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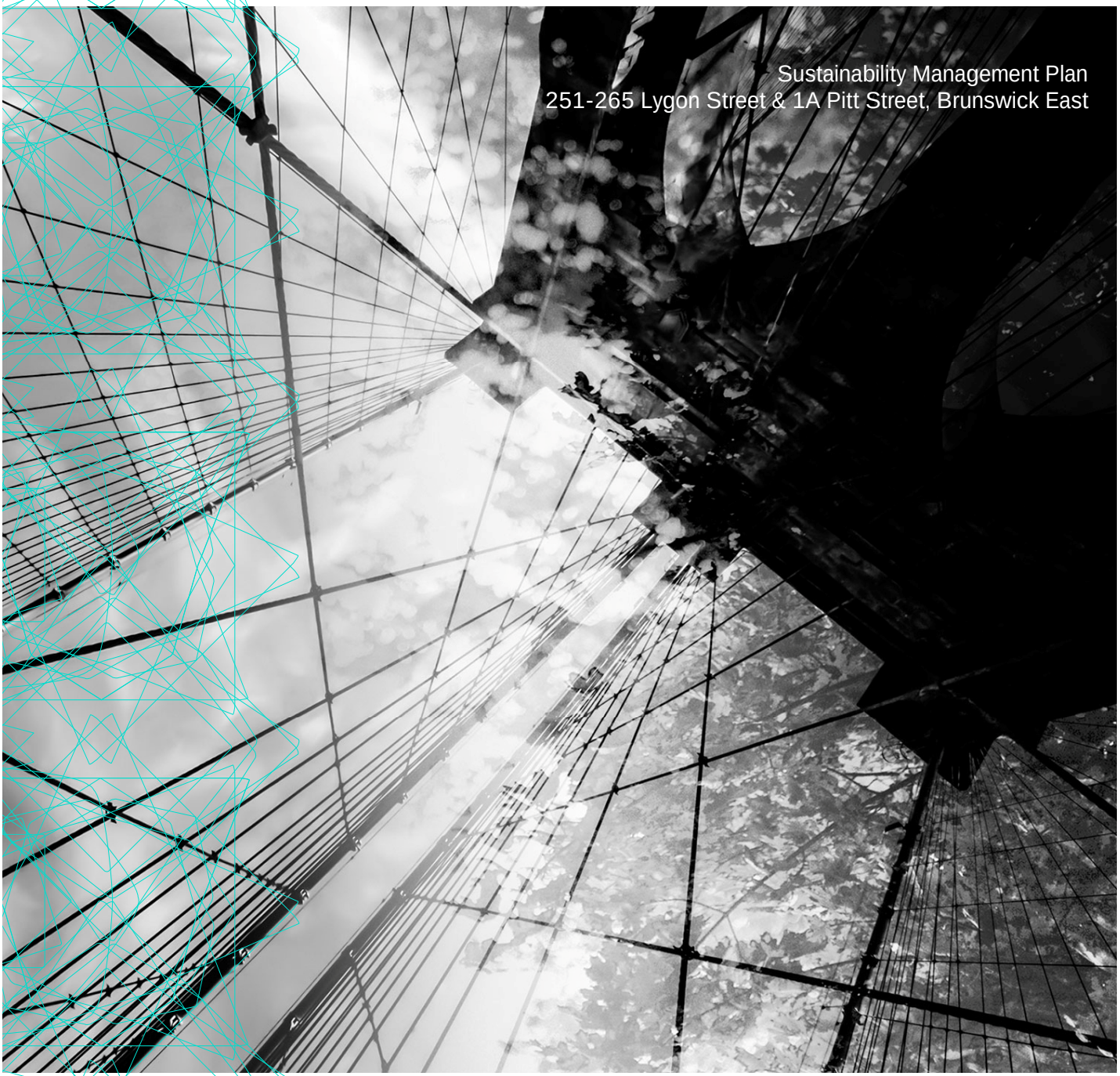

Sustainability Management Plan
251-265 Lygon Street & 1A Pitt Street, Brunswick East

SUSTAINABLE DEVELOPMENT
_CONSULTANTS

Proposed Mixed-Use Development 251-265 Lygon Street & 1A Pitt Street, Brunswick East

Sustainability Management Plan

May 2026

S4523A SMP.V3a

PREPARED BY:

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Version	Date of Issue	Description	Author	Approved
V1a	13-09-2024	For Council Approval	MG	SD
V2a	24-06-2025	Updated to Reflect the Amended Design	LB	SD
V3a	05-05-2026	Updated to Reflect the Amended Design	MG	SD

1. Introduction

This Sustainability Management Plan (SMP) has been prepared to assist the design, construction and operation of the proposed mixed-use development at 251-265 Lygon Street & 1A Pitt Street, Brunswick East, which is to be an eight-storey development comprising a supermarket and recreation facility on the ground floor and residential apartments above.

Sustainable Development Consultants have assessed the proposed development and provided input to the design team. This SMP captures initiatives necessary to ensure that the development meets the sustainability requirements of the City of Merri-bek, as outlined in Section 1.3 of this report.

This document has been prepared by Sustainable Development Consultants with reference to the architectural drawings prepared by PACE Building Group.

1.1 Site Description

The site at 251-265 Lygon Street and 1A Pitt Street is on the corner of Lygon and Evans Streets with access also off Pitt Street at the south. It is situated within the evolving Brunswick East retail shopping strip, approximately 5km north of the Melbourne CBD and around 1.5km from Brunswick railway station and Merri Creek. The site is currently occupied by two-storey commercial buildings, which will be demolished as part of the proposed development.

