ESD Report

211180 STATION ROAD
DATA CENTRE EXPANSION

Revision:
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REPORT INFORMATION

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Client	
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REVISION SCHEDULE

Revision	Date	Issue Name	Author	Authorised
A	31/01/2022	Draft 1	AN	MW
B	01/02/2022	Update following comments	AN	MW
C	04/03/2022	Update following comments	AN	MW
D	23/03/2022	Issue for DA	AN	MW
E	13/05/2022	Response to DPE comments	AN	MW

CONTENTS

Executive Summary

Lehr Consultants International is the applicant for the proposed Station Road Data Centre Expansion at 57 Station Road, Seven Hills, NSW.

The proposal is State Significant Development (SSD) for the purposes of the Environmental Planning and Assessment Act 1979 (EP&A Act) and clause 14(a) of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011 (SEPP SRD) as it involves development with a capital investment value in excess of $30 million.

The Data Centre Expansion seeks to deliver significantly enhanced data centre services, including the accommodation, support and maintenance of large-scale centralised IT equipment. It is an expansion of a smaller data centre located at the front of the site, due for completion in early 2023.

The proposed expansion will be located to the back of the site, to the north away from Station Road.

The SEARs was issued by the Department of Planning, Industry and Environment on 23rd December 2021.

In preparing this report, the following SEARs General Requirements, Key Issues, and Agency's Advice letters have been addressed. The table below sets out the reference or location of these matters within this report.

General Requirement or Key Issue or Agency Advice	Reference / Location within this report
Identify how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation) would be incorporated in the design and ongoing operation phases of the development.	Details of how best practice ESD principles, as defined by Part 7(4) Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (reproduced in Clause 193 of the 2022 revision of the Regulation), will be incorporated in the design and ongoing operation phases of the development. See **Section 2.1**.
Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environment performance standards.	Details of how the proposed development will meet or exceed relevant industry recognised building sustainability and environment performance standards can be found in **Section 2.2**.
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.	Details of how the proposed development minimises greenhouse gas emissions and consumption of energy, water (including water sensitive urban design) and material resources can be found in **Section 2.3**. Estimates of the impacts of these on greenhouse gas emissions, energy and water consumption are provided in **Section 2.4.**

This report also details the ecologically sustainable design features considered by the proposed development, and how requirements for sustainable building standards will be addressed by the proposed development.

The impacts of these sustainability strategies on greenhouse gas emissions, energy and water consumption are also estimated. These are summarised below.

Resource	Annual Quantity by Proposed Building	Percentage Reduction
Energy	124.65 GWh	72% (100% incl. Green Power)
Water	128.4 kL	77%
Greenhouse Gas Emissions	114.88 kilotonnes $CO_{2\text{-}e}$ (Scope 2)	72% (100% incl. Green Power)

1 Introduction

1.1 Purpose

This ESD SEARs report has been prepared on behalf of Lehr Consultants International (Australia) Pty Ltd (LCI) in support of a State Significant Development Application (SSDA) submitted to the Department of Planning and Environment (DPE) under Part 4 of the *Environmental Planning and Assessment Act 1979 (EP&A Act 1979)*.

LCI is seeking to secure approval for the construction of a new data storage centre development on the site known as 57 Station Road, Seven Hills, located within the Blacktown City Council local government area (LGA). The proposed development will comprise the erection of a new two-storey data centre at the rear of the site, associated plant and equipment, car parking areas, landscaping, and civil works.

This report responds to the Industry Specific Secretary's Environmental Assessment Requirements (SEARs) issued by DPE on 23 December 2021. An outline of the SEARs relevant to ESD, and how they have been responded to, is summarised in the table below.

Issue and Assessment Requirements	Documentation	Response
8. Ecologically Sustainable Development (ESD) • *Identify how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation) would be incorporated in the design and ongoing operation phases of the development.* • *Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environment performance standards.* • *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.*	nil	• Details of how best practice ESD principles, as defined by Part 7(4) Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (reproduced in Clause 193 of the 2022 revision of the Regulation), will be incorporated in the design and ongoing operation phases of the development. See **Section 2.1**. • Details of how the proposed development will meet or exceed relevant industry recognised building sustainability and environment performance standards can be found in **Section 2.2**. • Details of how the proposed development minimises greenhouse gas emissions and consumption of energy, water (including water sensitive urban design) and material resources can be found in **Section 2.3**. Estimates of the impacts of these on greenhouse gas emissions, energy and water consumption are provided in **Section 2.4.**

1.2 Site Location

The site is within the Blacktown local government area (LGA), however is on the boundary of the Parramatta LGA also. The site is in the Seven Hills Industrial Area, approximately 3.8km east of the Blacktown CBD and 6.8km west of the Parramatta CBD, and approximately halfway between Toongabbie and Seven Hills railway stations.

Figure 1: Site Location. Source: Google Maps

1.3 Site Description

The site is located on land known as 57 Station Road, Seven Hills, described legally as Lot B / DP 404669. The site is rectangular in shape with an area of 2.57ha and a northeast-southwest orientation. It is a corner lot with a frontage of around 111m to Station Road to the southwest, and 242m to McCoy Street road reserve to the southeast. The majority of the McCoy Street road reserve is unformed, with a formed 80m long driveway providing access to the adjoining McCoy Park.

The site is currently occupied by a range of buildings and structures associated with the previous industrial uses. An HV transmission tower is also located on the Site in the south, at the corner of Station Road and McCoy Street. Vehicular access is provided via three separate crossings along Station Road.

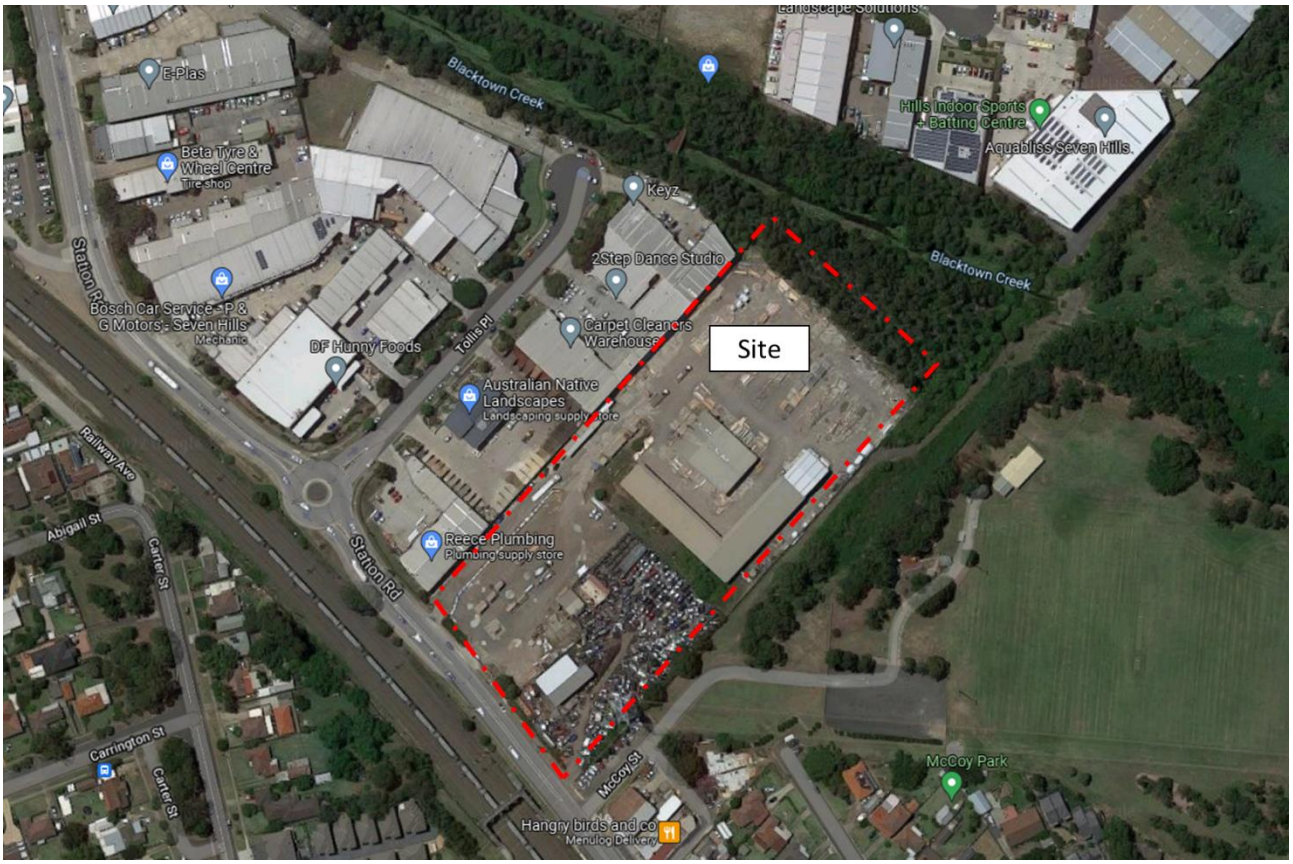


Figure 2: Existing Site and Immediate Surroundings. Source: Google Maps

1.3.1 Overview of Approved Development

The Site is subject to an existing development approval, issued by Blacktown City Council under DA-21-01058 on 10 January 2022. The development consent permits:

> *Removal of trees, bulk earthworks, stormwater drainage works and construction of a single storey data centre to operate 24 hours a day 7 days a week with ancillary offices, on-site parking and associated landscaping.*

The existing approval permits tree removal, bulk earthworks, and drainage works across the entirety of the site, with the construction of a data centre on approximately the front third as depicted in the figure below. The balance of the site is the location of the proposed SSDA, excluding bulk earthworks.

Figure 3: Site Plan for approved data centre on Site, under DA-21-01058. Source: DEM architects

1.4 Overview of Proposed Development

The SSDA seeks approval for the construction and use of a new data storage premises at the rear of the site. The particulars of the Proposal are as follows:

- Construction of a new two-storey 19.2MW data centre at the rear of the Site including ancillary office space
- A total floor area of approximately 8,076 m^2
- Provision of external plant in plant yards to the west, north and south of the proposed data hall, as well as rooftop plant, which will be screened
- Provision of 9 generators, for a site total of 12 generators
- Capacity for up to 289,000L of diesel fuel storage
- Operation to take place 24 hours a day, 7 days a week
- New vehicular circulation to provide access to Station Road, connecting into new driveways already approved under DA-21-01058
- Parking for 31 vehicles

- Landscaping works.

Images of the Proposal are provided below.

