NORTHROP

ESD REPORT

Woolworths Austral North

495 Fourth Avenue, Austral NSW 2179

PREPARED FOR
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1. Introduction

This Ecologically Sustainable Design (ESD) report has been prepared for Woolworths Group to support the development application submitted to the City of Liverpool relating to the development site at 495 Fourth Avenue, Austral NSW 2179. The application seeks approval for the detailed design and operation of a new retail centre with supporting food and beverage tenancies and commercial tenancies.

This report addresses the following items of Liverpool Growth Centre Precincts Development Control Plan (DCP):

- To encourage energy efficient building design and operation that complies with statutory benchmarks in sustainable development.
- To minimise energy and resources consumption during construction and operation.
- To consider local climatic conditions and ensure that the design of centres maximises amenity and activity within the public domain during a wide range of weather conditions.

This report addresses the above and provides an overview of the ESD principles and greenhouse gas and energy efficiency measures that will be implemented.

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

- Space efficient building layout.
- Water Sensitive urban design principles
- High Efficiency Electrical Systems
- Large scale on-site renewable energy generation
- Installation of a rainwater capture and reuse system for all structures on-site
- Energy Efficient heating, ventilation and air conditioning including natural ventilation to open spaces.
- Waste Minimisation strategies
- State Environment Planning Policies (SEPP 2022)

Through the implementation of the initiatives noted in this report, the project addresses, and endeavours to mitigate against negative environmental, social and economic impacts associated with the development of the site.

1.1 The Site

The proposed development site is situated at the south-east corner of Fourth Avenue and Gurner Avenue, and is located within the City of Liverpool Local Government Area. It is located approximately 5.2km north of Leppington Station. (refer to **Figure 1** below).

Figure 1 – Site location

Source: Google

1.2 Overview of the Proposed Development

This development application seeks approval for the detailed design and operation of the retail centre that will have a total GLAR of **7,410 m²** including **5,681m²** of retail tenancies and **1,729m²** of commercial tenancies.

In summary, the proposal includes:

- the construction and operation of a three-storey retail centre with specialty retail and commercial tenancies
- the construction of entry piazza
- lower ground and upper ground level car parking in the southern portion of the site with approximately 348 spaces;
- approximately 24 bicycle parking spaces in the lower ground level;
- detailed landscape design; and
- external infrastructure upgrades, including the construction of the pedestrian link adjacent to the development.

This report is based on the design package prepared by ClarkeHopkinsClarke. The Site Plan illustrating the proposal is provided at **Figure 2** below.

