MUSEUMS DISCOVERY CENTRE EXPANSION
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX Q
ECOLOGICALLY SUSTAINABLE DEVELOPMENT STATEMENT

Northrop

SUSTAINABILITY REPORT

Powerhouse Museums Discovery Centre

2 Green Road, Castle Hill NSW 2154

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Sustainability Report

Revision Schedule

Date	Rev	Issue	Prepared By	Approved By
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Executive Summary

Northrop Consulting Engineers have been engaged by Lahznimmo Architects and Create NSW to inform the design of the Museums Discovery Centre Building J expansion in Castle Hill, NSW. The purpose of this document is to outline how the Ecologically Sustainable Design (ESD) requirements and initiatives will demonstrate the project's commitment to environmental, economic and social sustainability and address the relevant Secretary's Environmental Assessment Requirements (SEARs.)

The proposed development of MDC Building J expansion includes the following key initiatives to reduce the impact of the development on the environment.

- A high-performance building envelope that exceeds the requirements of the National Construction Code.
- A centralise HVAC system to provide humidity and temperature control to the facility in a highly energy efficient manner.
- Well controlled LED lighting system to allow minimisation of energy use in space lighting and the exploitation of daylight where available.
- Material selections that help minimise environmental impact
- A rainwater capture and reuse system to help minimise drinking water use for irrigation and manage more extreme rainfall
- Onsite solar power generation.
- Water and energy efficient appliances
- Provisioning for the removal of most fossil fuels from the site into the future
- Well located glazing to balance heat gains into the space and daylighting opportunities
- Pale roof surfaces to mimise heat gain and accommodate the expected increased surface temperatures as a result of climate change, and
- The benchmarking of the site to exceed Australian Best Practice Sustainability as defined by the Green Building Council of Australia.

The sustainability initiatives outlined within this report will be, where feasible, incorporated to enhance the comfort, appeal, beauty, and well-being of the proposed development.

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1. Introduction

The report supports a State Significant Development (SSD) Application for the proposed construction and use of a new building to facilitate the expansion of the Museums Discovery Centre (MDC) site at 2 Green Road, Castle Hill.

The primary objective of the SSD Application is to provide expanded facilities to accommodate the Powerhouse collection including spaces for storage, conservation, research and display and spaces to facilitate increased public access to the collection through education, public programs, workshops, talks, exhibitions and events. The expansion of the existing MDC facility within the site at 2 Green Road Castle Hill will integrate with the existing MDC site located at 172 Showground Road, Castle Hill and its operations on a permanent basis.

The proposal is a type of *"Information and Education Facility"* with a Capital Investment Value (CIV) in excess of $30 million and is classified as SSD under Schedule 1 Clause 13 of the State Environmental Planning Policy (State and Regional Development) 2011 (State and Regional Development SEPP).

Create Infrastructure is the proponent of the SSD Application.

1.1 Background

The MDC is owned and operated by the Museum of Applied Arts and Sciences (MAAS) and features exhibitions and displays in collaboration with Australian Museum and Sydney Living Museums, who also maintain collection storage and conservation facilities on the site. The MDC is located at 172 Showground Road, Castle Hill. There are six buildings primarily providing collection storage as well as areas for displays and education and public programs, accessible to visitors (Building E). During 2017-2018 a total of 17,481 persons visited the MDC site.

The MDC Expansion is part of the renewal of the Museum of Applied Arts and Sciences, known as the Powerhouse Program, that includes:

- **Powerhouse Parramatta**: A new benchmark in cultural placemaking for Greater Sydney that will be a symbol of a new approach to creative activity and engagement.
- **Powerhouse Ultimo**: The NSW Government recently announced that the Museum's Ultimo site will be retained, and the Museum will operate over four sites across the Greater Sydney area.
- **Powerhouse Collection Relocation and Digitisation Project**: The relocation of the Powerhouse collection and digitisation of around 338,000 objects, enhancing the collection's accessibility for local, national and international audiences.

The MDC expansion is an integral component of the Powerhouse Program and will provide the opportunity to increase visitation to the site, forming an important and significant cultural institution within The Hills Shire. In addition to the storage component of the proposal, the expansion will increase access to the Powerhouse collection through a range of spaces for visible storage, research and viewing of the collection, as well as flexible spaces for education and public programs, workshops, talks, exhibitions and events.

1.2 Site Description

The proposed Building J site is located within the property known as 2 Green Road, Castle Hill which comprises a single lot legally described as Lot 102 DP 1130271. The site is generally square in shape with a splay corner to the intersection of Green Road and Showground Road and a total area of approximately 3.8ha. The site has a primary frontage of approximately 183m to Green Road and a secondary frontage of approximately 186m to Showground Road. Refer to **Figure 1.** The location of the proposed new MDC building (to be known as "Building J") is located on the western end of the site and is marked on **Figure 1** in a dashed yellow line (referred as the Building J Site). The overall site contains large institutional buildings set within a landscaped setting featuring a high tree canopy.

