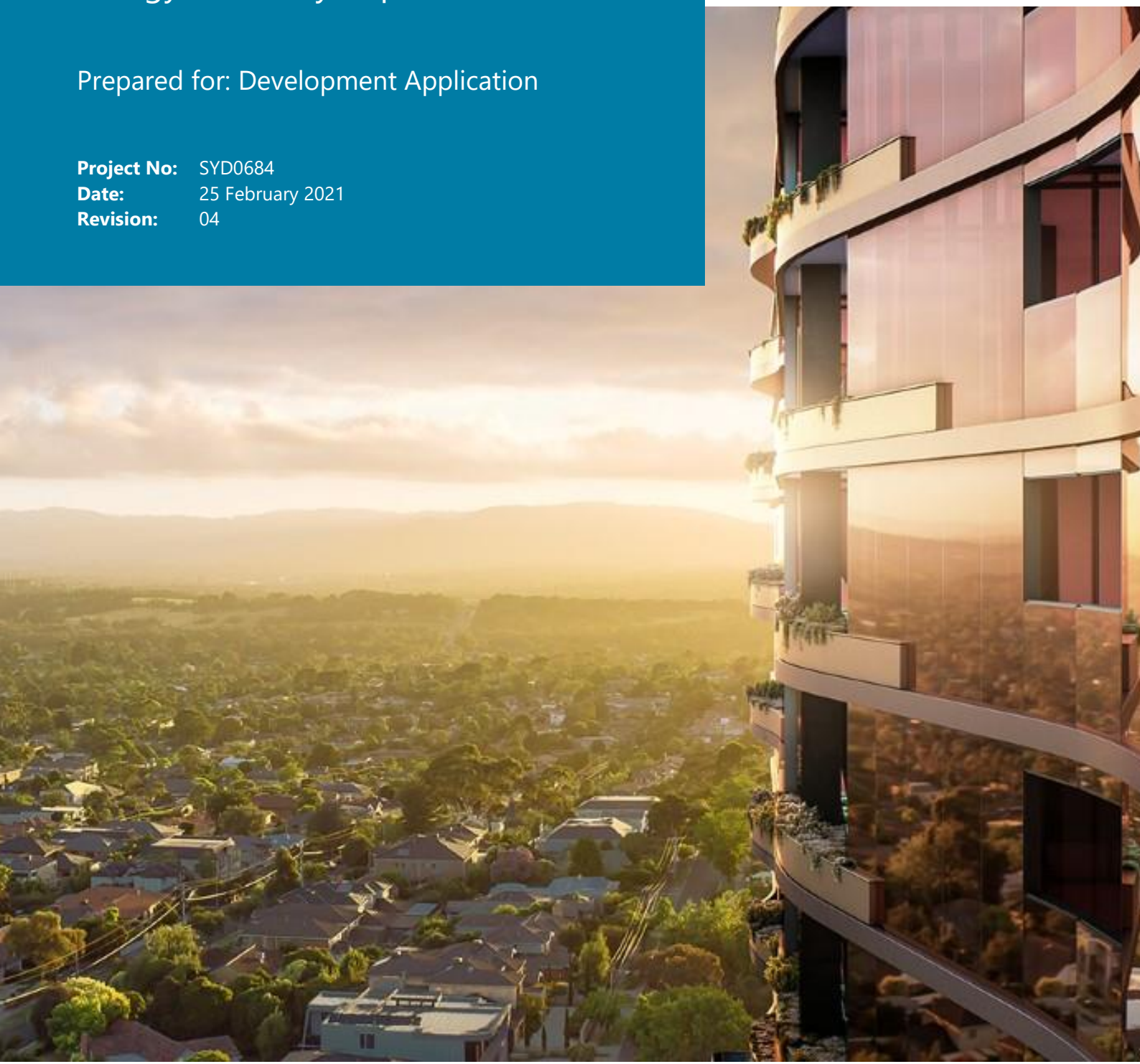
Eden Gardens

Energy Efficiency Report

Prepared for: Development Application

Project No: SYD0684
Date: 25 February 2021
Revision: 04



ADP Consulting : Engineering

Creating great environments with great people

Project:	Eden Gardens
Location:	307 Lane Cove Road Macquarie Park, NSW 2113
Prepared by:	ADP Consulting Pty Ltd Level 3, 8 Spring Street Sydney NSW 2000
Project No:	SYD0684
Revision:	04
Date:	25 February 2021

