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LBS REFERENCE NUMBER: LBS30222

DATE: Friday, 24 January 2025

PROJECT ADDRESS: 290 Unley Road, Hyde Park SA 5061

PRINCIPAL'S PROJECT REQUIREMENTS - ESD

290 UNLEY ROAD DEVELOPMENT

BUILDING CLASS: Class 2 | 6

REPORT COMMISSIONED BY: URPS

ON BEHALF OF: TBC

CLIENT REFERENCE NUMBER: 24113

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CONTENTS

DOCUMENT CONTROL

Revision	Date	Description	Author	Reviewed
v1.0	24th Jan 2025	For Review	YZ	AP

1.0 INTRODUCTION

The project team is committed to creating an environmentally sustainable and liveable project by incorporating environmentally sustainable design into the development.

This Principal's Project Requirements (ESD) has been prepared to establish how the proposed development will incorporate sustainability and address the below objectives, outlining the relevant stakeholder/s and project stage/s for each initiative to assist the project team during the design, construction, and operation process.

The following key elements of sustainability have been identified:

Construction & Building Management

Integrated Water Management

Operational Energy

Indoor Environment Quality

Transport

Waste & Resource Recovery

Urban Ecology

ENVIRONMENTALLY SUSTAINABLE DESIGN (ESD) ASSESSMENT TOOLS

The following sustainability benchmarks have been used to assess the proposed development against the objectives outlined above.

- Sustainable Design in the Planning Process (SDAPP)
- Built Environment Sustainability Scorecard (BESS)
- Green Star Buildings v1.0
- Green Star Design & As Built v1.3
- NCC 2022, Vol. 1
- Australian Standards
- ASHRAE
- Walk Score

ESD STRATEGY

The project team has collaborated to consider ESD principles and initiatives during the design phase, these principles have been based on the following ESD hierarchy:

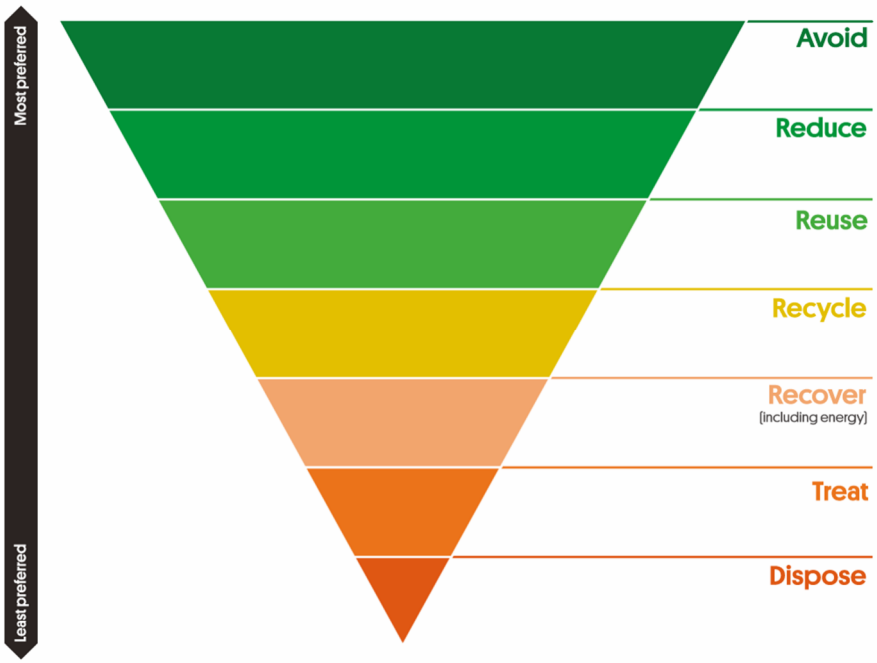


Figure 1 - ESD Hierarchy (Source: Green Industries SA[1])

SITE DESCRIPTION

Proposed Building Works	Mixed-Use Tower
Total Building Area	2,354m^2
Ground Floor (627m^2)	Carpark, lobby, stairs & lift, bin room, services, commercial tenancy (not considered in this report).
Floor 1 (579m^2)	Apartments (ex. balconies), corridor, stairs & lift.
Floor 2 (484m^2)	Apartments (ex. balconies), corridor, stairs & lift.
Floor 3 (346m^2)	Apartments (ex. balconies), corridor, stairs & lift.
Floor 4 (318m^2)	Apartments (ex. balconies), corridor, stairs & lift.
Total Site	719.6m^2

