

Block 20a, Edmondson Park Affordable Housing Project

Prepared for Landcom

NORTHROP.COM.AU



Document Information

PROJECT NUMBER:	251437
PROJECT NAME:	Block 20a, Edmondson Park Affordable Housing Project
REPORT TITLE:	Ecologically Sustainable Development (ESD) Report
CLIENT:	Landcom
REVISION:	4

REVISION	STATUS	REVISION BY	VERIFIED BY	DATE	COMMENT
1	Draft	Stefan Takac	Sumedh Kulkarni	19 January 2026	
2	Issue for SSDA	Stefan Takac	Sumedh Kulkarni	22 January 2026	
3	Issue for SSDA	Stefan Takac	Sumedh Kulkarni	06 March 2026	
4	Issue for SSDA	Stefan Takac	Sumedh Kulkarni	17 April 2026	

Northrop Consulting Engineers Pty Ltd

ACN 064 775 088 | www.northrop.com.au

© 2026 Northrop Consulting Engineers Pty Ltd. All rights reserved.

Northrop Consulting Engineers Pty Ltd (**Northrop**) has been retained to prepare this report based on specific instructions, scope of work and purpose pursuant to a contract with its client. It has been prepared to the standard of skill, care and diligence that would be expected of a competent professional consultant engineer practicing in the particular relevant fields applicable to the scope of work at the time it was prepared. No other warranty, express or implied, is made as to the professional advice included in this report.

This report has been prepared for the use by **Landcom/Department of Planning Housing and Infrastructure**. Except where expressly permitted in writing or required by law, no third party may use or rely on this report unless otherwise agreed in writing by Northrop. Where this report indicates that information has been provided to Northrop by third parties, Northrop has made no independent verification of this information except as expressly stated in the report. Northrop is not liable for any inaccuracies in or omissions to that information. The report was prepared on the dates shown and is based on the conditions and information received at the time of preparation. This report should be read in full, with reference made to all sources. No responsibility is accepted for use of any part of this report in any other context or for any other purpose. Northrop does not purport to give legal advice or financial advice. Appropriate specialist advice should be obtained where required. To the extent permitted by law, Northrop expressly excludes any liability for any loss, damage, cost or expenses suffered by any third party relating to or resulting from the use of, or reliance on, any information contained in this report.

CONTENTS

Document Information.....	1
CONTENTS	1
Executive Summary.....	3
1 Introduction.....	4
1.1. Project Overview	4
1.2. Project Objectives.....	4
1.3. Proposed Development	4
1.4. Report Purpose	5
2 Site Information	6
2.1. Site Analysis.....	7
3 Project Background.....	9
3.1. Concept Plan Approval	9
3.2. Modification No.5 to the Concept Approval.....	9
4 Methodology.....	10
4.1. Secretaries Environmental Assessment Requirements (SEARs)	10
4.2. Environmental Planning and Assessment Regulation 2021.....	10
4.3. State Environment Planning Policies (SEPP) 2022 - Sustainable Buildings Requirements.....	11
4.4. Liverpool Development Control Plan (DCP) 2008	12
4.5. Edmondson Park South Development Control Plan (DCP) 2012	12
4.6. Limitations	12
5 Ecologically Sustainable Design Strategies	13
5.1. Energy Efficiency.....	13
5.2. Energy Generation	14
5.3. Indoor Environment Quality	14
5.4. Water Efficiency.....	15
5.5. Water Sensitive Urban Design	16

5.6.	Circular Economy and Waste Management	16
5.7.	Low Impact Materials Selections.....	17
5.8.	Sustainable Transport.....	17
5.9.	Mitigating Urban Heat Island Effect	17
5.10.	Improved Ecology.....	18
6	Green Star Framework.....	19
6.1.	Overview.....	19
6.2.	Green Star Buildings.....	19
7	Conclusion	24

Executive Summary

This Ecologically Sustainable Development (ESD) report has been prepared by Northrop Consulting Engineers to accompany an application for a State Significant Development (SSD-99909708) for infill Affordable Housing at part Lot 40 DP1286151, Edmondson Park also known as Block 20a.

The report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-99909708).

This report concludes that the proposed development is suitable and warrants approval subject to the implementation of the sustainability initiatives detailed in Section 5, including but not limited to:

- Exceeding the energy efficiency requirements of Section J of the Building Code of Australia.
- Exceeding the energy, water and thermal performance requirements of BASIX.
- Designing a highly efficient façade wall-glazing system to minimise heat gains while maximising daylight entry for daytime-occupied areas.
- Reducing potable water use through high WELS-rated sanitary fixtures and fittings.
- Collecting and reusing rainwater to conserve water resources.
- Increasing the use of daylighting to reduce reliance on artificial lighting and lower power consumption.
- Implementing comprehensive waste minimisation strategies.
- Adopting Water Sensitive Urban Design (WSUD) principles to manage stormwater effectively and protect water quality.
- Installing a solar array to generate renewable energy and reduce dependency on the grid.
- Providing electric vehicle (EV) charging infrastructure to support the transition to low-emission transport.
- Incorporating secure bicycle parking to encourage active transport.
- Selecting low-carbon materials to minimise embodied carbon in construction.

The integration of these initiatives demonstrates a strong social and environmental commitments of the project, aligning the project to an Australian Excellence Sustainability Standard and effectively addressing and mitigating the negative environmental, social, and economic impacts associated with the project. The project seeks to meet and exceed the sustainable requirements set for both residential and non-residential developments. Further, the proposed building initiatives provide a cost-effective solution in design, construction and operation and the design team is committed to further pursuing the goals of sustainable development across this site as the project progresses.

1 Introduction

This Ecologically Sustainable Development (ESD) report has been prepared by Northrop Consulting Engineers to accompany an application for a State Significant Development (SSD-99909708) for infill Affordable Housing at part Lot 40 DP1286151, Edmondson Park also known as Block 20a. Block 20a is subject to development approval (DA-421/2025) which will subdivide Lot 40 into several smaller allotments. The development will be constructed on future Lot 401 and relies on future Lot 402 which is dedicated to becoming a future laneway.

1.1. Project Overview

As the NSW Government's land and property development organisation, Landcom has a mandate to take a lead role in improving the supply, diversity, and affordability of new housing in NSW.