Figure 4: Render of proposed development. Source: DEM architects

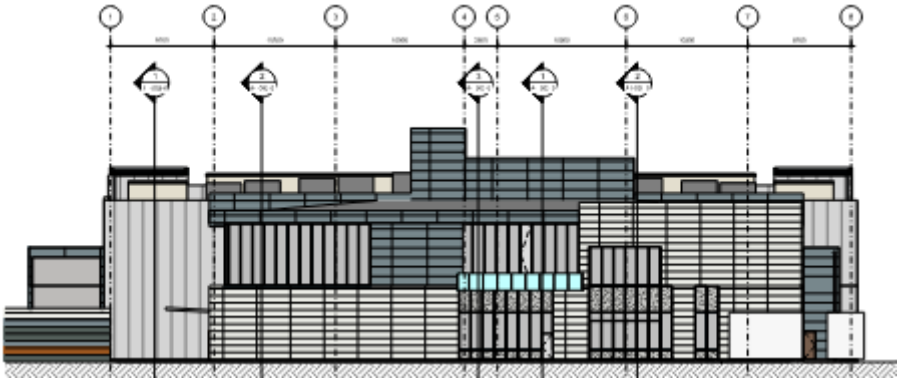


Figure 5: South elevation of proposed development. Source: DEM architects

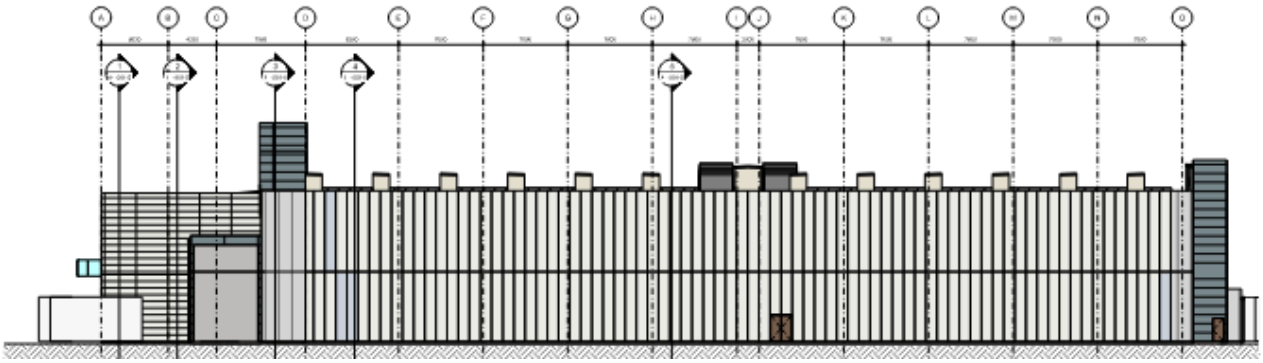


Figure 6: East elevation of proposed development. Source: DEM architects

Figure 7: North elevation of proposed development. Source: DEM architects

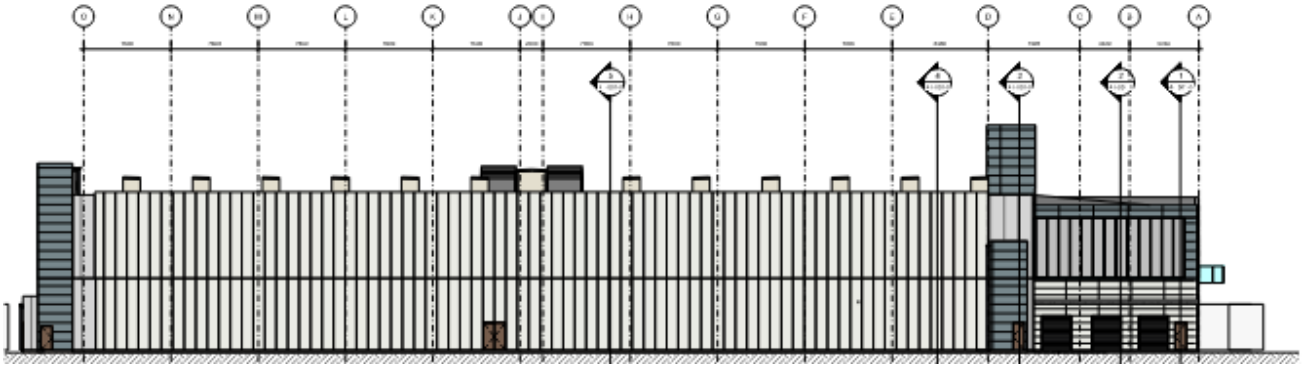


Figure 8: West elevation of proposed development. Source: DEM architects

1.5 Site Climate

The site is located in a humid subtropical climate, characterised by its long hot summers and cool short winters with cold nights, with maximum annual temperatures averaging 28.4°C and minimum annual temperatures averaging 4.5°C. Based on the BOM weather data for Penrith, the annual precipitation is just over 900mm, as shown in Figure 9.

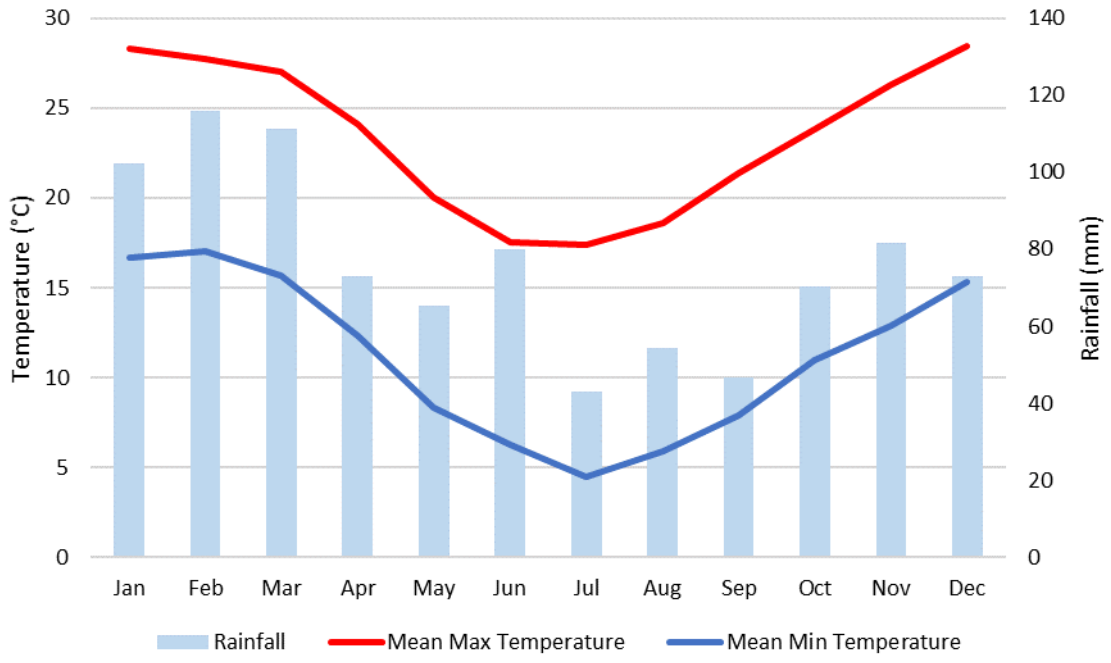


Figure 9: Seven Hills Climate

2 Assessment Requirements and Project Responses

2.1 SEAR 8 | Ecologically Sustainable Development (ESD)

The ESD principles that are to be incorporated into the proposed development must be aligned with Clause 7(4) – Schedule 2 – Environmental Planning & Assessment Regulation (2000). These principles are defined and reproduced in Clause 193 of the 2022 revision of the Regulation.

2.1.1 The Precautionary Principle

Namely, 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. In the application of 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

The proposed development is situated on a previously developed site. The development site is currently used for industrial purposes, including a timber warehouse, a car junkyard and container storage. These will be demolished as part of the enabling works for the data centre expansion. Blacktown Creek is situated to the north of the site. The design has been carefully developed in order to prevent degradation of this waterway. The stormwater treatment system has been designed in order to prevent peak stormwater discharge into the creek from exceeding predevelopment (greenfield) conditions. Thus, the development will not have an adverse environmental impact, thereby alleviating concern of serious or irreversible environmental damage.

Proactive measures to further minimise environmental degradation will be included within the design, construction and operational phases of the proposed development. Much of these will be captured by the design and construction measures adopted to ensure the building achieves a LEED Gold rating. During the design and construction phases, the main contractor will implement an erosion and sedimentation control plan, which will prevent construction activities from increasing soil sedimentation flows into surrounding waterways. Throughout the building's operation, adherence to procedures that account for environmental risk and mitigation measures will be met.

2.1.2 Inter-Generational Equity

Namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

PROJECT RESPONSE

To uphold inter-generational equity, the proposed development minimises the consumption of energy and water resources whilst reducing waste. The ESD principles incorporated into the proposed development facilitates the conservation of energy and water resources through energy and water efficiency measures. Further, the location of the proposed building on predeveloped land removes the need for virgin natural areas to be repurposed, hence the health, diversity and productivity of the environment is maintained.

The building has been designed to achieve the DTS requirements of Section J of the National Construction Code. Furthermore, the IT equipment, which is the most energy intensive component of the proposed development, is more efficient than typical equipment used in the industry. Reduction in water use will be achieved through high WELS-rated water fixtures and fittings. Rainwater will also be collected and reused for irrigation and toilet flushing. Vegetation with low irrigation requirements will also be selected. Waste generated during the construction and operational phases will be diverted from landfill to be recycled. Operational waste streams will be separated to maximise recycling. Reducing energy, water and waste ensures that the health, diversity and productivity of the environment is maintained for the benefit of future generations.

2.1.3 Conservation of Biological Diversity and Ecological Integrity

Namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

PROJECT RESPONSE

The location of the development on previously developed land reduces the need to adopt pristine natural environment for the expansion of health services. Further, the site at design is already cleared as part of enabling works for the data centre at the front of the site, which will significantly reduce the chance that the development works will negatively impact any native flora and fauna that was present before the works. Nevertheless, the project team will take all steps to minimise impact on any native vegetation that is located on site. The probability of negative impact is low, as any native vegetation that can be found on site will likely be planted as part of earlier development works and not be part of old-growth, especially given the development state of the site.

The project's ESD principles to reduce energy, water and waste consumption will have an indirect impact to conserve biodiversity and ecological integrity to the surrounding area. By minimising demand on energy, water and material resources, the need for land-clearing and the pollution generated from utility infrastructure to support the surrounding area will be minimised.

2.1.4 Improved Valuation, Pricing and Incentive Mechanisms

Namely, 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;
(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and
(iii) *environmental goals, having been established, 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 valuation of the project's assets and services consider environmental factors through the implementation of various ESD initiatives. An erosion and sedimentation control plan will be implemented throughout the construction to control pollution, while a construction and demolition waste management plan will be implemented to establish recycling and landfill waste streams during construction. This creates a system where pollution is managed and controlled and creates an incentive to reduce pollution and waste. Environmental goals of the project are pursued in the most cost-effective way by first reducing demand via passive design measures through the design of the building form and fabric before active design measures such as more efficient building systems are considered.

2.2 Building Sustainability and Environmental Performance Standards

The issued SEARs requires the development to demonstrate that it meets or exceeds the relevant industry recognised building sustainability and environmental performance standards. This section addresses this requirement.

2.2.1 NCC 2019 Section J Requirements

The National Construction Code (NCC): Building Code of Australia (BCA) 2019 Section J Energy Efficiency sets minimum energy performance requirements for new developments (Class 3, Class 5 to 9). The objective of the code is to reduce building greenhouse gas emissions by efficiently using operational energy.

