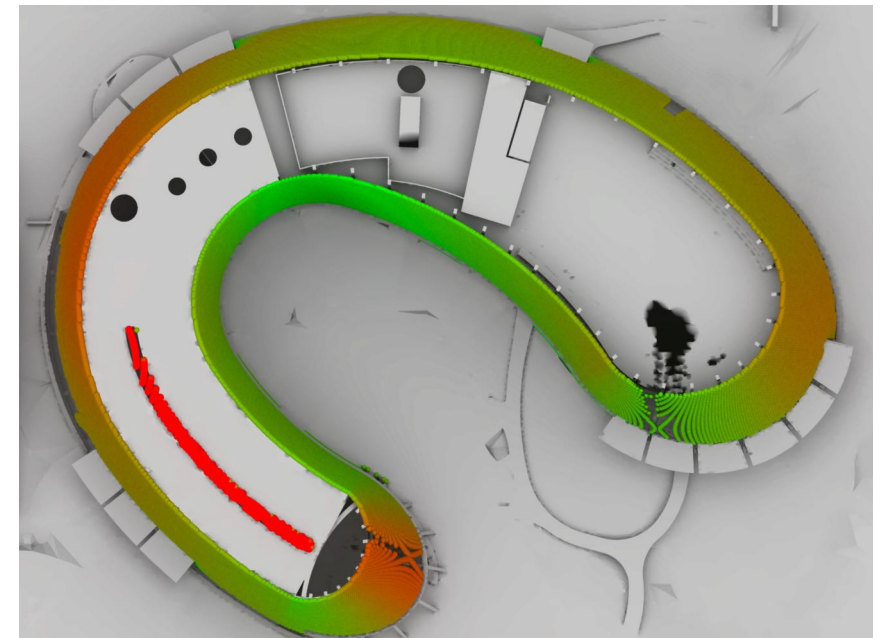


Figure 20. Early solar availability testing (Source: Flux)

4.2. Health and Wellbeing

Health and wellbeing are intrinsic informers of the plan. We have expanded this definition to include the environment and Country.

A protective facade buffers against noise and air pollution from the central thermal plant and Victoria Road's traffic. The central landscape court increases the extent of the facade with an aspect conducive to heat and wellbeing.

The project has the opportunity to innovate in avoiding harmful synthetic gases by designing HVAC systems that use refrigerants that minimise Global Warming Potential and are free of PFAS. Further information can be found in Appendix - Refrigerants.

The project's mechanical heating and cooling will connect to the university's central energy plant, with only the canteen units requiring a separate system. Any new equipment will utilise PFAS-free refrigerant with maximum GWP < 700, such as R32.

Users of 'owned' space will have control over their environment, with the option to adjust air conditioning and windows or use blinds for glare reduction and privacy. These local units can be centrally overridden by building management to ensure systems are shut down at the end of each day.

'Un-owned' space will operate under automatic thermostat settings and timers controlled by building managers.

In addition to Green Star requirements and to align with the project brief to care for Country, a 'Do No Significant Harm' approach is taken to avoid materials that involve scheduled carcinogens and harm human health or the environment in their manufacture.

4.3. Passive Design and Resilience Thermal envelope

The thermal envelope will meet the minimum requirements of the National Construction Code for solar transmission and conduction of heat.

Solar transition requirements are expected to be met without reliance on treated glazing, which provides a better visual connection to the outside and full access to the sun's warmth in winter.

The NCC provides requirements for thermal insulation, and it is not proposed to invest in additional insulation beyond the minimum requirements. This will protect against over-investment, where returns will be minimal and the additional embodied energy significant.

Solar shading is extensive and will be carefully calibrated to the needs of the climate.

The confirmation of the required U-value and SHGC to satisfy Section J requirements can be found in the Appendix.

4.3.1. Water Conservation

Water conservation will be achieved by using water-efficient fittings and designing a landscape that does not demand year-round irrigation.

Rainwater from the roof will be collected and stored for reuse for non-human contact needs, such as toilet flushing and landscape irrigation, through dual piping throughout the building.

Water in the landscape will be retained to reduce the flow of pollutants off the site and to meet irrigation demands.

The volume of stormwater flow leaving the site is restricted to those required to sustain the nearby creek ecosystem.

4.3.2. Resilience to flooding

Due to the site's exposure to flood paths associated with a major drain and riverine flooding, the consultant team has elevated the floor level so as not to disrupt the flood path or adversely displace flood waters.

In addition, adequate freeboard will be provided to allow safe passage of flood waters under the structure per best practice design principles for a floodway.

Plant and equipment will be above the probable maximum flood level to avoid damage and system interruption during flood events.

4.3.3. Renewable energy

The project will be externally supplied with 100% renewable energy following Western Sydney University's usual electricity procurement practices.

4.3.4. Shading

The clay tile screen provides extensive solar shading. The density of shade and openness is tuned to suit the facade's orientation and the space's needs.

4.3.5. Operational Efficiency

The Gallery and associated spaces will maintain high indoor air quality through careful control measures, including buffer zones and positive air pressure to prevent unregulated air and moisture ingress.

4.4. Sustainable Procurement

The mass timber structure is the most significant initiative to reduce the impacts of materials used for the new building. In addition to timber's inherent embedded energy benefits, forest stewardship certification will be sought to protect native forest habitats.

The other significant potential impact of the superstructure will be the use of concrete and steel. The specification of concrete mixes with high Supplementary Cementitious Materials (SCMs) is progressing in later stages. A best practice outcome is sought with a minimum 20% reduction in GHG emissions compared to a business-as-usual specification in line with Green Star requirements.

Recycled steel may also be required to achieve Green Star target.

