



SUSTAINABILITY REPORT

City Park Penrith

Corner of Henry Street and Station Street, Penrith NSW 2750

PREPARED FOR
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Penrith City Park ESD

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Table of Contents

Executive Summary	4
1. Introduction	5
1.1 Background	5
1.2 Scope	5
1.3 Limitations	5
2. Ecologically Sustainable Design	6
2.1 Energy Efficiency	6
2.2 Water Efficiency	7
2.3 Waste Reduction	7
2.4 Sustainable Transport	8
2.5 Sustainable Space Design	8
2.6 Materials	8
3. Planning Requirements	9
3.1 LEP	9
3.2 DCP	10
4. Conclusion	12

Executive Summary

Northrop Consulting Engineers have been engaged to provide Sustainability Consulting advice to JMD Design to support the Development Application process for the proposed city park at 42-50 Station Street & 134-144 Henry Street, Penrith NSW 2750. This report will analyse the design of the proposed park and its alignment to sustainability initiatives set out in the Penrith City Council Local Environment Plan (LEP), and Development Control Plan (DCP). The project seeks to meet and exceed the sustainable requirements set for recreational areas, and to align itself with the Cooling the City Strategy, outlined by Penrith City Council in August 2015, to reduce the Urban Heat island effect throughout the city. These requirements are met through the following key design initiatives.

- Conserving Energy and reducing Carbon Dioxide emissions through use of energy efficient equipment
- Minimising energy required for lighting through the effective use of daylight
- Ensuring usage of low embodied energy materials and improved building processes
- The incorporation of natural ventilation to eliminate the need for auxiliary heating and cooling.
- The inclusion of programmable control systems for lighting ensure that lighting only activates when required.
- The use of efficient water fixtures and fittings.
- The incorporation of non-potable water supplies for irrigation through considered design of waste and storm water systems.
- Reducing vehicle dependence through the site's proximity to public transport and connection to footpaths and cycleways.
- Eliminating usage of Volatile Organic Compounds and Hydrochlorofluorocarbons for public safety
- Designing for flexibility of spaces to promote reuse and repurposing in the future.
- Native Vegetation employed where possible to encourage the natural habitat of the Penrith area
- Trees existing on site have been kept in the interests of conservation of flora and fauna

The integration of these initiatives demonstrates the strong environmental commitment of the project in line with the Penrith City Council's development guidelines.

1. Introduction

1.1 Background

JMD Design has engaged Northrop to complete an Ecologically Sustainable Development Report for the proposed Penrith City Park, in line with the documentation required as part of the development application.

To ensure that the development meets the requirements of Penrith City Council, and aligns with JMD’s commitment to sustainability, this report has examined the park design and its connection to the surrounding area. Northrop has then examined Ecological sustainable Design principles that have been incorporated into the project design and will be considered throughout the project’s detailed design. This report lays out the site approach to sustainability and refers to the applicable elements of the planning requirements.



Figure 1: Initial Concept Image

1.2 Scope

Northrop Consulting Engineers have been engaged by JMD Design to provide a Sustainability Report that will outline how the project meets the relevant planning requirements. The following sections of this report will identify the Ecologically Sustainable Design (ESD) principles of the construction, and its relation to the Development Control Plan (DCP) and Local Environment Plan (LEP) requirements relevant to the area.

This report has considered the amenities and parkland design as well as how the project links with and is supported by the surrounding council infrastructure.

1.3 Limitations

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

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. Ecologically Sustainable Design

2.1 Energy Efficiency

The project is committed to producing a space that is energy efficient and reduces greenhouse gas emissions through the considered design of systems.

2.1.1 Passive Building Design

The project has used passive solar design within the amenities block to remove the need for auxiliary heating or cooling. The use of thermal mass in the building takes advantage of the diurnal temperature changes across the year to achieve consistent temperature conditions within the Amenities Building. Other passive design considerations include the usage of ventilation openings, inclusion of skylights, operable glazing systems, external shading devices, and use of insulation to prevent overheating throughout the summer.

The details of these design initiative are as follows.