To meet the requirements of JP1 of Section J of the BCA, compliance of the design and construction of the building can be demonstrated with the Deemed-to-Satisfy (DTS) provisions of Section J Parts J1 to J8. An assessment of the proposed building has been carried out to determine the DTS requirements of its building fabric.

2.2.1.1 Building Type

Section J applies only to the conditioned and habitable areas of the building. This means that only the admin building located at the south-eastern end of the building will be subject to Section J requirements, as this is the only part of the building where the temperature is controlled within strict temperature bands related to human comfort. The data halls are excluded from Section J requirements as these are not considered habitable rooms.

The admin building comprises of office spaces for support and security, and plant rooms for auxiliary operations of the site and is thus a Class 5 building.

2.2.2 Climate Zone

The proposed development site is located in Climate Zone 6.

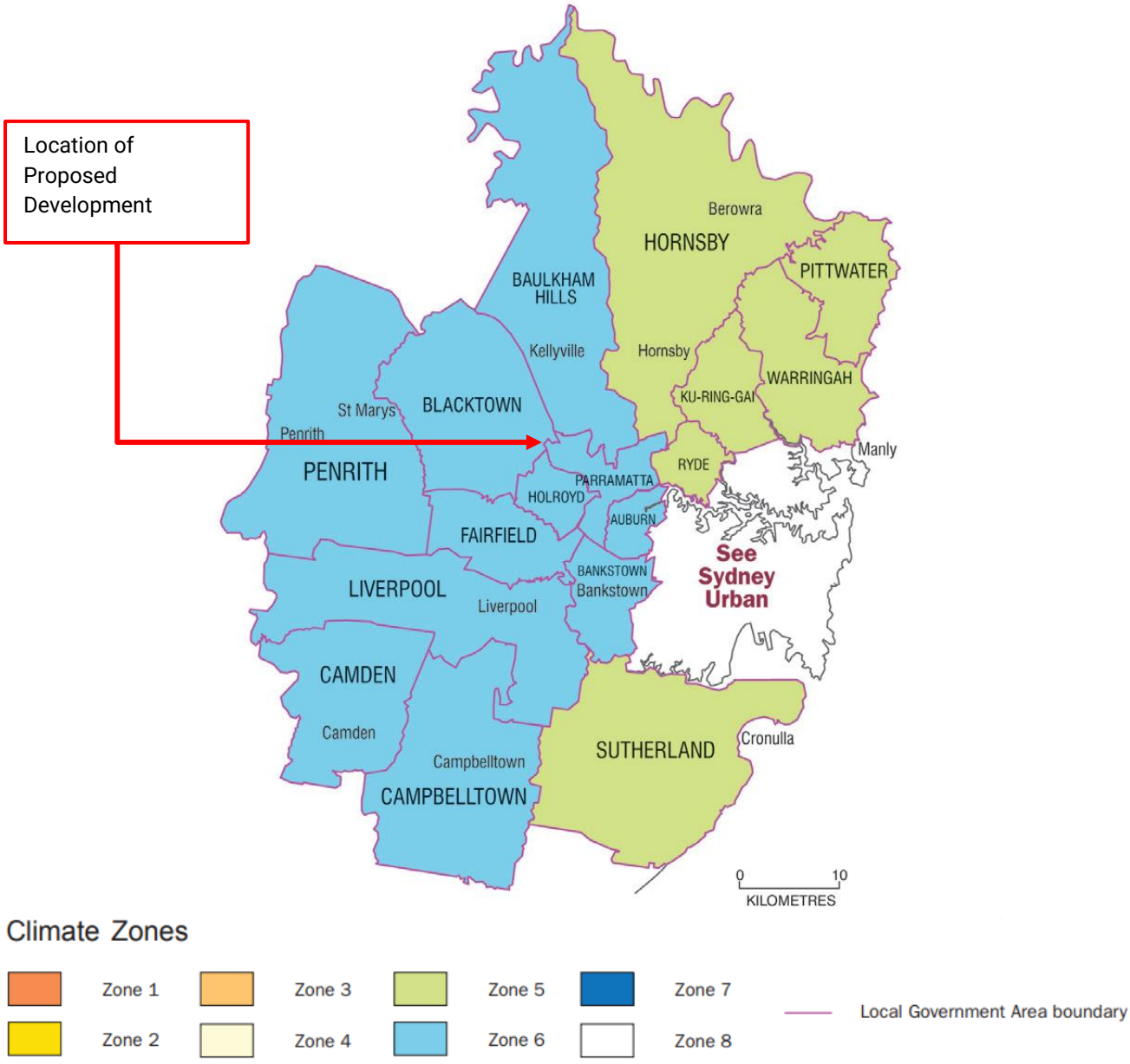


Figure 10: Climate zone of Project

2.2.2.1 Building Fabric DTS Requirements

To meet the requirements of Section J NCC 2019, the building will need to comply with the fabric requirements laid out in NCC2019 Section J Part J1. The fabric requirements are determined according to the building geometry, including the location and dimensions of windows in its thermal envelope, and the presence of shading devices for windows.

The following table details the DTS requirements for the thermal performance of various elements of the building based on the layout and external façade of the 30% DD architectural drawings. These requirements include R-values for walls, and U-values and SHGC for glazing systems. These requirements would include the effect of thermal bridging through structural members between insulation.

Building Thermal Element	Minimum Total System R-value (m^2.K/W) Required
External Envelope Walls (<20% WWR)	R1.4
External Envelope Walls (>20% WWR)	R1.0
Internal Envelope Walls	R1.4
Roofs & Ceilings*	R3.2
Floors	R2.0

* The solar absorptance of roofs must not be more than 0.45

Building Thermal Element	Maximum Total System U-value (W/m2.K) Required	Maximum Total System SHGC Required
Glazing	5.80	0.42

The development will be designed to exceed the DTS requirements listed above.

2.2.3 Leadership in Energy and Environmental Design (LEED)

Leadership in Energy and Environmental Design (LEED) is a green building rating system developed by the US Green Building Council and administered by the US Green Business Certification Inc. LEED seeks to maximise the sustainability of building construction and operation through design, with holistic consideration of a wide array of sustainability aspects that it addresses. Through LEED, building projects are encouraged to optimise the use of natural resources, including energy and water, promote regenerative and restorative strategies of the natural environment, and minimise negative environmental and human health impacts of the construction industry while at the same time providing high quality indoor environments for building occupants.

2.2.3.1 LEED Categories

LEED encourages and rewards environment-friendly design and construction through a points-based system, where points are awarded for the achievement of requirements and intents of well-defined credits, each addressing a different aspect of environmentally-sustainable design and construction. The credits themselves are separated into 8 overarching categories, as described below:

- **Integrative Process** – this category encourages sustainable design through a holistic, integrated design process whereby opportunities to achieve synergies across disciplines and building systems are identified and pursued. To maximise the benefits of this process, the process needs to commence early in the design and needs to cover both energy and water consumption.

- **Location and Transport** – this category rewards site selection that facilitates green travel options such as public transport, bicycle parking, low-emissions vehicles, electric vehicle charging and connection with essential services for the development type. The development is well-placed near essential services. Designated parking spaces for low-emissions vehicles parking and electrical vehicle charging will be provided to encourage transportation with lower emissions.

- **Sustainable Sites** – this category rewards decisions about the environment within and surrounding the site, with emphasis on the relationship between the building and surrounding ecosystems. Elements of sustainable design considered in this category include the protection and restoration of habitats, open space, stormwater management, light pollution, heat island reduction and controls put in place to reduce pollution by construction activities. The development will reduce its contribution to the heat island effect through landscaping and cool roofs, while pollution from construction activities will be minimised via a erosion and sedimentation control plan.

- **Water Efficiency** – this category rewards design that reduces water consumption by the proposed development, looking at indoor water use (taps, showers, toilets, appliances, etc), irrigation water use via selection of plants with low irrigation demand or water efficient systems, water use by cooling towers, and the provision of water meters to enable the monitoring of water consumption in order to benchmark and identify wastage. The development will reduce water consumption via highly-efficient flush and flow fixtures, rainwater reuse for flushing and irrigation and strategic water metering. Further measures considered include careful selection of plants with low irrigation demand and optimisation of water consumption by cooling towers.

- **Energy and Atmosphere** – this category addresses energy issues holistically, rewarding energy use reduction, energy-efficient design strategies, and renewable energy sources. The points in this category form the largest portion of the available points, and are awarded for enhanced commissioning processes, energy efficient design, purchase of green power, energy metering that facilitates troubleshooting and monitoring and sustainable refrigerant selection. The development will endeavour to reduce energy consumption through energy-efficient equipment and lighting, while an advanced commissioning process will be considered to ensure that the building operates as designed. Strategic energy metering that is connected to the BMCS system and cooling that avoids the use of high impact refrigerants will be targeted during procurement will be provided.

- **Materials and Resources** – this category focuses on minimising the embodied energy and other impacts associated with the extraction, processing, transport, maintenance and disposal of building materials. Strategies rewarded by this category include the reduction of construction and demolition waste, the provision of waste facilities that allow the collection and storage of recyclables, use of materials that reduce the embodied carbon of the project, use of materials with recognised sustainability credentials such as environmental product declarations and the use of sustainable materials such as recycled content. For this category, the development will minimise construction and demolition waste through the use of a construction and demolition waste management plan. Waste equipment will be provided to facilitate the collection and storage of recyclables. Procurement of products with EPDs will also be considered.

- **Indoor Environmental Quality** – this category rewards strategies that improve occupant health and comfort through building systems and connection to nature, which will in turn enhance productivity and decrease absenteeism. A wide range of strategies and environmental factors are addressed by this category, including indoor air quality, lighting quality, acoustic design, views and daylight. The project will consider the provision of outdoor air in excess of required standards to improve air quality. Pollutant sources will also be isolated and exhausted directly outside, while entryway systems will be considered to prevent pollutants from the outdoors from infiltrating the building. Indoor lighting systems will be designed to be comfortable by minimising glare, maximising colour rendering potential, while occupants will be provided with controls on lighting levels.

- **Innovation** – LEED also rewards strategies adopted by the project that goes above and beyond and are recognised as pioneering. Points are also awarded for meeting stretch thresholds in some of the credits in the other categories. Pilot credits published by USGBC can also be pursued as part of this category.

2.2.3.2 Target Rating

LEED ratings are awarded by achieving the minimum points threshold required, with LEED Certified being awarded at 40 points, LEED Silver at 50 points, LEED Gold at 60 points and LEED Platinum at 80 points.

Figure 11: LEED ratings and points thresholds

The project is committed to achieving a LEED Gold rating. This means at least 60 points will be targeted, with a minimum of 5 additional points to be targeted to act as a buffer to ensure the targeted minimum points is maintained as emerging design and construction constraints may affect compliance of some of the credits.

The project is targeting most of the points available in the energy category, including all 19 of the credit associated with energy reduction (EAc2 Optimise Energy Performance), which includes 1 point for exemplary performance. This is equivalent to a reduction of energy consumption of 54% compared to an industry-recognised baseline developed according to ASHRAE 90.1. Further, all 6 points available for renewable energy and Green Power will be targeted, owing to the commitment of the owner to procure or generate 100% of its energy consumption from renewable energy sources. A total of 31 out of 33 points for the energy credit will be targeted.