The clay tile facade screen is another essential element of the design. The team is working on the opportunity for the clay tile screen to clay source in the Darug / Sydney region.

A "do no significant harm" approach is taken to avoid materials that involve scheduled carcinogens and harm human health or the environment in their manufacture.

4.5. Green Star

The building is targeting a minimum 5-star Green Star rating.

The indicative pathway is provided to 5 and 6 star ratings as the Western Sydney University aspires to achieve a 6-star Green Star certification but understands that it may not be affordable. The initial Green Star pathway can be found in Appendix of this report.

The design maximises the credits achieved through the buildings' inherent design qualities and minimises reliance on credits not directly aligned with the project's core sustainability brief.

The approach avoids Green Star pathways that the team considers o have less substance and long-term benefits to the environment and university.

Parramatta DCP 2023

5. Parramatta DCP 2023

This section summarises how the proposed development satisfies the Parramatta DCP 2023 requirements.

5.1. Energy Efficiency

The building will fully comply with NCC 2022 Section J Energy Efficiency provisions. The details of the calculation can be found in [Appendix A](#) of this report.

5.2. Water Efficiency

The building will provide a 100kL of rainwater tank serving toilets and irrigation. Rainwater will be collected from the roof, and the tank is projected to capture 93% of typical year rainfall for reuse.

5.3. Urban Cooling

This control doesn't technically apply. However, reducing urban heat is a key priority of the project to maintain a quality external environment.

Retaining moisture in the landscape, shade, and the selection of materials will mitigate urban heat.

The outer facade of the building will minimise the heat entering the landscape by avoiding highly reflective surfaces and providing extensive clay tile shading.

5.4. Solar Light Reflectivity (Glare)

A reflectivity report is not required as the building is below 40 meters in height. However, the primary risk to vehicular traffic would arise from the north facade of the building facing Victoria Road, which is fully opaque with no reflective surface, thus eliminating risk. The clay tile screen and its ability to reduce direct solar reflections will protect pedestrian visual comfort within and beyond the site.

5.5. Natural Refrigerants in Air Conditioning

The Indigenous Centre of Excellence will be supplied with heating and cooling from the University's existing central thermal plant.

New onsite refrigerants will be limited to a small dedicated system serving the comms room units. This system will operate with R32 refrigerant, so it does not comply with the DCP condition. However, it has a relatively low GWP of less than 700 and is the only HFC currently used in air conditioning that is free of PFAS concerns.

5.6. Bird Friendly Design

The clay tile facade thoroughly screens the majority of the glazing. Where glazing extends above the roof line and is not screened by the clay tiles, bird-friendly treatments will be applied.



Figure 21. Clay tile screening (Source: JCB)

5.7. Wind Mitigation

A qualitative wind assessment has been undertaken by CPP Wind Engineering Consultants.

5.8. Waste Management

The mass timber structure brings benefits for early life and end-of-life waste management. Off-site manufacturing of structural elements will reduce waste on site, and the timber structure can be upcycled at end-of-life.

More than 90% of construction and demolition waste will be diverted from landfill per the Green Star Buildings credit requirements.

SEPP (Sustainable Buildings) 2022

6. SEPP (Sustainable Buildings) 2022

This section summarises how the proposed development addresses the relevant requirements of the SEPP (Sustainable Buildings 2022)

6.1. Waste from associated demolition and construction

Demolition waste will be minimised by targeting credit achievement under the Green Star Buildings team. This will contract a minimum of 90% diversion from landfill from demolition waste.

The use of a mass timber structure minimises construction waste. The structural elements will be manufactured offsite, reducing construction waste. The construction contract will also require more than 90% diversion from landfill of all waste generated on-site in the construction process.

6.2. Reduction of peak electricity demand

The building is designed for energy efficiency operation. The primary circulation spaces (aside from active cooling in the Welcome Arrival area and theatre ticket office area) target air tempering through spilled air from air-conditioned spaces, reducing the maximum demand for air conditioning.

A Building Management System (BMS) will control the efficient operation of services, and zoning of air handling plans will allow isolation or set-back of spaces that are not in use or when natural ventilation conditions are favourable.

6.3. Passive Design

The passive design will maximise natural lighting to avoid dependence on artificial lighting during daytime hours.

Air tempering will be targeted through spilled air from air-conditioned spaces when it is too hot outside for natural ventilation.

The clay tile screen applied to the glazed facade provides extensive solar shading. This feature allows the amount of shade to be tailored to suit the orientation of the facade and the needs of the adjacent internal program.

This architectural approach allows significant flexibility to adjust requirements on a bay-by-bay basis and even more discretely if the design requires it.

6.4. Generation of renewable energy

The design does not provide for on-site renewable energy generation.

The design will be externally supplied with 100% renewable sources procured under the University's Policy.

6.5. Metering and monitoring

Electrical metering will be interfaced with the BMS. The metering will be in accordance with Section J of NCC 2022 Volume One and include the main switchboard, mechanical Control centre, Lifts submains and each distribution board.

6.6. Minimisation of potable water

Rainwater collection and reuse will be provided. The captured rainwater will be used for irrigation and non-human contact building uses, including toilet flushing and landscape irrigation.

6.7. NABERS Embodied Emissions Material Form

This is prepared by Slattery as Quantity Surveyors for the proposed development and is provided separately to this report.

6.8. Net Zero Statement

The Net Zero Energy Statement is prepared by Steenson Varming, the Building Services engineer for the proposed development, with input from the team and is provided separately.

