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MIXED USE DEVELOPMENT
2b-6 Hassall Street, Parramatta

Ecologically Sustainable Development Report for Development Application

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MIXED USE DEVELOPMENT **18255**
2b-6 HASSALL STREET, PARRAMATTA

ECOLOGICALLY SUSTAINABLE DEVELOPMENT REPORT

This register identifies each issue of and each amendment to this document by Revision No, Page No, the details of each amendment and date of issue.

AMENDMENT REGISTER						
Rev. No	**Section & Page No**	**Issue/Amendment**	**Author**	**Project Engineer**	**Checked**	**Date**
P1	-	Preliminary DA Issue	RC	TB	TB	20/03/19
02		DA Issue	RC	TB	TB	20/03/19
03		Revised DA	RC	TB	TB	31/07/19

Disclaimer

This report undertaken at concept/schematic design stage describes the intended development design features and desired outcomes. Design features and outcomes provided herein are preliminary in nature and are subject to further review during design development.

EXECUTIVE SUMMARY

This Ecological Sustainable Development (ESD) report has been prepared by Floth and is submitted to the City of Parramatta Council to accompany a Development Application (DA) for a mixed development at 2b-6 Hassall Street, Parramatta.

Incorporating leading sustainable design and construction features, the project is proposed to incorporate the following:

- Basement Carpark Level, university tenancy and supporting services,
- Ground - Entry foyer, university tenancy, retail/café tenancies, plantrooms and loading dock,
- Podium Levels 01 & 02 - University tenancy,
- Low Rise Levels 03 to 09- University tenancy,
- High Rise Levels 10 to 17 - Commercial office tenancy,
- Roof Level 18 - Plantroom.

The building design team has incorporated both passive design features and energy efficiency initiatives which will achieve a significant reduction in energy and water usage of the building. It will create an ecologically sustainable development with significantly reduced greenhouse gas emissions.

Some of the proposed ESD key initiatives to be committed for the proposed development are listed below:

- Green Star Design & As Built v1.2 rating with a 5 star target
- Sufficient exposure to daylight
- Appropriate construction and glazing selection
- Energy efficient high performance air conditioning systems
- LED luminaires
- Efficient water fixtures
- Stormwater management plan
- Waste management plan
- Climate Adaptation Plan

Consideration has been made to optimise the sustainability of materials and building components. It is recommended that ESD initiatives continue to develop and be implemented during the detailed design stage of the project.

The proposed development will comply with National Construction Code (NCC) Section J Energy Efficiency by means of a Deemed-To-Satisfy Solution or Performance Solution as appropriate.

RESPONSE TO SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

This report has been prepared to accompany the EIS for the proposed development. It responds to the infrastructure and water management issues addressed in the SEARs as outlined in the table below.

Relevant SEARs	Item discussed at
3. Built Form and Urban Design • ESD principles including sustainability targets and integration of these in design approach	Section 4.1 & 4.2
7. Ecologically Sustainable Development (ESD) • Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation) will be incorporated in the design and ongoing operation phases of the development.	Section 4.2, 4.3 & 4.4
• Include a framework for how the future development will be designed to consider and reflect national best practice sustainable building principle to improve environmental performance and reduce ecological impact. This should be based on a materiality assessment and include waste reduction design measures, future proofing, use of sustainable and low carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy.	Section 4.2, 4.3, 4.4, 4.6 & 4.7
• Include preliminary consideration of building performance and mitigation of climate change, including consideration of Green Star Performance.	Section 4.2 & 4.9
• Provide a statement regarding how the design of the future development is responsive to the CSIRO projected impacts of climate change, specifically: - hotter days and more frequent heatwave events - extended drought periods - more extreme rainfall events - gustier wind conditions - how these will inform landscape design, material selection and social equity aspects (respite/shelter areas).	Section 4.9

CONTENTS

1. INTRODUCTION

This report addresses the environmentally sustainable design (ESD) proposed for the mixed-use development at 2b-6 Hassall Street, Parramatta NSW 2150. The development is located in Zone B4 Mixed Use within the City of Parramatta Local Government Area (LGA) where Parramatta Local Environmental Plan 2011 applies.