Landcom aims to create innovative and productive places that demonstrate global standards of liveability, resilience, inclusion, affordability, and environmental quality, and uses its sites and close working relationships with the private sector to deliver quality, socially inclusive community places, where people can grow and thrive regardless of income levels and stages of life.

In response to the NSW Government's commitment to increasing the supply of Affordable Housing under the National Housing Accord, Landcom has committed to delivering 1,800 affordable rental housing dwellings by 2029. As part of this commitment, Block 20a at Edmondson Park has been earmarked as a suitable site for infill affordable housing.

1.2. Project Objectives

Landcom's objectives for the project are:

- Delivery of sustainable high quality affordable accommodation.
- Provide a sense of place within the development to ensure good high-quality accommodation.
- The use of robust materials that allow for long service life of the building.
- Create a building that meets the needs of the community and serves the requirements of the area.
- To establish seamless integration of cultural and sustainable objectives that align to Landcom's key principles.

1.3. Proposed Development

Landcom is seeking development consent to construct an infill affordable housing development. Development consent is sought for:

- Site preparation works;
- Earthworks and associated site works;
- Construction of:
 - One (1) level of basement car parking comprising of 58 car parking spaces, bicycle parking, storage and associated services
 - Three (3) inter-connected buildings across the site comprising;
 - One, fifteen (15) storey building located along the north-eastern corner of the site;
 - One, nine (9) storey building located along the eastern side of the site;
 - Four, two-storey attached terraces.
 - Ground floor includes five (5) at grade parking spaces including three (3) dedicated car share spaces and two (2) retail car parking spaces;
 - Two main lobby areas which are designed to be adaptable and cater for co-working;
 - A retail unit;

- A landscaped plaza along the eastern side of the site;
 - Small office space for a Community Housing Provider;
 - Communal room for residents on the second floor;
 - Large area of communal open space located on Level 2;
 - Associated amenities for services and waste
- A total of 172 affordable housing units are to be delivered.

The proposed development has an estimated development cost that exceeds \$30million and 100% of the gross floor area of the development will be used for the purposes of affordable housing. Accordingly, the proposal is SSD for the purposes of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP).

1.4. Report Purpose

This Report has been prepared to address the following 'Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Housing and Industry on 26 November 2025.

Table 1: Secretary's Environmental Assessment Requirements

SEARS REQUIREMENTS		REPORT SECTION
Ecologically Sustainable Development	Identification of how esd principles (as defined in section 193 of the ep&a regulation) are incorporated in the design and ongoing operation of the development.	Section 4.2
	Where relevant, provide an assessment of the development against the standards for non-residential development set out in Chapter 3 of State Environmental Planning Policy (Sustainable Buildings) 2022.	N/A

2 Site Information

The proposed development site is in the Liverpool Local Government Area within the Town Centre North precinct of Edmondson Park South. Edmondson Park South is identified in the Western City District Plan as a Local Centre in recognition of its proximity to the Southwest Rail Line and the Edmondson Park Railway Station. It borders the motorway intersection of the M31, M5 and M7 with Camden Valley Way, providing excellent road access to a large extent of the Greater Sydney Metropolitan Area.

The proposed development site is a 3,385m² parcel of land currently known as Block 20a and part of Lot 40 in DP1286151, Croatia Avenue, Edmondson Park (Figure 1). A Site Plan (aerial view) is provided at Figure 2.



Figure 1: Site location in the broader context highlighting the Edmondson Park precinct boundaries



Figure 2: Site Location (Source: GRC Hydro, October 2025)

2.1. Site Analysis

Table 2 summarises the key features of the site which have the potential to impact or be impacted by the proposed development.

Table 2: Key Features of the Site and Surrounds

ATTRIBUTE	SITE DETAILS
Land ownership	The site is owned by Landcom.
Land configuration	- The site has an approximate area of 3,385m². - The site forms part of Lot 40 DP1286151 and is subject to development approval to create two new allotments (Lots 401 and 402). - The site is irregular in shape and has frontages of: - Approximately 42 metres to Buchan Avenue. - Approximately 84 metres to new Macdonald Road. - The site includes a splay of approximately 7.36m along the north-western corner. Approximately 48m combined frontage width to the southern future laneway (Lot 402).
Topography and geology	- The site is vacant and generally level with a slight slope and fall from west to east with a crossfall of some 2.5m - Geotechnical Report will be able to confirm these details of subsoil conditions and geology.
Existing features	The site is currently vacant.
Easements and covenants	The site is currently unencumbered of easements and covenants.
Local context	The site and its surrounds are generally made up of large super lots comprising remnant vegetation, cleared areas, grassed paddocks and scattered, which are undergoing progressive development.
Regional context	- The site is strategically positioned between the Western Sydney Aerotropolis and the regional centres of Liverpool and Campbelltown/Macarthur. - The site is approximately 10km from Liverpool CBD, 14km from Campbelltown CBD and 25km the future Western Sydney International Airport (WSI) and Aerotropolis, which is earmarked to become Sydney's third CBD (Figure 6). - The site is accordingly well placed to leverage off the growth and job opportunities from these strategic centres and the WSI and Aerotropolis. The Region Plan and District Plan show that these strategic centres will play a critical role in attracting investment, business activity and jobs across Greater Sydney. - The site and broader Edmondson Park Town Centre are anchored by the Edmondson Park Train Station and Southwest Railway Line. These public transport corridors will act as a gateway which will integrate the site with the broader Western Parkland City, the WSI and Aerotropolis.
Infrastructure	Civil works for future Macdonald Road are underway.
Site access	Vehicular access to the site is proposed via the rear laneway (future Lot 402). Pedestrian access to the site is via Buchan Avenue.
Services	- Services will be provided through DA1098/2021 including sewer, potable water, recycles water, electrical and communications. The site will be independently serviced with appropriate metering to the apartments. - Service will enter the site from the Northeast.
Contamination	- A Site Audit Statement issued for the site confirms it is suitable for the purposes of 'residential with gardens and accessible soil'. - No further potential sources of contamination have been identified to date.