Appendix

Appendix A - Section J

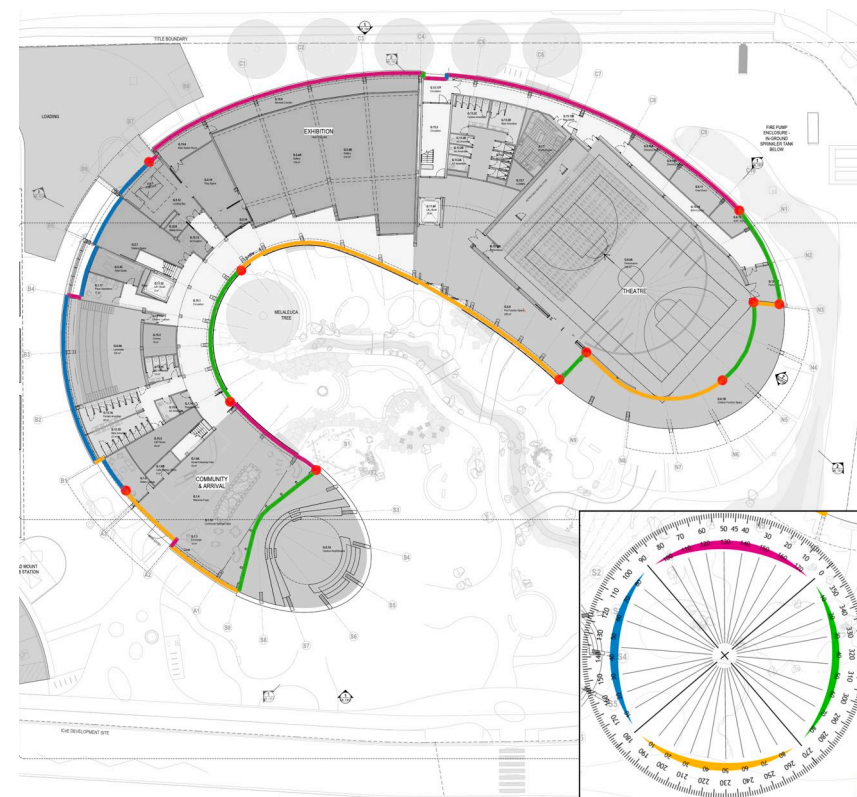
Compliance with the energy provision of NCC 2022 requires that the facade meet the building envelope requirements of Part J4 Building Fabric. Part J4D6 provides the requirements for walls and glazing to be achieved in either a Deemed-to-Satisfy solution or the reference case for a performance pathway. Available performance pathways include JV3 and Green Star, with the latter being necessary anyway due to project's commitment to a Green Star rating.

The thermal performance of facades in the NCC does not vary by aspects in climate zone 6, which applies to Parramatta. The average solar admittance must be above 0.13 for all aspects, and the average minimum total R-value must be 1.4.

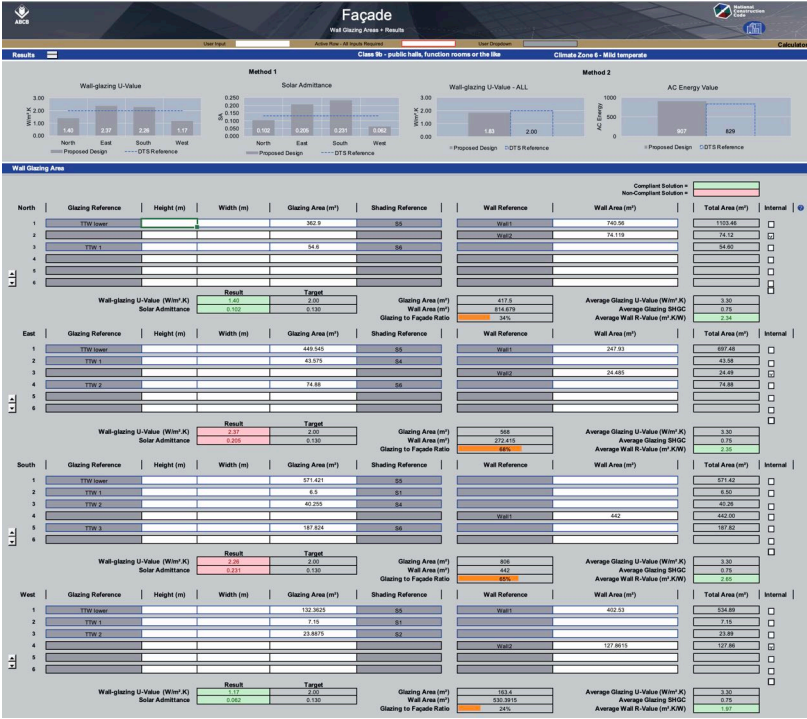
The NCC treats solar shading and solar admittance very simplistically. The NCC considers only four aspects for solar admittance; vertical shading and self-shading cannot be considered. This cannot reasonably determine the performance of the proposed built form.

Shading “devices” can only be considered in the NCC if they block at least 80% of summer solar radiation. The average coverage of solid elements in the shading screen is 64%. However, we expect the summer solar radiation to be in the order of 80% due to the additional shading benefits of the screen's framing and the angular relationship of the sun. Therefore, the glazed areas shaded by the screen can be treated as shading devices in the NCC facade assessment.

The NCC Thermal Envelope requirements were further developed early in the Design Development stage by taking a more accurate measure of the glass and wall areas in each cartesian direction required by the NCC. Flux and the architects determined the allocation of wall sections to the four orientation directions of the NCC, and the architects provided corresponding window and wall areas from their 3D model.



The facade calculator was populated with the window-to-wall ratio areas calculated from the 3D model. The NCC facade calculator is shown on the next page. Method 2 is applied to confirm requirements, and the relative thermal insulation of wall and glazing U-values is rebalanced to suit facade engineering requirements.