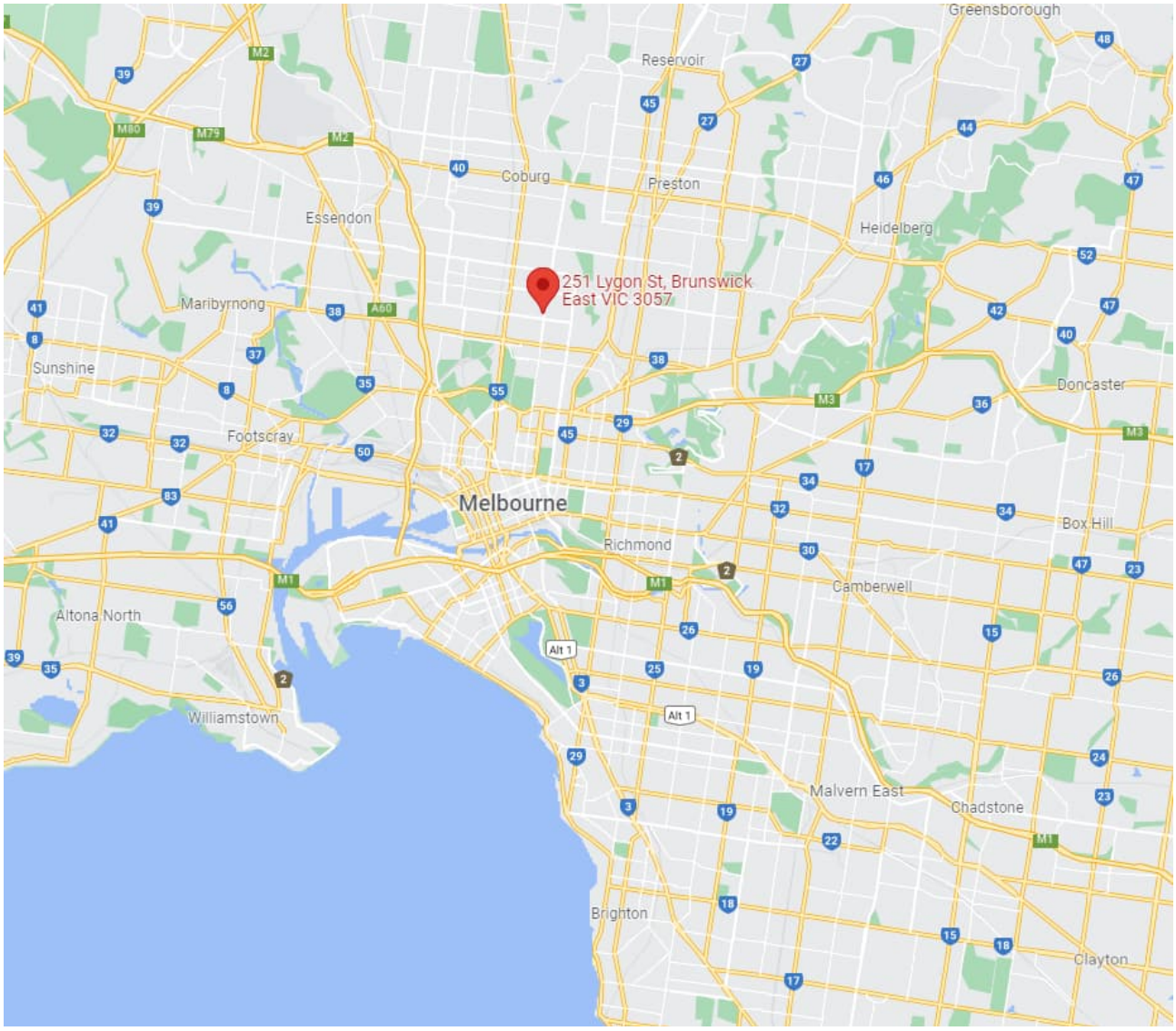


Figure 1: Location of 251-265 Lygon Street & 1A Pitt Street, Brunswick East (Source: Google Maps)

Figure 2: Aerial image of 251-265 Lygon Street & 1A Pitt Street, Brunswick East (Source: Landchecker, mark-up by SDC)

1.2 Development Summary

Set out in Table 1 below is a development summary for this project.

Table 1: Development Summary

Development Information	
Total Site Area	2,476m^2
Basement 1 & 2	108 car spaces (including 1 accessible) and 3 motorbike spaces
Ground Level	Supermarket (Tenancy 1) – 740.3m^2 Recreation facility (Tenancy 2) – 338.1m^2 118 residential bicycle parks + 8 retail employee bicycle parks + 16 visitor parks 3 apartments - 2 x one-bedroom and 1 x two-bedroom
Levels 1 to 7	76 x one-bedroom and 55 x two-bedroom Resident indoor and outdoor communal outdoor facilities
Totals	**108 car spaces and 142 bicycle spaces** **2 retail tenancies – 1,078m^2** **Total of 134 Apartments (190 bedrooms) as follows:** • **78 x one-bedroom** • **56 x two-bedroom**

1.3 Merri-bek City Council Requirements

Merri-bek City Council is committed to make Merri-bek a more sustainable place to live, work and play. Critical to achieving this commitment is for development to meet appropriate environmental design standards.

The City of Merri-bek expects that this mixed-use project should achieve best practice in environmentally sustainable development from the design stage through to construction and operation. To comply with the Local Planning Scheme including Clause 15.01-2L *Environmentally Sustainable Development* this project is required to satisfy the objectives as set out within the following categories, where applicable:

- Energy Performance
- Integrated Water Management
- Indoor Environment Quality
- Stormwater Management
- Transport
- Waste Management
- Urban Ecology

This requires a Sustainability Management Plan (SMP) which demonstrates how for this project, the relevant policy objectives will be achieved.

The City of Merri-bek also requires that the Brunswick East Development addresses the following planning scheme provisions:

- Clause 52.34 *Bicycle Facilities*
- Clause 53.18 *Stormwater Management in Urban Development*
- Clause 58.03 *Site Layout*
- Clause 58.07 *Internal Amenity*

In September 2018, the City of Merri-bek declared a climate emergency and as part of this, are committed to enhanced Environmentally Sustainable Design.

1.4 ESD Assessment Tools

There are several calculators and modelling programs available in Victoria to assess proposed developments against benchmarks for ESD, as set by the Victorian government, local councils and the Building Code of Australia.

For this project, set out below are the assessment tools that have been adopted for this project.

1.4.1 GREEN STAR

The Green Star Buildings tool was created by the Green Building Council of Australia (GBCA) for new buildings and major refurbishments. The tool helps to assess and benchmark projects against a thorough set of criteria, specifically designed to ensure that all buildings meet the new definition of a sustainable building and reward both best practice and innovative sustainable design approaches.

The tool assesses projects against a set of eight (8) categories, which represent key issues that will define the built environment over the next decade. These are:

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

The levels of achievement in this tool are defined as: 4 Star Green Star being "Best Practice", 5 Star being "Australian Excellence", and 6 Star being "World Leadership". The project is to be registered to achieve a Green Star Buildings v1 rating, with a minimum 4-Star rating being targeted, which requires a minimum of 15 points in addition to the minimum expectations which are applicable at all levels of certification.

A preliminary Green Star Scorecard for the Buildings assessment can be found in Appendix 1 of this report. The main body of the report under Section 2 provides an outline of the credits targeted and an overview of what will be provided via each initiative.

While the points and associated initiatives targeted may change during the design process, a minimum 15 points will still be maintained to ensure a 4-Star certified rating is achieved.

1.4.2 MODEL FOR URBAN STORMWATER IMPROVEMENT CONCEPTUALISATION V6 (MUSIC)

MUSIC is an urban stormwater modelling software that was developed to provide an easy-to-use universal treatment model for all urban stormwater systems. The tool is capable of simulating stormwater runoff, its treatment and quality during a rainfall event for catchment areas up to 100km^2 and can be used to assess and inform on stormwater treatment measures necessary to ensure the design of urban development meet required Water Sensitive Urban Design Standards.

Details and results for the MUSIC assessment completed for the proposed development can be found in Appendix 2 of this report.

1.4.3 DESIGNBUILDER

DesignBuilder is a comprehensive analytical software package that analyse the energy and economic impacts of building-related selections such as architectural features; heating, ventilation and air-conditioning (HVAC) systems; building utilisation or scheduling, and financial options. DesignBuilder includes weather data including, latitude, longitude, altitude, time zone, and summer and winter design conditions; hourly observations information such as dry-bulb and wet-bulb temperatures (OADB, OAWB), humidity ration (HR), cloud cover (CCM), wind velocity, and outdoor air pressure (OAP). DesignBuilder was used for both the thermal performance modelling (verification method JV2) and daylight modelling of the proposed building.

Results of the daylight modelling can be found in Appendix 4.

Results of the thermal performance modelling can be found in Appendix 5.

1.4.4 FIRSTRATE5

FirstRate5 is a house energy rating software that is accredited under the Nationwide House Energy Rating Scheme (NatHERS) Software Protocol to generate energy ratings for the purpose of demonstrating compliance of residential dwellings under the National Construction Code of Australia (NCC).

The software is used to assess the thermal performance of dwellings based on climate zone, materials used in a structure, positioning, orientation and building sealing. Higher scores are achieved through adoption of passive design principles such as improved building fabric elements (e.g. glazing and insulation), effective shading and promoting natural ventilation, among others.

A representative sample of dwellings has been modelled to determine the predicted heating and cooling loads and subsequent NatHERS ratings to provide an overview of how the development design is likely to perform.