ATTRIBUTE	SITE DETAILS
Stormwater and flooding	- The site is situated to the south of Maxwell Creek – a tributary of Cabramatta Creek and Georges River. - Liverpool City Council's online flood mapping tool indicates the site is not flood prone.
Bushfire risk	The site is no longer mapped as Bushfire prone.
Biodiversity	Edmondson Park South has been Biodiversity Certified under the now repealed Threatened Species Conservation Act 1995. It is also covered by a Conservation Agreement under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
Aboriginal heritage	- No Aboriginal heritage items, Aboriginal objects, or areas of archaeological potential are considered likely to be present within the site. - AHIP No.C0001134 (AHIMS 3849) has been issued for Edmondson Park South, Southwest Growth Centre which approved salvage works.
European heritage	- The site does not contain any mapped items of non-Aboriginal heritage. - There are no heritage items or conservation areas within the immediate vicinity of the site.

3 Project Background

3.1. Concept Plan Approval

The Edmondson Park Concept Plan (MP 10_0118), initially approved in August 2011 under the former Part 3A of the EP&A Act, provides for a new diverse and sustainable urban community covering an area of 605.4 hectares. Once complete, Edmondson Park South is expected to accommodate a mix of land uses, a diversity of housing, a new town centre incorporating retail, business and commercial floor space with employment opportunities, multi-purpose community and education facilities, a new 150-hectare regional park, several other local parks, and environmental conservation areas.

The Concept Plan has been modified several times to date. Since the Concept Plan's approval, staged development applications have also been determined and constructed, with Edmondson Park now comprising a growing local centre with shops and supporting community services, residential dwellings and open space and public domain.

3.2. Modification No.5 to the Concept Approval

Modification No.5 relates to Town Centre North (TCN) and Precinct 3 within the Edmondson Park South area and approval of the modification supported the following changes:

- Amend the Concept Approval boundary to include 2.5ha of land owned by Office of Strategic Lands (OSL).
- Establish a maximum gross floor area (GFA) of 140,389sqm for the TCN Station Precinct which is to be distributed across four quadrants.
- An increase to building heights from 12m-24m to 12m-50m (with one 67m landmark building).
- Reduce the size of the school site from 8ha to 6ha.
- Amend the road network and bushfire asset protection zones.
- Establish TCN design guidelines (the Design Guidelines) and a Design Excellence Strategy (DES)
- Enter into a planning agreement with Liverpool City Council and amend the Statement of Commitments.

The proposed development aims to satisfy the maximum height and Gross Floor Area provisions and is generally consistent with the Design Guidelines (refer to Figure 3 below).

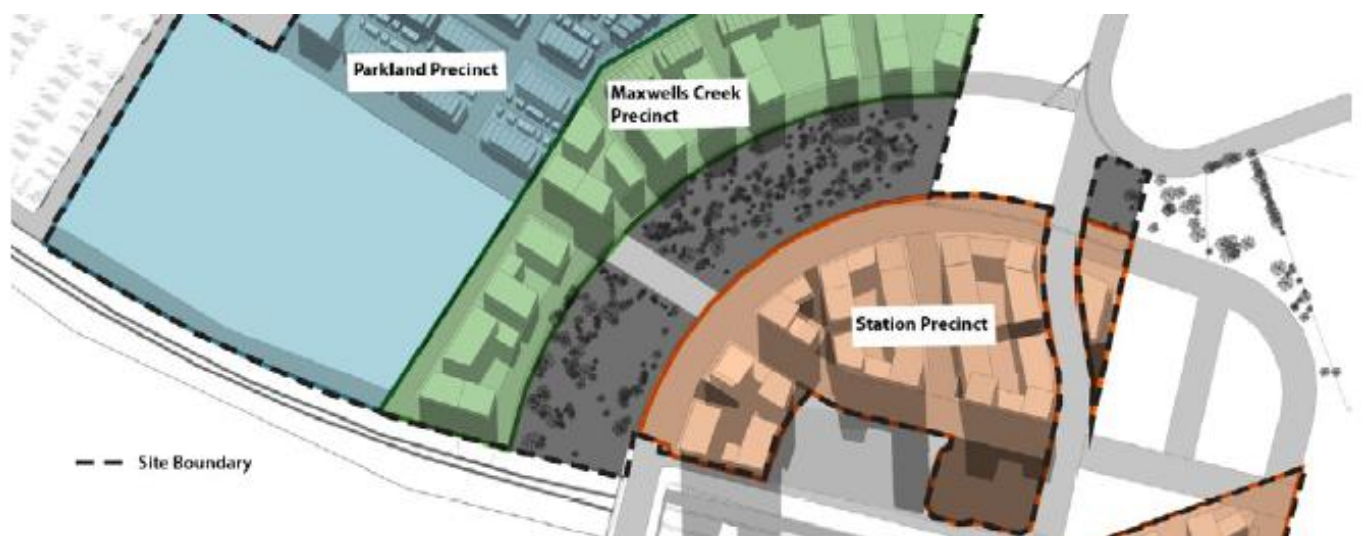


Figure 3: Extract from the Concept Masterplan approved under MOD 5 (Source: Edmondson Park Town Centre North Design Guidelines, October 2024)

4 Methodology

Information contained within this report has been prepared in direct response to:

- Secretary's Environmental Assessment Requirements (SEARs)
- Environmental Planning and Assessment Regulation 2021
- State Environmental Planning Policy (Sustainable Buildings) 2022
- Liverpool Development Control Plan (DCP) 2008 (September 2024)
- Edmondson Park South Development Control Plan (DCP) 2012

The ESD initiatives and targets outlined within this report have been compiled based on the following:

- Best practice design principles.
- National Construction Code (NCC) Section J – Energy Efficiency Targets.
- Building Sustainability Index (BASIX).
- Green Star Buildings Submission Guidelines
- Landcom Town Centre North Design Guidelines (2024)

4.1. Secretaries Environmental Assessment Requirements (SEARs)

This report discusses how the proposed development addresses Ecologically Sustainable Development (ESD) of the SEARs. The requirements are outlined below, along with references to where each response can be found within this report.