J4 Compliance approach

Compliance will be achieved by the prescriptive Deemed-to-Satisfy (DtS) provisions that apply to the building envelope, as outlined in Part J4. Part J4 contains DtS provisions for the building envelope, including roofs, ceilings, roof lights, wall, glazing, and floors.

Thermal construction - general

Insulation must comply with AS/NZS 4859.1 and be installed as per J4D3 guidelines.

Thermal envelope

The thermal envelope separates conditioned spaces from non-conditioned spaces and the exterior.

For NCC Volume One, a conditioned space is a space within a building where the environment is likely to have its temperature controlled by air conditioning. The DtS provisions of Part J4 contain the minimum performance requirements applicable to the thermal envelope. The building elements forming part of the thermal envelope are shown in the subsequent pages.

Roofs or Ceilings

The minimum thermal performance requirements for roofs and ceilings are:

	Minimum Total R-Value of (m².K/W)	Maximum solar absorptance
Roof	3.2	0.45
Ceilings in contact with non conditioned spaces	3.2	N/A

Walls and glazing

The maximum walls and total system glazing U value proposed are:

	Wall	Glazing	SHGC
U value (w/m2/k)	0.60	3.47	0.69

Floors

The minimum thermal performance requirements for the floor are:

	Minimum Total R-Value of (m².K/W)
External floor	2.00
Floor in contact with non-conditioned spaces	2.00

J5 Compliance Approach

NCC 2022 requires that the facade meet the Deemed-to-Satisfy Provisions (DtS) for Part J5 Building sealing. Part J5 contains DtS provisions for the building envelope, including windows and doors, exhaust fans, and construction of ceilings, walls and floors.