Building fabric elements may vary as the plans are refined for building approval. However, the design team is committed to achieving an overall average building energy rating of 7.0 Star for the whole site as a minimum, with no dwelling scoring less than 6.0 Star.

The results of this assessment can be found in Appendix 6 of this report.

2. Sustainability Initiatives

The following sections outline the initiatives that will be incorporated into the development throughout its design, construction and operation. Initiatives that are included to contribute towards the BESS benchmark have a reference next to them, e.g. (BESS Management 4.1). Some initiatives without the BESS reference have also been included as they also contribute to the overall sustainability of the development.

The following sections, as well as nominating the sustainability initiatives, also identify the party/parties responsible for implementation of the initiative, and the stage at which implementation will be demonstrated.

The following are the broad project stages:

1	Design Development	• Consultants develop conceptual design drawing to a detailed stage suitable as a basis for preparing working drawings - Integration of architectural, services, structure and site attributes • Checking compliance with all statutory requirements, codes and standards • Arranging special surveys or reports as required
2	Construction Documentation	• Architectural and services drawing sets completed • All specialist reports completed • All necessary planning and building consents obtained as required by authorities
3	Construction	• All work carried out onsite – site preparation, construction, alteration, extension, demolition • Purchase of all materials / certification • Evidence gathering from subcontractors • Commissioning
4	Post Occupancy	• Operation and Maintenance • Education – Building Users Guides

2.1 Net-Zero Carbon Development

Climate change has recently received global attention, as scientists are recognising the relationship among carbon footprint, global warming (greenhouse effect) and climate change. In Australia, the built environment is accountable for approximately one quarter of all greenhouse gas emissions.

Increasing Australian urbanisation, which is growing at an unprecedented rate, coupled with the rise in temperature and the current inefficient use of natural resources, is causing loss of biodiversity, pollution and land degradation. This is likely to result in increased pressure on natural capital and infrastructure, as well as an increase in the cost of energy and water, negatively impacting the quality of living and the natural environment.

Carbon footprint, global warming and climate change represent an important challenge for those in the built environment sector, but they also represent a valuable opportunity to contribute to achieving great sustainability outcomes, including greenhouse gas emissions reduction, ecosystems remediation, and community engagement.

To address the above challenges, the Lygon Street & Pitt Street development will commit to become a net-zero carbon building. This will be achieved with a combination of energy-efficient design, renewable energy sources, and a reduction of embodied greenhouse gas emissions from products and materials. The net-zero carbon strategies included in the development are:

- All-electric residential dwellings – no connection to gas supply will be provided to the dwellings;
- A green Power Purchase Agreement (PPA) will be entered into for the development – electricity will be sourced from 100% green and renewable sources, at a rate which is desirable for tenants to continue buying in the future;
- Energy efficient hot water, heating and cooling systems;
- Onsite Solar PV System – this will offset energy use from central services;
- A minimum 7.0 Star NatHERS average for the development;
- Water efficient fixtures and fittings; and
- Green and sustainable certified products and materials.

2.2 Responsible

The responsible category targets aspects of the development that ensure buildings are designed, procured, built and handed over in a responsible manner.

Design Requirements	Responsibility & Implementation	Project Stage
Credit 1 – Industry Development		
A Green Star Accredited Professional (GSAP) will be engaged as part of the core project team to help guide throughout the project and act as the project contact for the purpose of communication with the GBCA. The building owner/developer will track and disclose the cost of the sustainable building practices implemented in the project to the Green Building Council of Australia (GBCA) via the *Green Star Financial Transparency disclosure template* provided by the GBCA. The project will provide information on-site and to the GBCA to highlight and market the sustainability achievements of the project.	ESD Consultant Builder/ Building Owner	Early Design Detailed Design/ Practical Completion
Credit 2 – Responsible Construction		
The head contractor will have an environmental management system in place to manage its environmental impacts on site and will create and implement a project specific Environmental Management Plan (EMP). At least 90% of construction waste will be diverted from landfill; waste contractors and processing facilities that align with the *Green Star Construction and Demolition Waste Reporting Criteria* will be used. The builder will also provide training on site to 95% of all contractors and subcontractors present on site for at least three days, covering key items and an overview of the Green Star certification being sought.	Builder	Pre-construction/ Demolition Construction
Credit 3 – Verification and Handover		
A thorough metering and monitoring strategy will be employed, in line with the Green Star requirements, to ensure optimum ongoing system management. Environmental targets will be set for energy and water consumption and air tightness, which will be monitored throughout the entire design and construction process. Operations and maintenance information will be compiled and provided to the facilities management team at the time of handover to ensure the best use of the building is carried through.	Head Contractor Builder Owner	All Stages
Credit 4 – Responsible Resource Management		
The development will provide facilities for separation and collection of the following waste streams, as a minimum: • General Waste; • Recycling Streams including paper and cardboard, glass, and plastic; and • Food organics and Garden Organics, e-waste. A waste specialist will be engaged to advise, review and sign off on the design to ensure appropriate dedicated waste storage area is provided for all streams, in line with Green Star Building minimum expectations.	Waste Consultant Architect/ Building Owner	Design Development/ Post Occupancy
Credit 9 - Responsible Finishes		
A minimum 40% of all internal building finishes (by cost) will be selected to meet a Responsible Products Value of at least 7.	Builder/ Architect	Construction Documentation

2.3 Healthy

The Healthy Category targets aspects of building design that impact occupant health and well-being.

Design Requirements	Responsibility & Implementation	Project Stage
Credit 10 - Clean Air		
All ventilation systems will be designed to comply with the minimum separation distances listed in the Green Star Guidelines for each space type to help maintain indoor pollutant levels. In addition to this, all systems will have adequate access to both sides of all moisture and debris catching components for maintenance within the air distribution system. Print / Photocopy areas and kitchen areas will be provided with an exhaust fan which draws air directly out of the building without any recirculation. Ventilation to the retail tenancies will be improved by providing a 50% improvement of outdoor air required by AS 1668.2:2012. The apartments will be naturally ventilated, as per the requirements of AS 1688.4:2012.	Services Consultant Builder Architect	Design Development / Commissioning
Credit 11 - Light Quality		
Artificial lighting design and selection will ensure the Green Star Minimum Expectation for lighting comfort and glare will be met. The apartment design and layouts will ensure access to daylight is maximised via windows and glazed doors which provide ample daylight to the main usable area of both the living area and bedrooms. All apartment living areas and bedrooms are provided with access to daylight and will be provided with internal blinds to control glare. The commercial spaces at ground floor are also provided with large glazed facades which will provide great access to daylight which will improve the indoor environment and also reduce reliance on artificial lighting. Please see Appendix 4 for preliminary daylight modelling and analysis.	Architect	Design Development
Credit 12 – Acoustic Comfort		
An acoustic comfort strategy will be prepared to describe how the building and acoustic design seeks to deliver acoustic comfort to the building occupants.	Acoustic Consultant	Early Design
Credit 13 - Exposure to Toxins		
Indoor air pollutants will be reduced by the use of low-VOC or non-toxic materials, ensuring that building occupants are not exposed to toxins. All paints, adhesives and sealants, flooring, wall and ceiling coverings will not exceed the limits outlined in the GS Buildings Submission Guidelines. All engineered wood products will be 'low' formaldehyde, certified as E0 or better.	Builder All Trades	Construction Documentation/ Construction

2.4 Resilient

The Resilient Category provides opportunities for building owners and designers to incorporate elements to ensure long-term performance and impact of the building against potential disruptions caused by the likes of climate change, health pandemics, infrastructure failure etc.