The overall site is a TAFE campus that caters for approximately 400 enrolled students, and provides courses on business and financial services, hospitality, general education, community services, health, nursing, carpentry, building and retail. The site currently includes TAFE buildings, car parking and vegetated open space areas. A dam is situated in the north eastern part of the site.

The MDC site is located immediately west of the existing TAFE site at 172 Showground Road, Castle Hill. A subdivision application (included within this SSD Application) will consolidate the site of the proposed Building J with the existing MDC site. The main public vehicle access to the MDC site is via Windsor Road. There is also a vehicular access point to the MDC on Showground Road. The MDC and TAFE have a longstanding arrangement, that permits vehicle access to the MDC site from Green Road, allowing vehicles to traverse across the TAFE site to access the MDC site.

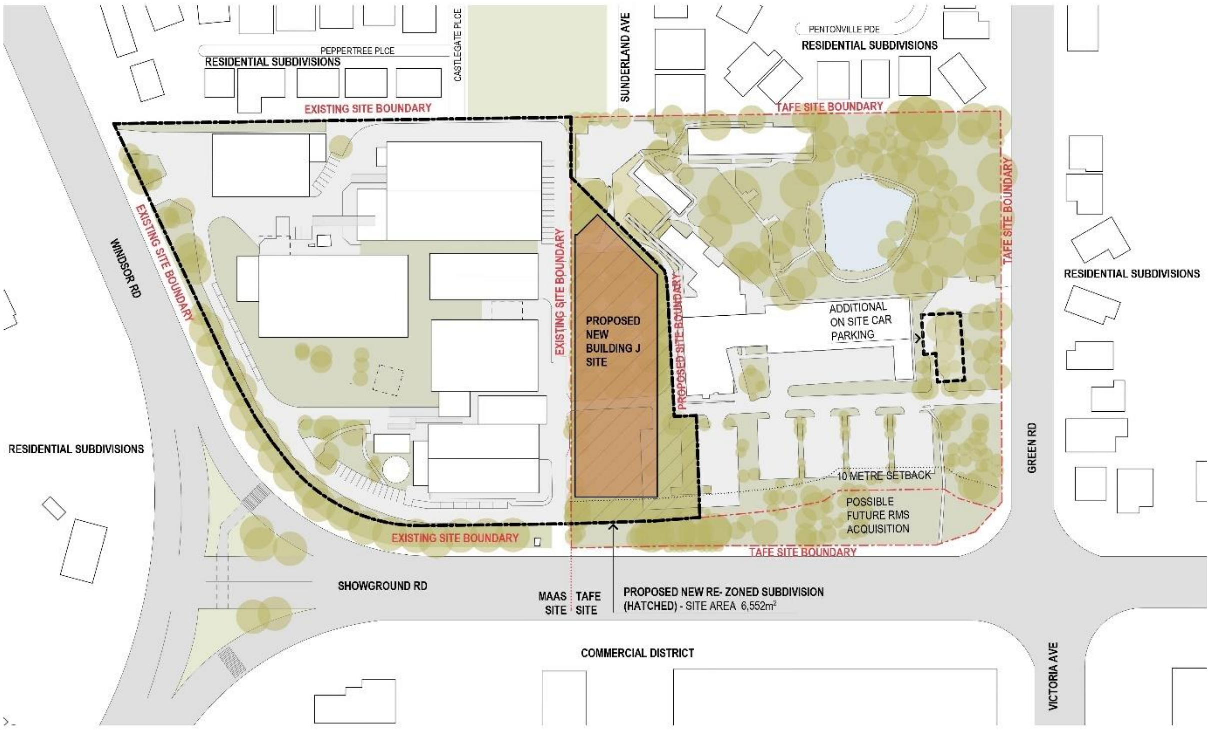

Figure 1: Existing site layout plan and proposed development site. Source: Lahznimmo Architects

Development surrounding the site to the east, and north consists of established residential neighbourhoods generally comprising two storey detached dwellings. Opposite the site to the south east and south west are a mix of warehouses, industrial units, and large format bulky goods retail premises. Views into the TAFE and MDC site from the surrounding roads is obscured by dense trees and vegetation along the perimeter of the sites.

A public park and children's playground is adjacent to the north of the site that is bound by Sunderland Avenue to the east and Castlegate Place to the west. The dwellings along Sunderland Avenue and the southern side of Pentonville Parade are the nearest residential properties to the proposed Building J site.

1.3 Overview of Proposed Development

The successful delivery of this SSD project supports a priority cultural infrastructure project and is a NSW Government 2019 election commitment (Powerhouse Precinct at Parramatta). This application will deliver a significant cultural institution for Castle Hill and The Hills Shire.

The proposed Building J will offer many opportunities for public engagement as part of a desire to increase public access to the Powerhouse collection. The renewal of the site offers a range of opportunities to increase public access including visible storage facilities, booked tours, Open Days, public and education programs, workshops, talks and other events. The facilities in Building J will serve the needs of a variety of user groups including staff, volunteers, education groups, researchers, artists, scientists, industry partners and the general public.