Table 3: Response to Ecologically Sustainable Development (ESD) of the SEARs

ITEMS FOR INCLUSION	SECTION REFERENCE IN THIS REPORT
Identification of how ESD principles (as defined in section 193 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development.	Section 4.2
Where relevant, provide an assessment of the development against the standards for non-residential development set out in Chapter 3 of State Environmental Planning Policy (Sustainable Buildings) 2022.	N/A

4.2. Environmental Planning and Assessment Regulation 2021

The following section describes how ESD principles (as defined within clause 193 of the Environmental Planning and Assessment Regulation 2021) are incorporated in the design, construction, and operation phases of the project.

PRINCIPLE	OBJECTIVE	DESIGN RESPONSE
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 applying the precautionary principle, public and private decisions should be guided by:	Through the implementation of environmental management and building maintainability, the project will incorporate a focus on adaptability and resilience into the project design. The concept behind the precautionary principle is to create features in the project that can both; adapt to changes, which may

PRINCIPLE	OBJECTIVE	DESIGN RESPONSE
	- careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and - an assessment of the risk-weighted consequences of various options.	eventuate in the future, and avoid the risk of serious or irreversible damage to the environment.
Inter-generational equity	Namely, that the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	To ensure the maintenance or enhancement of the health, diversity, and productivity of the environment for the benefit of future generations, the design will incorporate initiatives such as best practices PVC and low-impact paints, sealants, adhesives and FSC certified wood. Additionally, there will be a focus on integrating more vegetation and enhancing the connection with nature. Through these measures, the project will demonstrate a strong commitment to preserving the environmental health, diversity, and productivity of the local area.
Conservation of biological diversity and ecological integrity	Namely, that the conservation of biological diversity and ecological integrity should be a fundamental consideration.	By planting native vegetation, reducing stormwater runoff from the site, and employing integrated landscaping, the project aims to enhance, conserve, and support biological diversity and maintain overall landscape integrity.
Improved valuation, pricing, and incentive mechanisms	Namely, that environmental factors should be included in the valuation of assets and services, such as: - polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement, and - the users of goods and services should pay prices based on the full life cycle of the costs of providing the goods and services, including the use of natural resources and assets and the ultimate disposal of waste, and - established environmental goals 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.	The design of this development will employ lifecycle costing to determine the optimal strategy for major plant items. Decisions will be based on whole-of-life costs rather than capital expenditure alone. The project will involve significant input from the Quantity Surveyor, who will ensure that the project remains on budget and effectively considers environmental factors in the valuation of assets and services.

4.3. State Environment Planning Policies (SEPP) 2022 - Sustainable Buildings Requirements

The SEPP (Sustainable Buildings) 2022 outlines new requirements to allow projects to reduce greenhouse gas emissions. This section specifically addresses the following sustainability objectives.

RESIDENTIAL DEVELOPMENT

Table 4: Response to SEPP (Sustainable Buildings) 2022 Requirements – Residential development

REFERENCE	OBJECTIVE	DESIGN RESPONSE
BASIX	Reduce water and energy consumption and greenhouse gas emissions from new houses and apartments.	The development will obtain a BASIX certificate issued by the Planning Secretary (not part of this report).

4.4. Liverpool Development Control Plan (DCP) 2008

Part 1 of the DCP provides specific objectives and controls that apply all land in Liverpool Local Government Area (LGA). The requirements relevant to sustainability are outlined below, along with references to where each response can be found within this report.

Table 5: Response to Ecologically Sustainable Development (ESD) of the Liverpool Development Control Plan (DCP) 2008

ITEM	CONTROLS	SECTION REFERENCE IN THIS REPORT
6.8 Water Conservation	New dwellings, including a residential component within a mixed-use building and serviced apartments intended or capable of being strata titled, are to demonstrate compliance with State Environmental Planning Policy – Building Sustainability Index (BASIX).	The development will obtain a BASIX certificate issued by the Planning Secretary (not part of this report).
22. Energy Conservation	New dwellings, including multi-unit development within a mixed-use building and serviced apartments intended or capable of being strata titled, are to demonstrate compliance with State Environmental Planning Policy – Building Sustainability Index (BASIX). A complying BASIX report is to be submitted with all development applications containing residential activities.	The development will obtain a BASIX certificate issued by the Planning Secretary (not part of this report).

4.5. Edmondson Park South Development Control Plan (DCP) 2012

Table 1 of the DCP of the set out the broad level development outcomes for Edmondson Park South. The requirements relevant to sustainability are outlined below, along with references to where each response can be found within this report.

Table 6: Response to Ecologically Sustainable Development (ESD) of the Liverpool Development Control Plan (DCP) 2008

ITEM	DESIRED OUTCOMES	SECTION REFERENCE IN THIS REPORT
Sustainability	- Core biodiversity areas are retained and observed. - Open spaces are well connected. - Water sensitive urban design measures, including the use of recycled water and integrated options for water supply, wastewater and stormwater servicing. - Lots are oriented to optimise solar access. - Public transport use, walking and cycling is encouraged	Section 5

4.6. Limitations

Due care and skill have 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 consider that party's requirements.

5 Ecologically Sustainable Design Strategies

The project will incorporate a set of ESD strategies which minimise the impact and, where feasible, enhance the ecological, social and economic outcomes for construction workers, future tenants, the wider community and ecosystem ecologies both local, regional and global.

5.1. Energy Efficiency



Energy efficiency in buildings is crucial for optimising resource use, reducing operational costs, and minimising environmental impact. Energy-efficient technologies and practices will be prioritised throughout the design development process. It is anticipated that the measures outlined below will provide significant savings in energy use.

5.1.1. FABRIC OPTIMISATION

Intelligent design and material selection will ensure thermal comfort is achieved without relying solely on mechanical means. Passive design strategies such as performance glazing, shading and use of insulation will reduce demand on the mechanical air conditioning systems leading to lower energy consumption and greenhouse gas emissions.

Implementing effective shading design ensures consistent access to daylighting throughout the building, consequently helping to minimise the use of artificial lighting.

The building fabric will be designed to meet or exceed the NCC 2022 and BASIX requirements for building envelope. Thermal breaks will be incorporated into walls and roofs where appropriate.

5.1.2. GREEN ROOF INTEGRATION

Green roofs significantly reduce the energy demand for air conditioning by providing natural insulation and cooling benefits. The combination of vegetation and soil on a green roof perform as a thermal barrier, minimising heat transfer between the exterior and interior of the building. This helps keep indoor temperatures more consistent, thereby reducing the energy demands on HVAC systems.