Similarly, the project is targeting most of the points available in the water category, with 10 out of the possible 11 points targeted. This includes 2 points for selecting plants that will not require irrigation beyond a 2 year establishment period and 6 points (plus one point for exemplary performance) for reducing potable water consumption for flush and flow fixtures by more than 55%. This is assisted by the collection and use of rainwater for flushing purposes.

6 points are targeted for transport-related credits, out of a potential 16. The low number of points is due to the remote location of the project and the lack of public transport and public services around the site. The project has endeavoured to make the most of the other credits, targeting measures such as location of the site on a previously-developed site surrounded by industrial and commercial lots and through the encouragement of low emissions vehicles and minimising car parking provisions.

9 out of 16 points are targeted in the indoor environmental quality category for credits associated with reducing occupant exposure to pollutants, improving their thermal comfort and lighting comfort.

A detailed scorecard has been provided in Appendix A.

2.2.4 Alignment with NABERS

NABERS (the National Australian Built Environment Rating System) is a rating system where the energy consumption of a building over a period of 12 months is rated across a benchmark. It encourages buildings to measure and monitor its energy consumption, which allows building owners to manage their energy consumption as it provides a starting point from which the owners can undertake analyses to identify any issues in the building and systems that are consuming more energy than expected, which then enables them to troubleshoot and optimise their building's energy consumption.

Buildings are awarded a Star rating on a scale from 1 to 6 Star with 6 Stars being the highest based on the energy consumed in the rating period compared to a benchmark. The rating will be valid for a period of twelve months.

The key principle that NABERS facilitates is that "what gets measured gets managed". As the proposed development is a datacentre, the energy consumption is expected to be very high compared to other building types, and any issues that would cause any system to use more energy than expected would result in significant energy increases. Thus, the building has been designed with a large number of submeters incorporated to facilitate energy analyses and diagnoses to optimise the energy consumption of the building. This allows the building operators to measure the building energy consumption and manage it, thus aligning with the key NABERS principle.

2.2.5 LEED vs NABERS as Industry Recognised Standard

As a green building certificate with a global reach, and the global nature of datacentres and the companies that own and operate them, LEED is the industry recognised standard for the certification of sustainable design of data centres. This is reflected by the large number of datacentre projects that have achieved LEED compared to NABERS. There are 105 LEED Datacentre projects on the LEED database, which doesn't include the private projects, while there are only 5 NABERS Datacentre ratings. LEED is a more stringent green building certificate as it assesses buildings with a more holistic approach to sustainability, with credits on site-related environmental issues, transport, energy, water, materials, and indoor environmental quality. By targeting a LEED rating, the development will meet the SEARs, which is to "meet or exceed the relevant industry recognised building sustainability and environmental performance standards".

2.3 Ecologically Sustainable Design Initiatives

The project is designed with a myriad of ecologically sustainable design initiatives, ranging from measures to reduce greenhouse gas emissions and consumption of energy and water to the use of sustainable materials, to minimising the impact to the surrounding environment and its occupants in its construction and operation. These can be categorised as per below.

2.3.1 Passive Cooling and Heating Design

The project is committed to energy efficient design to reduce energy consumption. This is done by prioritising passive design strategies, which reduce the demand for conditioned air to cool and heat the spaces in the building.

Continuous Roof and External Wall Insulation

Insulation obstructs the flow of heat from the exterior of the building to the interior in hot weather, while preventing the unwanted loss of heat from the interior to the exteriors in cold weather. However, the performance of insulation is reduced by structural members that is sometimes used to support the building and also the insulating material, effectively providing a path for heat to bypass the insulation and thus degrading the overall thermal performance of the building. The project will maximise the use of continuous insulation that removes this heat bypass wherever appropriate, which would enhance the insulative performance of the building envelope.

Optimised Window to Wall Ratio

Solar heat gain leads to overheating of the building, particularly for offices. Glazing area will be optimised in order to reduce the amount of sunlight penetrating into the building, which reduces the need for cooling energy and also the size of equipment to cool the building spaces.

High-performance Glazing Systems

The building will consider the use of high-performance glazing systems which will reduce energy consumption in two ways. Low U-values will reduce the amount of heat conduction through the window, including the glass and the frames, while low SHGC will reduce unwanted solar heat gain.

2.3.2 Mechanical Services

Mechanical systems are used to cool and heat the air in a building and generally constitute a large proportion of the building's energy consumption. While passive design elements in the building envelope reduce the cooling and heating required, it doesn't completely remove all of the cooling and heating demand due to the presence of internal heat sources, such as equipment, lighting and people. For a data centre, the heat generated by the IT equipment is a significant source of heat that will need to be removed by mechanical systems. The energy required to cool the building can be reduced by careful design of the mechanical systems.

Provision of High-efficiency Cooling Systems

One way to reduce energy required for cooling is via high-efficiency systems. In order to improve the efficiency of mechanical systems, the project will consider evaporative cooling, which is an efficient cooling system alternative to conventional refrigerant-based systems.

The efficiency of cooling systems will be further enhanced through elevation of the operating temperatures of the equipment. This reduces the amount of cooling required as the system needs to reduce temperatures of the treated air to a less extreme temperature.

Directly using outside air to cool the data halls will also be used as a cooling strategy. This reduces the energy consumed by cooling systems as it reduces the time it needs to operate, or for certain components of the system to operate. In this case, the cooling component will be used less as the outside air will not need to be treated further before being used to cool the building, which reduces the need for pumps, chillers and cooling towers to run. This strategy also synergises well with the elevation of indoor conditions as it increases the time during which ambient conditions fulfil operational requirements.

Building Management Control System

A Building Management Control System (BMCS) with automatic intelligent controls to control cooling equipment will be used. This allows plant efficiency to be optimised as cooling equipment are brought online only when required. A BMCS also allows equipment and their energy consumption to be monitored, facilitating troubleshooting and reducing excessive energy consumption when key components, such as sensors or equipment, fail.

2.3.3 Electrical Services

Electrical services including lighting and equipment will be designed as far as possible to reduce energy consumption or facilitate the reduction in energy consumption.

Lighting

Robust, long-life LED lighting will be used throughout the building and will constitute a majority all luminaires. This is a highly-efficient, state-of-the-art type of lighting that reduces the power demand of illuminance. The long life of LEDs also reduces the need for replacement, which further reduces waste and its associated impact on the environment.

Dimmable lighting will be provided for all regularly-occupied areas, such as offices. This allows energy consumption of lighting to be reduced. Additionally, occupants will be provided with dimming controls, which allows occupants to control the lighting in their immediate environment, enhancing their satisfaction with the indoor environment.

Building Management Control System

A BMCS will be provided that would control the building operation and enable monitoring of equipment and their energy consumption, including all IT equipment and lighting. This allows problems to be identified and handled, which optimises energy consumption.

Energy-efficient IT Equipment

The development will endeavour to use IT equipment that is energy efficient compared to standard equipment used in the data centre industry. This allows less energy to be consumed for the provision of the same services. As energy consumption for IT equipment constitutes the most significant portion of energy consumption by the site, this would have a large impact on the energy consumption by the proposed development.

2.3.4 Hydraulic Services

The project team will incorporate water efficient hydraulics services into the design.

Highly-efficient Water Fixtures and Appliances

The project will adopt high-efficient water fixtures with high WELS ratings and appliances for use, including the following:

- Showerheads: ≥3 Stars
- Toilets: ≥4 Stars
- Taps: ≥5 Stars
- Dishwashers: <13.5 L/cycle (if 8 cycles or more)

Rainwater Capture and Reuse

Rainwater harvesting and reuse will be used to reduce potable water consumption. Rainwater from roofs can be harvested for reuse in irrigation and flushing. This is consistent with Blacktown City Council requirements for rainwater reuse, and will contribute towards a LEED credit. Rainwater reuse for toilet flushing will also meet requirements for the associated LEED credit.

Low-Irrigation Demand Plant Selection

Plants with low irrigation demand will be considered to reduce water consumption for irrigation. The potential for plants that do not require irrigation beyond a 2-year establishment period will also be considered, which will contribute strongly towards a LEED credit.

Strategic Water Metering

Water metering will be provided to monitor and record the water consumption by the overall development, with further submetering for irrigation systems, water fixtures and water use for the mechanical systems. The meters will be connected to the BMCS system to enable monitoring and recording of water use data and to facilitate troubleshooting and improve water use efficiency.

2.3.5 Civil Engineering Services

Civil design will affect the impact the development will have on its surrounding environment, particularly in relation to stormwater discharge.

Stormwater Management

Stormwater discharge, particularly after heavy storms, will affect the natural environment through increased erosion of soils, through conveyance of pollution from the site to natural waterways, including rubbish, hydrocarbons and oils from vehicles, and biological nutrients such as phosphorus and nitrogen from green waste. Development will enhance this impact as pervious soil surfaces are replaced or covered by impervious hardscapes including asphalt, concrete including the building itself.

The project team will implement design strategies to minimise pollution of local waterways after storm events. This would be done through the collection of rainwater from part of the roof, and also through detention of stormwater on site in an underground on-site stormwater detention tank. The tank and its outlet will be designed to slowly release stormwater a discharge rates lower than the undeveloped greenfield condition. This tank will be designed to also manage the stormwater discharge by the neighbouring datacentre site. Treatment of the stormwater discharge will also be considered to partially remove rubbish before its discharge. Further treatment may not be necessary as the stormwater will be discharged into the catchment of the council stormwater treatment plant. The design of the stormwater system will be consistent with Blacktown City Council requirements.

2.3.6 Transport

The development will adopt strategies to encourage less fuel-demanding vehicles. This are listed below.

Low-emissions Vehicles

Priority parking will be provided for low-emissions vehicles. These would include hybrid vehicles and electric vehicles. The provision of priority parking will raise awareness on low-emissions vehicles and encourage building occupants to use them, which will enable the building to indirectly reduce the environmental impact through its occupants.

Electric Vehicle Chargers

The provision of electric vehicle chargers will be provided in order to encourage occupants to purchase and drive electric vehicles. These vehicles would reduce direct emissions by drivers. As the energy grid becomes greener as renewable energy is further adopted, the greenhouse gas emissions of electric vehicles will reduce further.

2.3.7 Sustainable Materials and Reducing Waste

The project team will take into consideration the sustainable strategies outlined below regarding materiality, waste reduction design measures, future proofing, and use of sustainable and low-carbon materials. Specification of materials or means to reduce waste will be considered and confirmed in the detailed design.

Construction and Demolition Waste Reduction

Construction and demolition waste will be reduced via the development and implementation of a construction and waste demolition waste management plan, which will divert waste from going to landfill. The C&DWMP will identify the potential waste streams and their expected quantities, collection and diversion methods for each waste stream, roles and responsibilities, and the waste haulers to be engaged. A C&D waste reduction target will be set as part one of the LEED credits available.

Environmental Product Declarations

An environment product declaration (EPD) is a standardised and world-recognised way of communicating the environmental impacts, such as such as global warming potential and energy resource depletion, of a product or system. They are linked to a product category rule that is used industry-wide in order to standardise the scope, system boundary, measurement procedures, impact measures and other technical requirements to report the EPD. Procuring products with EPDs allow construction projects to better understand the impact of their construction activities, which will enable them to reduce their impact through better procurement practices, which can involve EPDs.