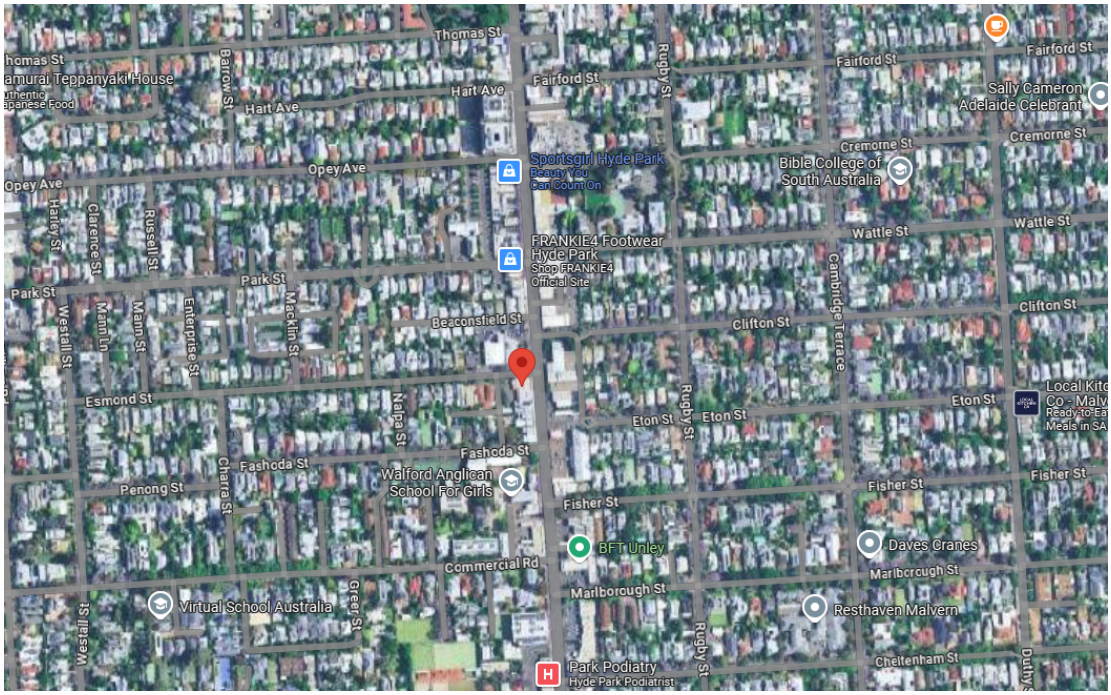


Figure 2 - Proposed Location

Figure 3 - Proposed Development

2.0 SUSTAINABLE INITIATIVES

The following sections outline the sustainable initiatives that will be incorporated into the design, construction, and operation of the proposed development. In addition, this section outlines the relevant project stage and nominates the appropriate project stakeholder responsibility. **All responsibilities of the Architect are to be documented on the plans prior to council submission.**

CONSTRUCTION AND BUILDING MANAGEMENT

Objective: To encourage a holistic and integrated design and construction process and ongoing high performance.

- ✓ Integrate sustainable principles into the development from concept through to construction and operation.
- ✓ Ensure the environmental impact of construction is managed.
- ✓ Future proof the proposed development for future occupants.
- ✓ Make key building services and sustainability information accessible for occupants.

DESIGN INITIATIVE	STAKEHOLDER	PROJECT STAGE
ESD Professional	ESD	Concept-Design
Green Star Buildings v1.0 – 1 Industry Development – Green Star Accredited Professional (Credit Achievement)		
An ESD professional is to be engaged to provide sustainability advice during design stage.		
Construction Environmental Management Plan	Head Contractor	Construction Documentation
Green Star Buildings v1.0 Credit 2 Responsible Construction – EMS, EMP		
The builder or head contractor (responsible party) must have a formalised systematic and methodical approach to planning, implementing, and auditing in place during construction. ▪ [If contract <$10 million] The responsible party must have an Environmental Management System (EMS) that complies with either the NSW Environmental Management System Guidelines or another recognised framework. ▪ [If contract ≥$10 million] The responsible party must have an Environmental Management System (EMS) certified to a recognised standard such as AS/NZS ISO 14001, BS 7750 or the European Community's EMAS. The EMS can be stand-alone or part of an integrated management system and must be valid for the duration of construction activities. The Head Contractor is to implement a project-specific Environmental Management Plan (EMP) to manage the environmental performance and impact of excavation and construction activities.		

Construction Stormwater Management	Development Manager	Construction Documentation

SDAPP Construction and Building Management Best Practice Standards

The project team recognises that the construction of the proposed development creates potential environmental impacts associated with stormwater runoff, including erosion and sediment. A Site Management Plan will be developed in accordance with local authority and EPA Construction Techniques for Sediment and Pollution Control. Risks managed during construction may include but are not limited to:

- General erosion and site runoff
- Redirection or temporary storage of existing roof runoff
- Erosion and pollutants from vehicle access and work areas
- Erosion and deposition from stockpiles
- Waste and litter management

Metering	ESD	Design Development

BESS Management 3.1 Metering - Residential / 3.3 Metering - Common Areas

- Utility meters (electricity, water & gas if applicable) will be provided for all individual dwellings.
- Utility sub-meters will be provided to all major common area services.
- Separate metering is to be provided for all energy and water uses. In addition:
  - Where an energy load exceeds 5% of total energy uses, or consumes ≥100kWh/annum, it must be independently metered.
  - Where a common water use consumes at least 10% of the project's water use it must be independently metered.