Design Requirements	Responsibility & Implementation	Project Stage
Credit 16 - Climate Change Resilience		
The project team will complete a climate change pre-screening checklist and communicate the building's exposure to climate change risks to key project stakeholders. This will ensure the project team is aware of the risks associated with a changing climate, and how the development may be impacted.	Architect/ ESD Consultant	Design Development
Credit 19 - Heat Resilience		
The development will adopt multiple initiatives across the site area to reduce the impact of urban heat island effect of the development. The key contributors to this will be landscaping across the site, light coloured paving to balconies and communal terraces, and the development roof which will be specified with a reflective, light finish (either light metal sheeting or white painted slab). Overall, at least 75% of the site will be provided with some form of treatment to reduce the heat island effect of the development.	Architect/ Landscape Architect	Design Development

2.5 Positive

The positive category addresses how the building intends to respond to its contribution to climate change by targeting reduction in energy consumption and switch to renewable energy sources.

Design Requirements	Responsibility & Implementation	Project Stage
Credit 21 - Upfront Carbon Emissions		
The building material selected for the proposed developed will be done to ensure at least a 10% reduction in upfront carbon emissions will be achieved when compared with a current standard practice building. This will be achieved through an efficient design and conscious material selection, especially for concrete and steel.	Builder/ Structural Engineer/ Architect	Construction Documentation
Credit 22 - Energy Use		
Residential The apartments will be designed and optimized to ensure the development achieves a minimum average NatHERS rating of 7.0-Stars, with no individual apartment achieving a rating of less than 6.0-Stars, in line with the requirements for the Credit Achievement. Preliminary energy ratings have been completed which demonstrate the ability of the design to achieve this target, in addition to ensuring that all apartment ratings are on track to adhere with the cooling load requirement of ≤30MJ/m^2 as per Clause 58.3 (Climate Zone 21). Please refer to Appendix 6 for details of this preliminary assessment. Additionally, all apartments will achieve the Green Star Buildings Tool's Building Service Requirements for: • Domestic Hot Water Generation • Clothes Drying • Vertical Transportation; and • Lift Lobbies and Corridors.	ESD Consultant/ Architect	Construction Documentation

Design Requirements	Responsibility & Implementation	Project Stage
Commercial/Non-Residential The non-residential component of the development will be designed to achieve a minimum 10% reduction in energy use, when compared with a reference building. However, a 20% improvement will be targeted to achieve the Credit Achievement. See Appendix 5 for preliminary energy modelling demonstrating one option for achieving this.		
Renewable Energy Systems - Solar PV		
Peak electricity demand to be reduced with the addition of roof-mounted solar photovoltaic arrays. Space on the roof of the development will be allocated for the provision of a minimum 31kW solar PV system which is to be split between the apartments and common areas. Of this, 15 kW will be dedicated to the residential spaces and 16 kW to the common areas.	Architect / Services Consultant	Design Development
Credit 23 - Energy Source		
Power for this project will be provided via an embedded electrical network which will provide 100% green energy for the building. All electricity under the control of the building owner/operator (i.e. entire building excluding tenant power) will commit to 100% green energy for at least 5 years.	Services Consultant	Design Development
Credit 25 – Water Use		
All fixtures and water-using appliances installed within the building will meet the minimum Water Efficiency Labelling Scheme (WELS) star ratings listed below: • Showers: 3-Star; • Taps: 5-Star; • Toilets: 4 Star; • Dishwashers: 5 Star; and • Clothes Washing Machines: 4 Star (if installed in project scope).	Architect / Services Consultant	Design Development

2.6 Places

The Places category seeks to encourage building designers and developers to consider development in a wider view by looking into ways that the building can contribute and positively impact the local area and community.

The 251-265 Lygon Street and 1A Pitt Street proposed development site has been assessed using the “Walk Score” locational performance tool. The tool was developed in 2007 by Front Seat using the Google Maps tools. This tool takes into account the number of facilities within close proximity, and public transit based on distance and type of nearby transit lines. Numerical scores of between 0 and 100 for the following 2 aspects are provided:

- Walk Score: 0 being heavily car dependent with access to community facilities that are located some distance away, and 100 reflecting a location that is easily accessible to abundant facilities by foot.
- Transit Score: 0 being the location only provides minimal transit while 100 reflecting a location that is well served by public transport.

The proposed development in Brunswick East achieves a Walk score of 94 out of 100 – “Walkers Paradise” and a Transit Score of 76 out of 100 – “Excellent Transit”, which indicate that the building occupants can complete daily errands without requiring a car and the transit is convenient for most trips.

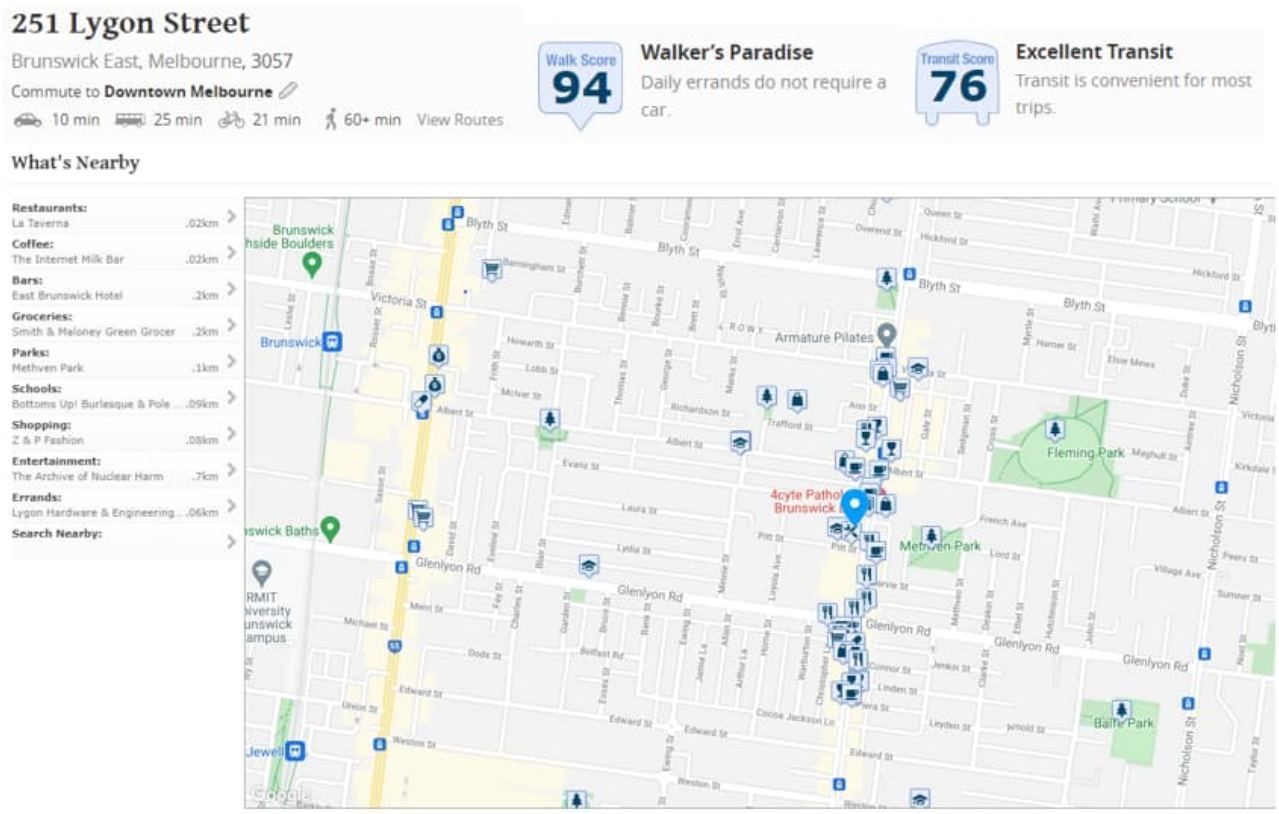


Figure 3: Walk Score results and map showing amenities surrounding 251-265 Lygon Street and 1A Pitt Street, Brunswick East (Source: walkscore.com)