L-00 Wall insulation

External walls

Internal walls to
unconditioned space



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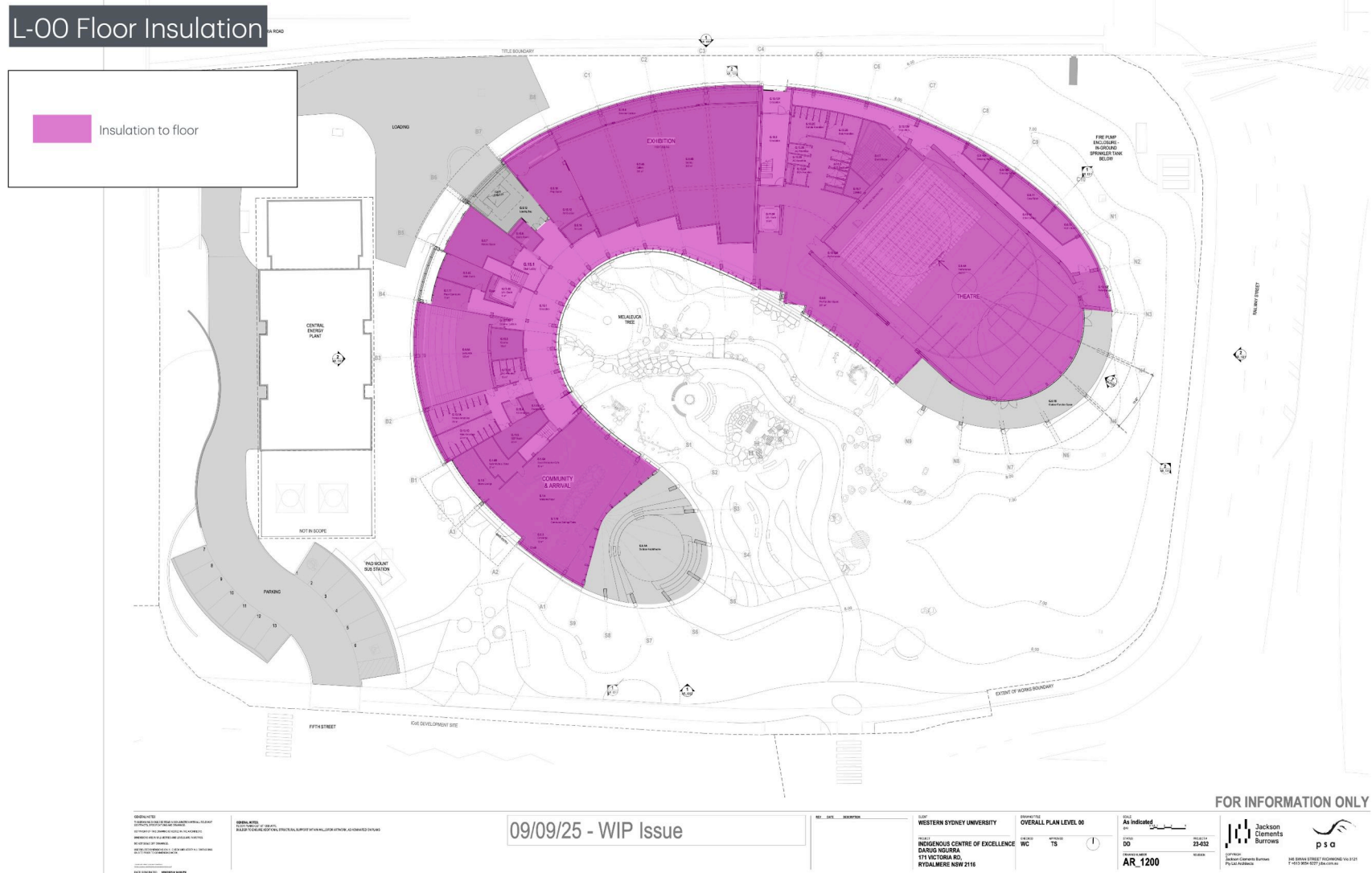
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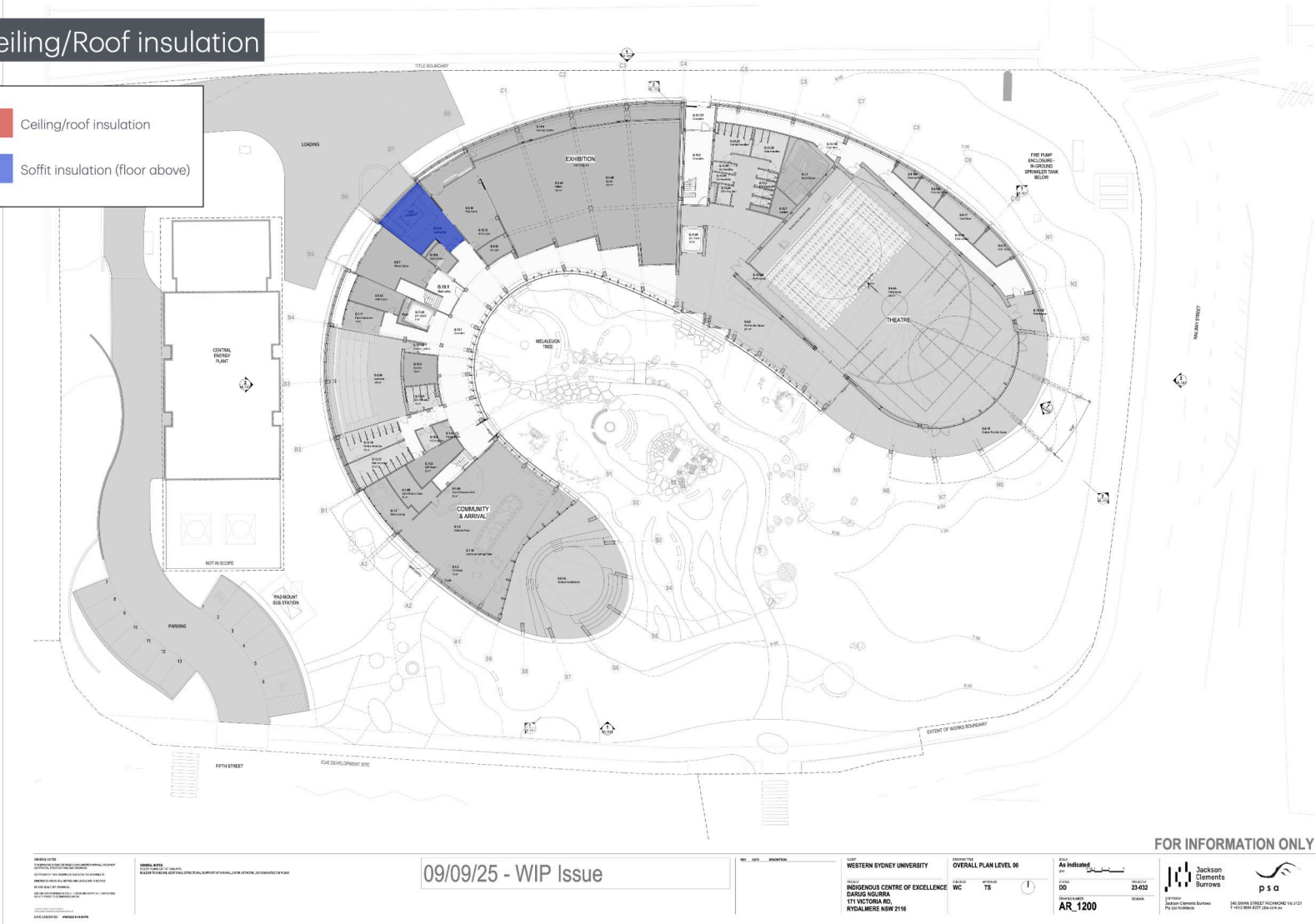
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T +61 2 9661 4337 FAX 000 000 000



L-00 Ceiling/Roof insulation

Ceiling/roof insulation

Soffit insulation (floor above)



L-01 Wall insulation

External walls

Internal walls to unconditioned space



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246 DOWNS STREET ROCKWOD NSW 1511
T 61 2 9554 5227 jcb.com.au