Rev	Date	Comment	Author	Technical Review	Authorisation & QA
01	28/10/20	Draft DA Issue	ZN	RR	MM
02	17/02/2021	DA Issue	ZN	RR	MM
03	23/02/2021	Updated DA Issue	ZN	RR	MM
04	25/02/2021	Minor Amendments for DA Issue	ZN	RR	MM

Project Team	
Client / Principal	Thunderbirds Are Go Pty Ltd atf the Gardeners Trust
Project Manager	Pier Property Corporation
Architect	DKO Architects

Contents

Executive Summary

Thunderbirds Are Go Pty Ltd have engaged ADP Consulting to provide an Energy Efficiency Report (EER) for the proposed development located at the 307 Lane Cove Road, Macquarie Park, NSW.

This EER has identified efficiency measures to address Council's Development Application (DA) requirements in accordance with the following framework:

- NSW Government - Local Environmental Plan (LEP) 2012
- City of Sydney - Development Control Plan (DCP) 2012
- City of Sydney – Sustainable Sydney 2030 Community Strategic Plan (2014)
- Section J provisions of the NCC 2019 Building (BCA) Code of Australia

It is understood that this document is required by Council to progress the projects Development Application.

To demonstrate compliance with the above requirements, the following works are intended to be carried out following DA approval:

- Investigate an improvement over the minimum compliance requirements outlined in the Building Code and explore (where feasible) any further council requirements or conditions of consent
- For the commercial tower, adopt the proposed building fabric requirements as outlined in the **ADP Eden Gardens JV3 Modelling Report (Rev 04)**, demonstrating that all facade elements (J1 & J3) and proposed building services design (J5-J8) will comply with Section J of the NCC 2019
- Where relevant to achieving the design intent, the project proposes to adopt a JV3 alternative verification method for the neighborhood shops, function centre, and restaurant to demonstrate that all facade elements (J1 & J3) and proposed building services design (J5-J8) will comply with Section J of the NCC 2019
- We anticipate that the intent of proposed architectural and building services design will likely be met through a performance-based approach, that will include:
  - A uniform glazing specification in line with the architectural intent for all facades for each proposed building
  - Trade off from various fabric and glazing elements as required to meet the proposed design intent of the building
  - Assessment of the mechanical and electrical services against the NCC 2019 Section J DTS provisions
- Explore opportunities for on-site rooftop solar photovoltaic (PV) generation on the carpark to assist with greater reductions in greenhouse gas emissions
- Optimised building services will be utilised to minimize the operational energy consumption of the proposed development, whilst providing the building occupants with a thermally comfortable space
- Develop a design solution to demonstrate that the proposed commercial tower may be capable of targeting a minimum NABERS Energy Office Base Build Rating of 5.5 stars
- Green Star and WELL initiatives

The energy efficiency initiatives discussed in this report will be investigated in further detail and developed throughout the projects detailed design stages to ensure that the development is compliant with the above frameworks and NCC Section J 2019 provisions.

1. Introduction

1.1 Project Background

ADP Consulting has been engaged by Thunderbirds Are Go Pty Ltd to provide an Energy Efficiency Report (EER) for the proposed development located at the 307 Lane Cove Road, Macquarie Park, NSW.

This EER Report has identified measures to address Council's DA requirements in accordance with the following frameworks:

- NSW Government - Local Environmental Plan (LEP) 2012
- City of Ryde - Development Control Plan (DCP) 2014
- Section J provisions of the NCC 2019 Building (BCA) Code of Australia

It is understood that this document is required by Council to progress the projects Development Application.

1.2 Report Scope and Limitations

The scope of this report includes a high-level assessment of the energy efficiency requirements for the development to comply with the local Council's DA framework, including:

- Design review against the NCC 2019, Section J DTS provisions.
- Other energy efficient measures adopted for the site, including (but not limited to) optimized building fabric, services, and passive design principles

This report has been prepared for DA purposes only and the energy efficiency measures will need to be fully developed during the detailed design stage.