Design Requirements	Responsibility & Implementation	Project Stage
Credit 27 – Movement and Place		
Bicycle Parking Facilities		
142 **bike parking spaces will be provided for residents, retail staff, and visitors at ground level: 1**18 **spaces will be dedicated to residents, 8 for retail employees, and 16 for retail visitors.** End-of-Trip facilities, including shower, lockers and change space will be provided to encourage building staff to cycle to and from the building. The development will encourage occupants and residents to choose alternative travel options to reduce their associated emissions.	Architect / Developer	Construction Documentation
Electric Vehicle Charging		
To enhance the development's ability to reduce vehicle emissions, the building will provide: • Ready to charge EV charging points to at least 5% of all car parking spaces (at least 6 spaces will be provided). • Connections for car sharing parking spaces, regardless of whether the vehicles are electric at the time of practical completion (in addition to the 5% provided). • Electrical infrastructure and a load management plan prepared to allow for future installation of EV charging of 25% of all car parking spaces (including the minimum 5% and car share spaces already provided). The mix of EV chargers assumed must be stated.	Services Consultant	Design Development

Design Requirements	Responsibility & Implementation	Project Stage
• A dedicated, safe, unobstructed route from the electrical supply point which allows for the future provision of all necessary electrical cabling without the need for substantial builders work on connection to the electrical cabling installation.		
Motorbikes		
The project is provided with 3 motorbike parking spaces on Basement Levels. This will encourage residents, staff and visitors to use a more sustainable transport option. Motorbikes use less fuel than cars and can provide many of the individual freedoms associated with them.	Architect	Design Development
Credit 29 – Contribution to Place		
The project team will provide an urban context report and public realm interface design that outlines the urban context of the development and the design responses.	Developer	Design Development
Car Share Scheme		
The City of Merri-bek supports Car Share Schemes through the allocation of public car spaces for use by commercial operators. The development is located near to the following car share pods: Flexicar: • One pod located on Glenlyon Road near Lygon Street – 200m from the development • One pod located on Nicholson Street and Hickford Street – 900m from the development GoGet: • One pod located on Glenlyon Road near Lygon Street– 200m from the development • One pod located on Albert Street between Minnie and Trafford Street – 350m from the development • One pod located on Victoria Street near Lygon Street – 350m from the development • One pod located on Glenlyon Road between Deakin and Ethel Street – 450m from the development • One pod located on Maghull Street near Fleming Park – 600m from the development One pod located on Victoria Street near the Myrtle Street and the Brunswick Bowling Club – 600m from the development	Inherent in Location	
Access to Public Transport		
The proposed development has direct access within 1.5km walking distance to the following public transport options: Train Line: • Brunswick Station: Upfield Line. Tram Route: • 1: East Coburg – South Melbourne Beach • 6: Moreland – Glen Iris • 96: St Kilda Beach – East Brunswick • 19: North Coburg – Flinders Street Station	Inherent in Location	

Design Requirements	Responsibility & Implementation	Project Stage
Bus Line: • 506: Moonee Ponds – Westgarth • 508: Alphington – Moonee Ponds		

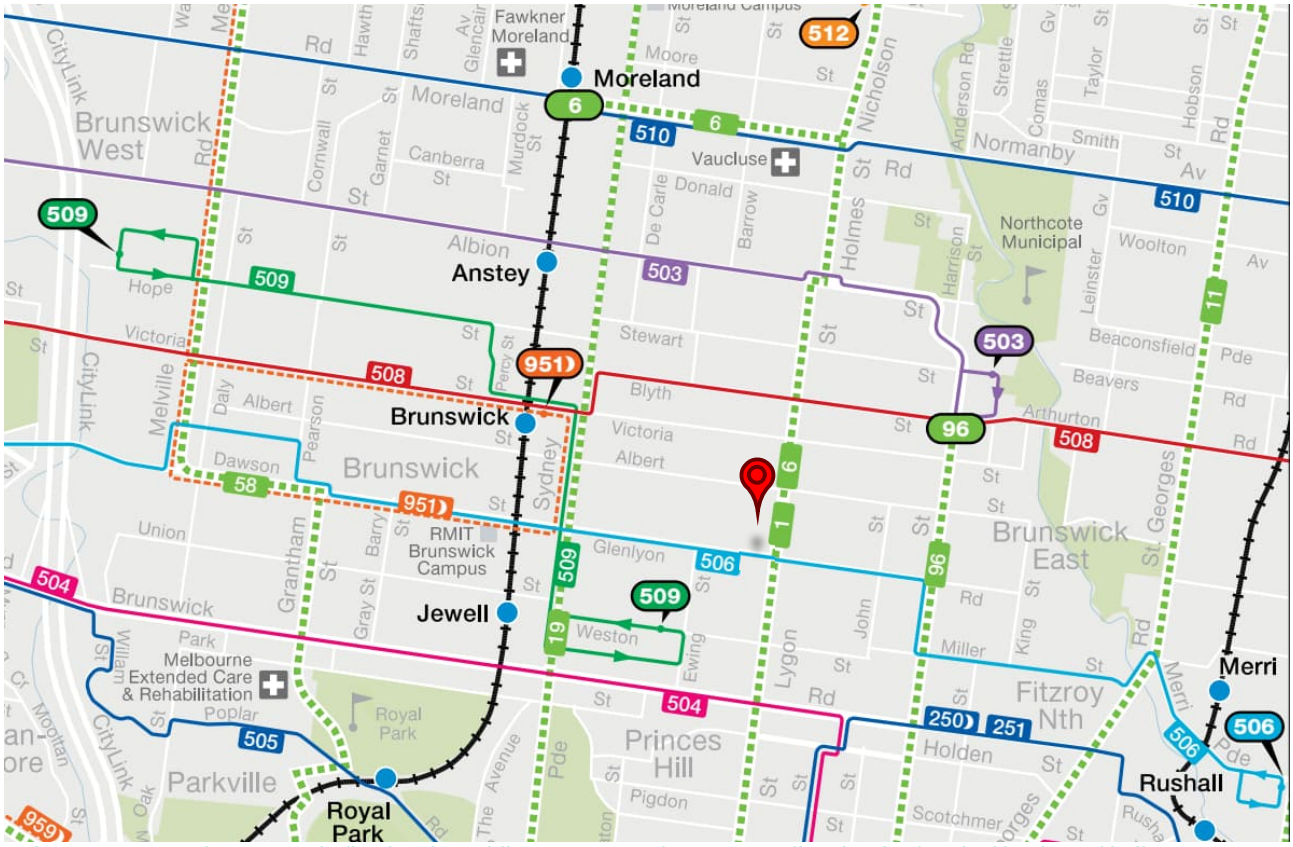


Figure 4: PTV Local Area Map indicating the public transport options surrounding the site (marked by the red balloon. Source: ptv.vic.gov.au)

2.7 People

The People category focuses on how elements of the building can contribute to improving social and community issues relevant to the development and local area.

Design Requirements	Responsibility & Implementation	Project Stage
Credit 31 - Inclusive Construction Practices		
The builder will ensure that gender inclusive facilities and protective equipment will be provided during construction. Additionally, they will also implement policies on site to address discrimination, racism and bullying while also provided training on drug and alcohol awareness and mental health, and information on the policies that are being implemented on-site.	Builder	Construction

2.8 Nature

The Nature category ensures that development considers its impacts on the environment beyond its boundary and contributing to rebuilding our natural environment.