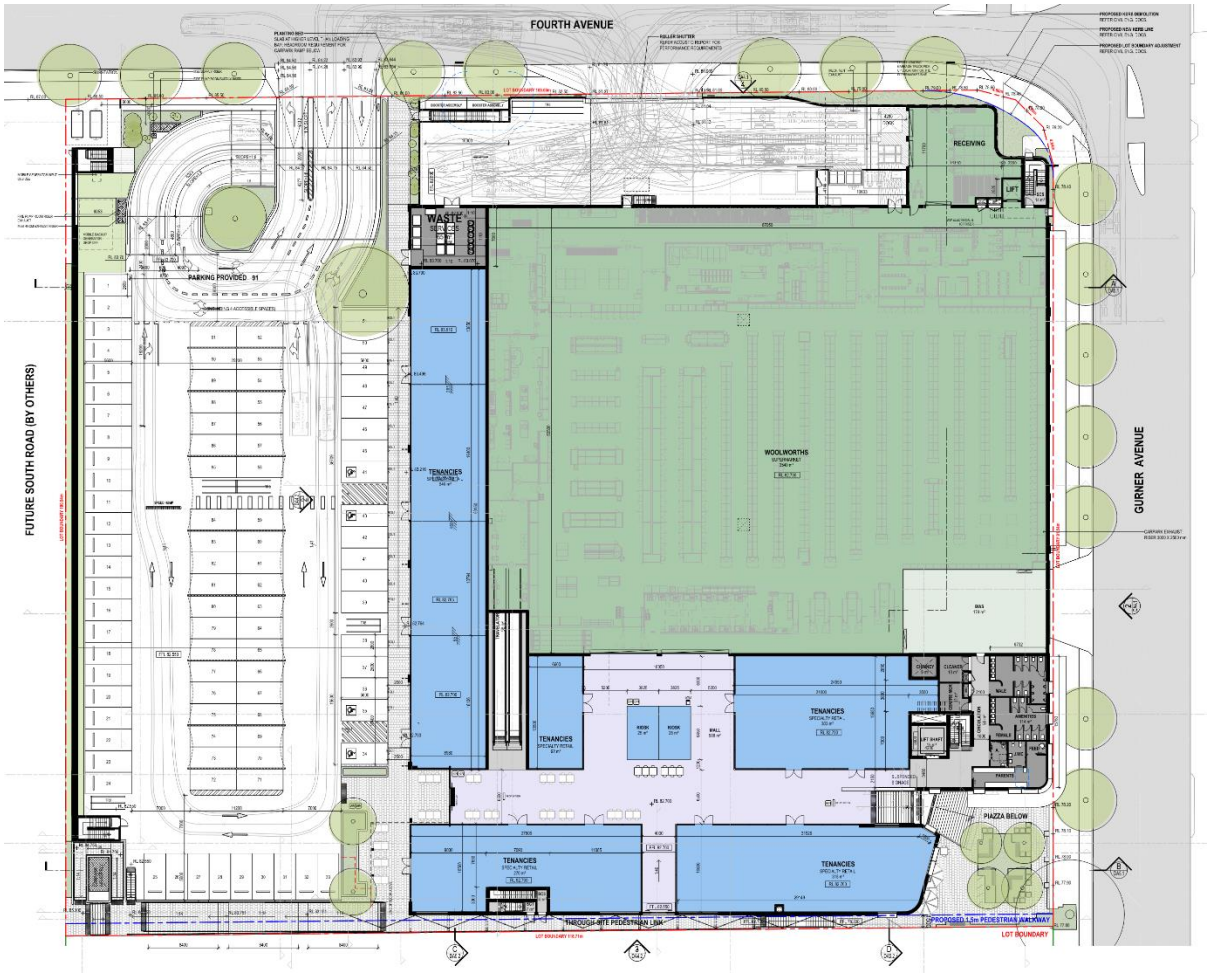

Figure 2 – Proposed Site Plan

Source: ClarkeHopkinsClarke (Not to Scale)

1.3 Response to Liverpool Growth Centre Precincts Development Control Plan (DCP)

This report addresses how the proposed project addresses the DCP. These requirements are outlined below alongside where the response to each can be found within this report.

Key Issue	Item for inclusion	Action to Address Requirement	Report Location
Solar access, weather protection and energy efficiency	To encourage energy efficient building design and operation that complies with statutory benchmarks in sustainable development.	The project has incorporated ESD principals in its design and included sustainability initiatives to reduce operational energy usage, this is detailed in section 2 of the report.	Section 2
	To minimise energy and resource consumption during construction and operation.	This report includes sections that nominate the materials, energy and water efficiency measures proposed during construction and operation.	Section 2
	To consider local climatic conditions and ensure that the design of centres maximises amenity and activity within the public domain during a wide range of weather conditions.	A climate risk assessment has been conducted with results incorporated in the current design.	Section 3

1.4 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.

All simulations and performances noted within this report are estimations only. They are based on the existing design of the facility and best practice estimation techniques. These figures are indicative only and should not be used for cost or other analysis purposes.

1.5 The Proposal

1.5.1 Project Details

Component	Description
Site Name	Woolworths Austral North
Address	495 Fourth Avenue, Austral NSW 2179
Site Area	Total area of 11,914 m2 (Approximate)

The site is in Austral North, 43km southwest of the Sydney CBD and 26km from Parramatta.