- Natural Ventilation – multiple openings on the exterior of the building are incorporated with an emphasis on the northern and eastern ends of the building to take advantage of the sites prevailing winds. This ventilation is provided through shaped timber boards on the northern side, and hit and miss bricks upon the eastern side, with both contributing to natural ventilation.
- Three skylights are planned for the building, which will daylight the entire bathroom area, reducing the need for auxiliary lighting during daylight hours. The layout of these skylights extruded 1.2m from the roof will reduce the direct solar irradiation upon the bathrooms themselves, which coupled with the insulative protection provided by the light shaft will reduce unwanted solar heat gain during the warmer months.
- The application of a planted roof will help to reduce the projects urban heat island impact and assist with the roof's thermal efficiency, providing additional roof insulation. This aligns well with the Cooling the City Strategy employed by the Penrith City Council to help reduce heat islanding.
- The use of a pergola surrounding the eastern and western sides of the building will also reduce the morning and afternoon solar radiation hitting the sides of the building, protecting against unwanted solar heat gain during the warmer months.
- With reference to the entire park, the use of the pergolas will prevent the buildup of heat within the site's hardscaping elements. By reducing the radiation that hits these surfaces though the design once again aligns itself with the Cooling the City Strategy.

2.1.2 Energy Efficient Systems

All systems chosen for use in this project have been considered in terms of their energy efficiency, in line with the relevant sections of DCP and LEP, as well as the Cooling the City Strategy implemented by Penrith City Council. The following section outlines the key measures included in the project design.

2.1.2.1 Energy Efficient Lighting System

Throughout the park, an Energy Efficient lighting system has been designed, making use of efficient LED's with long lifespans, looking to reduce replacement periods and minimize maintenance requirements and operational waste from the replacement of lamps. The project design includes LED throughout the park. The use of modular smart poles for general lighting of the park, LED strips along the concrete bench seats and within the Amenities building shows the projects commitment to operational efficiency while increasing the nighttime usability of the park itself for the community. The following outlines the lighting, security and controls systems being provided throughout the project.

- LED lights with daylight control systems for the bathrooms, taking advantage of the skylights above providing natural light.
- Motion sensor-controlled luminaires allowing for dimming of lighting when not required for safety.
- Energy Efficient Security cameras integrated into modular smart pole.
- LED landscape lights on time schedules to reduce unnecessary lighting and align to sunrise and sunset times across the year.

2.1.2.2 Energy Metering and Monitoring

To understand the usage of energy within the precinct, private metering will be installed within the amenities building to allow for direct analysis of energy usage. This energy metering will assist council to understand the operation of the site and inform lighting control parameters for future projects and identify operational concerns for the site.

2.2 Water Efficiency

Water efficiency and management is incorporated throughout the entire park area. This has been a key within the design of the Amenities building and irrigation throughout the park. The design has focused on the selection of fixtures and fittings, and the extensive water recycling.

2.2.1 Water Efficient Fixtures and Fittings

Water fixtures for use in the amenities building will be chosen with direct reference to the Water Efficiency Labelling and Standards (WELS) star scheme, ideally selecting products with ratings exceeding 4.5 stars.

2.2.2 Water Recycling

Water is to be collected from the amenities roof and southern gardens via drainage cells, to be stored in a water tank by the amenities building. This water is intended to be used within the amenities building for use in the flush toilets and is also accessible for other purposes.

2.3 Ecologically Sustainable Vegetation

2.3.1 Native Vegetation

Native Vegetation has been planned for inclusion throughout the park to enhance and support the endemic flora and fauna of the Penrith region. Native vegetation will include selections for trees, climbers, shrubs, grasses, and groundcover over the park.

2.3.2 Tree Conservation Plan

Existing trees are mixed with trees to be newly planted post construction within the Park. In conserving the existing native Eucalyptus coupled with the planting of native fig trees, the ecologically sustainable design of the park encourages conservation of trees more broadly across Penrith City and supports the variation in the age and size of vegetation across the park.

2.4 Waste Management

2.4.1 Waste Management Plan

Penrith City Council how the site will deal with operational waste throughout the detailed design and consultation process. Ideally a detailed waste management plan will be implemented for the park with spaces assigned within detailed design. This will incorporate strategies to promote the use of separated waste collection throughout the park to promote recycling. The strategy will also involve the

separation of waste where necessary and encourage better consumer choices including reducing the quantity of waste going to landfill.

2.5 Sustainable Transport

The site is located close to public transport and the design of the internal footpaths and facilities has considered how to encourage sustainable transport options. Connection to footpaths encourage park users to walk to and from the site, and bike racks have been incorporated across the park to encourage the use of low energy, sustainable form of transport. Furthermore, the site's vicinity to Penrith station encourages accessing the park via train, reducing the reliance on less sustainable forms of transport such as personal vehicles (Cars, Motorcycles).