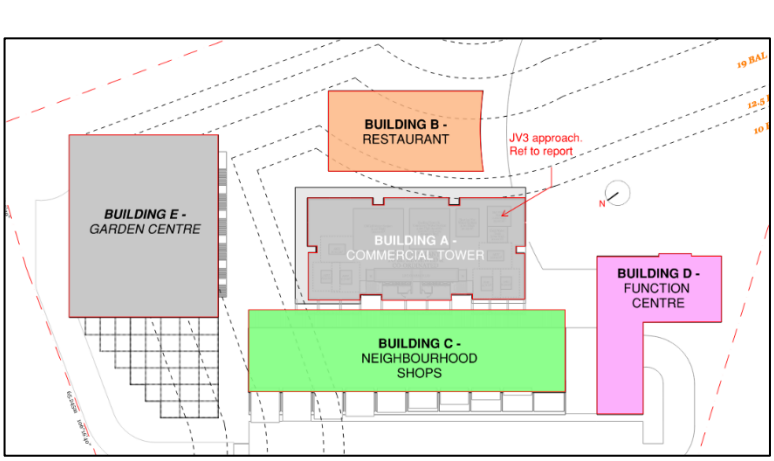
1.3 Site Context

The following new and existing buildings are to be located within the Eden Garden site boundary have been included in the scope of this Energy Efficiency Report:

Building Type	Development Type	Building Space Classification
Building A: Commercial Office Tower	New Building	Class 5 (Office)
Building B: Restaurant	New Building	Class 6 (Retail)
Building C: Neighbourhood Shops	Existing Building Additions & Alterations	Class 6 (Retail)
Building D: Function Centre	Existing Building Additions & Alterations	Class 9b (Retail)
Building E: Eden Gardens/Carpark & BOH services, Horticulture, Shops, and Garden centre	*New Building*	*Class 6 (Retail)*

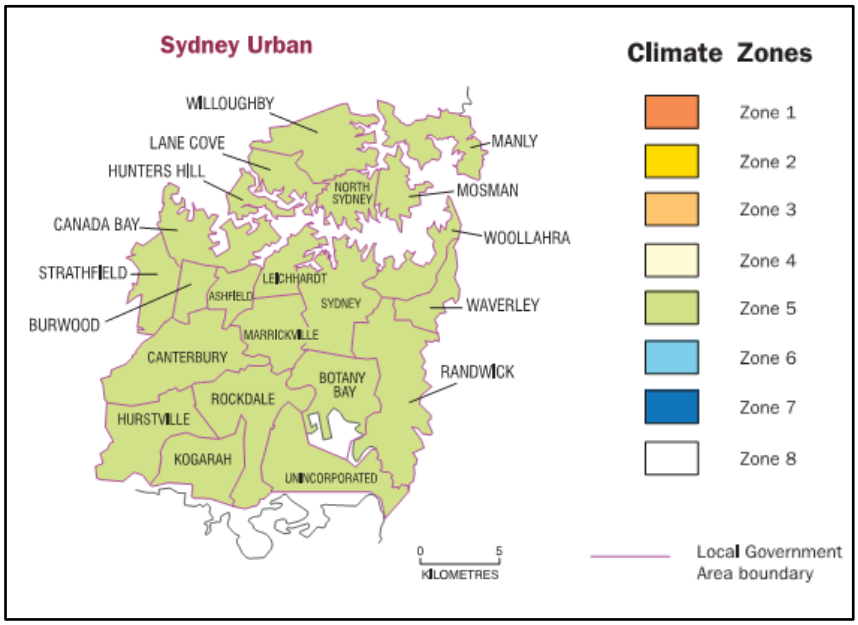
The site is located close to Macquarie Park within the City of Ryde Council boundaries and is located between the Lane Cove Road to the northwest and the Lane Cove National Park stretching out to the southeast.

Figure 1 Proposed Development Site Plan



The development is located within Climate Zone 5 (warm temperate) as per the Australian Building Codes Board (ABCB) Climate Zone Map (Figure 2).