The project will consider procuring products with EPDs for a portion of the products used, which may include concrete, steel, paint and insulation panels.

Life Cycle Assessment

A life cycle assessment enables the impact of the construction and operation of a building to be analysed and compared against a baseline building on key impact categories, including the following:

- global warming potential (greenhouse gas emissions)
- depletion of the stratospheric ozone layer
- acidification of land and water sources
- eutrophication
- formation of tropospheric ozone
- depletion of non-renewable energy resources

The analysis will ideally facilitate the identification of improvements in construction, procurement and operation of the building, which will lead to reductions in environmental impacts of the building.

A life cycle assessment may be conducted in order to estimate reductions in carbon emissions from material selections and structural design of the building. This will contribute towards a LEED credit.

Recyclable Collection and Storage Facilities

The development will be provided with sufficient room for the separate storage and collection of recyclables and general waste to facilitate the collection of recyclables and minimise operation waste going to landfill. This will be subject to the Operational Waste Management Plan that would be developed as part of this SSD.

Storage and collection facilities will also be provided by the project for batteries and electronic waste during operation.

2.3.8 Water-sensitive Urban Design

Water sensitive urban design (WSUD) is an approach that helps integrate water cycle management into urban planning and design. It is used to help mitigate and reduce the impacts of development on local waterways and the natural environment. A range of measures contribute towards water-sensitive urban design, and are referenced in Blacktown City Council's DCP (2015) Part J *Water Sensitive Urban Design and Integrated Water Cycle Management*. The table below summarises the WSUD measures that will be considered by the development.

Measure Referenced in Blacktown City DCP	Proposed Development Design Consideration
Water conservation measures including reduction of potable use through installation of water efficient appliances	Project will adopt highly efficient water fixtures with high WELS ratings. Please refer to **Section 2.3.4**.
Use of rainwater or reuse of stormwater or treated effluent for toilet flushing, washing machines, garden watering, car washing or for industrial purposes	Rainwater harvest and reuse for irrigation and toilet flushing will be provided. Please refer to **Section 2.3.4**.
Structural stormwater treatment measures such as gross pollutant traps, secondary filtration systems or porous paving	A gross pollutant trap will treat outflows from the OSD tank by removing 100% of gross pollutants larger than 20mm prior to entering the downstream receiving system, which is the council trunk overland drainage before it enters Blacktown Creek. Please refer to Stormwater Management Plan submitted as part of SSDA.
Vegetated stormwater treatment measures such as street tree bioretention systems, bioretention systems and wetlands	This will not be considered owing to the small natural landscape areas available.
Schemes which incorporate structural and vegetated stormwater treatment measures such as stormwater harvesting and reuse schemes	Stormwater will be detained in an underground onsite stormwater detention tank to the prescribed Blacktown Council permissible site discharge. This will be below the greenfield site discharge conditions. Please refer to Stormwater Management Plan submitted as part of SSDA.
On-site stormwater detention measures such as surface storages or tanks.	As above

2.3.9 Green Power and Energy Offsets

As part of the project's commitments to LEED, the owner of the project will consider to either install renewable energy off site or purchase Green Power to offset 100% of its electricity consumption. The associated LEED credit will also be targeted

2.4 Impact of Sustainability Measures

2.4.1 Energy Consumption and Greenhouse Gas Emissions

Based on energy modelling carried out for the LEED submission using the methodology outlined in their reference manual, the building is expected to consume roughly 124.65 GWh. On the other hand, a baseline building, which is a hypothetical building which just meets the minimum requirements outlined in the LEED reference manual and ASHRAE, would consume around 441.38 GWh. This represents a 72% reduction in energy consumption compared to the industry standard. The results of the energy simulation is summarised in Figure 12.

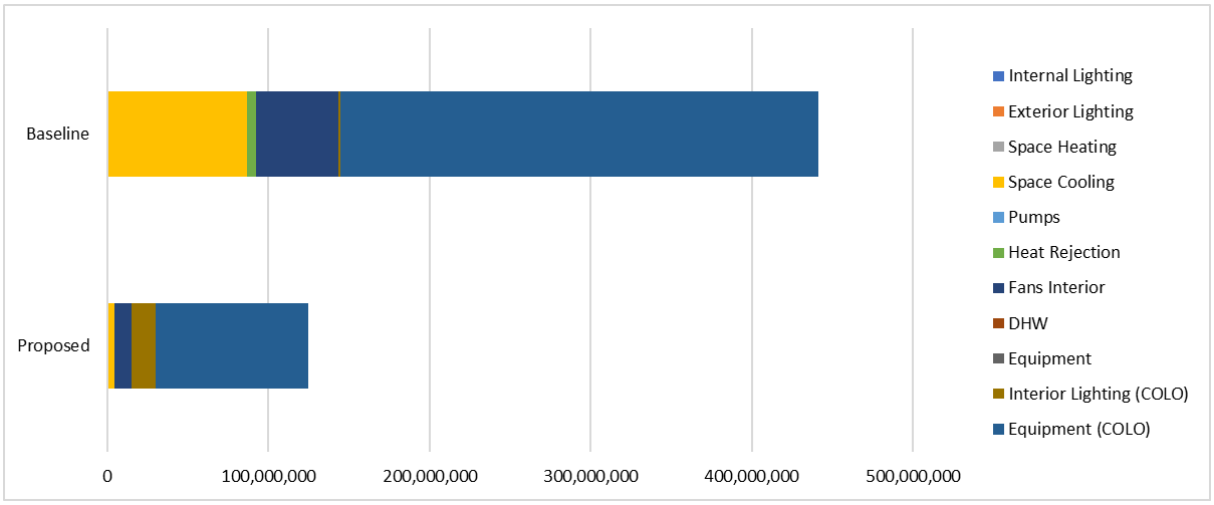


Figure 12: Energy Consumption of Proposed Building vs Baseline

Based on these results, the greenhouse gas emissions expected for the project is around 114.88 kilotonnes $CO_{2\text{-}e}$ compared to a baseline emission of 406.78 kilotonnes $CO_{2\text{-}e}$. As all systems in the building use electricity, with the exception of emergency generators, all of the emissions are Scope 2 emissions. This constitutes around 0.02% of the national greenhouse gas emissions inventory (2021 figures) and 0.08% of the NSW greenhouse gas emissions inventory (2019 figures).

Further, the project is considering to offset 100% of its electricity consumption for the next 10 years as part of its strategy to obtain a LEED Gold rating, which would mean the building will become a net zero building, which will contribute towards the NSW Government's goal of net zero emissions by 2050.

2.4.2 Water Consumption

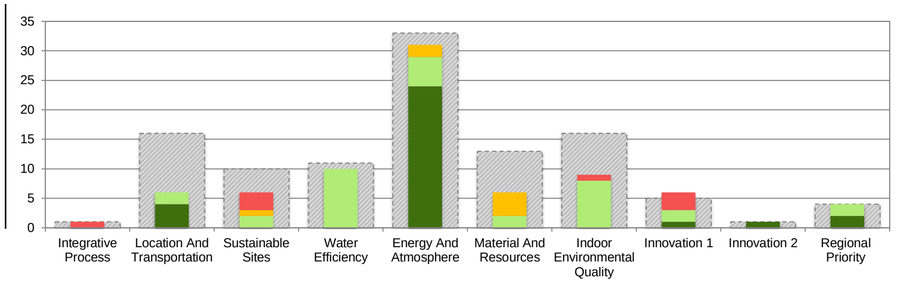
The water consumption by the proposed project with the selected flow and flush fixtures is anticipated to be 359.6 kL of water per year, which is a 36% reduction compared to a LEED baseline of 561.4 kL/year, without considering further reduction by rainwater harvest and reuse for flushing. On average, 440kL of rainwater is estimated to be collected annually, which would cover all of the flushing requirements. This would bring down the potable water consumption to 128.4 kL, which increases the reduction to 77%. No water consumption is expected for irrigation beyond a 2 year establishment period.

3 Conclusion

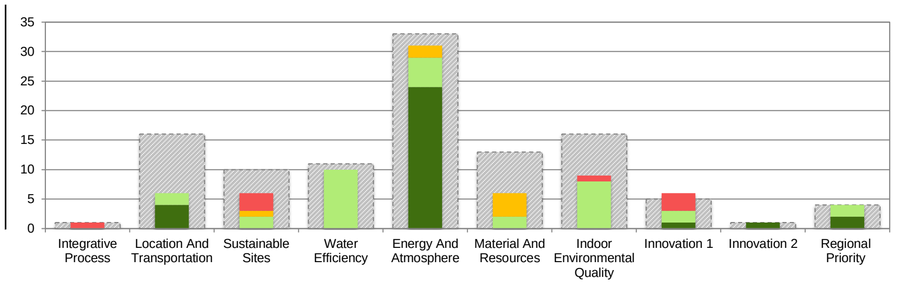
This report details responses to the Department of Planning, Industry and Environment's SEARs, identifies ecologically sustainable design features that will be considered by the proposed development, and how the proposed development utilises sustainability standards for the preparation of an Environmental Impact Statement (EIS) for the proposed development. The report demonstrates that a myriad of ESD initiatives have been incorporated within the current project design and all the policy requirements under SEAR 8.

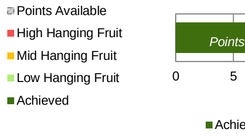
Appendix A – LEED Scorecard

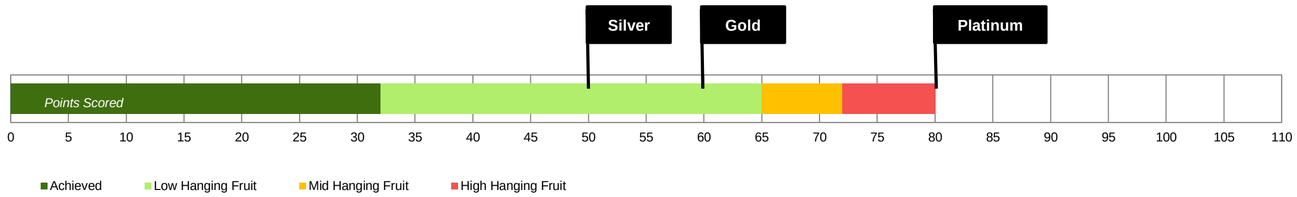
SYD08 - LEED v4 BD+C: NC Scorecard (4th March 2022)