The SSD Application seeks consent for the delivery of the MDC expansion as a single stage, comprising:

- Site preparation works, including the termination/relocation and installation of site services and infrastructure, tree removal (337 trees in total), earthworks, and the erection of site protection hoardings and fencing.
- Demolition of existing car park and vehicle accessway along the eastern and north eastern parts of the site. A new at-grade car park is proposed to be constructed on the eastern side of the TAFE site and will accommodate 24 car parking spaces removed from the Building J site.
- Construction of the proposed new Building J. The proposed new Building J will cater for the following uses:
  - Storage for the Powerhouse collection and archives (both collected archives and institutional archives).
  - Flexibles spaces for education and public programs, workshops, talks, exhibitions and events.
  - Suites of conservation laboratories and collection work spaces.
  - Photography, digitisation and collection documentation facilities.
  - Work space for staff, researchers, industry partners and other collaborators. This will include amenities, meeting and storage rooms, collection research and study areas as well as other ancillary facilities.
  - Components of the image and research library.
  - Object and exhibition preparation, packing, quarantine and holding areas.
- Construction of new vehicle accessways to maintain connectivity to the MDC and TAFE sites.
- Subdivision of the proposed Building J site from the TAFE site including creation of right-of-carriageway easement to facilitate access over the new realigned accessway by TAFE vehicles and consolidation to form a single lot with the existing MDC site.

1.4 Secretaries Environmental Assessment Requirements

The Department of Planning, Industry and Environment have issued Secretary's Environmental Assessment Requirements (SEARs) to the applicant for the preparation of an Environmental Impact Statement for the proposed development. This report has been prepared having regard to the SEARs as follows:

SEAR	Where Addressed
14. Ecologically Sustainable Development (ESD)	
- Identify how the development will incorporate ESD principles (as defined in Clause 7(4) of Schedule 2 of the Regulation) in the design, construction and ongoing operation phases of the development, and include innovative and best practice proposals for environmental building performance	*Section 3*
- Include a framework for how the future development will be designed to consider and reflect best practice sustainable building principles to improve environmental performance and reduce ecological impact. This should be based on a materiality assessment and include waste reduction design measures, future proofing, use of sustainable and low-carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy	*Section 4*
- Use the climate change projections developed for the Sydney Metropolitan area to inform the building design and asset life of the project and address impacts including: ○ increased frequency of extreme heat days ○ extended heatwave events ○ more extreme (intense) rainfall events.	*Section 5*
15. Utilities	
- Outline any sustainability initiatives to minimise/ reduce the demand for drinking water, water sensitive urban design and water conservation measures proposed.	*Section 3.7*

1.5 Referenced Drawings

- Architectural Plans prepared by Lahznimmo Architects – dated 07.08.2020;

1.6 Limitations

Due care and skill has been exercised in the preparation of this advice.

No responsibility or liability to any third party is accepted for any loss or damage arising out of the use of this report by any third party. Any third party wishing to act upon any material contained in this report should first contact Northrop for detailed advice, which will take into account that party's particular requirements

2. National Construction Code Compliance

2.1Section J

Section J of the National Construction Code (NCC) 2019, outlines mandatory Building Fabric and Glazing requirements under Section J Part J1 respectively, to improve energy efficiency of all new developments in Australia. The MDC Building J will need to be assessed for Section J compliance. There are two methods of achieving minimum compliance under Section J; Deemed-to-Satisfy (DTS) or a JV3 Performance Based Solution.

The following sections provide advice using the DTS methodology for each classification of the building in Climate Zone 6.

2.2 Building Characteristics

The MDC Building J will be located in Castle Hill, NSW which is specific to Climate Zone 6 as defined by the NCC Climate Zone Map shown in Figure 3.