2.6 Sustainable Space Design

The spaces within the park precinct have been designed as multi-purpose areas, with potential to be rezoned and repurposed in the future. The design focused on allowing these spaces to grow with the surrounding area. The park area multi-purposed and can be used for recreational purposes, as well as having the capacity to host concerts and events. This sustainable design allows the park to adapt to the needs of the community at will, promoting future usage.

2.7 Materials

The materials selected for the Penrith City Park have considered maintenance, longevity and embodied impacts, both from material form and the impact they have on the building processes. Consideration has also been given to the impact certain materials will have on user health and their broad environmental impact. Materials with high impact materials such as Volatile Organic Compounds (VOC's) and formaldehyde have avoided where possible due to their volatility at room temperature and contribution to poor air quality.

The design itself aims to make use of materials with incredibly low embodied energy, of which the amenities building is a prime example. In application of salvaged terracotta tile on the western side of the building, as well as the use of timber boards upon the exterior, used to provide natural ventilation while providing a material that sequesters carbon. This is also true for the remainder of non-natural structures within the park limits, with green concrete, and recycled brick used for the vast majority of pavements. Sustainably sourced recycled brick is to be used extensively for paved areas. Green concrete is made from industrial by products of coal-fired power stations, and of co-products from the steel industry, and indicates the direction of the park to make use of more sustainable materials.

3. Planning Requirements

3.1 LEP

Part 7.4 of the Penrith Local Environment plan deals with the sustainable development requirements for development consent, regarding the principles of sustainable development as they relate to a “whole of building” approach. This introduces a range of local provisions for the Penrith Area. Furthermore, Part 8.2 is also relevant to Penrith City Park, outlining Sun Access provisions for areas within the LGA. Below, the LEP provisions and the relevant design response for each provision is outlined.

Reference	Provision	Design Response
7.4.a	Conserving Energy and reducing carbon dioxide emissions	Use of Energy Efficient LED Lighting & Four Skylights within Amenities Building ensures reduced Energy contribution from lighting. Bike racks within the park encourage the use of low-energy transport to and from the park, and energy efficient LED light poles and recessed wall/stair luminaires are used in conjunction to meet the required illuminance compliant with AS1158.3.1 and AS 4282
7.4.b	Embodied energy in materials and building processes	Materials outlined in initial designs have been selected with the purpose of reducing the embodied energy of the amenities building itself and its associated building processes, such as the use of a Salvaged Terracotta Tile on the western side of the building and use of Timber boards. In the park, use of low embodied energy materials such as green concrete and recycled brick ensure a more sustainable material approach
7.4.c	building design and orientation	The Amenities building, the only freestanding building in the park, has been designed with the areas of the greatest use, being the toilet block and change rooms, facing the north to maximise solar access, whilst incorporating shading devices with the purposes of controlling heat gain.
7.4.d	natural ventilation	Shaped Timber boards with openings for natural ventilation used as privacy guard on the northern side of the amenities building, with hit and miss bricks used on the upper area of the eastern side for natural ventilation through the toilet block while preserving privacy
7.4.e	energy efficiency and conservation	Furthermore, to the design response discussed in 7.4.a, a programmable control system can be used to analyse available daylight and the detection of motion to control lighting. This can ensure that sufficient lighting is provided throughout the night, and energy is not wasted on lighting throughout the day

7.4.f	water conservation and water reuse	To be included in the detailed design, water fixtures for use in the amenities building, including but not limited to toilets, sinks and taps shall be chosen with direct reference to the Water Efficiency Labelling and Standards (WELS) star scheme, ideally selecting products with ratings exceeding 4.5 stars.
7.4.g	water minimisation and recycling	In line with the above mention of the WELS scheme, water use shall be minimised with the use of fixtures chosen using this scheme. Passive irrigation is to be used to irrigate the trees within the park, minimising potable water use and storing and using storm/rainwater.
7.4.h	reduction of vehicle dependence	The Park itself will not have through traffic for vehicles, however public parking is available Parkside via Allen Place, which will drive down vehicle dependence. The project will improve walking access to the train station and provide support for cycling in the area.
7.4.i	potential for adaptive reuse	By designing areas for future multi-purpose uses such as event and market space, the park itself has potential for reuse in the future as per needs of the community
8.2.1	The objective of this clause is to protect public open space from overshadowing	The non-natural structures of the open & closed pergola and the Amenities Building (5.4m tall) shall not overshadow any residential areas or public open space.