Design Requirements	Responsibility & Implementation	Project Stage
Credit 35 – Impacts to Nature		
The development site does not hold high ecological value. Light pollution to neighbouring bodies will be minimized by designing all external lighting in accordance with AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting. No external luminaire on the project will have an Upward light Output Ratio (ULOR) exceeding 5%, relative to its mounted orientation. External lighting will be designed to avoid light spill off the site or into the night sky.	Lighting Designer/ Engineer	Design Development

3. Conclusion

As set out in this SMP the proposed mixed-use development at 251-265 Lygon Street & 1A Pitt Street, Brunswick East, will meet best practice requirements through the initiatives outlined in this report including the use of energy efficient systems, rainwater tank(s) and the use of low to zero VOC content materials, as well as reduced environmental impacts during the construction stage.

Implementation of all initiatives will be managed under the Green Star certification process. While some initiatives and credits claimed may vary during the design and works, the project will ensure all minimum expectations are met and ensure at least 15 points are achieved to ensure a 4-Star Green Star Buildings certification can be achieved.

Appendix 1 – Green Star Scorecard

greenstar Buildings

Submission planner

Summary

Climate Positive Pathway

Registering from / certified	2023 onwards	Desired Green Star rating	4 Star

The Climate Positive Pathway is optional for

Green Star rating

Core points targeted	15	Minimum expectations met	Yes
Leadership points targeted	0	Green Star rating targeted	4 Star
Total points targeted	15	Climate Positive Pathway met	No

	Credit	Minimum Expectation	Credit Achievement	Exceptional Performance	Total points available	Targeted performance level	Total points targeted
Responsible					**17**		
1	Industry Development		1		**1**	Credit Achievement	**1**
2	Responsible Construction	•	1		**1**	Credit Achievement	**1**
3	Verification and Handover	•	1		**1**	Minimum Expectation	•
4	Operational Waste	•			**0**	Minimum Expectation	•
5	Responsible Procurement		1		**1**		**0**
6	Responsible Structure		3	2	**5**		**0**
7	Responsible Envelope		2	2	**4**		**0**
8	Responsible Systems		1	1	**2**		**0**
9	Responsible Finishes		1	1	**2**	Credit Achievement	**1**
						Total	**3**
Healthy					**14**		
10	Clean Air	•	2		**2**	Minimum Expectation	•
11	Light Quality	•	2	2	**4**	Minimum Expectation	•
12	Acoustic Comfort	•	2		**2**	Minimum Expectation	•
13	Exposure to Toxins	•	2		**2**	Minimum Expectation	•
14	Amenity and Comfort		2		**2**		**0**
15	Connection to Nature		1	1	**2**		**0**
						Total	**0**
Resilient					**8**		
16	Climate Change Resilience	•	1		**1**	Minimum Expectation	•
17	Operations Resilience		2		**2**		**0**
18	Community Resilience		1		**1**		**0**
19	Heat Resilience		1		**1**	Credit Achievement	**1**
20	Grid Resilience		3		**3**		**0**
						Total	**1**
Positive					**30**		
21	Upfront Carbon Emissions	•	3	3	**6**	Minimum Expectation	•
22	Energy Use	•	3	3	**6**	Credit Achievement	**3**
23	Energy Source	•	3	3	**6**	Credit Achievement	**3**
24	Other Carbon Emissions		2	2	**4**		**0**
25	Water Use	•	3	3	**6**	Minimum Expectation	•
26	Life Cycle Impacts		2		**2**		**0**
						Total	**6**
Places					**8**		
27	Movement and Place	•	3		**3**	Credit Achievement	**3**
28	Enjoyable Places		2		**2**		**0**
29	Contribution to Place		2		**2**	Credit Achievement	**2**
30	Culture, Heritage and Identity		1		**1**		**0**
						Total	**5**
People					**9**		
31	Inclusive Construction Practices	•	1		**1**	Minimum Expectation	•
32	Indigenous Inclusion		2		**2**		**0**
33	Procurement and Workforce Inclusion		2	1	**3**		**0**
34	Design for Inclusion		2	1	**3**		**0**
						Total	**0**

	Nature				14		
35	Impacts to Nature	•	2		**2**	Minimum Expectation	•
36	Biodiversity Enhancement		2	2	**4**		**0**
37	Nature Connectivity		2		**2**		**0**
38	Nature Stewardship		2		**2**		**0**
39	Waterway Protection		2	2	**4**		**0**
						Total	**0**

	Leadership				0		
40	Market Transformation				**0**		**0**
41	Leadership Challenges				**0**		**0**
						Total	**0**

Please note that while the credits targeted may alter during the design process, a minimum of 15 points will be maintained to ensure a 4-Star Certification is achieved.

Appendix 2 – MUSIC Assessment & WSUD Report

Objectives

The quality and quantity of stormwater leaving a site can have a significant impact on the surrounding infrastructure and waterways. Impervious surfaces move water quickly and efficiently out of built-up areas straight into stormwater infrastructure, which in turn quickly moves the untreated water into natural watercourses. This process does not treat the stormwater and as the water flows into natural water courses, it causes erosion and pollution of those waterways with the rubbish, sediments, pathogens, and other pollutants that run off the impervious surfaces into the stormwater drains.

New developments in the City of Merri-bek must comply with *Clause 53.18* and the best practice performance targets for suspended solids, total phosphorous and total nitrogen, as set out in the Urban Stormwater Best Practice Environmental Management Guidelines, Victoria Stormwater Committee 1999. Currently, these water quality performance targets require:

- Suspended Solids - 80% retention of typical urban annual load.
- Total Nitrogen - 45% retention of typical urban annual load.
- Total Phosphorus - 45% retention of typical urban annual load.
- Litter - 70% reduction of typical urban annual load.

New developments must also incorporate treatment measures that improve the quality of water and reduce flow of water discharged into waterways (such as collection and use of rainwater/stormwater on site) and encourage the use of measures to prevent litter being carried off-site in stormwater flows. The proposed development has addressed these requirements by identifying the impervious surfaces within the site and implementing treatments to mitigate the impacts of stormwater leaving the site. To assess these initiatives, the MUSIC tool – which is an industry accepted tool – was used to determine the treatment effectiveness of these initiatives.

Site Characteristics

For the purposes of the stormwater assessment, the townhouses have been delineated into basic surface types listed below and highlighted in mark-up plans following:

- Total site area (red delineation): 2,476m²
- Non-trafficable roof area (blue): 1,044m²
- Roof terrace and balconies catchment area (orange): 1,074m^2
- Level 1 communal garden (yellow): 314m²
- Remaining impervious surfaces (unshaded): 44m²