5.1.3. ENERGY EFFICIENT EQUIPMENT

Only energy-efficient appliances and equipment will be used in the project, with a focus on selecting systems with higher Seasonal Energy Efficiency Ratio (SEER) rating when compared to Section J/ Minimum Energy Performance Standards (MEPS) requirements.

5.1.4. HVAC SYSTEM

The air-conditioning and ventilation systems will be designed to comply or exceed the minimum requirements of NCC 2022 Section J Part J6.

Ductwork and pipework systems will be designed to reduce system pressure losses to reduce fan and pump motor power. This includes the selection of equipment for reduced coil and vessel pressure drops and being generous with ductwork and pipework sizes to reduce friction losses.

5.1.5. HIGHLY EFFICIENT LIGHTING SYSTEM

Installing efficient lighting systems, such as LED lighting, throughout the building will significantly decrease its overall energy consumption. LED lights are more efficient than traditional fluorescent lights and are characterized by an extended lifespan contributing to a reduction in carbon emissions. They are also efficient in dissipating heat and therefore reduce the heat load experienced within conditioned spaces.

Lighting will be designed to comply or exceed the minimum requirements of NCC 2022 Section J Part J7.

5.1.6. ENERGY METERING AND MONITORING

An energy metering and monitoring strategy will be implemented to effectively monitor the main energy uses within the building as per the requirements of Section J9D3 in the NCC 2022.

5.2. Energy Generation



Renewable energy generation is essential for optimising building's efficiency, reducing reliance on fossil fuels and decreasing greenhouse gas emissions. The measures are expected to achieve significant energy savings and enhance overall efficiency.

5.2.1. PHOTOVOLTAIC (PV) PANELS

Integrating PV panels into the design will reduce reliance on external power sources and lower utility bills. Solar arrays will help offset on-site energy consumption and reduce peak daytime demand from the grid, resulting in cost savings and enhanced energy efficiency.

5.3. Indoor Environment Quality



Indoor environment quality is always an important consideration in spaces that are regularly occupied. The following have been considered as part of the building design.

5.3.1. DAYLIGHT ACCESS

An integrated daylighting strategy will be applied across the project to maximise natural light and direct sunlight in all occupied spaces through high Visible Light Transmission (VLT) glazing. This will enhance occupant wellbeing by creating a visually stimulating and comfortable environment.

In addition to promoting occupant comfort, providing daylight will reduce the overall energy consumption of the building. Natural light will alleviate the need for artificial lighting whilst the direct sunlight will enhance thermal comfort during cooler months.

5.3.2. INDOOR AIR QUALITY (IAQ)

The quality of indoor air has a significant impact on both our health and the environment, potentially leading to adverse health effects such as allergies and asthma.

To address this concern, the project will improve the access to outdoor air to regularly occupied spaces, which will reduce CO₂ build up and improve occupant's comfort.

5.3.3. INTERIOR NOISE LEVEL CONTROL

Internal noise levels will be actively considered with the building layout and systems design, taking into account how noise will reverberate through the building. The use of acoustic insulation and sound isolation measures will ensure that interior noise levels to be maintained below acceptable limits.

5.3.4. MATERIAL SELECTION

Materials selection for the project aims to improve the internal environment of the site with materials with low volatile organic compound (VOC) and formaldehyde content preferred to help minimise respiratory issues for building occupants.

5.4. Water Efficiency



A strong focus has been put on the effective management of water within the building with the following initiatives being included in the design in all areas throughout the project.

5.4.1. RAINWATER CAPTURE AND REUSE

The site's extensive building roofs offer significant potential for rainwater harvesting, presenting a particularly advantageous opportunity. The project design will incorporate rainwater harvesting systems to collect, store, and distribute rainwater to offset the site potable water usage. Currently, it is proposed that the harvested rainwater will be used for irrigation.

5.4.2. RECYCLED WATER CONNECTION AND REUSE

A recycled water main is available to service the site, providing an opportunity to significantly reduce potable water consumption. The project design will incorporate provisions to connect to the recycled water network and distribute recycled water to nominated non-potable end uses within the development.

It is proposed that recycled water will be utilised for toilet flushing and laundry washing machines, which represent a substantial proportion of the building's internal water demand. In addition, recycled water will be used to top up the rainwater tank when harvested rainwater is insufficient, ensuring reliable non-potable water supply during extended dry periods.

5.4.3. WATER EFFICIENT EQUIPMENT

Water efficient fixtures and fittings will reduce the water consumption of the site. All sanitary fixtures and water-using appliances installed within the project's scope should, at minimum, meet the following WELS ratings:

Table 7: Sanitary Fixtures Efficiency

FIXTURE / EQUIPMENT TYPE	WELS RATING	WELS LABEL
Taps - Kitchen	4 Star	
Taps	5 Star	
Urinals	5 Star	
Toilet	4 Star	
Showers	3 Star	
Dishwashers	5 Star	

5.4.4. LANDSCAPING

The planting design features native and drought-resistant species, including trees, shrubs, groundcovers, and grasses. These plants are chosen from local vegetation to ensure they are well-adapted to the local climate. Once established, they require less water, reducing the need for frequent irrigation and minimising water waste. This diverse selection of plants results in a visually appealing and resilient landscape that requires minimal maintenance.

5.4.5. IRRIGATION SYSTEMS

The irrigation systems will use real-time weather data, including rainfall, temperature, and humidity, to optimise watering schedules and prevent overwatering during wet conditions while ensuring adequate moisture during dry periods. Drip irrigation will be employed to deliver water directly to the plant roots, reducing evaporation, water waste and runoff.

5.5. Water Sensitive Urban Design



Water Sensitive Urban Design (WSUD) stands at the forefront in modern urban planning, offering innovative solutions to the complex challenges of water management in urban environments.

5.5.1. STORMWATER MANAGEMENT & TARGETS

The project will prepare a Stormwater Management Plan, including calculations and strategies for containing and discharging stormwater from the site. The plan will address stormwater quality objectives and incorporate treatment measures to meet the pollution reduction targets outlined in the Council's DCP.