Building Users Guide	Development Manager	Construction Documentation

BESS Management 4.1 Building Users Guide

A Buildings User Guide and building information is to be developed and made available to the building owner, facilities management team, and occupants at the time of practical completion. This is to outline the following for all nominated building systems:

- Operations and maintenance information
- Building logbook
- Building user information:
  - Description of energy efficiency initiatives
  - Description of water efficiency initiatives
  - Description of basic function of nominated building systems
  - Strategies to optimise the building's performance and efficiency, including operational strategies to reduce energy and waste use, and waste production.
- List of maintenance contacts

On-going Management	Development Manager, Services Contractors	Post Occupancy

Green Star Buildings v1.0 Credit 3 Verification and Handover

The building manager is responsible for the implementation, monitoring, maintenance, and review of all initiatives outlined in this report.
This report and all supporting ESD reports are to be included in all document packs for the building manager and tenants.

INTEGRATED WATER MANAGEMENT

Objective: To ensure the efficient use of water, to reduce total operating potable water use, to encourage the appropriate use of alternative water sources, and to incorporate the use of water sensitive urban design, including rainwater re–use.

- ✓ Use efficient fixtures and fittings.
- ✓ Capture and re–use rainwater.
- ✓ Connect to recycled water infrastructure.
- ✓ Include indigenous/water efficient landscaping and irrigation methods.
- ✓ Minimise the use of mains water for toilets, urinals, and landscape irrigation by maximising on-site rainwater reuse.
- ✓ Reduce the impact and volume of stormwater runoff.

DESIGN INITIATIVE	STAKEHOLDER	PROJECT STAGE
Water Fixtures	Architect	Design Development
BESS Integrated Water Management 1.1 Potable Water Use – Fixtures, Fittings, and Connections; Green Star Buildings v1.0 25 Water Use (Min. Expectation)		

The development will include efficient fitting and fixtures to reduce the consumption of mains water. The following Water Efficiency Labelling Scheme (WELS) star rating products are required (within 1 star of best available):

- Taps: ≥ 5 Star WELS
- WCs: ≥ 4 Star WELS
- Showerheads: ≥ 4 Star WELS (≤ 7.5L/m)
- Dishwashers: ≥ 5 Star WELS

Water Efficient Landscaping	Architect	Design Development
BESS Integrated Water Management 3.1 Water Efficient Landscaping		

- Water efficient/drought tolerant plants to be planted in all landscaped areas.
- If irrigation is required, drip or under mulch irrigation is to be used.

Building System Water Use Reduction	Development Manager	Construction Documentation
BESS Integrated Water Management 4.1 Building Systems Water Use Reduction		

- HVAC system to use air cooled condenser components.
- ≥80% water used during fire protection system testing is to be collected for reuse.

OPERATIONAL ENERGY

Objective: To ensure the efficient use of energy, to reduce total operating greenhouse emissions, and to reduce energy peak demand.

- ✓ Ensure energy efficiency is incorporated into planning and design.
- ✓ Include effective shading.
- ✓ Enhance building fabric above minimum building code requirements.
- ✓ Install efficient appliances, lighting, and heating and cooling systems.
- ✓ Promote the use of alternative energy sources.
- ✓ Achieve or work towards net zero carbon emissions.

DESIGN INITIATIVE	STAKEHOLDER	PROJECT STAGE
Preliminary Energy Modelling	ESD	Design Development

NCC 2022, Vol.1; Green Star Buildings v1.0 – 22 Energy Use – Residential Pathway (Credit Achievement)

Preliminary modelling has been completed on a sample of apartments (6x apartments) which are representative of the project's apartment typologies. The results of the sample have then been extrapolated to predicted results for all apartments.

The NCC 2022, Vol 1. was used as a benchmark for modelling, requiring a weighted-area average of NatHERS 7.0 Stars and minimum 6.0 Stars for each sole-occupancy unit. This benchmark also meets the requirements of Green Star Buildings – Energy Use – Credit Achievement (weighted-area average of NatHERS 7.0 Stars and minimum 5.5 Stars).