Figure 1 Part Plan of Parramatta Local Environmental Plan 2011, Land Zoning Map – Sheet LZN_010

The ESD initiatives are based on the City of Parramatta Development Control Plan (DCP) 2011 - 3.2.4 Energy Efficient Design.

This report details sustainable design strategies for the development, the building services and the construction to achieve the required sustainability performance.

2. DESCRIPTION OF BUILDING

This ESD report has been prepared by Floth and is submitted to the City of Parramatta Council to accompany a State Significant Development Application (SSDA) for a mixed-use development at 2b-6 Hassall Street, Parramatta.

The proposed mixed-use development comprises:

- Site preparation works including bulk excavation and tree removal;
- Construction and use of two basement levels;
- Construction and use of a twenty-one storey building comprising:
  - Ground level university and retail tenancies;
  - Two podium levels for university tenancy;
  - Lowrise levels with seven levels (Levels 3 – 9) of university tenancy;
  - Highrise levels with eight levels (Levels 10 – 17) of commercial tenancy and
  - Rooftop terrace.

- Landscaping and public domain works including the provision of a public plaza on ground level; and
- Extension and augmentation of services and infrastructure as required.

The building classifications defined in the NCC 2016 Building Code of Australia are:

▪ Carpark areas	Class 7a
▪ Retail areas	Class 6
▪ Office areas	Class 5
▪ Educational use	Class 9b

3. GENERAL

The design and construction measures of the project will be undertaken in accordance with:

- City of Parramatta DCP 2011 – 3.2.4 Energy Efficient Design
- National Construction Code (NCC) 2016 Section J

The building construction will feature materials that have advantageous thermal properties to ensure that the air conditioning systems use less energy.

Intelligent design and material selection ensure that thermal comfort is not entirely achieved by a mechanical means. Passive design initiatives such as performance glazing, building orientation and use of insulation will reduce demand on the mechanical air conditioning systems resulting in a reduction of energy consumption and greenhouse gas emissions.

4. ESD INITIATIVES

The ESD initiatives to be committed for the proposed development are outlined in sections below.

4.1 Building Elements

4.1.1 Site Location

The subject site is located in the suburb of Parramatta surrounded by existing educational, commercial, residential buildings and the rail corridor.

The location of the proposed mixed-use development is shown in Figure 2 below.

Figure 2 Site Location and surrounding developments

The building's positioning and internal layout combined with other energy efficiency features are key elements that can help minimise the energy consumption of the air-conditioning systems required for heating and cooling, reducing greenhouse gas emissions and improving comfort. The aim is to achieve an optimum balance between capturing sunlight and cool breeze access.

4.1.2 Solar Access

To create a pleasant working environment and have a positive effect on human health, it is important to have a sufficient exposure to daylight.

The site shall be designed to receive direct sunlight and minimise the need for artificial lighting during the daytime and improve the thermal comfort of employees, customers and visitors.

4.1.3 Natural Ventilation

Adequate natural air movement makes an important contribution in creating a comfortable environment and reducing the need for mechanical ventilation by carrying accumulated heat out and replacing it with cooler external air. This is important during the summer months where heat build-up in the building can be quickly removed with the availability of suitable breeze at the site.

The architectural design encompasses a covered plaza which facilitates natural ventilation under suitable environmental conditions.

4.1.4 Building Fabric

The proposed development is to be designed to exceed the NCC 2016 for building envelope.