5.5.2. VEGETATION

Green roofs and drought-tolerant landscaping are key strategies for managing stormwater. Green roofs will capture and absorb rainwater, reducing runoff and filtering pollutants to improve water quality. Drought-tolerant plants will further reduce runoff and enhance groundwater recharge. These practices will support sustainable urban water management and contribute to long-term environmental resilience.

5.5.3. PERMEABLE PAVEMENTS

Permeable unit pavers are proposed for pedestrian paths and hardstands within the landscape to facilitate water infiltration into the soil and reduce pressure on stormwater systems.

5.6. Circular Economy and Waste Management



Effective waste management throughout construction and operation of the site will help to promote resource efficiency and minimise the adverse environmental impacts of the project. By integrating circular economy principles, a system can be created where materials are reused, recycled and repurposed, reducing waste and conserving natural resources. The following are being considered as part of the design process.

5.6.1. WASTE MANAGEMENT PLAN

A Waste Management Plan will be prepared with the following key objectives:

- To minimise the environmental impacts of the operations of the development.
- To minimise the impact of the management of waste within the development.
- To ensure waste is managed to reduce the amount landfilled and to minimise the overall quantity generated.
- To ensure appropriate storage and collection of waste.

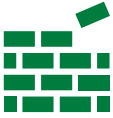
5.6.2. SEPARATED WASTE AND RECYCLING STREAMS

Separate waste and recycling streams will be provided to support effective recycling of the project's operational waste. By segregating waste appropriately, the building's operational efficiency will improve, leading to substantial environmental benefits. The Waste Management Plan will specify the processes for interim and final waste storage, transfer, and collection.

5.6.3. CONSTRUCTION WASTE MINIMISATION

The project will limit the amount of construction waste sent to landfill with the aim of at least 90% of all waste produced to be sent to recycling facilities or reused onsite.

5.7. Low Impact Materials Selections



Embodied energy will be reduced by avoiding unnecessary use of materials and procuring materials with a low carbon footprint where appropriate.

5.7.1. SUSTAINABLE SOURCING

Steel and concrete suppliers with environmental product disclosures (EPDs) will be preferred to support the improvement of industry standards and transparency of information on material impacts.

5.7.2. LOCAL MATERIALS

Materials that are locally sourced will be preferred to reduce transportation impacts and support local economies. Local materials typically have a lower carbon footprint due to reduced shipping distances.

5.8. Sustainable Transport



The following site attributes and sustainable transport initiatives will be implemented to reduce carbon emissions associated with transport, and access to amenities by building users.

5.8.1. ELECTRIC VEHICLES (EV) INFRASTRUCTURE

Provisions for dedicated car parking spaces equipped with charging infrastructure will be strategically implemented for electric vehicles. The aim is to encourage the adoption of electric vehicles to promote green transport, thereby minimising greenhouse gas emissions and promoting sustainable transportation practices.

5.8.2. BICYCLE PARKING

The project will include dedicated bicycle parking for residents, visitors and employees. These facilities will be conveniently located and designed to meet security and accessibility requirements. It will encourage cycling as a preferred mode of transport. By promoting cycling over car use, the project aims to reduce greenhouse gas emissions, decrease traffic congestion, and support sustainable transport practices that contribute to improved environmental and community outcomes.

5.8.3. CARPOOLING AND RIDE-SHARING

Carpooling and ride-sharing reduce traffic congestion, lower greenhouse gas emissions, save costs, improve air quality, and decrease parking demand, while also enhancing social interaction and supporting sustainable transportation practices. To support these benefits, the design includes dedicated spaces for carpooling and ride-sharing programs.

5.9. Mitigating Urban Heat Island Effect



The urban heat island effect is significant due to its role in elevating temperatures in urban areas, which can increase energy usage, health risks, and environmental strain. To address this issue, the project should prioritise strategies like green infrastructure, light-coloured materials, permeable pavement and sustainable urban planning to create cooler and healthier built environments.

5.9.1. LIGHT-COLOURED ROOFING

To mitigate potential urban heat island effects on the site and its surroundings, a roof colour with a low Solar Absorptance (SA) will be chosen to reflect solar radiation.

5.9.2. GREEN ROOFS

Extensive green roofs are integrated into the design on the podium level to improve aesthetics and provide practical benefits. They reduce urban heat island effects by providing natural insulation and cooling the environment. This reduces surface and ambient temperatures, lowers the demand for air conditioning, and contributes to a more comfortable and sustainable urban space.

5.9.3. PERMEABLE OR POROUS PAVEMENT

Permeable pavers will be used in pedestrian areas and hardstands, while light-colored pavements and concrete are proposed to reflect more sunlight and reduce heat absorption. This approach not only promotes sustainable landscape practices but also improves the overall comfort and environmental quality of the urban space.

5.9.4. INCREASING VEGETATION

Vegetation plays a crucial role in mitigating the urban heat island effect by providing shade, reducing temperatures, and enhancing overall environmental quality. Tree planting will be concentrated along the site boundaries and streetscapes, adjacent to communal and private areas, as well as on rooftop terraces to effectively reduce temperatures in these areas. Additionally, landscaped garden beds will replace paved areas throughout the development to further reduce heat.

5.10. Improved Ecology



Through planting native vegetation and promoting improved interaction with the natural environment, the project will look to improve the site's ecology and minimise its ongoing environmental impact.

5.10.1. LIGHT POLLUTION TO NEIGHBOURING BODIES

The design team will investigate strategies to reduce light pollution that could affect migratory fauna and insects in nearby areas. The decisions will be finalised as the design progresses further.

5.10.2. RIPARIAN CORRIDOR AND ECOSYSTEM CONNECTIVITY

The nearby riparian corridor will be complemented by tree plantings at the ground plane and on roof terraces. This integrated landscape strategy will support habitat succession, increase species diversity, and facilitate fauna movement between adjacent creek corridors. Collectively, these measures will enhance ecological connectivity and strengthen the site's integration with the surrounding natural environment.