Preliminary Section J energy modelling shows that the proposed design achieves an average of 7.4 stars and a minimum of 6.0 stars. The following minimum specification is to be incorporated into the design:

- ≥R1.3 roof blanket with reflective foil to framed roofs
- ≥R4.0 insulation to ceilings below external slab or framed roofs
- ≥R2.0 insulation to all external framed walls
- ≥R1.5 insulation to all internal wet area framed walls
- ≥R2.0 insulation to suspended slab between unconditioned Ground floor spaces and Apartments
- ≥200mm concrete slab floors to all levels
- Double glazing (or equivalent) to all windows and doors. Total system values:
  - Sliding door - U-value: ≤3.81, SHGC: 0.62±10%
  - Awning window - U-value: ≤4.01, SHGC: 0.58±10%
  - Fixed window - U-value: ≤3.47, SHGC: 0.62±10%
- External adjustable shading devices to all west facing glazing

Table 1 - Preliminary NatHERS Results

Apartment	Heating (MJ/m^2)	Cooling (MJ/m^2)	Total (MJ/m^2)	Star Rating
1.1	46.2	34.6	80.8	6.0
1.2	18.2	16.7	34.9	8.6
1.3	9.6	19.9	29.5	8.9
1.4	32.3	28.5	60.8	7.2
2.1	-	-	-	6
2.2	3.9	22.3	26.2	9.1
2.3	23.0	31.0	54.0	7.6
3.1	-	-	-	7.1
3.2	-	-	-	7.5
4.1	-	-	-	6.0
Average				**7.4**

*Apartment 2.1, 3.1, 3.2, and 4.1 results have been extrapolated from the sample rate

Lift and External Lighting Electrical Design Development

SDAPP Energy Best Practice Standards; NCC 2022, Vol 1;
Green Star Buildings v1.0 – 35 Impacts to Nature – Managing Light Pollution Impacts (Min. Expectation)

- Lift and external lighting to be high efficiency LED lighting with occupancy sensors and daylight control (external lighting only) fitted in accordance with NCC 2022, Vol 1.
- Light Pollution to neighbouring bodies: All outdoor lighting on the project complies with AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting to minimise the building's light pollution.
- Light pollution to night sky: The project will reduce light pollution by either:
  - Control of upward light output ratio (ULOR); OR
  - Control of direct illuminance.

Internal Lighting Services Engineer Design Development

BESS Operational Energy 3.6 Internal Lighting – Apartments; SDAPP Energy Best Practice Standards

- All indoor lighting to be LED warm white colour.
- Maximum illumination power density in at least 90% of the Class 2 area is ≥20% lower than NCC requirements (Table J7D3a NCC 2022, Vol.1).

Air Permeability Testing	Services Contractors, Principal Consultant, Head Contractor	All

Green Star Buildings v1.0 – 3 Verification and Handover – Commissioning and Tuning (Min. Expectation)

The project team must perform the following:

- Prior to construction:
  - Design for airtightness
- During construction and practical completion:
  - Test for airtightness

A suitably qualified airtightness practitioner (ATTMA Level 2 or AIVAA testing member) must be engaged from the pre-design to verification phase of the project to ensure best practice airtightness construction methods are implemented in the design and construction of the building. The development is to achieve an average air permeability rate of ≤7.0m^3/h/m^2 @ 50Pa. Air permeability testing is to be completed on one apartment per level (4 tests in total) to provide an accurate sample rate of the building.

Renewable Energy	Services Engineer	Design Development

BESS Operational Energy 4.2 Renewable Energy Systems – Solar; Green Star Buildings v1.0 Credit 23 Energy Source

The proposed development is to incorporate a ≥10kW Solar PV system with ≥8kW inverter to reduce total electricity consumption of the site. Solar PV panels are to be mounted on the roof of Level 4 to ensure minimum overshadowing.

INDOOR ENVIRONMENT QUALITY

Objective: To achieve a healthy indoor environment quality for the wellbeing of building occupants.

- ✓ Consider air quality, natural ventilation, and daylight access.
- ✓ Control shading, glare, and noise.
- ✓ Maintain thermal comfort.