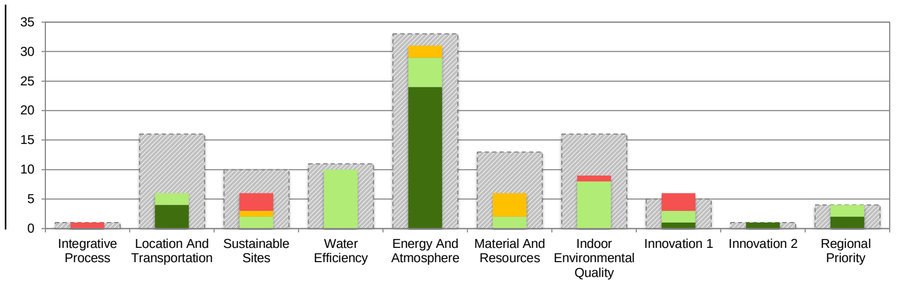
Credit	Available Points	Targeted Points	Achieved	Low Hanging Fruit	Mid Hanging Fruit	High Hanging Fruit	Cannot be Achieved	To be Assessed	Volume Credit	LEED BD+C Version	Const. Credit	Resp. Party	Credit Pathway	Requirements
INTEGRATIVE PROCESS														
IPc1: Integrative Process	1	1			0	1			Vol	v4		LCI (ESD)		- Carry out preliminary box energy modelling to inform the design on at least 2 strategies which will inform design decisions in the OPR and BOD. AND - Carry out preliminary water budget analysis of indoor water, outdoor water, process water demand and alternative supply sources.
Category Total	**1**	**1**	**0**	**0**	**0**	**1**								
LOCATION AND TRANSPORTATION														
Credit LTc1 Not Targeted	12	12	0	0	0	12								
LTc2: Sensitive Land Protection	1	1	1						Vol	-		LCI (ESD)		- Locate development footprint on previously-developed land
LTc3: High Priority Site	2	0					2		Vol	-		FDC		- Locate on a brownfeld where soil or groundwater contamination has been identifed, and where the local, state, or national authority (whichever has jurisdiction) requires its remediation. Perform remediation to the satisfaction of that authority.
LTc4: Surrounding Density and Diverse Uses	5	3	3				2		Ind.	v4.1		LCI (ESD)		- Surrounding residential density in 400m radius around site meets minimum values; OR - Locate site within 800m of a minimum number of 'diverse uses'
LTc5: Access To Quality Transit	5	0					5		Vol	-		LCI (ESD)		- Entry of site is within 400m walking distance of planned or existing bus, streetcar, informal transit, BRT, light or heavy rail, commuter rail or ferry stops servicing a minimum number of trips a day.
LTc6: Bicycle Facilities	1	0					1		Vol	-				- Entrance is 180m from a bicycle network connecting to at least 10 'diverse uses', school or employment centre, or BRT, train or ferry station; AND - Provide short-term and long-term bicycle storage
LTc7: Reduced Parking Footprint	1	1		1					Vol	v4				- Do not exceed minimum local code requirements for parking capacity; AND - Provide parking capacity 20% (or 40% if LTc4 or LTc5 is achieved) less than base ratios recommended by the Parking Consultants Council; AND - 5% of parking to be designated as preferred parking for car pooling
LTc8: Green Vehicles	1	1		1					Vol	v4		Stowe / DEM	Electric vehicle charging	- 5% of all parking to be designated as preferred parking for green vehicles (scores at least 45 on American Council for an Energy Efficient Economy annual vehicle rating guide; AND - 2% of all parking spaces to be provided with EV chargers.
Category Total	**16**	**6**	**4**	**2**	**0**	**0**	**10**							

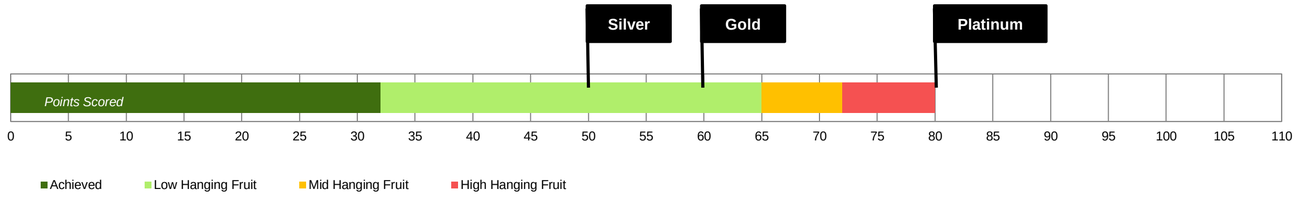




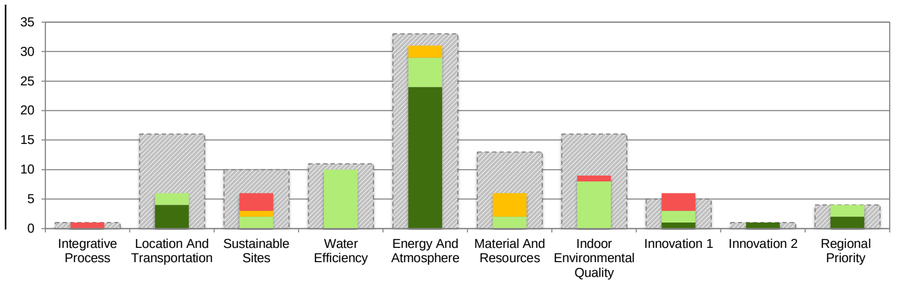


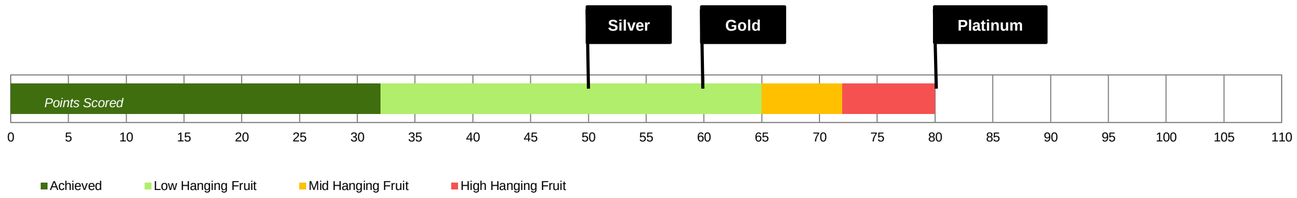
Credit	Available Points	Targeted Points	Achieved	Low Hanging Fruit	Mid Hanging Fruit	High Hanging Fruit	Cannot be Achieved	To be Assessed	Volume Credit	LEED BD+C Version	Const. Credit	Resp. Party	Credit Pathway	Requirements
SUSTAINABLE SITES														
SSp1: Construction Activity Pollution Prevention	Prerequisite							Y	Vol	v4	Y	Contractor / ACOR		- (const) Development of an erosion and sedimentation control plan for all construction actitivies.
SSc1: Site Assessment	1	1			1				Vol	v4		Various (LCI to coord. documentation)		- Conduct site assessment as per LEED template, covering topography, hydrology, climate, vegetation, soils, human use and human health effects.
SSc2: Site Development - Protect or Restore Habitat	2	0					2		Ind	-		Contractor		- Preserve and protect 40% of all greenfield areas on site from development and construction activities; AND - Restore 30% of previously-disturbed portions of site with native or adapted vegetation; AND - All disturbed or compacted soils to be revegetated need to be restored to quality of reference soils in organic matter, compaction, infiltration rates, soil biological function and soil chemical characteristics.
SSc3: Open Space	1	0					1		Ind	-				- Provide outdoor space >=30% of total site area. At least 25% of outdoor space must be vegetated (does not include lawns). Outdoor space needs to be accessible, and be pedestrian-oriented, recreation-oriented, garden space or preserved/created habitat.
SSc4: Rainwater Management	3	3				3			Ind	-		ACOR		- Runoff from 95th percentile storm to be managed using low-impact development and green infrastructure; OR - Manage on-site annual increase in runoff volume from natural landcover condition to the postdevelopment condition.
SSc5: Heat Island Reduction	2	2		2					Vol	v4		DEM		- Provide vegetation and high SRI roof and non-roof materials for a weighted area greater than building footprint and vegetation. Non-roof measures have a weighting of 2 while roof measures have a weighting of 1.3. Roof initial SRI requires to be >0.82. Paving initial SRI requires to be >0.33.
SSc6: Light Pollution Reduction	1	0					1		Vol	v4			Upward Light: Calculation Method Light Trespass: BUG Method	- Demonstrate that external luminaire uplight and trespass requirements are met using simulations or photometric methods.
Category Total	**10**	**6**	**0**	**2**	**1**	**3**	**4**							
WATER EFFICIENCY														
WEp1: Outdoor Water Use Reduction	Prerequisite								Vol	v4		LCI (Hyd)	Reduced Irrigation	- Reduce irrigation by 30% compared to baseline through plant selections. Use of bore water and rainwater cannot be used to achieve compliance. OR - Landscape does not need irrigation beyond a 2-year establishment period.
WEc1: Outdoor Water Use Reduction	2	2		2					Vol	v4		LCI (Hyd)	Reduced Irrigation	- Use plant selections or alternative water sources to reduce irrigation water demand.



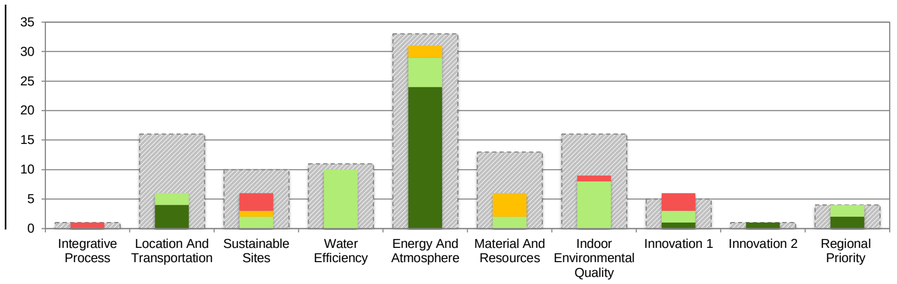


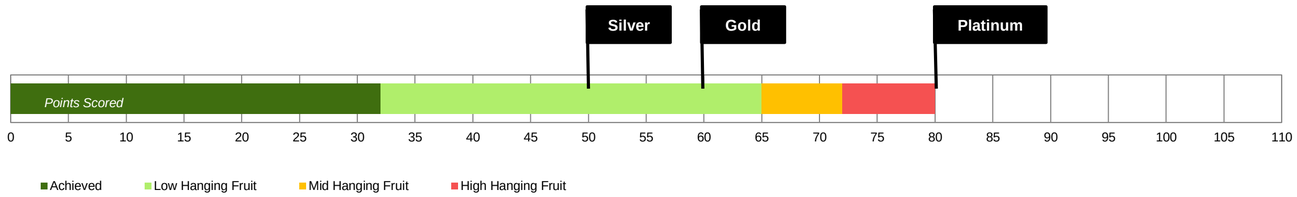
Credit	Available Points	Targeted Points	Achieved	Low Hanging Fruit	Mid Hanging Fruit	High Hanging Fruit	Cannot be Achieved	To be Assessed	Volume Credit	LEED BD+C Version	Const. Credit	Resp. Party	Credit Pathway	Requirements
WEp2: Indoor Water Use Reduction	Prerequisite								Vol	v4		LCI (ESD) / DEM		- Reduce water consumption by 20% compared to baseline. Use of low flow fixtures and rainwater reuse system. Makeup water meters for CTs, conductivity controllers, overflow alarms, drift eliminators required. Dishwasher water consumption to be less than 13.2L/cycle (if 8 settings or greater)
WEc2: Indoor Water Use Reduction	6	6		6					Vol	v4		LCI (ESD) / DEM		- Reduce indoor water use by flush and flow fittings by 25% to 55% for 1 to 7 points (1 point in exemplary performance)
WEp3: Building-level Water Metering	Prerequisite								Vol	v4		LCI (Hyd)		- Provision of water meters to measure total potable water use for entire building. - Commit to share dat with USGBC
WEc3: Cooling Tower Water Use	2	1		1				1	Ind	v4		LCI (Mech)		- Set cooling tower cycles according to water quality at site. Testing at utility connection may be required.
WEc4: Water Metering	1	1		1					Vol	v4		LCI (Hyd)	Metering of irrigation water and indoor plumbing fixtures	- Provide metering for 2 of indoor plumbing fixtures, irrigation, and/or domestic hot water.
Category Total	**11**	**10**	**0**	**10**	**0**	**0**	**0**							