5.10.3. ENHANCING POLLINATOR ECOSYSTEMS

The project will enhance local biodiversity by establishing native landscapes that provide natural habitats for wildlife. Indigenous trees, shrubs, and understorey plantings will provide food and shelter opportunities for birds, insects, and small mammals. Native flowering species will be strategically planted across the site, including garden beds, landscaped areas, and roof terraces, to create habitats for pollinators such as bees, butterflies, and other beneficial insects. These plantings will provide essential nectar and pollen resources, supporting pollinator populations, enhancing plant reproduction, and contributing to the ecological connectivity and resilience of the surrounding landscape.

6 Green Star Framework

6.1. Overview

The Green Building Council of Australia provides an internationally recognised system to assess sustainable outcomes throughout the life cycle of the built environment. It was developed by the Australian Building Industry through the Green Building Council of Australia (GBCA), which is now the nation's leading authority on sustainable buildings and communities. As such, the project is looking to implement some additional elements drawn from the Green Star Buildings tool to holistically address all elements of Ecologically Sustainable Design Principles across a building and precinct level.

This section provides a summary of how the project is incorporating best practice in line with elements drawn from the Green Building Council of Australia (GBCA). These elements provide a benchmark for the project to industry best practice.

The Green Star Buildings tool incorporates ESD principals across eight major categories:

- Responsible
- Healthy
- Resilient
- Positive
- People
- Places
- Nature
- Leadership

The following outlines the benchmarked categories for this project and outlines how the project design team can deliver equivalency to this best practice standard.

6.2. Green Star Buildings

6.2.1. RESPONSIBLE

The Responsible category aims to assist owners, builders, and the supply chain on the sustainability journey to ensure the building is designed, built, and handed over in a responsible manner. This proposed project design is incorporating the following areas of focus:

- Responsible Construction
- Verification and Handover
- Operational Waste

6.2.1.1. Responsible Construction

To ensure responsible construction is achieved within this project, a formalised systematic approach to the planning, implementing, and auditing phase of construction is proposed to promote opportunities for improved environmental and social outcomes. From the onset of construction an Environmental Management System certified to the recognised standard AS/NZS ISO 14001 and environmental management plan covering the scope of construction activities should be introduced. Additionally, the project design should look to divert at least 80% of the demolition and construction waste from landfill and provide sustainability training to all contractors and subcontractors present onsite for more than three days regarding the sustainable attributes of the building and their role in delivering a sustainable building.

6.2.1.2. Verification and Handover

The project design should aim to incorporate an array of monitoring and metering systems regarding the energy and water usage of the building. These systems should be independently verified through a series of commission and tuning assessments conducted prior to, during and 12 months following the completion of the building. Relevant building information regarding the operation and maintenance of the building to deliver best practice should be provided to the building facilities management team to enhance the environmental performance of the building.

6.2.1.3. Responsible Resource Management (Operational Waste)

The building design should provide storage areas to ensure the efficient collection and separation of waste into appropriate waste streams by the building occupants and waste collection contractors. The waste storage area design considers safe accessibility for collection vehicles including driveway access and appropriate height clearances which are to be assessed and signed off by a waste specialist or contractor.

6.2.2. HEALTHY

The Healthy category strongly emphasises the importance of improving the indoor environment quality of rated buildings to enhance the health and wellbeing of occupants. The proposed project design is incorporating the following areas of focus:

- Clean Air
- Light Quality
- Acoustic Comfort
- Exposure to Toxins

6.2.2.1. Clean Air

Outdoor air pollutant infiltration should be mitigated through compliance with ASHRAE Standard 62.1:2013 regarding the minimum separation distances between pollution sources and outdoor air intakes. Photocopying equipment should meet minimum emissions standards for indoor pollutants, and any kitchen stoves or vehicles should be exhausted directly to the outside of the building.

Where mechanical ventilation is provided it should increase the supply of air by 50% compared to the minimums outlined in AS 1668.2:2012. The HVAC system should be sized according to the increased outdoor air rates.

6.2.2.2. Light Quality

Lighting within the building should be LED and flicker free with a Colour Rendering Index (CRI) of 85 to meet minimum comfort requirements to ensure occupant comfort.

The project design should also aim to address the quality of artificial light in the space by providing highlights and contrasts and avoiding excessive lighting or overly uniform solutions. Horizontal and vertical illuminance levels for typical tasks should also be designed in accordance with current best practice standards and guidelines.

To control glare from artificial lighting, bare light sources should be fitted with baffles, louvers, translucent diffusers, ceiling design or other means to obscure the direct light source from all viewing angles of occupants.

High levels of daylight should be provided to ensure regularly occupied areas are in reasonable proximity to windows or skylights and occupants are in or near daylight areas during their daily activities.

External glare from sunlight should be reduced through a combination of blinds, screens, fixed devices, tinted glazing or other means.

6.2.2.3. Acoustic Comfort

An Acoustic Comfort Strategy should be prepared to ensure the building design delivers acoustic comfort to the occupants. This strategy should be prepared by a qualified acoustic consultant during the design stage to ensure the proposed performance metrics for each Acoustic Comfort criteria applicable to this project type will exceed the minimum legislative and best practice guidelines.

6.2.2.4. Exposure to Toxins

At least 95% of all internally applied paints, adhesives, sealants and carpets should meet the below stipulated 'Total VOC Limits' (TVOC).

Table 8: Maximum TVOC Limits for Paints, Adhesives and Sealants

PRODUCT CATEGORY	MAX TVOC CONTENT IN GRAMS PER LITRE (G/L) OF READY TO USE PRODUCT	MAX TVOC CONTENT IN GRAMS PER LITRE (G/L) OF READY TO USE PRODUCT
General purpose adhesives and sealants		50
Interior wall and ceiling paint, all sheen levels		16

PRODUCT CATEGORY READY TO USE PRODUCT	MAX TVOC CONTENT IN GRAMS PER LITRE (G/L) OF READY TO USE PRODUCT	MAX TVOC CONTENT IN GRAMS PER LITRE (G/L) OF READY TO USE PRODUCT
Trim, varnishes and wood stains		75
Primers, sealers and prep coats		65
One and two pack performance coatings for floors		140
Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives		250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants		100

To demonstrate compliance with this credit, the use of carpets all products should be certified under a recognised Product Certification Scheme or other recognised standards.