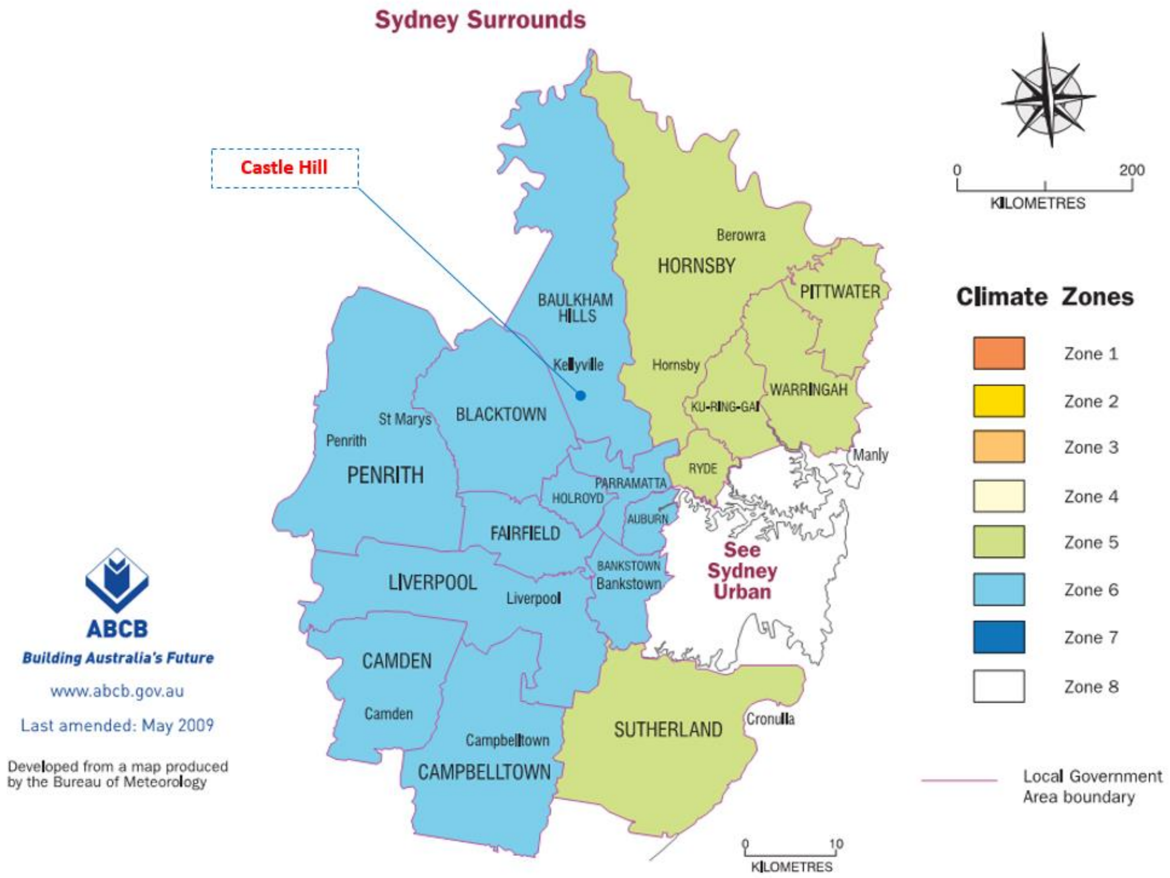

Figure 1: NSW Climate Zones

Table 5. Building Classifications

Level	Class	Description
Lower Ground	7b & 8	Storage & Workshops
Ground	7b & 9b	Storage and Assembly areas
Level 1	7b, 8 & 5	Storage, Labs, Workrooms & Offices
Level 2	-	Roof and Plant areas

2.3 Building Fabrics

The building fabric thermal performance minimum requirements have been determined in accordance with Part J1 of Section J of the NCC. Thermal performance requirements apply to the building's thermal envelope which is defined under the NCC as the parts of a building's fabric and glazing that separates a conditioned space or habitable room from:

a) The exterior of the building; or
b) A non-conditioned space including -
   I. the floor of a rooftop plant room, lift-machine room or the like; and
   II. the floor above a carpark or warehouse; and
   III. a common wall with a carpark, warehouse or the like.

Table 6 outlines the building fabric thermal performance requirements for a Class 7b, 8 & 5 building in Climate Zone 6. Construction material breakdowns for each building element based and a thermal boundary mark-up will be included as part of the DTS assessment in the detailed design phase.

2.3.1 Table 6: Building Fabric R-Values for Climate Zone 6

Building Fabric Element	Required total R- Value
External walls	1.4
Internal walls	1.0
Suspended floors	2.0
Floor and ceiling to unconditioned areas	2.0
Roof and ceiling	4.2

2.4 Glazing

Thermal performance requirements of glazing systems (glass plus frame) are determined in accordance with Part J1 of Section J of the NCC. The current design has been assessed to determine the maximum compliant U-Values and Solar Heat Gain Coefficients (SHGC) these were determined to be 7.0 and 0.77 respectively. Due to the low performance required for the building's glazing the selected glazing will greatly exceed minimum code requirements.

3. Sustainability Initiatives

The following section describes how ESD principals (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design and ongoing operation phases of the project. This section in concert with the targeted best practice benchmarking exercise, outlined in section 4 illustrates how the project addresses the following.

- The precautionary principle – through the implementation of environmental management, maintainability and climate change adaption planning the project is actively including adaptability and resilience within the project. These design responses demonstrate that the project is actively considering the concepts behind the precautionary principle to create a space that can both accommodate for changes that may eventuate in the future and one that carefully evaluates and avoids serious or irreversible damage to the environment.
- Inter-generational equity to ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations – through the inclusion of zero ozone depleting materials, sustainably sourced timber, low impact steel and concrete, alongside a focus on native vegetation, water sensitive urban design and support of connection with nature, the project demonstrates a strong commitment to the preservation of environmental health, diversity an productivity for future generations.
- Conservation of biological diversity and ecological integrity – through the planting of endemic native vegetation, improvement of stormwater runoff from the site and use of landscaping that blends with the surrounding parklands, the project will act to improve, conserve and support the local biological diversity and integrity.
- Improved valuation, pricing and incentive mechanisms - the project has involved significant input from the Quantity Surveyor who will be involved throughout the entire design process to ensure that the project both remains on budget and effectively considers environmental factors in the valuation of assets and services. Furthermore, the project will look at maintainability and the operational costs associated with individual design initiatives and the overall design.