CLASS 5, 6 AND 9 AREAS

a) Construction

The minimum performance requirements for the building form and construction of air-conditioned areas at the proposed development location as per the NCC 2016 Section J- Energy Efficiency are:

- Roof and Ceiling R3.2
- External Walls R2.8
- Internal Walls R1.8
- Floor R2.0
- Glazing as per Part J2 of the NCC 2016 and the BCA glazing calculator, or Performance Solution.

This will necessitate the use of insulation in the walls, floor and roof. Insulation reduces heat flow and consequent heat loss in winter and heat gain in summer. This minimises the heating and cooling load demand on the air conditioning systems.

Slab and external walls will be concrete. Concrete is a high density material and a reasonably good conductor in comparison with other building products. For high density materials a large amount of heat energy is required to change the temperature. This means that it has high thermal mass and excellent properties for absorbing, storing and releasing heat energy it to the room. It is advantageous in damping daily temperature variations within conditioned spaces, resulting in both heating and cooling loads reductions.

Light coloured roof material is recommended to be used to reflect more sunlight and reduce summer heat gain.

b) Glazing

It is recommended that windows for air-conditioned areas of the development be high performance glazing systems. Performance glazing substantially reduces heat transmission. This particularly reduces heat loss in winter; therefore, internal heat gain from equipment, lighting and people are better contained. Also, performance glazing absorbs the infrared portion of sunlight and reduces the amount of heat transferred into the conditioned space. This will correspond in a reduction of both heating and cooling loads.

The glazing will comply with NCC Section J Energy Efficiency by means of Deemed-To-Satisfy Solution or Performance Solution as appropriate. The assessment to show compliance will be carried out during the detailed design development stage of the project.

CLASS 7

The car park areas will not be air-conditioned. Therefore, there are no construction and/or glazing performance requirements for these areas in NCC Section J1 and J2.

c) North façade reflection to Common Open Space

The design competition jury for the building required that the speculative reflective surfaces on the north façade should be 30% shaded at 1pm AEDT on 21st Dec.

The shading on the north façade was projected on the building's 3D model and the shaded speculative reflective surface areas were measured and compared to the total speculative reflective surface area.

The percentage of shaded speculative surface areas to the total speculative surface area is found to be 32%. This satisfies the requirements of the design competition jury.

The north façade elevation with the shadow at 1pm of summer solstice is attached in Appendix B.

4.2 Green Star

The project team endeavour to design and achieve a Green Star Design & As Built v1.2 Rating of 5 stars.

The project is registered with the Green Building Council of Australia (GBCA). The Green Star project number is GS-4370DA.

4.3 Energy Efficiency

Each climate zone under the National Construction Code (NCC) has different design and conditioning requirements to minimise energy use for heating and cooling. Good balance of heating and cooling reduction techniques are required to create an energy efficient development.

4.3.1 Rating Systems

Low energy consumption levels will be achieved by exceeding compliance requirements of the NCC Section J Energy Efficiency.

A NCC 2016 Section J Energy Efficiency assessment of the proposed development will be carried out to show compliance. A preliminary Section J report is included in the Appendix of this report.

4.3.2 Air-conditioning and Mechanical Ventilation

Air conditioning for office, retail tenancy, commercial tenancy and educational areas is provided via energy efficient high-performance air conditioning systems. Cooling will provide via a chilled water system with high performance chillers, with condenser water heat rejection provided via cooling towers.

The air-conditioning systems shall be designed to comply or exceed the minimum requirements of NCC 2016 Section J5.

Heating will be provided by a heating water system utilising gas-fired hot water heaters to achieve compliance with NCC 2016 Section J5.

A building management and control system (BMCS) is proposed for the control of the building services to enhance energy efficiency. The BMCS will include smart controllers for time scheduling, occupancy sensors and/or after hours run-on timers, etc. incorporated to switch on and off for spaces requiring air conditioning and other services as required when a space is occupied only.

Thermal energy metering will be used in combination with power sub-metering and other monitoring devices to assist in fine-tuning and optimising the combined plant efficiency considering chillers, gas-fired hot water heaters, cooling towers, pumps and air handling units (AHU).