6.2.3. RESILIENT

The Resilient category provides building owners the opportunity to demonstrate their careful consideration towards the short-term and long-term performance and resilience of the building regarding several disruptions including climate change and other externalities ranging from pandemics to infrastructure failure. The proposed project design is incorporating the following areas of focus:

- Climate Change Resilience

6.2.3.1. Climate Change Resilience

The project team should conduct a climate change pre-screening to consider potential impacts and exposure risks to climate change for the building which will be effectively communicated to the building owner and future tenants. This checklist should be signed off by a member of the project leadership team and shared with key project stakeholders, including the client/building owner.

6.2.4. POSITIVE

This category drives project designs to address critical aspects of the built environment such as the need to reduce the energy consumption of a building and a transition to renewable energy to pursue the 1.5 °C climate trajectory. This category encourages the built environment to address its emissions alongside water consumption. The proposed project design is incorporating the following areas of focus:

- Upfront Carbon Emissions
- Energy Use – Reference Building Pathway
- Energy Source
- Water Use

6.2.4.1. Upfront Carbon Emissions

The proposed project design should incorporate good design and responsible material selection to ensure the upfront carbon emissions are at least 10% less than those of a reference building. This is proposed to be achieved through reductions in the impact of concrete and steel.

6.2.4.2. Energy Use – Reference Building Pathway

The project design should aim to reduce energy use by at least 20% in comparison to a 2019 National Construction Code or later Section J compliant building. This should be assessed as part of the project detailed design with a strong focus on the measures detailed in Section 4 of this report.

6.2.4.3. Energy Source

In alignment with the SEPP 2022 and the NSW Government policy for Net Zero Emissions, the project should aim to remove fossil fuel use from the site where possible by 2035. This should be detailed in a supporting net zero statement, alongside any

renewable energy generation and energy minimisation strategies used in the project and a quantification of annual energy consumption and amount of emissions relating to energy use in the building (if information is available).

6.2.4.4. Water Use

The proposed project design should look to incorporate efficient water fixtures, rainwater capture and reuse systems and infrastructure for potential future recycled water connection to reduce the potable water usage of the building by 15-45% in comparison with a 2019 National Construction Code or later Section J compliant building.

All sanitary fixtures and water-using appliances installed within the project's scope should, at minimum, meet the following WELS ratings:

Table 9: Sanitary Fixture Efficiency

FIXTURE / EQUIPMENT TYPE	WELS RATING	WELS LABEL
Taps	5 Star	
Urinals	5 Star	
Toilet	4 Star	
Showers	3 Star	
Washing Machine	4 Star	
Dishwashers	5 Star	

6.2.5. PLACES

The Places category places people at the forefront of design. Buildings inevitably impact their wider surroundings, and this category emphasises the importance of promoting positive impacts and limiting negative ones. This is achieved through celebrating culture, promoting a sense of belonging and welcomeness to occupants and visitors.

6.2.6. PEOPLE

The People category targets issues such as diversity and gender equity, inclusion, and mental health. This category encourages solutions that address social health of the community whilst bringing a new dimension to the design and construction process of buildings. The proposed project design is incorporating the following areas of focus:

- Inclusive Construction Practices

6.2.6.1. Inclusive Construction Practices

During the construction phase the head contractor should provide adequate onsite facilities, policies, and training to promote workplace diversity and enhance the overall wellbeing of site occupants. This can be achieved through the provision of gender inclusive bathroom facilities, gender-specific fit-for-purpose personal protective equipment as well as the enforcement of policies which address discrimination, racism and bullying onsite.

Training should be provided to all contractors and subcontractors present onsite for more than three days regarding drugs and alcohol awareness and discrimination policies present onsite. The head contractor should also look to evaluate the effectiveness of physical and mental health programs provided to the needs of the onsite workers.

6.2.7. NATURE

The Nature category addresses the pressures placed upon ecosystems and biodiversity as a result of rapid urbanisation. This category encourages building designs to minimise their impacts on the natural environment by actively bringing nature and biodiversity back into the cities. It also celebrates the positive impacts of green spaces and biodiversity on people and the urban environment. The proposed project design is incorporating the following area of focus:

- Impacts to Nature
-

6.2.7.1. Impacts to Nature

The proposed project should avoid the development of highly ecological valued sites whilst minimising the light pollution to neighbouring bodies. Outdoor lighting should be designed to achieve control of upward light output ratio (ULOR) by demonstrating that no external luminaire on the project has a ULOR that exceeds 5%, relative to its actual mounted orientation.

6.2.8. LEADERSHIP

The Leadership category provides recognition for the implementation of innovative practices, processes, and strategies that promote achievements within the built environment that surpass the scope of the rating tool as released.

To address leadership, the project should consider how it can positively influence the industry or the operation of the building throughout its design, construction, and operation.

7 Conclusion

This report has addressed the ESD initiatives to support the SSDA for infill Affordable Housing at part Lot 40 DP1286151, Edmondson Park also known as Block 20a.

Specific sustainability initiatives proposed for the building include, but are not limited to:

- Exceeding the energy efficiency requirements of Section J of the Building Code of Australia.
- Exceeding the energy, water and thermal performance requirements of BASIX
- Designing a highly efficient façade wall-glazing system to minimise heat gains while maximising daylight entry for daytime-occupied areas.
- Reducing potable water use through high WELS-rated sanitary fixtures and fittings.
- Collecting and reusing rainwater to conserve water resources.
- Increasing the use of daylighting to reduce reliance on artificial lighting and lower power consumption.
- Implementing comprehensive waste minimisation strategies.
- Adopting Water Sensitive Urban Design (WSUD) principles to manage stormwater effectively and protect water quality.
- Installing a solar array to generate renewable energy and reduce dependency on the grid.
- Providing electric vehicle (EV) charging infrastructure to support the transition to low-emission transport.
- Incorporating secure bicycle parking to encourage active transport.
- Selecting low-carbon materials to minimise embodied carbon in construction.

Overall, through the implementation of the initiatives noted within this report the project clearly demonstrates the site's commitment to ESD principles throughout the design, construction, and operation. Additionally, the project design team has worked to optimise the sites energy performance, address key climate related risks posed to the site, align the project to the NSW Government's commitment to carbon neutrality by 2050.

NORTHROP