Figure 2: ABCB Climate Zone Map



2. Environmentally Sustainable Design (ESD) Opportunities

2.1 General

This section outlines energy conservation design measures, in line with the City of Ryde Council DCP, including additional opportunities that are to be considered during the detailed design stage of the project.

The proposed buildings will be designed in line with the NCC 2019 Section J Energy Efficiency provisions and will consider energy efficient building services and optimized façade performance.

In addition to this, the heating, ventilation, and air-conditioning systems will be developed with a view to minimize the operational energy consumption of the proposed development, whilst providing the building occupants with a thermally comfortable space.

2.2 Energy Efficiency Measure & Initiatives

The project will explore key Environmentally Sustainable Design (ESD) opportunities to reduce the production of greenhouse gas emissions associated with the building design, construction and operations, and will seek to improve the buildings operational energy efficiency through the following design measures:

2.2.1 High Performance Building Fabric

The design team will explore the following:

- Provision of high-performing windows system to help reduce heat loss in winter and heat gain in summer
- Provision of appropriately placed external shading devices, horizontal shading fins to the east façade, and vertical shade fins to the north, west, and south facades of the commercial tower to reduce solar heat gains experienced during the day.
- Provision of high levels of insulation to the external walls, roof, and exposed floorings that form part of any new elements of the building envelope
- An appropriate window-to-wall ratio for the east and west glazed facades of the office
- Encourage passive solar design that not only maximises natural light to the space but aims to reduce reliance on artificial lighting and any associated energy expenditure
- Improved building fabric provisions for any new façade constructions of the neighbourhood shop and function centre to offset the existing constructions inefficient thermal performance

2.2.2 Efficient Heating, Ventilation, and Air Conditioning (HVAC) Design

The following HVAC systems have been identified as potential solutions to provide occupant thermal comfort to the space whilst minimising energy consumption.

The design team will explore the following:

- Basement carparks - CO monitoring with VSD fans

- Commercial tower:
  - Centralised water-cooled chiller system (COP ≥ 7.0)
  - Efficient hot water heat pumps (COP ≥ 5.0) for domestic hot water use
- Provisions for an all-electric heating system for the development consisting of:
  - Solar hot water heating for domestic hot water use
  - Highly efficient, solar powered hot water heat pumps for air conditioning heating
- Provision of CO2 sensors is intended to control the amount of outside air supplied by air handling units to space with variable occupancy. Where CO2 levels are lower than the set point, the volume of outside air is reduced. Energy saving is achieved through avoiding unnecessary conditioning of high outside air volumes
- Economy cycle will be explored providing outside air directly into the space cooling (when outdoor ambient temperatures are favourable). This is intended to reduce energy consumption through minimising the cooling load of the system

2.2.3 Passive Cooling & Indoor Air Quality

The project will explore opportunities for the Garden Centre and the winter gardens of the commercial tower to include provisions for natural ventilation. We note that the winter gardens are currently designed to include air conditioning, however will explore opportunities to maximise the use of cross flow ventilation through the winter gardens, where feasible through the design. We anticipate that this approach will help to:

- Drastically reduce the amount of energy required for cooling while at the same time helping to improve the indoor air quality within the space
- Maintain low energy expenditure whilst improving thermal comfort levels. The project will explore opportunities, in collaboration with the architect, to identify and include areas suitable for operable windows
- For the Garden Centre, provide opportunities for natural cross ventilation flow that can be achieved by having windows on more than one aspect of the level with direct exposure to prevailing winds, or windows that open to notably different pressure regions

2.2.4 Energy Efficient Lighting

The lighting design for the project will consider opportunities for high efficiency whilst providing optimal levels of visual comfort

The project will consider:

- High efficiency LED lights to provide adequate lighting levels with minimal energy expenditure
- Opportunities to deliver electric lighting that has been designed for energy efficiency and occupant comfort and will encourage well-lit spaces that are fit for purpose
- Efficiency measures for any common internal areas, including meeting rooms, corridors, lobbies, and any back of house spaces
- Careful design of daylighting controls to adjust electric lighting in response to daylight levels without causing undesirable noticeable switching effects or interactions
- Use of sensors including motion and photoelectric sensors to ensure back of house spaces and outdoor lighting is automatically switched off when not required