Through the inclusion of the above and the sustainability initiative outlined within this report the project clearly addresses the ESD Principles as defined in clause 7(4) of schedule 2 of the Environmental Planning and Assessment Regulation 2000. Further detail of the general sustainability initiatives is outlined below.

3.1 Passive Design

The site's characteristic and building orientation can have significant effect on the building's energy demand for space heating, cooling, and ventilation.

Key considerations include designing a high-performance facade with attention to the extent and performance of glazing, the use of external shading, daylight direction devices, insulation levels, envelope material properties and possible natural ventilation openings.

3.1.1 Facade Performance

Achieving a good thermal performance of the façade is vital to providing an energy efficient and thermally comfortable building. The NCC Section J compliance requirements for building fabric has been outlined in Section 2 of this report, however the project aims to exceed these for project glazing performance to improve both thermal comfort and energy consumption. The development will select a glass performance to balance the need for daylight within the community spaces and the cooling and heating loads from the facade.

3.1.2 Shading

The project design has incorporated strategic folds within the façade of the building to provide both vertical and horizontal shading across the key glazed areas. This incorporation of shading within the design allows for internal access to views and daylight while managing the heat transfer into the building from direct sun light.

3.1.3 Thermal Mass

Thermal mass refers to material within the insulated envelope of a building which acts as a heat sink for the surrounding conditioned space. This material can take the form of a concrete slab (on ground) exposed to the indoor air.

In winter, a thermal mass can store solar heat captured during the day and gradually release it during the night. Conversely, during summer, a thermal mass has the ability absorb excess heat both from the internal air and inhabitants, creating a cooling effect in the space. Both these effects work to lower the heating and cooling loads of the building, saving on energy costs and, consequently, carbon emissions.

Through the previously discussed inclusion of well-considered glazed areas and shading of windows the project aims to prevent direct solar access into the building during summer while allowing solar energy to enter the space and heat the floor slabs throughout winter. This shows the strong focus of the site on passive management of heating and cooling.

3.1.4 Daylight

The controlled transmission of natural light into the building will reduce the reliance artificial lighting for much of the year, whilst still achieving acceptable illumination. High levels of natural lighting have also been shown to have a positive impact on the well-being of occupants while also improving visual comfort and productivity.

The current design allows the building to make effective use of natural daylight by placing light shelves under the north facing windows. Light shelving consists of horizontal panels with reflective upper surfaces that reflect daylight onto the ceiling and deeper into a building.

3.1.5 Solar Amenity

Good solar amenity is essential for considering passive design principles for the site. A balance between natural daylight and solar access is required to optimise thermal performance of the buildings on the site and therefore to create comfortable conditions for occupants and an energy efficient building.

The architectural design of the project has looked to enhance the solar amenity across the site through the inclusion of the following,

- High performance glazing
- Selection of glazing with high Visual Light Transmittance (VLT)
- Optimised shading
- Good building orientation.

The MDC Building J is orientated to maximize solar amenity, and benefit from daylighting on the southern façade with a predominantly glazed envelope. This southern façade design allows for high levels of daylight ingress without direct solar radiation gain. This approach encourages natural lighting whilst remaining considerate to surrounding developments.

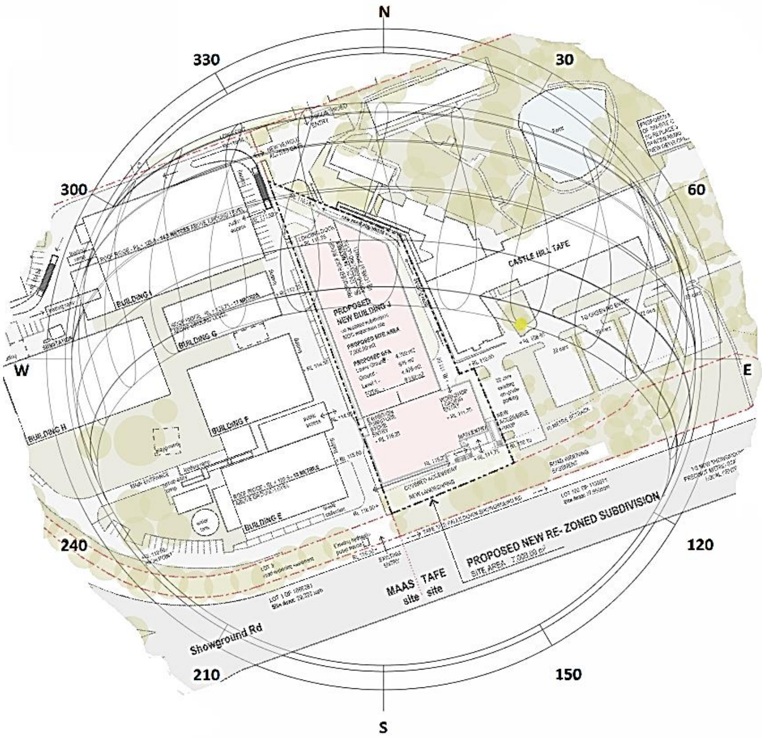

Figure 5: Annual Solar Path (EnergyPlus weather file AUS_NSW.Richmond.RAAF.957530_RMY)

3.1.6 Thermal Separation

Heat will flow the easiest path from the heated space to the outside - the path with the least resistance. Several components in the building envelope usually act as a thermal bridge, a conduit for heat to leak through the walls, roofs, floors and windows internally and externally.