DESIGN INITIATIVE	STAKEHOLDER	PROJECT STAGE
Daylight Access	ESD	Design Development
Green Star Design & As Built v1.3 – 12 Visual Comfort - 12.1 Daylight		
The proposed design provides good levels of natural light to occupied areas, achieving a daylight factor of at least 1.5% to 68.2% of bedrooms and living areas when incorporating a Visible Light Transmittance (VLT) of ≥0.30. Refer to Appendix B Daylight Report for further details.		
Ventilation Systems – Fresh Air	Services Engineer	Construction Documentation
Green Star Buildings v1.0 – 10 Clean Air – Provision of Outdoor Air (Min. Expectation)		
The regularly occupied areas must be provided with good access to outdoor air, appropriate for the activities and conditions by using one of the following options: ▪ Where ventilation is by mechanical means, the building must provide outdoor air as per AS1668.2:2012 for the default occupancy. ▪ Where ventilation is by natural means, the building must meet natural ventilation requirements as per AS1668.4:2012.		
Ventilation System Attributes	Mechanical	Design Development Construction
Green Star Buildings v1.0 – 10 Clean Air – Ventilation System Attributes		
Separation from Pollutants: Building ventilation systems to be designed to comply with ASHRAE Standard 62.1:2013 or AS 1668:2012 (whichever is greater) regarding minimum separation distances between pollution sources and outdoor air intakes. Cleaning Ductwork: All new and existing ductwork that serves the building must be either sealed until installation/project completion or cleaned prior to occupation in accordance with a recognised standard. Maintenance: Mechanical ventilation systems will be designed/located to provide adequate access for maintenance to both sides of moisture/debris catching components within the air distribution system.		
Exposure to Toxins	Architect, Development Manager	Construction Documentation
Green Star Buildings v1.0 – 13 Exposure to Toxins (Min. Expectation)		
>95% of all new paints, adhesives, sealants (by volume), and carpets (by area), and engineered wood products (by area) meet the total VOC or formaldehyde limits specified by Green Star (see Appendix A) or hold a relevant certification (e.g. GECA, Global GreenTag, GreenRate).		

Thermal Comfort	Architect	Design Development
BESS IEQ 3.1 Thermal comfort – Double Glazing, 3.2 Thermal Comfort – External Shading		

The following measures are to be included to assist in maintaining thermal comfort:

- All glazing is to be double glazing.
- Balconies provide extensive shading to all north, east, and west facing external glazing to habitable rooms, reducing solar heat gain, and assisting in maintaining thermal comfort.

TRANSPORT

Objective: To minimise car dependency and to ensure that the built environment is designed to promote the use of low-emission transport options such as public transport, walking, and cycling.

- ✓ Provide convenient and secure bike storage.
- ✓ Encourage use of lower emission transport options.

DESIGN INITIATIVE	STAKEHOLDER	PROJECT STAGE
Bicycle Parking Facilities	Architect, Development Manager	Design Development

Green Star Buildings v1.0 – 27 Movement and Place – Bicycle Parking Facilities (Credit Achievement)

The building's access must prioritise walking and cycling options – well lit, weather protected, and separated from vehicles.

Bicycle parking facilities must meet the following criteria:

- Separated from the primary vehicle entrance to ensure safety.
- Ensure the cycling equipment is safely secured.
- The access points must connect to the relevant bicycle storage facilities.

The development includes 11 bicycle parking spaces.

Reducing Private Vehicle Usage	Transport Planner, ESD	Design Development

Green Star Buildings v1.0 – 27 Movement and Place – Reducing Private Vehicle Usage (Credit Achievement)

The building's design and location reduce emissions associated with transport with excellent access to essential amenities within walking distance. Nearby public transport options including bus and trains, along with the Unley Road bike path, further facilitate active transport.

Walk Score provides the following scores for the project location:

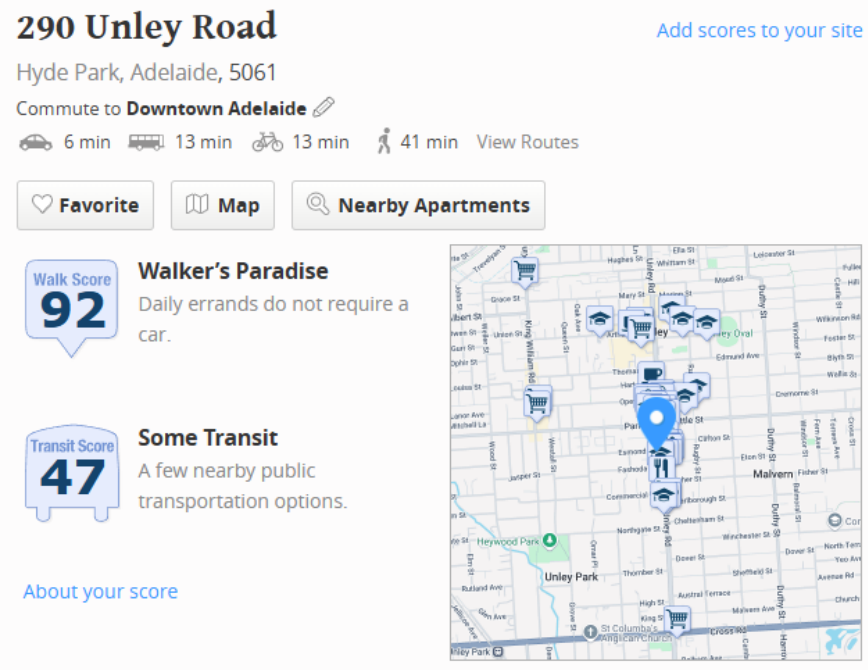


Figure 4 - Walk Score

WASTE & RESOURCE RECOVERY

Objective: To ensure waste avoidance reuse and recycling during the construction and operation stages of development.