Mechanical ventilation will satisfy or exceed the DTS requirements of the NCC.

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.

These initiatives will provide significant savings in energy use.

Sufficient outdoor air will be provided to ensure that levels of indoor air pollutants are maintained at acceptable levels. Outdoor air shall be provided at a rate 50% greater than the min. required by AS1668.2:2012.

4.3.3 Lighting System

Fittings incorporating the latest lamp technologies will be installed to minimise energy use and provide efficient artificial lighting systems.

The proposed development will allow plenty of natural daylight access to minimise the use of artificial lighting where possible.

Lighting will be designed to comply with or exceed the minimum requirements of NCC 2016 Section J6.

The proposed developments shall be illuminated using LED fittings and be controlled via local motion detector or time switch to ensure lights are not left on when not required.

A lighting control system is proposed to control the lighting systems with smart controllers to enhance energy efficiency by zone programming, time scheduling, enabling daylight harvesting and occupancy detection.

4.3.4 Metering

To help each tenant understand the effect that their behaviour has on the energy consumption, separate light and power metering will be provided in each tenancy.

4.3.5 Emission Intensity Target

The City of Parramatta DCP requires developments with a construction cost of over $5 million to demonstrate a commitment to achieve no less than 4 stars under the NABERS Rating system or equivalent.

The project team endeavour to meet or exceed this requirement with an emission intensity equivalent to a NABERS Energy rating of 5 star.

As the education facilities in the building is over 25%, the NABERS Office Energy Base Building Rating will be unfairly penalised as the rated area must be discounted.

For a fair comparison, the building emission intensity will be designed to 69 kg CO_2 / m^2.pa or less, which is equivalent to the emission intensity of a NABERS Office Energy Base Building rating of 5 stars.

4.3.6 Hot Water System

Energy efficient high performance hot water systems utilising centralised gas fired hot water heaters, hot water circulating pumping system, and insulated hot water piping system will be installed. The BMCS will monitor the gas consumption, leak detection in the piping system to minimise wastage and achieve energy efficiency.

4.3.7 Lifts

Lifts will be specified to be energy efficient with variable speed drives. Controls of lifts will have a destination control system.

4.3.8 Photovoltaic (PV) System

Provisions will be allowed for a solar PV array which will be installed on the roof of the commercial tower to the maximum available area.

4.4 Water Conservation

Water is one of our most precious resources. Water restrictions have been applied across the greater Sydney area.

The following initiatives are proposed to ensure that significant water savings are achieved.

4.4.1 Fittings and Fixtures

All water fittings and fixtures such as showerheads, water tap outlets and toilet cisterns are to have and/or exceed the following WELS star ratings:

Water Fittings / fixtures	Proposed Rating	Highest Available Rating (AS/NZS 6400-2016)
Shower head rating	3	4
Kitchen tap ratings general taps	4	6
Urinals	4	6
Toilet cistern	4	6
Bathrooms - sink tap ratings	4	6
Retail kitchen tap ratings general taps	3	6
Retail kitchen tap ratings spray / rinse taps	3	6

4.4.2 Water Consumption Target

The project team endeavour to achieve a water consumption target of 0.65 kL/m^2.pa which is better than an equivalent water consumption of NABERS Water rating of 4 stars (0.684 kL/m^2.pa).

4.4.3 Rainwater Harvesting

A rainwater harvesting system is proposed to collect rainwater from the roof and terraces and stores it. Condensate harvesting from air handling units will be incorporated.

Harvested rainwater and condensate will be appropriately filtered and treated, and will meet a proportion of the building's non-potable water demand, namely urinal and toilet flushing, heat rejection and landscape irrigation, via a separate noon-potable water reticulation system.

Rainwater shall be supplied throughout the building for the nominated uses via a boosted non-potable cold water (NPCW) service. A potable water back-up connection to the boosted NPCW service shall be provided to ensure continued supply during dry periods.