2. Ecologically Sustainable Development

The following section describes how ESD principals (as defined in section 193 of the Environmental Planning and Assessment Regulation 2001) are being incorporated in the design, construction, and operation phases of the project. These initiatives illustrate how the project addresses the following;

- The precautionary principle – through the implementation of environmental management and an assessment of the building's operational maintainability, the project attempts to incorporate adaptability and resilience into the project design. The concept behind the precautionary principle is to create spaces that can both; accommodate for changes, which may eventuate in the future, and avoid the risk of serious or irreversible damage to the environment.
- Inter-generational equity to ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations – through the inclusion of zero ozone depleting refrigerants, best practice PVC and low impact paints, sealants and adhesives, alongside a focus on providing native vegetation and support for the building's connection with nature, the project demonstrates a strong commitment to the preservation of environmental health, diversity and productivity of the local area.
- Conservation of biological diversity and ecological integrity – through the planting of native vegetation, improvement of stormwater runoff from the site and use of integrated landscaping, the project will act to improve, conserve and support the local biological diversity and integrity.
- Improved valuation, pricing and incentive mechanisms - the design process shall involve significant input from the Quantity Surveyor who will be involved ensure that the project both remains on budget and effectively considers environmental factors in the valuation of assets and services. Furthermore, the project will look at maintainability and the operational costs associated with individual design initiatives and the overall design.

Through the inclusion of the above and the sustainability initiative outlined within this report the project clearly addresses the ESD Principles into the design, construction and operation of the building as defined in section 193 of the Environmental Planning and Assessment Regulation 2001. Further detail of the general sustainability initiatives is outlined below.

2.1 Energy Efficiency:

Energy efficiency will be considered throughout the design development process with the following improvements to be considered by the design team. It is expected that the measures outlined in the following section, alongside a large solar array, will significantly reduce the site's grid electricity demands when compared to a standard practice building.

2.1.1 Improved building fabric and glazing performance

The building envelope comprises several different façade types, with the proposed scheme using a combination of light-coloured metal roof finishes and low-e glazing to lower heat gains throughout summer while maintaining good daylighting throughout of the building.

The use of well-designed glazing and building materials will also assist the projects targets for energy efficiency, acoustic performance, and thermal comfort.

2.1.2 Integration of Cool roofs

To address heat islanding across the site and wider area, the site should incorporate cool roofing with a high Solar Reflectivity Index (SRI 82) which will minimise the build-up of heat within the material and reduce load on the HVAC system.

2.1.3 HVAC System Control

The proposed HVAC system will provide thermal comfort and acceptable indoor air quality to individual areas of the site. The project will look to select a HVAC system with a higher seasonal energy efficiency ratio (SEER) rating. Given the scale of the conditioned spaces this will likely be a variable refrigerant flow (VRF) energy efficiency system which will provide individual comfort control and simultaneous heating and cooling within different zones ensuring the system does not consume more energy than required at any given time.

2.1.4 Energy Metering and Monitoring

An energy metering and monitoring strategy is to be considered to effectively monitor the main energy uses within the building, alongside the lighting and small power use. This aims to provide fault detection and monitoring of the different areas of the building.

2.1.5 Improved Outdoor Air Provision

The project will aim to improve the outdoor air provided to regularly occupied spaces. This will be achieved through the use of CO_2 sensors and monitoring to minimise CO_2 build up within the internal areas and improve comfort for the building occupants.

2.1.6 Highly efficient lighting system

The installation of LED lighting throughout the building will assist in the minimisation of lighting energy use. Improved lighting energy also reduces the heat loads within conditioned spaces and therefore lowers the energy used to condition the building. The use of efficient controlled lighting within the retail areas will provide a significant improvement in energy use.

2.1.7 Low Impact

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

2.2 Energy Generation

With the above energy efficiency measures, the energy load of the facility will be reduced, allowing a large portion of the site's electrical energy demand to be met through the suggested inclusion of a PV Solar Array. This will assist to both offset the sites energy use and minimise the sites daytime peak demand from the grid.