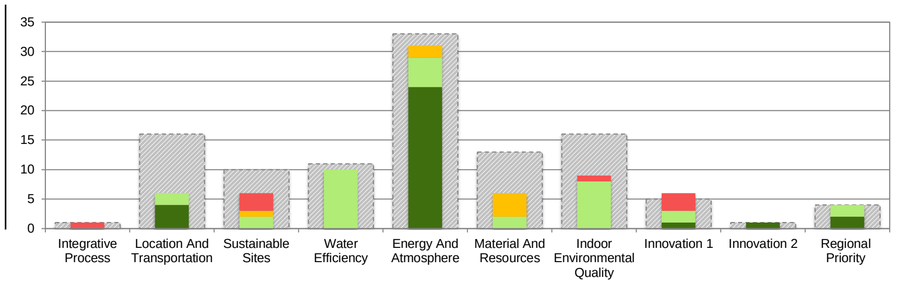


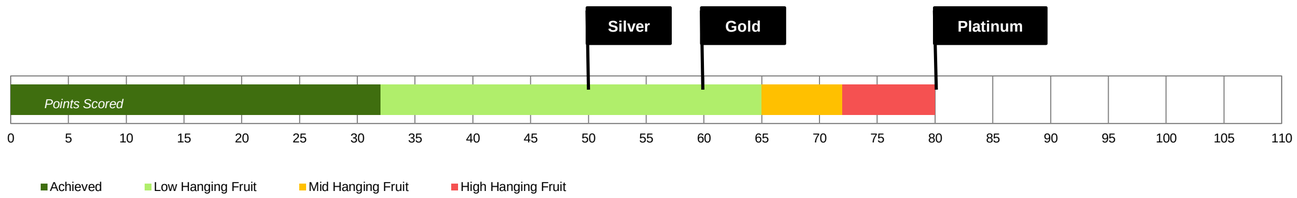
Credit	Available Points	Targeted Points	Achieved	Low Hanging Fruit	Mid Hanging Fruit	High Hanging Fruit	Cannot be Achieved	To be Assessed	Volume Credit	LEED BD+C Version	Const. Credit	Resp. Party	Credit Pathway	Requirements
ENERGY AND ATMOSPHERE														
EAp1: Fundamental Commissioning and Verification	Prerequisite							Y	Vol	v4		TBC		Complete designated commissioning activities, including: - reviewing OPR, BOD and design documents, - developing and implementing a Cx plan, - confirmation of implementation of Cx requirements into construction documents, - developing construction checklists, - developing systems test procedure, - witnessing tests, - maintain a log during commissioning, and - prepare final Cx Report.
EAp2: Minimum Energy Performance	Prerequisite							Y	Vol	v4		LCI (ESD)		- Demonstrate 5% improvement over ASHRAE 90.1-2010 baseline model
EAc2: Optimize Energy Performance	18	18	18						Vol	v4		LCI (ESD)		
EAp3: Building-level Energy Metering	Prerequisite							Y	Vol	v4		LCI (EPMS)		- Provide metering for all energy sources at the buillding level. - Commit to share data with USGBC
EAp4: Fundemental Refrigerant Management	Prerequisite							Y	Vol	v4		LCI (Mech)		- Use no CFC for refrigerants.
EAc1: Enhanced Commissioning	6	6	1	3	2				Vol	v4		TBC	Enhanced Systems Commissioning with Monitoring-based Commissioning AND Envelope Commissioning	3 points - Enhanced commissioning. - Review contractor submittals - Verify inclusion of systems manual requirements in construction documents. - Verify inclusion of operator and occupant training requirements in construction documents. - Verify systems manuals updates and delivery. - Verify operator and occupant training delivery and effectiveness. - Verify seasonal testing - Review building operations 10 months after substantial completion. - Develop On-going Cx Plan 1 point - Monitoring-based commissioning - Develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems. Include the procedures and measurement points in the commissioning plan. - Address dot points required in manual at the minimum in the plan. 2 points - Building Envelope Commissioning - Fulfil requirements of EAp1 for building's thermal envelope. - Carry out enhanced commissioning activities for building's thermal envelope.
EAc3: Advanced Energy Metering	1	1		1					Vol	v4		LCI (EPMS)		- Energy meters for all whole-building energy sources; and - Energy meters for all systems consuming more than 10% of whole building energy use. - Advanced meters have minimum requirements on data monitored, CCMS connection, data storage, interval of energy use reporting, etc
EAc4: Demand Response	2	0					2		Ind	-				- Participate in a demand response program for at least 10% of estimated peak electricity demand for minimum 1 year with intention to renew.
EAc5: Renewable Energy Production	3	3	3						Vol	v4.1		LCI (ESD)		- Generate renewable energy from on-site sources equivalent to 1%, 5% or 10% of estimated site energy consumption.
EAc6: Enhanced Refrigerant Management	1	1		1					Vol	v4		LCI (Mech)		- No refrigerants or use only refrigerants with ODP of 0 and GWP <50; OR - Select equipment with refrigerants that comply with formula in LEED manual.
EAc7: Green Power and Carbon Offsets	2	2	2						Vol	v4.1		LCI (ESD)		Purchase Green Power for 5 years for 50% or 100% of project's estimated energy consumption.
Category Total	**33**	**31**	**24**	**5**	**2**	**0**	**2**							



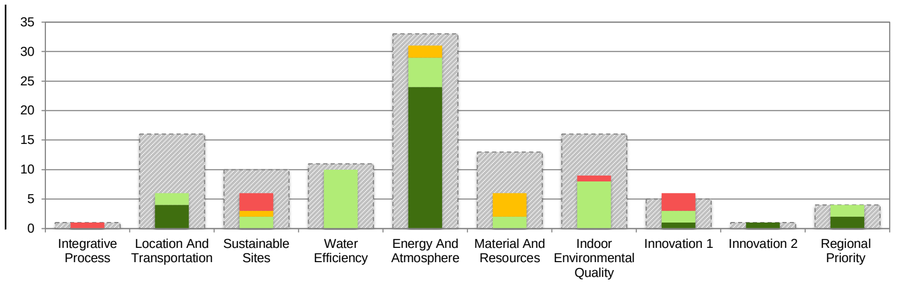


Credit	Available Points	Targeted Points	Achieved	Low Hanging Fruit	Mid Hanging Fruit	High Hanging Fruit	Cannot be Achieved	To be Assessed	Volume Credit	LEED BD+C Version	Const. Credit	Resp. Party	Credit Pathway	Requirements
MATERIAL AND RESOURCES														
MRp1: Storage and Collection of Recyclables	Prerequisite								Vol	v4		DEM		- Provide dedicated areas for collection and storage of recyclable materials. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals - Provide dedicated collection and storage area for two of batteries, mercury-containing lamps and electronic waste.
MRp2: Construction and Demolition Waste Management Planning	Prerequisite								Vol	v4	Y	Contractor		- Development of waste management plan and diversion target
MRc1: Building Life-cycle Impact Reduction	5	3			3		2		Vol	v4		LCI (ESD) / Contractor (info)	Whole-building Life Cycle Assessment	- Conduct life-cycle assessment of project's structure and enclosure demonstrating a minimum of 10% reduction in global warming potential and at least 2 of 5 impact categories compared to a baseline. The others cannot be increased by more than 5%.
MRc2: Building Product Disclosure and Optimisation - Environmental Product Declarations	2	1			1		1		Vol	v4.1	Y	Contractor	Environmental Product Declaration AND Embodied Carbon/LCA Optimisation	1 point - Use at least 20 different permanently installed products sourced from at least five different manufacturers that meet one of the environmental product disclosure & use at least 50% by cost products that demonstrate a reduction in one of 5 environmental impacts compared to industry average. AND/OR 1 point - Use products that have an embodied carbon optimisation report or action plan separate from the LCA or EPD. Reports complying with different requirements have different weightings, and need to cover at least 10% of all products by cost or at least 10 permanently-installed products from at least 3 manufacturers.
MRc3: Building Product Disclosure and Optimisation - Sourcing of Raw Materials	2	0					2		Ind	v4	Y		Raw Material Source and Extraction Reporting	- Source materials from at least 3-5 manufacturers that meet at least one of the responsible sourcing and extraction criteria, including: Extended producer responsibility, Bio-based materials, Wood products, Materials reuse, Recycled content.
MRc4: Building Product Disclosure and Optimisation - Material Ingredients	2	0					2		Ind	-	Y			- 1 point - Use at least 20 different permanently installed products from at least 5 manufacturers that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000ppm): Manufacturer Inventory, Health Product Declaration, Cradle to Cradle, Declare, ANSI/BIFMAe3, Cradle to Cradle Material Health Certificate, Product Lens Certification, Facts - NSF/ANSI 336, other USGBC-approved programs. AND/OR - 1 point - Material Ingredient Optimisation
MRc5: Construction and Demolition Waste Management	2	2		2					Vol	v4	Y	Contractor	Divert 75% and Four Material Streams	- 1 point - >50% waste diverted from landfill from three material streams; OR - 2 points - >75% waste diverted from landfill from four material streams; OR - do not generate over 12.2kg of waste per m2 of building floor area.
Category Total	**13**	**6**	**0**	**2**	**4**	**0**								