The system can be easily modified for the future connection of authority non-potable water supply if it is available.

4.5 Stormwater Management

It is important to improve water quality, ensure that public health and safety is maintained and protect the development from stormwater inundation.

Well-managed stormwater in urban areas will minimise impacts on the natural water cycle by litter, chemical pollutants and sediments to waterways.

A Stormwater management plan has been prepared to demonstrate how stormwater is proposed to collected, stored and discharged from the development site.

4.6 Waste Management

Waste collection and disposal plays an important role in the protection of the environment and the health of the population in the modern world.

Waste management plans (WMPs) including construction and operational WMPs has been prepared by EcCell Environmental Management Pty Ltd in accordance with City of Parramatta's requirements to assess and monitor the waste management process during construction and demolition, as well as waste produced during occupation within the development.

A simple user guide will be provided for each tenancy to inform them of waste management arrangements.

4.7 Materials

Construction material selection is an important part of environmental strategy. Every material consumes natural resources during its manufacture and transportation to site. The selection of materials and finishes also impacts ongoing maintenance by susceptibility to weathering, deterioration and replacement cycles contributing to energy consumption and greenhouse gas emissions.

Where possible, it is recommended that building materials, fittings and finishes have been recycled or incorporate recycled materials and have environmental certification recognized by a third party certification scheme.

The proposed ESD initiatives for materials to be utilised on this project comprise:

- Paint and floor covering containing low levels of volatile organic compounds (VOC).
- Design of building components, including the structural framing, roofing and facade cladding for optimal durability and longevity.
- Waste cupboard or storage areas for recycling and garbage.
- PVC products specified will either be avoided or comply with “Best Practice Guidelines for PVC” for 90% by cost of PVC products.
- Timber used will be specified to be at least 95%, by cost, either certified by a forest certification scheme that meets the GBCA’s ‘Essential’ criteria for forest certification or is from a reused source.
- At least 95%, by mass, of the building’s steel will be sourced from a Responsible Steel Maker and at least 60%, by mass, of all reinforcing bar and mesh will be produced using energy-reducing processes in its manufacture.

4.8 Biodiversity and Landscape design

Good landscaping and planting design in conjunction with existing natural systems can make a major contribution to the natural cycle of the local environment. It can help improve the overall quality, health and well-being of the users of the development.

It is a council requirement that landscaping design is to conserve significant natural features of the site and contribute to effective management and biodiversity, and to promote energy efficiency by enhancing solar access and shade.

The Landscape architect will prepare documentation in accordance with City of Parramatta’s requirements for landscaping and tree management for the proposed development site.

4.9 Climate Adaptation Plan

A Climate Adaptation Plan is in development to facilitate resilence of the building to the impacts of a changing climate and natural disasters.