- ✓ Promote waste avoidance, re-use, and recycling during the planning, design, construction, and operation of the proposed development.
- ✓ Consider food and garden waste opportunities.
- ✓ Put construction waste and operational waste management plans in place.

DESIGN INITIATIVE	STAKEHOLDER	PROJECT STAGE
Construction Waste	Development Manager	Construction
Green Star Buildings v1.0 – 2 Responsible Construction – Construction and Demolition Waste (Min. Expectation)		
≥80% of demolition and construction waste (by mass) will be recycled or re-used. The builder will develop a construction waste management plan for the demolition, pre-construction, civil works, and construction phases.		
Operational Waste	Architect, Development Manager	Design Development
BESS Waste 2.1 - Operational Waste - Food & Garden Waste; 2.2 - Operational Waste - Convenience of Recycling Green Star Buildings v1.0 – 2 Responsible Resource Management (Min. Expectation)		
The building must provide bins or storage containers to building occupants to enable them to separate their waste, in accordance with the following: ▪ Bins must be labelled, with all waste streams equally convenient to access. ▪ Waste Streams are to include general waste, co-mingled recycling, and organic waste. ▪ A dedicated and appropriately sized area(s) for the storage and collection of the waste streams must be provided. Bins must be sized and collected in accordance with third-party best practice guidelines such as City of Adelaide Council guidelines.		

URBAN ECOLOGY

Objective: To protect and enhance biodiversity and to encourage the planting of indigenous vegetation.

- ✓ Consider green spaces that focus on health, social, environmental, and economic benefits.
- ✓ Encourage and consider the retention of existing significant trees.
- ✓ Maintain and/or enhance the site's ecological value.
- ✓ Consider climate change and minimise use of potable water.

DESIGN INITIATIVE	STAKEHOLDER	PROJECT STAGE
Encouraging Green Spaces	Architect	Design Development
BESS Urban Ecology 2.4 Balconies, Courtyards, and Roof Terraces		
All balconies are to have water supply (a tap) and a wastewater connection (drain) to promote and facilitate vegetation on balconies.		

3.0 CONCLUSION

This PPR sets a standard of sustainability for the project using the following recognised benchmarks:

- Sustainable Design in the Planning Process (SDAPP)
- Built Environment Sustainability Scorecard (BESS)
- Green Star Buildings v1.0
- Green Star Design & As Built v1.3
- NCC 2022, Vol. 1
- Australian Standards
- ASHRAE
- Walk Score

The proposed development will meet and/or exceed the objectives if it is constructed in accordance with the contents of the report, supporting documentation, and applicable drawings. This report is to be read in conjunction with any relevant reports written by third parties. It is the responsibility of the Principal Consultant to ensure the implementation, monitoring, maintenance, and review of all initiatives outlined in this report are upheld.

DISCLAIMER

APPENDIX A – VOC LIMITS

Compliance with Low VOC products is met the product meets the requirements of Table 3 or is recognised under a Product Certification Scheme - http://new.gbca.org.au/product-certification-schemes/

Table 2 - Max TVOC Limits for Paints, Adhesive and Sealants

Product Category	Max TVOC content in grams per litre of ready to use product
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	16
Interior wall and ceiling paint, all sheen levels	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

Compliance with Carpets is met by demonstrating the carpet meets the requirements of Table 4 or is recognised under a Product Certification Scheme - http://new.gbca.org.au/product-certification-schemes/

Table 3 - Carpet Test Standards and TVOC Emissions Limit

Compliance Option	Test Protocol	Limit
ASTM D5116	ASTM D5116 - Total VOC limit*	0.5mg/m2 per hour
	ASTM D5116 - 4-PC (4-Phenylcyclohexene)*	0.05mg/m2 per hour
ISO 16000 / EN 13419	ISO 16000 / EN 13419 - TVOC at three days	0.5 mg/m2 per hour
ISO 10580 / ISO/TC 219 (Document N238)	ISO 10580 / ISO/TC 219 (Document N238) - TVOC at 24 hours	0.5 mg/m2 per hour

* Both limits should be met when testing against ASTM D5116

Compliance with engineered wood products is met by demonstrating the product meets the requirements of Table 5 or is recognised under a Product Certification Scheme - http://new.gbca.org.au/product-certification-schemes/

Table 4 - Formaldehyde Emission Limit Values for Engineered Wood Products

Test Protocol	Emission Limit / Unit of Measure
S/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1mg/ L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1mg/ L
AS/NZS 4357.4 - Laminated Veneer Lumber (LVL)	≤1mg/ L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1mg/ L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)	≤0.1 mg/m^2hr*
ASTM D5116 (applicable to high pressure laminates and compact laminates)	ASTM D5116 (applicable to high pressure laminates and compact laminates)
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m^2hr (at 3 days)
ASTM D6007	≤0.12mg/m^3**
ASTM E1333	≤0.12mg/m^3***
EN 717-1 (also known as DIN EN 717-1)	≤0.12mg/m^3
EN 717-2 (also known as DIN EN 717-2)	≤3.5mg/m^2hr

*mg/m^2hr may also be represented as mg/m^2/hr.