2.3 Indoor Environment Quality

Indoor environment quality is always an important consideration in spaces that are regularly occupied such as the commercial tenancies and shopping centre. The following considerations have been considered as part of the building design:

2.3.1 Daylight Access

The design of the facility has aimed to allow good daylight penetration into both internal and external spaces. Daylighting is provided through shopfront glazing with awnings above to avoid addition of significant thermal gains. This access to daylight throughout the building will both minimise energy used for lighting and will improve occupant connection to their external environment.

2.3.2 Interior noise level control

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

2.3.3 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.

2.4 Sustainable Transport

2.4.1 Bicycle parking

Bicycle parking spaces will be provided near the north-east side of the lower ground carpark and accessible to both staff and patrons to encourage the uptake of sustainable transport option.

2.4.2 Electric vehicle charging

Dedicated car parking spaces with charging infrastructure provided for electric vehicles to support the uptake of electric vehicles to minimise greenhouse gas emissions.

2.5 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. It is expected that these initiatives will reduce the sites potable water demand by more than 50% compared to a standard practice building.

2.5.1 Water efficient fixtures and fittings

Water Efficient fixtures and fitting will reduce the water consumption of the site. As an indication, the following should be targeted:

- Wash hand basin taps 6-star WELS
- General taps 6-star WELS
- Toilets dual flush 4-star WELS
- Urinals 0.8 L per flush 6-star WELS
- Shower heads 7-9 L per minutes 3WELS

2.5.2 Water Sensitive Urban Design

The project will look to incorporate a water sensitive urban design to reduce the demand on potable water, treat urban stormwater and redirect stormwater into the urban landscape to improve facilities. Rainwater gardens are a low maintenance and cost-effective way to achieve water sensitive urban design as they are designed to capture stormwater runoff within the urban environment. Benefits associated with rainwater gardens include the reduction in water pollution entering downstream receiving water, flood mitigation in surrounding areas, nutrient supply to plans, groundwater reserve replenishments and the promotion of biodiversity through habitat provisioning.

2.5.3 Rainwater capture and reuse

A large rainwater capture and reuse system could be designed for installation to offset the sites water usage for washdown, toilet flushing and other facets of production. This system would have the ability to offset most of the sites potable water usage.

2.6 Improved Ecology

A well-designed landscape featuring a selection of native grasses, shrubs and trees will promote the biodiversity of insects and native birds through the creation of wildlife corridors and habitat provisioning. Consequently, the design will actively contribute to conservational efforts within the urban environment, encourage positive interactions between people and nature whilst also minimizing the ongoing environmental impact of the project.

2.7 First Nations Consultation

Connection to Country shall be explored within the design to incorporate insights of Elders and to acknowledge the local indigenous narrative.

2.8 Waste Management

Effective waste management throughout demolition, construction and operation of the site will help to promote resource efficiency and minimise the adverse environmental impacts of the project. The following are being considered as part of the design process.

2.8.1 Waste Management Plan

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

1. To minimise the environmental impacts of the operations of the development
2. To minimise the impact of the management of waste within the development
3. To ensure waste is managed to reduce the amount landfilled and to minimise the overall quantity generated

These objectives will be achieved through strategies such as the integration of recycling bins and back-of-house separation areas, which will encourage recycling and separation of cardboard/paper waste, glass, food waste and comingled recycling and general waste.

2.8.2 Separated Waste and Recycling Streams

The provision of separated waste and recycling streams could allow for more effective recycling of the project's operation waste. Providing separate bins for cardboard/paper waste, glass, food wastes, comingled recycling and general waste will improve the buildings operational efficiency and result in significant environmental benefits.

2.8.3 Construction and Demolition Waste Minimisation

The project should look to minimise the demolition and construction waste associated with the project and can aim to divert over 90% of waste from landfill to recycling or reuse facilities.