psa

L-02 Wall insulation

External walls

Internal walls to unconditioned space



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L-02 Floor

Insulation to floor



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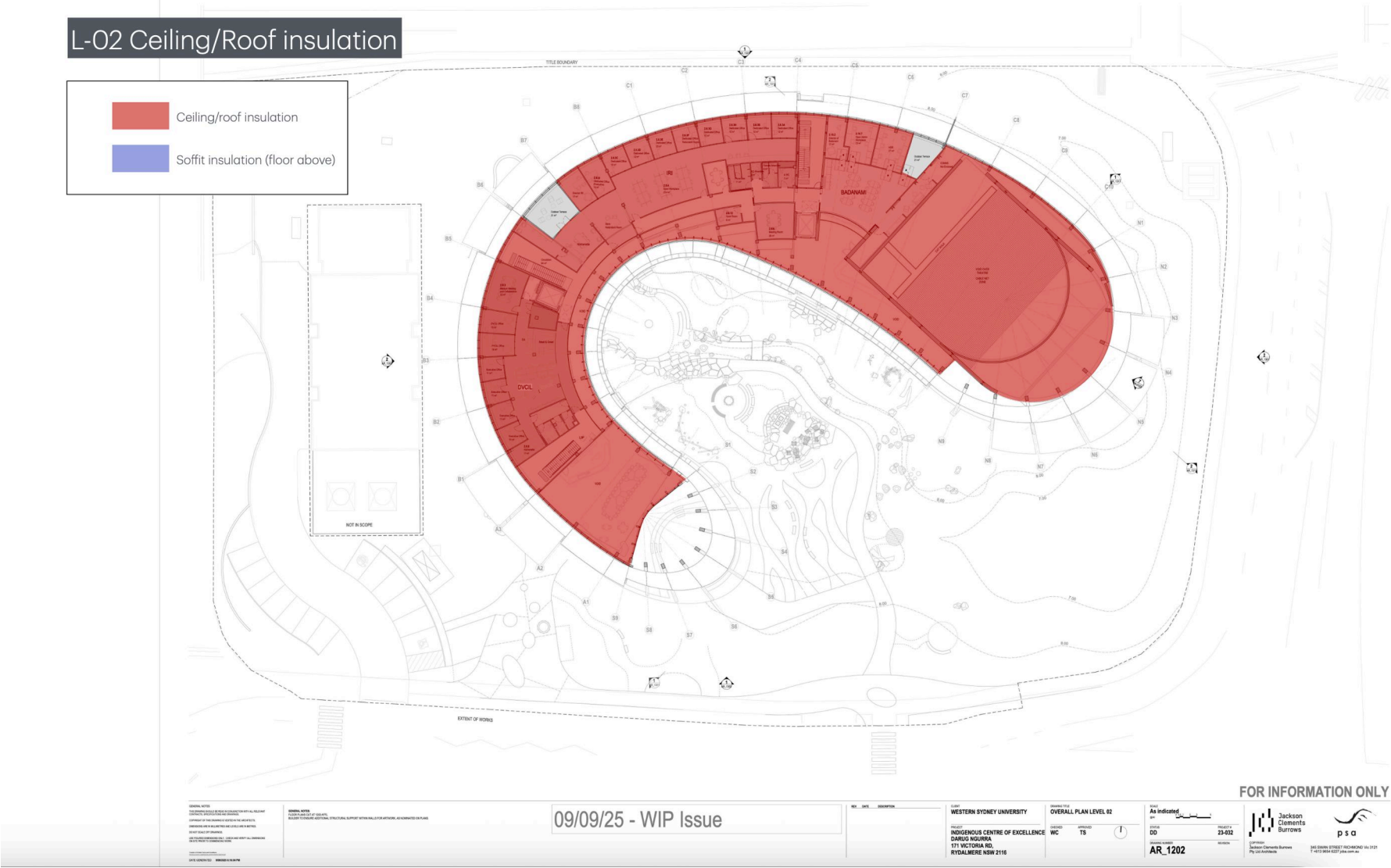
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Pty Ltd (Incorporated)

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Appendix B - Green Star Pathway

This section outlines the initial pathway to achieving a 5-star or 6-star Green Star Building certification.

The pathway will evolve as the design progresses, and delivery risks can be isolated and assigned.

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
Responsible	1	Industry development	1	1	0	Credit Achievement	- Green Star Accredited Professional; - Financial transparency; and - Marketing sustainability achievements	Low		Flux	Western
	2	Responsible Construction	Nil	Nil	0	Minimum Expectation	- Builder has EMS in place; - 80% C+D water diverted from landfill; and - Head contractor provides training on targets	Low		Builder	JCB/PSA
			1	1	0	Credit Achievement	- 90% of C+D waste is diverted from landfill, and contractor's facilities comply	Low		Builder	JCB/PSA
	3	Verification and Handover	Nil	Nil	0	Minimum Expectation	- Metering and monitoring ; - Commissioning + tuning (+ air tightness testing), and - Building information	Low		SV	Builder
			1	0	0	Credit Achievement	- A soft landings approach, that involves the facilities management team; and - ICA in the commissioning and tuning process		Medium	Western	SV
	4	Responsible Resource Management	Nil	Nil	0	Minimum Expectation	- Separating waste streams; - Dedicated waste storage area; and - Easy and safe access to waste storage areas	Low		JCB/PSA	Elephants Foot consulting
	5	Responsible Procurement	1	0	0	Credit Achievement	- The building's design and construction procurement process follows ISO 20400 and at least one identified supply chain risk and opportunity is addressed	High		Builder	-

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
	6	Responsible Structure	3	0	0	Credit Achievement	- 50% of all structural components (by cost) meet a RPV score of at least 10.	Low	High	TTW	Builder
			2	0	0	Exceptional Performance	In addition to credit achievement: - 10% meet a RPV score of at least 15, or - 80% meet a RPV score of at least 10	Medium	High	-	-
	7	Responsible Envelope	2	0	0	Credit Achievement	- 30% of all building envelope components (by cost) meet a RPV score of at least 10.	Low	High	TTW	Builder
			2	0	0	Exceptional Performance	In addition to credit achievement: - 10% meet a RPV score of at least 15, or - 60% meet a RPV score of at least 10	Medium	High	-	-
	8	Responsible Systems	1	0	0	Credit Achievement	- 20% of all building systems components (by cost) meet a RPV score of at least 6.	High	High	SV	-
			1	0	0	Exceptional Performance	In addition to credit achievement: - 5% meet a RPV score of at least 11, or - 35% meet a RPV score of at least 6	High	High	-	-
	9	Responsible Finishes	1	0	0	Credit Achievement	- 40% of all internal building finishes (by cost) meet a RPV score of at least 7.	Low	High	JCB/PSA	Builder
			1	0	0	Exceptional Performance	In addition to credit achievement: - 10% meet a RPV score of at least 12, or - 60% meet a RPV score of at least 7.	Medium	High	-	-