**The test report must confirm that the conditions of Table 3 comply for the particular wood product type, the final results must be presented in EN 717-1 equivalent (as presented in the table) using the correlation ratio of 0.98.

***The final results must be presented in EN 717-1 equivalent (as presented in the table), using the correlation ratio of 0.98.

APPENDIX B – DAYLIGHT REPORT

COMPLIANCE SUMMARY

First and Third Floor of the proposed development have been assessed using the prescribed *Daylight Modelling Methodology* outlined in the *Green Star - Design & As Built v1.3 Submission Guidelines* to demonstrate compliance with the following compliance pathway:

- 12.1B Compliance Using Daylight Factor

Compliance with *12.1B Compliance Using a Daylight Factor* is achieved where it is demonstrated that ≥40% of the nominated area achieves a daylight factor of at least 1.5%, assuming a uniform sky of 10,000 lux. Points are awarded as follows:

- For ≥40% of the nominated area – 1 point; or
- For ≥60% of the nominated area – 2 points.

68.2% of nominated areas of the proposed development achieve the minimum 1.5% daylight factor and a total of 2 points are awarded.

CALCULATION METHODOLOGY

The assessment has been undertaken in accordance with the Green Star Design and As Built *Submission Guidelines* criteria with the 'nominated' areas defined as all **primary space** within the development:

Primary space – All areas where a person is expected to work, or remain for an extended period of time, including, but not limited to:

- Offices, either open plan or private;
- Residential lounge rooms and bedrooms;
- Classrooms, laboratories, computer labs;
- Ward rooms, nurse's stations, clinic rooms;
- Kitchen and preparation areas where food is being sold;
- Retail / sales floor, exhibition halls, galleries (unless exclusion is justified), multi-purpose rooms (as a general setting); and
- Occupied areas within industrial buildings such as manufacturing spaces, shop floors and work stations. Warehouse and distribution spaces are considered primary space only if the majority of the space is an area where people expected work or remain for an extend period of time.

The nominated areas considered in this assessment are articulated on the floor plan/colour gradient images in the Modelling Output section and Simulation Summary results tables.

> *Note: the floor area values may not correlate with figures noted on the drawings due to differences in definitions of space and calculation methodology.*

The results were calculated using the DesignBuilder Radiance simulation engine which provides a detailed multi-zone physics-based calculation of illumination levels on the working planes of the building. The calculations allow light to be transmitted through exterior and interior windows and the shading and reflective effect of local shading devices and component/assembly blocks is included.

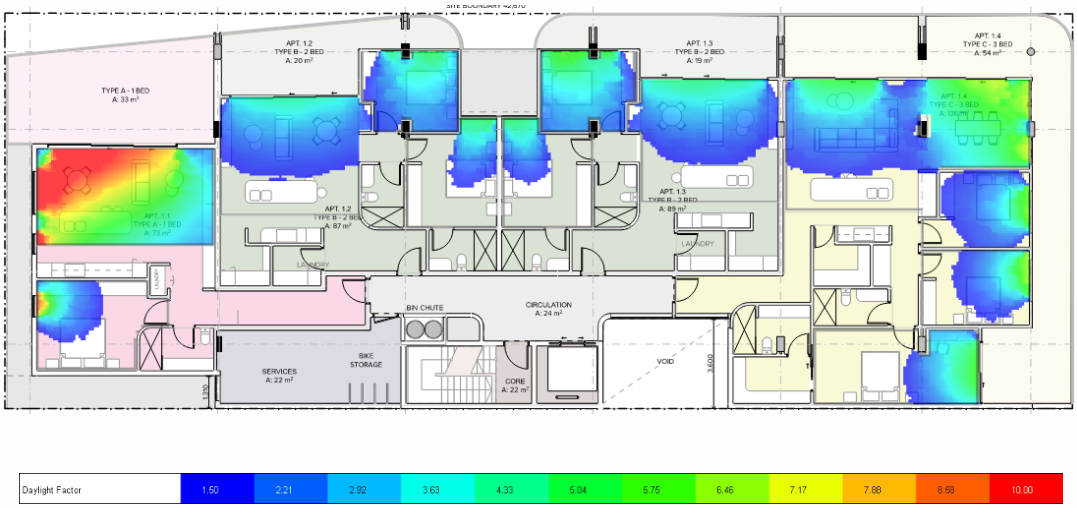
The modelling is based on the attached architectural drawings and the following assumptions:

- All horizontal shading elements are fixed/non-operable (e.g. terraces)
- External glazing has a visible light transmittance (VLT) value of 0.30
- Internal/external floor surface reflectance of 30%
- Internal wall surface reflectance of 70%
- Internal ceiling surface reflectance of 80%
- Working plane nominated as finished floor level
- No significant overshadowing elements
- Uniform design sky of 10,000 lux (ISO 15469:2004)
- Modelling grid area of 0.1m x 0.1m
- Perimeter margin of 0.1m
- Adelaide Airport (IWEC2) location/weather file

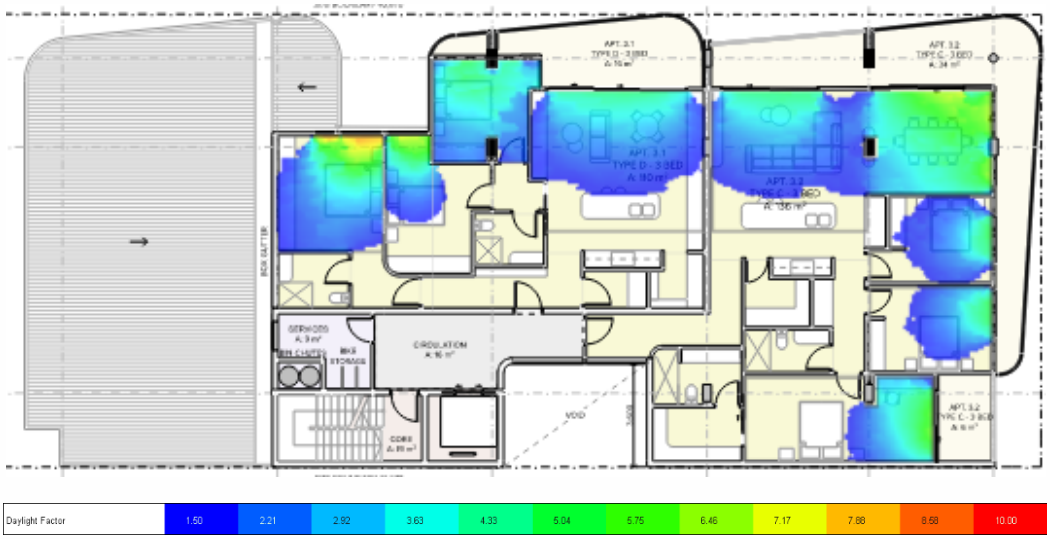
Daylight Factor is defined as the ratio of internal horizontal illuminance to external global horizontal illuminance. It represents the proportion of available external light which illuminates a given point inside the building.

MODELLING OUTPUT

FIRST FLOOR:



THIRD FLOOR:


Daylight Factor
1.50
2.21
2.92
3.63
4.33
5.04
5.75
6.46
7.17
7.88
8.58
10.00

SIMULATION SUMMARY

The proposed development has been assessed and 68.2% of the nominated residential areas achieve the minimum 1.5% daylight factor.

LEVEL	AREA TYPE	FLOOR AREA (m^2)	FLOOR AREA ABOVE 2.0% DF (m^2)	FLOOR AREA ABOVE 2.0% DF (%)
Level 1	A Bed	16.7	6.2	37.2
Level 1	A Living	27.9	27.9	100.0
Level 1	B1 Bed 1	11.8	11.3	95.3
Level 1	B1 Bed 2	14.9	4.7	31.3
Level 1	B1 Living	27.5	18.0	65.3
Level 1	B2 Bed 1	11.8	11.6	98.5
Level 1	B2 Bed 2	14.7	4.3	29.1
Level 1	B2 Living	28.2	18.1	64.1
Level 1	C1 Bed 1	19.8	7.9	39.8
Level 1	C1 Bed 2	13.7	7.8	57.0
Level 1	C1 Bed 3	12.3	10.2	82.9
Level 1	C1 Living	45.8	36.2	79.0
Level 3	C2 Living	42.9	35.3	82.4
Level 3	C2 Bed 1	19.9	8.1	40.5
Level 3	C2 Bed 2	13.7	7.2	52.6
Level 3	C2 Bed 3	12.1	9.0	74.1
Level 3	D Living	29.2	20.5	70.0
Level 3	D Bed 1	12.5	12.5	99.7
Level 3	D Bed 2	15.1	5.7	37.5
Level 3	D Bed 3	15.5	14.7	95.0
Total		**406.3**	**277.1**	**68.2**

DF = Daylight Factor

CONCLUSION

Detailed energy modelling and daylight analysis has been undertaken on First and Third Floor of the proposed residential development at 290 Unley Road, Hyde Park, SA 5061. The results of the analysis demonstrate the nominated areas of the proposed development meet the requirements of *12.1B Compliance Using Daylight Factor* with 2 points being awarded for credit *12.1 Daylight*.