This results in additional energy consumed by the HVAC system to compensate for heat gains and losses and achieve comfort. Thermal Bridging could account for up to 10% of total energy consumption.

To eliminate thermal bridging, thermal separation is recommended for the following components.

- Foundation wall transitions
- Metal panel wall support connections
- Roof to wall transitions
- Window wall transitions
- Window frames

Thermal bridging and breaks are included within key elements of the architectural detailing which will help to improve energy performance and reduce the impact of longer term increases in heatwaves and hot weather events.

3.1.7 Building Sealing

Air leaks due to poor sealing lead to unwanted heat transfer to and from buildings. Direct leaks are the most obvious, such as undercuts, that allow outside air to come directly under the sill or around the frame of a window or door. Indirect leaks occur where air penetrates/escapes the building exterior at one location and enters/leaves the interior at another location.

Extensive building sealing should be applied to eliminate unwanted heat transfer in the building, improve the efficiency of HVAC systems and increase the thermal comfort of building occupants. Sealing will need to be undertaken on the interior and exterior of the building during construction works.

3.2 HVAC and Control Methods

The project has incorporated a central plant system to optimise air conditioning and heating efficiency. It is noted that a gas fire boiler system is used due to the building's need for strong humidity control and the simultaneous need for heating and cooling. Further control and efficiency measures are detailed below.

3.2.1 Economy Cycles

Building cooling requirements can be minimised through the use of an economy cycle. An economy cycle is a HVAC control method that is enabled when the outside air temperature is lower than the zone return air temperature e.g. lower than 20ºC, to modulate outdoor air up to 100% to supply air to the space. While the economy cycle is operating the cooling coils are switched off via the BMS system therefore reducing the daily chiller energy consumption.

This initiative is only achievable with a central cooling plant and due to the required humidity controls for most of the storage areas would only be applied to the office and community spaces.

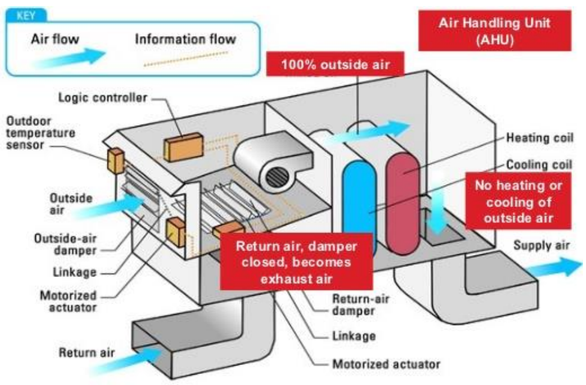

Figure 7: Economy cycle diagram

3.2.2 Heat Recovery

Heat Recovery Ventilation (HRV) systems provide energy savings in mechanical ventilation systems which can be added to the existing HVAC system. During the cooler months, warm, stale exhaust air is captured and pulled through an internal heat exchanger core to heat the cold outside air stream. During the hotter months, the opposite occurs. The heat exchanger allows for air balance in the building by moving heat between the two airstreams without mixing or contaminating them. HRV's have the potential to recover up to 85 percent of the heat in the exhaust airstream which can be a more energy and cost-effective solution than operable windows with the additional benefit of controlled filtered air.

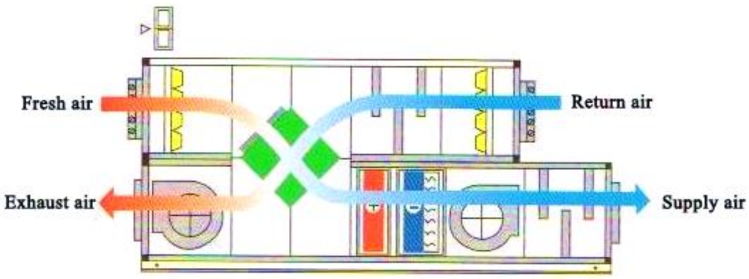

Figure 8: Heat Recovery System

3.3 Lighting

3.3.1 Energy Efficient Artificial Lighting

The provision of highly energy efficient lighting is incorporated into the building design to minimise the lighting density. In particular, LED lighting provides the maximum efficiency and has become a robust cost effective lighting technology.