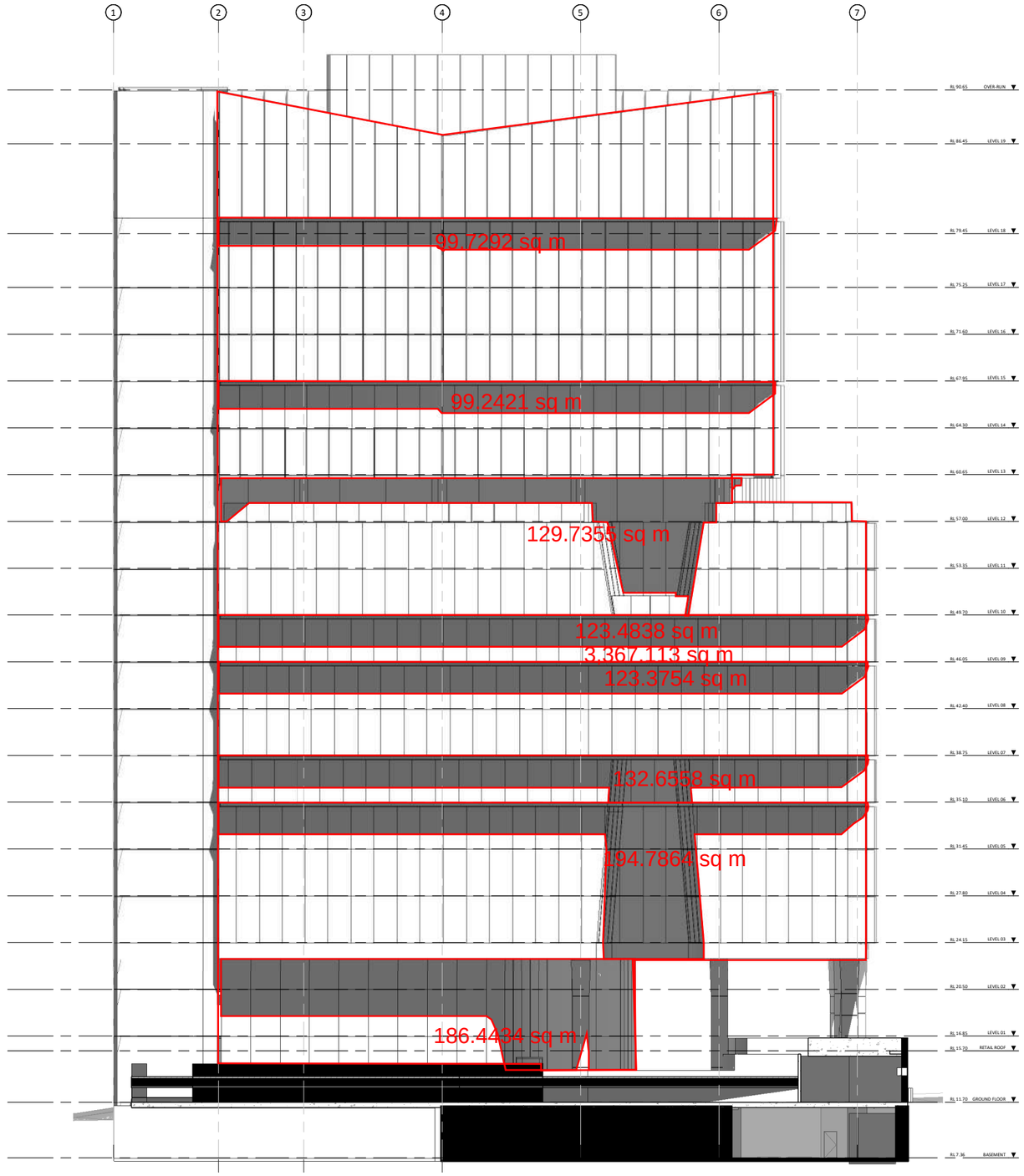
The Climate Adaptation Plan is being prepared as per Green Star Design & As Built V1.2 – 03 Adaptation and Resilience and AS 5334:2013 Climate Change Adaptation for Settlements and Infrastructure.

The Climate Adaption Plan will Contain the following information:

- Summary of the project's characteristics (site, location, climatic characteristics);
- Assessment of climate change scenarios and impacts on the project using at least two time scales, relevant to the projects anticipated lifespan. This will include a summary of potential direct and indirect climate change impacts (environmental, social and economic) on the project;
- Identification of the potential risks (likelihood and consequence) for the project and the potential risks to people;
- A list of actions and responsibilities for all ‘high’ and ‘extreme’ risks identified; and

- Details of stakeholder consultation that will be undertaken during plan preparation and how the issues raised will have been incorporated.

APPENDIX A – NORTH FAÇADE DIAGRAN ON 1PM OF SUMMER SOLSTICE



Total facade area = 3367 sqm

Shadow Area = 1089 sqm

Shadow percentage = 32%