2.2.5 Daylighting & Shading Strategies for Reduced Energy Consumption

Daylighting initiatives and shading strategies will be considered to support the projects drive for energy efficiency including:

- The incorporation of fixed external solar shade structures that can dramatically reduce the radiant temperature of a space, improve thermal comfort levels, and reduce the energy required to cool the space.
  - An example of this already incorporated in the project includes the horizontal shading fins to the east façade, and vertical shade fins to the north, west, and south facades of the commercial tower
  - We will explore opportunities to provide additional horizontal shading to the glazed façade components of the neighbourhood shop and function centre
- The provision of vision glazing with good Visual Light Transmission (VLT) to allow for optimal levels of daylight whilst reducing the demand on the buildings electrical lighting need and corresponding energy consumption and costs
- The provision of high-performance glazing with a low solar heat gain coefficient to reduce unwanted heat gain from the sun, optimising the thermal comfort levels and reducing the energy required to cool the space

2.2.6 Solar Energy Generation & GreenPower Purchasing

On-site solar photovoltaic (PV) generation and GreenPower purchasing will be explored as an effective method to assist with greater reductions in greenhouse gas emissions, helping to minimise the developments electricity consumption from the grid and offset any associated operational greenhouse emissions.

The project will consider:

- Solar Photovoltaic (PV) cells are proposed to be located on large, unobstructed roof areas across all buildings and to the proposed canopy umbrella structures of the carpark. We will explore the systems size and capacities that can be generated from specific orientations to the north, west and east to avoid overshadowing
- Opportunities to utilise the most appropriate PV solution and system. We will consider a combination of different options, layouts, and orientations to optimise performance whilst considering the constrained space, orientation, and aesthetics of the project
- Greenpower purchasing to assist with the development's 5.5 Star NABERS Energy target. The project has the opportunity to purchase eligible offset units to support certified carbon offset projects (such as the Yarra Yarra Biodiversity Corridor) to compensate for emissions that cannot be completely reduced through energy efficient design or the generation of on-site renewable energy

2.2.7 NABERS Energy Target (Office Base Build)

The commercial office tower will be designed to target a 5.5 Star NABERS Energy Office Base Build Certification. This would be demonstrated through detailed energy modelling in accordance with the NABERS Handbook for Estimating NABERS Ratings.

This ensures that the building's environmental performance will be benchmarked to a high standard through the implementation of high-performance building fabric, highly efficient HVAC and vertical transportation systems, high efficiency lighting/fittings, and general overall reduction of GHG emissions.

Further design parameters will be considered during the detailed design stage to identify additional requirements that would support the NABERS Energy target.

2.2.8 Green Star & WELL Certification

The project has aspirations to explore a 5 Star Green Star Design & As-built V1.3 certification, and WELL initiatives aligned with WELL gold certification.

Opportunities and innovations aligned with Green Star that will be explored include:

- Optimising Energy:
  - Site Wide Solar PV Strategy
  - Fuel Switching Opportunities (Green Power Purchasing)
  - Circadian Lighting & OLED Technology
  - Electric Vehicle Charging & Supporting Infrastructure

Opportunities and innovations aligned with WELL aspirations that will be explored include:

- Enhancing occupant health whilst minimising operational energy consumption:
  - Thermal Comfort
  - High Levels of Natural Daylight
  - Enhanced Ventilation
  - Lighting Comfort
  - Glare Control

3. Conclusion and Recommendations

Based on the energy efficiency opportunities and initiatives identified in this EER, the following works are intended to be explored following DA approval:

- Investigate an improvement over the minimum compliance requirements outlined in the Building Code and explore (where feasible) any further council requirements or conditions of consent
- For the commercial tower, adopt the proposed building fabric requirements as outlined in the **ADP Eden Gardens JV3 Modelling Report (Rev 04)**, demonstrating that all facade elements (J1 & J3) and proposed building services design (J5-J8) will comply with Section J of the NCC 2019
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