3. Climate Change Projections

As part of the design review the project has completed a risk assessment for the sites climate adaption risks based on the CSIRO climate change projections for Southwestern Sydney. This risk assessment reviewed the following three elements:

- Consequence: what will be the effect of the development should the impact occur?
- Likelihood: how likely is it that the impact will occur?
- Risk Rating: what is the associated risk of the development when the likelihood of it happening is measured against the possible consequence of the impact?

Key risks posed to the site which will be addressed as part of this process and high-level issues are outlined below with comment on how these are addressed within the current design; further detail will be developed within the projects detailed design development stages.

- Changing Surface Temperatures should be addressed through the following.
    - Use of high reflectivity roofing to minimise heat gain and heat island effects.
    - Integration of solar panels to provide shading to areas of the roof and provide increased power to the site when peak energy use for cooling is required.
    - Incorporation of heating, ventilation, air conditioning (HVAC) systems designed to modulate in the event of changing outside air temperatures. Equipment will be rated to continue operating during higher temperatures.
- An increase in rainfall intensity should be managed through the following.
    - Inclusion of rainwater and stormwater storage systems to modulate flows exiting the site.
    - Ability to provide increased finished floor level (FFL) designed to be 0.50 m above freeboard requirement to account for increased flooding potential at the site.
    - Inclusion of awnings to the entry access points to promote allow continued operation during adverse conditions.
- An increase in wind speed intensity should be addressed through the following.
    - The metal roof design incorporating roof bracing to fasten the roof onto the building structure to account for increasingly strong winds on site and prevent damage to the roof due to prevailing winds.
    - Improved structural integrity to ensure that the building is not significantly impacted in the event of high intensity wind loads. This includes wind loading on loading dock awnings and doors.
- Decrease in humidity and increased drought conditions will be addressed through the following.
    - Increased capacity within the fire safety systems to assist in the management of bushfire risk associated with dryer conditions.
    - Additional non potable water supply for irrigation needs and the integration of native and drought tolerant vegetation.

Overall, the current design incorporates significant measures to address key projections for climate change in the near term. The project will incorporate further initiatives to address all high and extreme risks posed to the site.

4. State Environment Planning Policies (SEPP) 2022

4.1 SEPP 2022 Requirements

The SEPP 2022 outlines new requirements to allow projects to reduce greenhouse gas emissions. This section specifically addresses the following sustainability objectives for non-residential buildings.

Reference	Objective	Design Response
General Sustainability	Reporting on general performance, including water conservation, waste minimization and use of renewable energy.	• Energy metering and monitoring strategy will be implemented to effectively monitor the main energy uses within the building. • The project is also aiming to divert construction and demolition waste from landfill. • Installation of PV array to generate renewable energy and reduce energy usage from the grid
Embodied Emissions Reporting	Implement processes of measuring and reporting on embodied emissions.	• Disclose embodied emissions via the NABERS embodied emission material form, at the development application and construction certificate stages.
Net Zero Provisions	Demonstrate at development application that the development is designed with sufficient space and infrastructure so all energy needs can be sourced from renewables by 2035.	• The project is not a large commercial development and is not required to meet this objective.
Energy Performance and Offsets	Independently verify that the development has met the energy performance required by the NCC, through NABERS post occupancy assurance. Purchase offsets for onsite fossil fuel use and to rectify any performance gap for energy efficiency	• The project is not a large commercial development and is not required to meet this objective.
Water Performance	Independently verify that the development has met a minimum 3-star NABERS water rating.	• The project is not a large commercial development and is not required to meet this objective.

5. Conclusion

This report has addressed the ESD requirements to support the development application for the Development located on 495, Fourth Avenue, Austral NSW 2179.

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

- Space efficient building layout.
- Water Sensitive urban design principles
- High Efficiency Electrical Systems
- Large scale on-site renewable energy generation
- Installation of a rainwater capture and reuse system for all buildings on-site
- Energy Efficient heating, ventilation and air conditioning including natural ventilation to open spaces.
- Waste Minimisation strategies
- State Environment Planning Policies (SEPP 2022)

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 Liverpool Growth Centre Precincts Development Control Plan, and benchmarked the project to industry best practice sustainability.