3.3.2 Lighting Controls

Control strategies are also vital to reduce excess energy use, including:

- Daylight sensor and motion sensor control for offices, hallways, lobbies and shared spaces.
- Lift lighting connected to lift call buttons.
- Motion sensor or time-based lighting for undercover car parking, switch rooms and service areas.
- Motion sensors in fire stairs to trigger between standby (dimmed) and full light outputs

3.3.2.1 Digitally Addressable Lighting (DALI)

Implementing a digitally addressable lighting (DALI) system across the office which will provide a greater ability to centrally control the operation of lighting and address lights at an individual level and providing the ability to readdress lighting layouts and zoning with minimal impact on occupants. The provision of a DALI system will be assessed during the detailed design phase.

3.3.2.2 Advanced Lighting Controls

Motion sensor controls are proposed for back of house lighting to switch off lights when there is no movement in those areas.

Timers will be provided to automatically shut down lighting outside of operational hours should also be installed in all areas. Time schedules will be regularly reviewed to ensure that they align with current operational hours.

3.4 Energy Efficient Appliances

Minimum Energy Performance Standards (MEPS) specify the minimum level of energy performance that appliances, lighting and electrical equipment must meet or exceed before they can be offered for sale or used for commercial purposes.

High MEPS rated appliances will be considered beyond mandatory product ranges in Australia and New Zealand. These products must be registered through an online database and meet a number of legal requirements before they can be sold in either of these countries.

Figure 13: Typical Energy Rating labels

3.4.1 Renewable Energy

Further investigation into the site's potential for solar PV will be conducted as part of the detailed design development. The provided roof plan indicates that the development has included 154 solar PV panels or approximately 40kW of generation capacity.

3.5 Water Efficiency

Given the recent dry weather conditions experienced across NSW the project is looking to minimise the impact that it will have Sydney's water supply systems. Through the use of efficient fixtures and fittings, rainwater collection and water sensitive design initiatives the project will not just consider the consumption by building occupants, but also the effects of stormwater runoff, landscape maintenance and how leaks are identified and repaired. Some measures being considered are described below.

3.5.1 Water Efficient Fixtures and Fittings

Water Efficient Fixtures and Fittings will reduce the water consumption of the site. As an indication, the following Water Efficiency Label (WELS) rated fittings and fixtures will be considered:

- Wash hand basin taps - 5 star WELS
- General taps - 5 star WELS
- Toilets dual flush - 4 star WELS
- Urinals - 6 star WELS
- Shower heads – 4 Star WELS

3.5.2 Water Reuse

A 25,000L rainwater tank has been provided within the design which is expected to offset 77% of the non-potable end uses. The rainwater systems will be used to supply garden irrigation systems and toilet flushing to reduce the potable-water demand on-site and lessen the impact to the local authority networks.

3.5.3 Water Sensitive Urban Design

Implementing Water Sensitive Urban Design (WSUD) practices reduces the reliance of stormwater infrastructure whilst enhancing the biodiversity of a site.

WSUD options considered as part of this design approach include:

Figure 15: Bioswales could be located in streetscapes to improve the water quality in the precinct

- Rain Gardens or plantings around building entrances;
- Sub-surface stormwater detention systems
- Tree Gardens/pits & Bio swales for storm water runoff treatment
- Native vegetation where applicable

3.6 Waste Management

Waste management throughout construction and operation has been considered within the project design. The layout of the building has attempted to improve waste management processes through the provision of adequate storage areas within the loading dock and by equipping building occupants with the tools required to use them effectively.

3.6.1 Construction and demolition waste

Building materials account for approximately half of all materials and about half the solid waste generated worldwide incurring significant environmental impacts at each process interval. The project has set targets for a diversion of 80% of construction and demolition waste from landfill.

3.6.2 Waste Sortation

Waste-sorting bins will be considered for installation in the final building within all internal spaces to enable users to sort their rubbish and recyclables. Back of house areas have been sufficiently sized and conveniently to enable the storage of these waste streams for regular collection.

Figure 16: Waste stream sortation

3.7 Social Sustainability

3.7.1 Cultural Contribution

Culture enables environmental sustainability at various levels: through the intrinsic links between cultural diversity and biodiversity, through its influence on consumption patterns, and through its contribution to sustainable environmental management practices because of local and traditional knowledge. Through the development of this project the Powerhouse Museum aims to provide a strong cultural contribution to the Castle Hill Community providing education and cultural spaces to improve community cohesion and connection.

3.7.2 Events Space

Additional to the museum storage and education spaces the project also provides event space within the foyer. This area will be available for events and education sessions providing facilities that the surrounding area currently lacks. This will improve social and community outcomes for the surrounding areas not able to access other facilities.

3.7.3 Public and Active transport

As discussed in the project Transport Assessment the project will aim to improve public transport connectivity of the area and support the improved use of active transport This is demonstrated through the project's improved access to footpaths, bike paths and public transport links, and through the provision of on site bike parking to support staff and visitors access to the site.

4. Best Practice Benchmarking

4.1 Overview

Green Building Council Australia (GBCA) is a non-government organisation that has developed a sustainability rating framework 'Green Star Design & As-Built' to assess and reward developments which minimise their ecological impact during the design, construction and operation phases of their project life-cycle.