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
				2	0						
Healthy	10	Clean Air	Nil	Nil	0	Minimum Expectation	- Ventilation system attributes; and - Provision of outdoor air (+50%); and - Exhaust or elimination of pollutants.			SV	-
			2	0	0	Credit Achievement	- Ventilation Systems Attributes; and - Provision of outdoor Air (+100%)	Medium		-	-
	11	Light Quality	Nil	Nil	0	Minimum Expectation	- Lighting Comfort; and - Glare from Light Sources; and - Daylight			SV	-
			2	2	0	Credit Achievement	- Artificial Lighting; or - Daylight	Medium	Low	Flux	-
			2	0	0	Exceptional Performance	- Artificial Lighting; and - Daylight	High	High	-	-
	12	Acoustic Comfort	Nil	Nil	0	Minimum Expectation	- An Acoustic Comfort Strategy is prepared to describe how the building and acoustic design aims to deliver acoustic comfort to the building occupants.	Medium	Low	TBD	-
			2	0	0	Credit Achievement	3 or 4 (depending on building use type) of the following: - Maximum Internal Noise Levels - Minimum Internal Noise Levels - Acoustic Separation - Impact Noise Transfer - Reverberation Control	High		-	-

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
	13	Exposure to Toxins	Nil	Nil	0	Minimum Expectation	- Paints adhesives, sealants, and carpets are low in TVOC; and - Engineered wood products are low in TVOC; and - Occupants are not exposed to banned or highly toxic materials.	Medium	Medium	JCB/PSA	TTW
			2	2	0	Credit Achievement	- On-site tests verify that the building has low TVOC (0.29 ppm) and formaldehyde (0.02 ppm) levels	Medium	Low	Builder	-
	14	Amenity and Comfort	2	2	0	Credit Achievement	- The building has dedicated amenity rooms to act as a parent room, relaxation room, or an exercise room.			JCB/PSA	-
	15	Connection to Nature	1	1	0	Credit Achievement	- The building provides views; and either of - The building includes indoor plants and incorporates nature-inspired design; or - 5% of the building's floor area or site area is allocated to nature in which occupants can directly engage with			JILA	JCB/PSA

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
			1	0	0	Exceptional Performance	- The building provides views; and - The building includes indoor plants and incorporates nature-inspired design; and - 5% of the building's floor area or site area is allocated to nature in which occupants can directly engage with	Medium	Medium	-	-
				7	0						
Resilient	16	Climate Change Resilience	Nil	Nil	0	Minimum Expectation	- Climate Change Pre-screening Checklist			Flux	-
			1	1	0	Credit Achievement	- Climate Change Risk and Adaptation Assessment; and - Extreme and high risks are addressed		Low	Flux	-
	17	Operations Resilience	2	0	0	Credit Achievement	- Undertake a comprehensive review of the acute shocks and chronic stresses. - Design and operations address any high or extreme system-level interdependency risks. - The building's design maintains a level of survivability and design purpose in a blackout.		Low	SV	Flux
	18	Community Resilience	1	1	0	Credit Achievement	- Undertake a needs analysis of the community that identifies shocks and stresses that impact the building's ability to service the community and develops responses to manage these.		Low	JCB/PSA	-

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
	19	Heat Resilience	1	1	0	Credit Achievement	- At least 75% of the whole site area comprises of one or a combination of strategies that reduce the heat island effect.			JCB/PSA	Flux
	20	Grid Resilience	3	0	0	Credit Achievement	- Provide active generation and storage systems; and/or - Infrastructure to deliver an appropriate demand response strategy; and/or - The building has reduced its electricity consumption through passive design (no A/C for 80% of area).	Medium	Medium	SV	Flux
				3	0						
Positive	21	Upfront Carbon Emissions	Nil	Nil	0	Minimum Expectation	- Reducing Upfront Carbon Emissions (10% less than reference building)	Low	Low	TTW	JCB/PSA
			3	3	0	Minimum Expectation Climate Positive Pathway (Credit Achievement)	- Reducing Upfront Carbon Emissions (20% less than reference building) - Offsetting Demolition Works	Low	Medium	Builder	TTW
			3	0	0	Exceptional Performance	- Reducing Upfront Carbon Emissions (40% less than reference building) - Offsetting Demolition Works	Low	High	-	-

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
	22	Energy Use	Nil	Nil	0	Minimum Expectation	- The building's energy use is at least 10% less than a reference building.			SV	Flux
			3	3	0	Minimum Expectation Climate Positive Pathway (Credit Achievement)	- The buildings energy use is at least 20% less than a reference building	Low	Low	Flux	SV
			3	0	0	Exceptional Performance	- The building's energy use is at least 30% less than a reference building.	Medium	Medium	Flux	SV
	23	Energy Source	Nil	Nil	0	Minimum Expectation	- Zero Carbon Action Plan			SV	Western
			3	3	0	Minimum Expectation Climate Positive Pathway (Credit Achievement)	- 100% Renewable Electricity (5 year agreement)			Western	-
			3	3	0	Minimum Expectation Climate Positive Pathway (Exceptional Performance)	- 100% Renewable Energy (all-electric building)			Western	-
	24	Other Carbon Emissions	2	2	0	Minimum Expectation Climate Positive Pathway (Credit Achievement)	- The building owner eliminates emissions from refrigerants; or - The building owner offsets emissions from refrigerants	Medium	Medium	SV	Western