3.2 DCP

Section 11.5 of the Penrith Development control plan for Penrith City Centre provides a framework for achieving sustainable development throughout the LGA. This section specifically addresses the following sustainability objectives.

1. Reflectivity
2. Maximising Liveability and Longevity
3. Reduce Resource Consumption

This introduces key controls and design objectives applicable to most new developments and sets minimum standards for these areas. The Penrith City park falls under the E11 Precinct of Penrith, as is subject to the following controls, with their associated design response assessed accordingly.

Reference	Provision	Design Response
11.5.1	<p>New buildings and facades should not result in glare that causes discomfort or threatens safety of pedestrians or drivers. Visible light reflectivity from building materials used on the facades of new buildings should not exceed 20%. Subject to the extent and nature of glazing and reflective materials used, a Reflectivity Report that analyses potential solar glare from the proposed development on pedestrians and motorists may be required.</p>	<p>Non-reflective materials have been chosen for the construction of the main features of the city park, such as timber for the pergola, and green concrete and recycled concrete for pavement sections. With limited use of reflective materials chosen for construction, and additional tree cover providing a protective layer for direct sunlight otherwise, the park will largely not result in glare. The amenities building itself will also not be a source of glare, with similar timber and recycled brick and terracotta materials chosen, and skylights protected so as not to result in glare towards the ground level.</p>
11.5.2	<p>Demonstrate how the passive and active environmental design features of the building design and proposed construction achieves ESD criteria and the 'whole of building' approach. Elements include, but not limited to:</p> <ul style="list-style-type: none"> a) Adaptability of buildings and floor levels within buildings to accommodate a range of uses over time; b) Occupant comfort and amenity; c) Fulfilling the Ecospecifier's Assessment criteria; and d) Incorporation of safety and crime prevention measures in the design of buildings and public domain as well as the siting of activities in the building. A report, prepared by a suitably qualified environmental design expert, may be required with the development application and application for Construction Certificate. Development proposals may require referral to the NSW Police for crime prevention and safety considerations, in accordance with the community safety protocol. 	<p>As seen in 7.4.i, there is potential for adaptive reuse throughout the park by design, with reference to both the amenities building and the open spaces of the park, taking advantage of temporary spaces for markets to ensure adaptability of the park. Amenity requirements have been accommodated with the inclusion of an amenities block and provision of drinking fountains, with fog fountains in use to increase comfort in a cooling capacity. It is also of note that safety and crime prevention has been undertaken, within the analysis of the lighting requirements of the park, with a Medium risk of crime established for the precinct, allowing for greater lighting throughout the night-time in the interest of safety of the community.</p>
11.5.3	<p>1) Materials with low embodied energy properties and/or materials that have been salvaged/ recycled are to be selected for the construction and fit out of the development. 2) Avoid using high environmental/high impact materials, such as volatile organic compounds (VOC's) and hydrofluoro-carbons (HCFC's) as these materials can become volatile at room temperature contributing to poor indoor air quality and affecting the health of occupants.</p>	<p>As described above in 7.4.b, the use of recycled and reused materials such as salvaged terracotta within the amenities building, and the use of recycled brick and green concrete ensure that low embodied energy materials have been selected for construction. It is also important to note that VOC's and HCFC's have been avoided in the design and construction of the city park where possible.</p>

4. Conclusion

This report has addressed the requirements outlined in the projects governing objectives and describes on how the project demonstrates its strong commitment to design excellence in sustainability incorporated within its design, construction and operation.

To repeat, the significant design initiatives the project is intending to include are as follows.

- Conserving Energy and reducing Carbon Dioxide emissions through use of energy efficient devices and daylighting
- Ensuring usage of lower embodied energy materials
- Taking advantage of natural ventilation to eliminate the need for auxiliary heating and cooling.
- Making use of programmable control systems to control lighting and ensure energy use aligns to the requirements of the spaces.
- Ensuring use of water efficient fixtures and fittings to reduce potable water demand/
- use of rainwater for irrigation purposes
- Reducing vehicle dependence through connection to public transport
- Minimising usage of Volatile Organic Compounds and Hydrochlorofluorocarbons in material selections.
- Designing spaces to also for reuse and repurposing in the future.
- Native Vegetation employed where possible to encourage the natural habitat of the Penrith area
- Trees existing on site have been kept in the interests of conservation of flora and fauna

The integration of these initiatives demonstrates the strong environmental commitments of the project, in line with the Penrith City Council's development guidelines and the design teams' aspirations for the project.