The framework is broken down into nine categories listed below, which task the development with initiatives that reduce the use of natural virgin resources, toxic materials and rewards best-practice building management methodology.

A pathway has been developed with the project team which outlines and targets realistic and cost-effective measures and are selected from the nine categories for implementation during the design, construction and operation of the development.

The nine categories are as follows;

- **Management**: Initiatives concerning the management procedures and considerations during design, construction and operation.
- **Indoor Environment Quality**: Initiatives that promote better indoor air quality, access to daylight and improved occupant comfort.
- **Energy**: Initiatives to promote better building energy performance.
- **Transport**: Initiatives to promote sustainable transport options for occupants.
- **Water**: Initiatives around the smarter use of water and reductions in potable water consumption and waste.
- **Materials**: Initiatives that encourage sustainable building materials and waste reduction.
- **Land Use and Ecology**: Initiatives that minimise the impact on ecosystems and water resources.
- **Emissions:** Initiatives to preference reduced pollutant emissions during building development and operation
- **Innovation:** Recognise the implementation of innovative practices, processes and strategies that promote sustainability in the built environment.

4.2 Rating Bands & Categories

The framework awards achievement at three levels, depending on the points achieved after assessment by the independent panel; this development will be using a self-assessment approach.

- 45-59 points, recognised as industry "Best Practice"
- 60-74 points, recognised as "Australian Excellence"
- 75+ points, recognised as a "World Leader" project

Credits are divided across the nine impact categories as follows

Table 7 – Credit Categories and Available Points

Category	Available Points
Management	14
Indoor Environment Quality	17
Energy	22
Transport	10
Water	12
Materials	14
Land Use and Ecology	6
Emissions	5
Innovation	10
Total	110

These categories are divided into individual credits, each of which addresses an initiative that improves or has the potential to improve a design, project or building's environmental performance. Points are awarded in each credit for actions that demonstrate the project has met the overall objectives for the assessment and the specific aims of the rating tool.

All credits are assessed for each category and the percentage score for the category is calculated. A weighting factor is then applied to each of the category scores to reach a single weighted score. Each category is weighted in line with current knowledge and industry practice to produce a rating that appropriately reflects ESD achievements obtained in a project.

Northrop have assessed the proposed building concept against the framework to determine where Australian best-practice green building principles can be implemented. It is intended that this process be further refined during the detailed design process. This will result in a true representation of a best practice pathway that demonstrates the approach to effective green building solutions across all phases of the development. The outcome of the pathway is a rating score card, of which the total points targeted will be more than 60 but less than 74 to exceed a best practice building performance. A GBCA Scorecard is provided in the Appendix of this report.

Please note that as a requirement of GREP; E4, government agency projects that qualify under this policy are required as a minimum to self-assess their development and are not required to submit documentation for formal certification by GBCA.

5. Climate Adaption

Through implementing actions outlined in the previous sections the project will be better able to passively control its internal and external environment. Climate adaption planning will be considered as part of the detailed design processes with measures to consider the likely climate change impacts for the Sydney Metropolitan area. These impacts include the following.

- increased frequency of extreme heat days
- extended heatwave events
- more extreme (intense) rainfall events and associated flood risks.

These key elements are addressed through the following measures.

5.1 Increased Frequency of Extreme Heat Days

The design of the building allows the site to better adapt to increased extreme heat is addressed through the improve façade performance, increased thermal mass and inclusion of façade shading as detailed within section 3.1 of this report. The mechanical design will also incorporate additional peak capacity to accommodate for increased summer design day temperatures, and the architectural fabric selections for roof material and site landscaping will consider the contribution of these elements on the urban heat island for the site.

5.2 Extended Heatwave Events

The project has actively included landscaping and pale coloured roofing within the design to address heatwave considerations and has included capacity within the air-conditioning systems to ensure that temperature conditions are able to be maintained within the facility.

5.3 More Extreme Rainfall Events

Rainfall frequency and intensity has been considered as part of the management of both rainwater and stormwater on the site. Onsite detention systems have been designed to ensure that the peak discharge from the site is not increased as a result of the project and a rainwater system included to offset water consumption by toilets and irrigation.

Furthermore, site guttering and downpipes have been designed to manage an increase in rainfall intensity based on the climate change projections.

6. Conclusion

Overall, the project design has incorporated a strong focus on building orientation, optimised daylight penetration and energy efficiency. This report illistrates how the project will benchmark to Australian Best Practice Sustainability and how the project demonstrates its strong commitment to environmental, economic and social benefit.

The initiatives outlined assist in reducing the project's upfront and ongoing energy use, improve the site resource efficiency, help to address the impacts of climate change and foster greater health and well-being for the occupants and visitors of MDC Building J in Castle Hill.

The project clearly addresses the Secretaries Environmental Assessment Requirements around ESD, Climate Adaptation, Sustainability Benchmarking and Resource Efficiency.

7. Appendix A GBCA Best Practice Pathway