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
			2	0	0	Exceptional Performance	- All other emissions not captured in the Positive Pathway category are eliminated or offset.	High		-	-
	25	Water Use	Nil	Nil	0	Minimum Expectation	- The building installs efficient water fixtures; or - The building uses 15% less potable water compared to a reference building.			SV	-
			3	3	0	Credit Achievement	- Reducing Water Use (45% less the reference); and - Recycled Water Infrastructure (where council or authority has plans)	Low	Low	SV	JILA
			3	0	0	Exceptional Performance	- Reducing Water Use (75% less the reference); and - Recycled Water Infrastructure (where council or authority gas plans)	High	Medium	-	-
	26	Life Cycle Impacts	2	2	0	Credit Achievement	- The project demonstrates a 30% reduction in life cycle impacts when compared to standard practice.	Low	Low	Flux	JCB/PSA
				19	0						
Places	27	Movement and Place	Nil	Nil	0	Minimum Expectation	- The building includes showers and changing facilities for building occupants - The facilities are accessible, inclusive, and located in a safe and protected space			JCB/PSA	-

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
			3	1	0	Credit Achievement	- The building's access prioritises cycling and includes bicycle parking facilities; and - Sustainable Transport Plan; and - The building has EV charging capabilities; and - Transport options that reduce the need for private fossil fuel powered vehicles are prioritised; and - The building's design and location encourage walking	Medium	Low	JCB/PSA	SV
	28	Enjoyable Places	2	2	0	Credit Achievement	- The building delivers memorable, beautiful, vibrant communal or public places where people want to gather and participate in the community; and - The spaces are inclusive, safe, flexible, and enjoyable.			JCB/PSA	JILA
	29	Contribution to Place	2	2	0	Credit Achievement	- The building's design contributes to the livability of the wider urban context and enhances the public realm; or - Independent reviews are held during the development of the design.			JCB/PSA	JILA
	30	Culture, Heritage and Identity	1	1	0	Credit Achievement	- The building's design reflects and celebrates local demographics and identities, the history of the place, and any hidden or minority entities; or - This outcome was arrived through meaningful engagement with community groups early in the design process.			JCB/PSA	-

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
				6	0						
People	31	Inclusive Construction Practice	Nil	Nil	0	Minimum Expectation	- On-site Facilities, Policies, and Training			Builder	-
			1	1	0	Credit Achievement	- Policies and programs implemented are relevant to construction workers on site. - The head contractor provides high quality staff support on-site to reduce at least five key physical and mental health impacts. - The effectiveness of the interventions is evaluated.			Builder	-
	32	Indigenous Inclusion	2	2	0	Credit Achievement	- The project team plays an active role in the organisational Reconciliation Action, or; - The building's design and construction incorporates design elements using the - Indigenous design and planning strategies and principles.			JCB/PSA	Western
	33	Procurement and Workforce Inclusion	2	0	0	Credit Achievement	- The project implements a social procurement plan. - At least 2% of the building's total contract value has been directed to generate employment opportunities for disadvantaged and under-represented groups.	Medium		Builder	-
			1	0	0	Exceptional Performance	- The project implements a social procurement plan. - At least 4% of the building's total contract value has been directed to generate employment opportunities for disadvantaged and under-represented groups.	High		Builder	-
	34	Design for Inclusion	2	2	0	Credit Achievement	- The building is designed and constructed to be inclusive to a diverse range of people with different needs.			JCB/PSA	Western
			1	0	0	Exceptional Performance	- Engagement with target groups has informed the inclusive design.			JCB/PSA	Western

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
				5	0						
Nature	35	Impacts to Nature	Nil	Nil	0	Minimum Expectation	- The building was not built on or significantly impacted a site with a high ecological value. - The building's light pollution has been minimised. - There is ongoing monitoring, reporting, and management of the site's wetland ecosystem.			JILA	SV
			2	2	0	Credit Achievement	- The building's design and construction conserves existing natural soil, hydrological flows, and vegetation elements; and - If deemed necessary by an Ecologist, at least 50% of existing site with high biodiversity value is retained			JILA	-
	36	Biodiversity Enhancement	2	2	0	Credit Achievement	- Site includes 15% landscape area; and - The landscaping includes a diversity of species and prioritises the use of climate-resilient and indigenous plants; and - Site-specific Biodiversity Management Plan provided to the building owner or building owner representative.		Low	JILA	-
			2	2	0	Exceptional Performance	- 30% area of landscaping is provided; and - The landscaping includes critically endangered and/or endangered plant species	Low		JILA	-
	37	Nature Connectivity	2	2	0	Credit Achievement	- The site must be built to encourage species connectivity through the site, and to adjacent sites. If the project sits within a blue or green grid strategy it must contribute to the goals of the strategy.	Low		JILA	-

Category	Credit		Available Points	Targeted Points	TBC points	Credit Criteria	Requirements	Risk (feasibility)	Risk (cost)	Primary Responsible	Other Responsible
	38	Nature Stewardship	2	0	0	Credit Achievement	- Areas of restoration or protection are provided; and - Restoration or protection activities are beyond the development's boundary; and - The building owner, through the project undertakes activities that protect or restore biodiversity at scale; and - These actions occur beyond legislated requirements.	Low	Medium	Western	-
	39	Waterway Protection	2	2	0	Credit Achievement	- The project demonstrates a reduction in average annual stormwater discharge of 40% across the whole site; and - Specified pollution reduction targets are met.	Low		JILA	SV
			2	0	0	Exceptional Performance	- The project demonstrates a reduction in average annual stormwater discharge of 80% across the whole site; and - Higher specified pollution reduction targets are met.	High	Medium	JILA	SV
				10	0						
Leadership	40	Market Transformation	0	0	0					-	-
	41	Leadership Challenge	0	0	0					-	-
		Total	100	52	0						