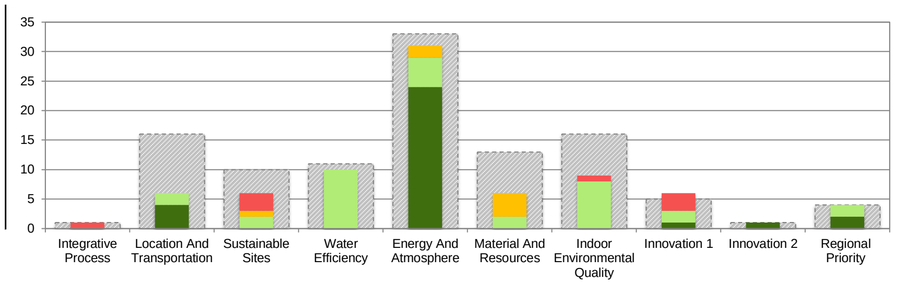


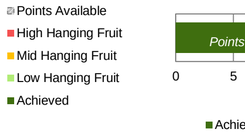


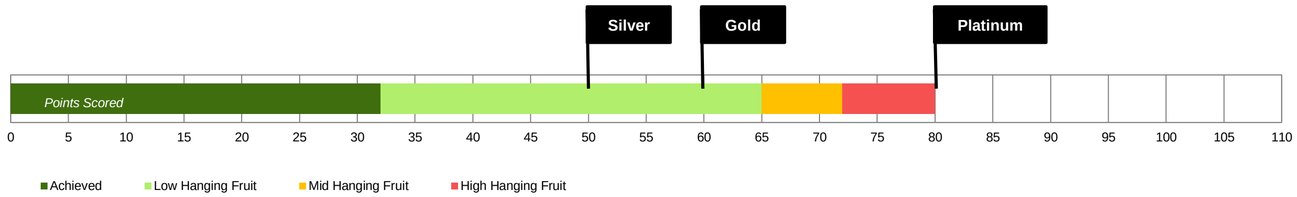
Credit	Available Points	Targeted Points	Achieved	Low Hanging Fruit	Mid Hanging Fruit	High Hanging Fruit	Cannot be Achieved	To be Assessed	Volume Credit	LEED BD+C Version	Const. Credit	Resp. Party	Credit Pathway	Requirements
INDOOR ENVIRONMENTAL QUALITY														
IEQp1: Minimum Indoor Air Quality Performance	Prerequisite							Y	Vol	v4		LCI (Mech)	Local standard	- Mechanically ventilated spaces comply with minimum ventilation requirements of ASHRAE 62.1-2010 or a local equivalent, whichever is more stringent. AND - Provide direct outdoor air measurement device capable of measuring minimum outdoor air flow. Must have an accuracy of at least 10% of minimum outdoor air rate. An alarm must be provided to indicate when the outdoor air rate deviates from the design value by 15%.
IEQp2: Environmental Tabacco Smoke Control	Prerequisite							Y	Vol	v4		DEM / MSFT	No smoking	- No smoking allowed inside building. AND - Prohibit smoking outside the building except in designated smoking areas (located at least 7.5m away from entries, air intakes and operable windows). AND - Signage must be posted within 3m of all building entrances indicating no-smoking policy.
IEQc1: Enhanced Indoor Air Quality Strategies	2	2		2					Vol	v4		LCI (Mech) / DEM	Enhanced IAQ Strategies AND Increased Ventilation	- Install permanent entry way systems to capture dirt and particulates entering the building. This can be grates/grills or rollout mats. AND - Separate exhaust systems for spaces which are likely source of pollutants (e.g. garages, cleaner rooms, copy/printer rooms). Exhaust systems to exhaust at minimum flow rates determined in IEQp1. These spaces must be provided with self-closing doors and slab to slab partitions. AND - Ventilation systems providing outdoor air must have filters that meet either MERV13 or Class F7 or higher. Air filters need to be replaced after end of construction and before occupancy. AND - Provide outdoor air supply 30% greater than minimum ventilation requirements.
IEQc2: Low-emitting Materials	3	1				1			Ind	v4.1	Y	Contractor		- Target of interior paint, interior adhesive, flooring, composite food & insulation. (2 categories for 1 point, 3 for 2 points, 4 for 3 points. VOC content emissions rate will need to comply with US/International standards. Check if local equivalency can be used via CIR.
IEQc3: Construction Indoor Air Quality Management Plan	1	1		1					Vol	v4	Y	Contractor		- Develop and implement a Construction IAQ Management Plan that meet or exceed SMACNA 008 Guidelines.
IEQc4: Indoor Air Quality Assessment	2	2		2					Vol	v4	Y	Contractor	Flush Out AND Air Testing	- Carry out air quality testing prior to occupancy and ensure maximum pollutant concentrations are not exceeded. Air flushout is advised to be conducted beforehand. Allow adequate time at end of project for flush out. Ensure flush out included in mechanical spec
IEQc5: Thermal Comfort	1	1		1					Ind	v4		LCI (Mech) / DEM		- HVAC indoor design conditions to achieve PMV ±0.5; AND - Provide individual thermal comfort controls for at least 50% of individual occupant spaces. AND - Provide group thermal comfort controls for all shared multioccupant spaces. Thermal comfort controls to control at least one of air temperature, radiant temperature, air speed, humidity.
IEQc6: Interior Lighting	2	2		2					Vol	v4.1		LCI (Elec)		For regularly-occupied spaces - Achieve Unified Glare Rating of <19, to be demonstrated using simulations. OR - Use light fixtures with a luminance <7000 cd/m2 between 45 and 90 degrees from nadir. AND - Use light sources that have a Colour Rendering Index ≥90; AND - Provide dimmable or multilevel lighting for 90% of occupant spaces.
IEQc7: Daylight	3	0					3		Ind	v4.1				- Provide glare-control devices for all regularly-occupied spaces AND - Meet minimum spatial daylight autonomy and annual sunlight exposure requirements through simulations OR - Meet daylight illuminance requirements through simulations.



Credit	Available Points	Targeted Points	Achieved	Low Hanging Fruit	Mid Hanging Fruit	High Hanging Fruit	Cannot be Achieved	To be Assessed	Volume Credit	LEED BD+C Version	Const. Credit	Resp. Party	Credit Pathway	Requirements
IEQc8: Quality Views	1	0					1		Ind	v4.1				- Provide >75% of regularly occupied areas access to views to the outdoors or internal atria. Views into atria can be used to meet up to 30% of required area. Views must include one of the following: nature, urban landmarks, art, or objects at least 7.5m from exterior of glazing.
IEQc9: Acoustic Performance	1	0						1	Ind	v4.1				- For all regularly-occupied spaces, meet requirements for 2 of HVAC background noise, sound transmission, and reverberation time. Compliance must be confirmed via calculations or sound measurements of representative rooms, and/or design documentation from a person experienced in acoustic design.
Category Total	**16**	**9**	**0**	**8**	**0**	**1**	**4**							

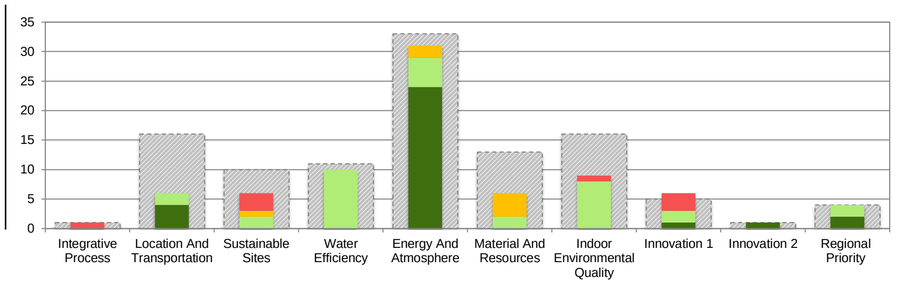


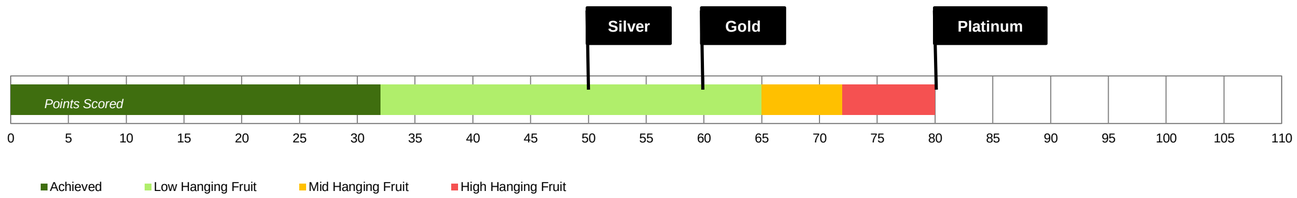




Credit	Available Points	Targeted Points	Achieved	Low Hanging Fruit	Mid Hanging Fruit	High Hanging Fruit	Cannot be Achieved	To be Assessed	Volume Credit	LEED BD+C Version	Const. Credit	Resp. Party	Credit Pathway	Requirements
INNOVATION 1														
Pilot Credit	1	0							Ind	-	Y	Contractor		Options: Performance-based IAQ design & assessment - Tier 2 (2pts) Perform testing on outdoor and indoor air to determine concentrations of pollutants defined in LEED pilot credit. Carry out occupant satisfaction evaluation with a focus on perceived IAQ 30-60 days after OC. Minimum participation rate is 30%. Test plan and proposed contaminant list must be approved by USGBC.
Pilot Credit	1	0					1		Ind	-		DEM		Options: All-gender restrooms (1pt) Build only all-gender toilet amenities; or Build separate gendered and all-gender amenities - separate bank, or - 2 individual stalls next to multi-stalled gendered toilets
Innovation	1	1				1			Ind			LCI		Biodiesel for generators. Difficult to obtain biodiesel in Aus. MS wants to create a market for it. Supply chain development.
Innovation	1	1				1			Ind			LCI		Covid filtration.
Innovation	1	1				1			Ind			LCI		Bushfire mode for HVAC systems.
Innovation	1	1		1					Ind			LCI / Stowe		Lamp purchasing
Exemplary Performance - EAc2 Optimise Energy Performance	1	1	1						Vol	v4				Achieve 54% reduction in energy use savings
Exemplary Performance - WEc2 Indoor Water Use	1	1		1					Vol	v4				Achieve 55% reduction in water use
Category Total	**Max 5**	**6**	**1**	**2**	**0**	**3**	**1**							
INNOVATION 2														
LEED Accredited Professional	1	1	1						Ind	v4				LEED AP on project
Category Total	**1**	**1**	**1**		**0**	**0**	**0**							
REGIONAL PRIORITY														
RP Credit 1.1: Regional Priority - Renewable Energy Production	1	1	1				1							
RP Credit 1.2: Regional Priority - Renewable Energy	1	1	1						Vol	v4.1				
RP Credit 1.3: Buidling product disclosure and optimization - material ingredients	1	0					1							Credit not targeted.
RP Credit 1.4: Open Space	1	0					1							Open space credit unlikely to be achieved.
RP Credit 1.5: Regional Priority - Outdoor water use reduction	1	1		1					Vol					Refer to WEc1: Outdoor Water Use Reduction [Note: Min 2 point must be achieved in WEc1]
RP Credit 1.6: Regional Priority - Indoor water use reduction	1	1		1					Vol					Refer to WEc2: Indoor Water Use Reduction [Note: Min 4 points must be achieved in WEc2]
Category Total	**Max 4**	**4**	**2**	**2**	**0**	**0**	**3**							

LEED Credit Category	Points Available	Points Targeted	Achieved	Low Hanging Fruit	Mid Hanging Fruit	High Hanging Fruit
Integrative Process	1	1	0	0	0	1
Location And Transportation	16	6	4	2	0	0





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Sustainable Sites	10	6	0	2	1	3								
Water Efficiency	11	10	0	10	0	0								
Energy And Atmosphere	33	31	24	5	2	0								
Material And Resources	13	6	0	2	4	0								
Indoor Environmental Quality	16	9	0	8	0	1								
Innovation 1	5	6	1	2	0	3								
Innovation 2	1	1	1	0	0	0								
Regional Priority	4	4	2	2	0	0								
TOTAL POINTS	**110**	**80**	**32**	**33**	**7**	**8**								

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