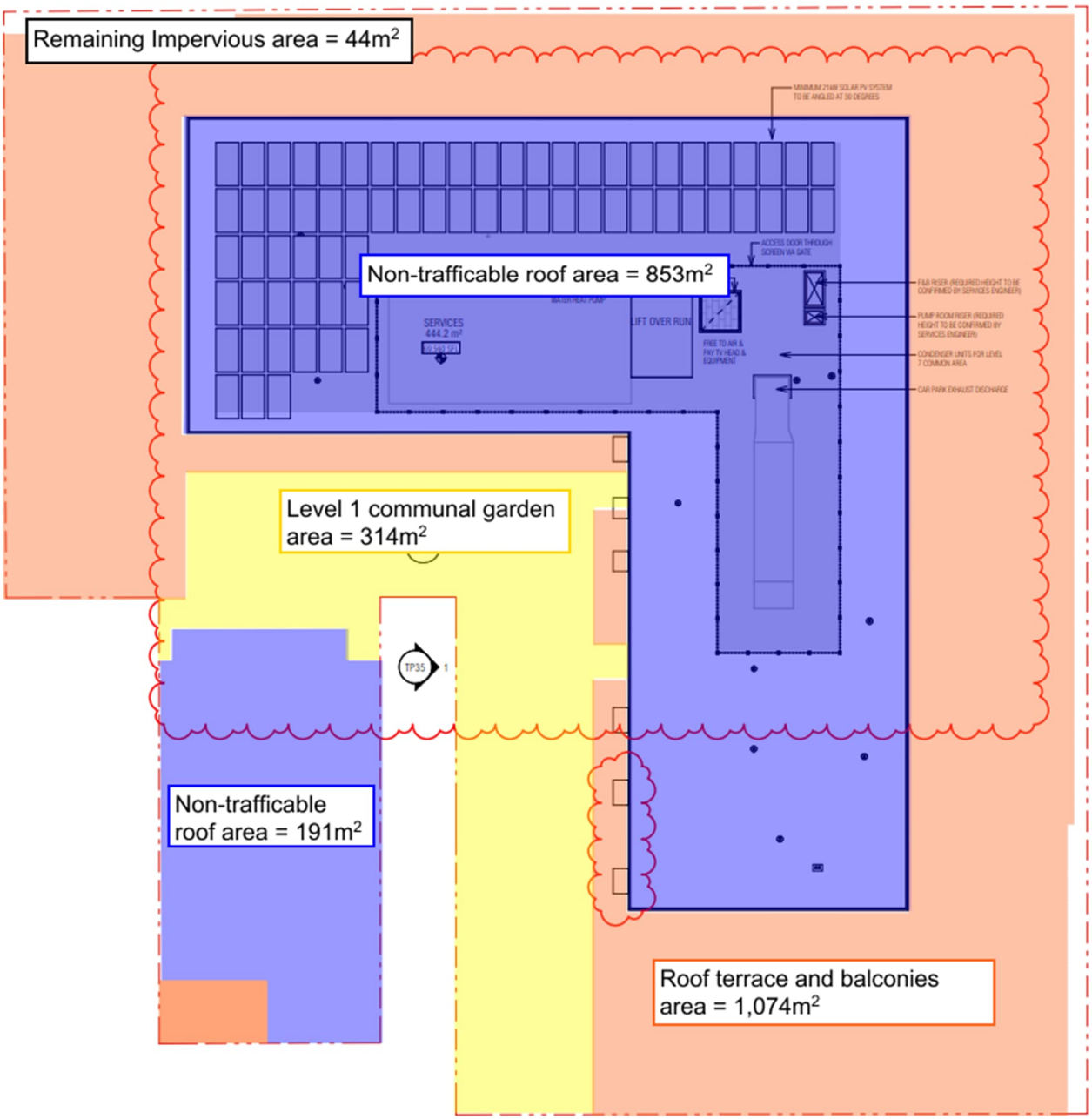


Figure 5: Site delineation

Stormwater Management Initiatives

Stormwater treatment initiatives will need to be implemented. The following section presents the different surfaces that have been identified for treatment, and the required treatment[1]. The initiatives to manage stormwater flows for the building area will underpin the overall performance of the site and its ability to meet stormwater management objectives.

Table 2: List of areas and their stormwater treatment measures

Surfaces	Area	Required Treatment
Site Area (red delineation)	2,462m^2	Detailed below.
Non-Trafficable Roof Area (blue)	1,044m^2	Runoff from the non-trafficable roof catchment area will be diverted to rainwater tank(s) with minimum effective storage capacity of 20,000L. Rainwater collected in the tank(s) will be connected to the irrigation system serving all common landscaped areas. Overflow from the rainwater tank(s) will be directed to a Gross Pollutant Trap (Atlan Ecoceptor or equivalent) prior to be diverted to the Legal Point of Discharge (LPD) onsite.
Trafficable Roof Terrace and Balcony Area (orange)	1,074m^2	Runoff from the trafficable roof terrace and balconies will be directed to raingarden(s) with a minimum surface area of 25m^2. Overflow from the rainwater tank(s) will be directed to a Gross Pollutant Trap (Atlan Ecoceptor or equivalent) prior to be diverted directed to the LPD onsite.
Level 1 Communal Garden (yellow)	314m^2	Runoff from Level 1 communal garden will be diverted directly to the LPD onsite.
Remaining Impervious Surfaces (unshaded)	44m^2	Runoff from remaining impervious areas will be diverted directly to the LPD onsite.

[1] Please note that alternative stormwater treatment devices may be selected, provided that they result in an equivalent or better level of stormwater treatment.

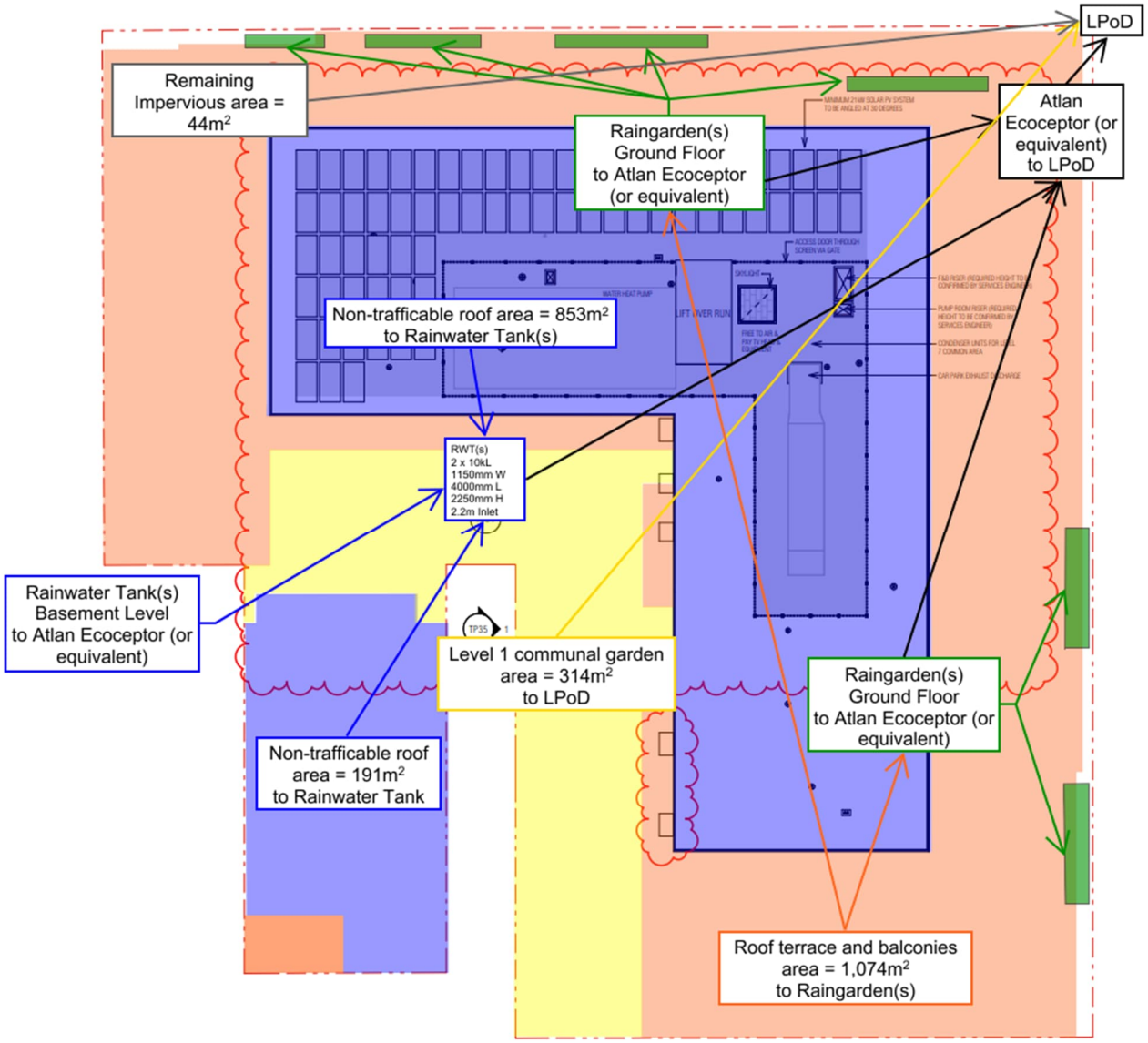


Figure 6: Stormwater treatment network and water flow direction

Rainwater Reuse

Water reuse demand for irrigation has been determined using the Green Star Potable Water Calculator as follows:

Table 3: Reuse demand (as per Green Star Potable Water Calculator)

Reuse	Demand
Landscape irrigation	16kL/year

Runoff from the roof catchment areas will need to be supplemented with mains water to provide sufficient potable water to the development site.

Stormwater Quality Modelling Results

The impervious surfaces and recommended treatments have been assessed using the MUSIC tool.

The MUSIC model of the treatment measures demonstrates that minimum pollutant load reductions are met.

Table 4: Comparison of pollutant load reduction from the stormwater treatment systems against the best practice target

Pollutant Load	Required Load Reduction	Calculated Load Reduction
Flow	40%	4.2%
Total Suspended Solids	80%	80.8%
Total Phosphorus	45%	74.4%
Total Nitrogen	45%	61.1%
Gross Pollutants/Litter	70%	85.8%

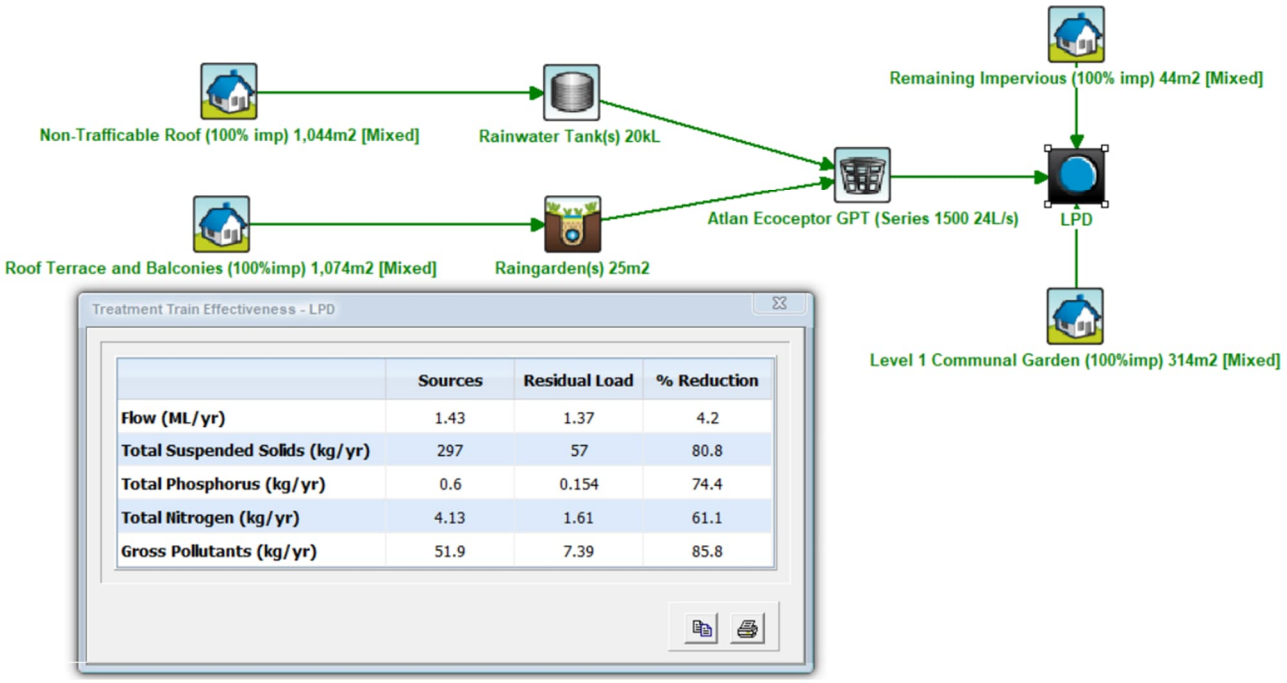


Figure 7: MUSIC interface layout of the stormwater treatment network and rainwater collection and reuse system. All flows will subsequently discharge to the legal point of discharge

MUSIC Inputs

Listed in the tables below are the basic inputs used for the MUSIC model. All low and high-flow bypass volumes were left at MUSIC default (0m^3/s and 100m^3/s respectively) unless specified by the manufacturer. *MUSIC Guidelines: Recommended input parameters and modelling approaches for MUSIC users (Melbourne Water 2018)* was used as a guideline in the creation of the model.

Weather

Rainfall Reference Station	Reference Year	Time Step
Melbourne City	1952-1961	6 Min

Source Nodes: Urban

Parameter	Input
Node Name	Non-Trafficable Roof 1044m^2
Total Area	0.104ha
Zoning/Surface Type	Mixed
Fraction Impervious	1.00
Rainfall-Runoff Parameters	MUSIC Default
Pollutant Flow Concentration Parameters	MUSIC Default

Source Nodes: Urban

Parameter	Input
Node Name	Roof Terrace and Balconies 1,074m^2
Total Area	0.107ha
Zoning/Surface Type	Mixed
Fraction Impervious	1.00
Rainfall-Runoff Parameters	MUSIC Default
Pollutant Flow Concentration Parameters	MUSIC Default

Source Nodes: Urban

Parameter	Input
Node Name	Level 1 Communal Garden 314m^2
Total Area	0.031ha
Zoning/Surface Type	Mixed
Fraction Impervious	1.00
Rainfall-Runoff Parameters	MUSIC Default
Pollutant Flow Concentration Parameters	MUSIC Default

Source Nodes: Urban

Parameter	Input
Node Name	Remaining Impervious 44m^2
Total Area	0.004ha
Zoning/Surface Type	Mixed
Fraction Impervious	1.00
Rainfall-Runoff Parameters	MUSIC Default
Pollutant Flow Concentration Parameters	MUSIC Default

Treatment Node: Rainwater Tank

Parameter	Input
Node Name	Rainwater Tank(s) 20kL
Number of Tanks	1
Total Tank System Properties	
Volume below overflow pipe	20.0kL
Depth above overflow	0.2m
Surface Area	10.0m^2
Initial Volume	10.0kL
Outlet Properties	
Overflow Pipe Diameter	50.00 mm
Advanced Properties	
Orifice Discharge Coefficient	0.60 (MUSIC Default)
Number of CSTR Cells	2
Pollutant k & C* Values	MUSIC Default
Re-use	
Max Drawdown Height	1.9m
Annual Demand[2]	16kL/year

Details of the rainwater tank(s), including location, dimensions, and sections, will be provided in the Architectural Documentation prepared for the development.

Treatment Node: Bioretention

Parameter	Input
Node Name	Raingarden(s) 25m^2
Inlet Properties	
Low Flow By-pass	0m^3/s (MUSIC Default)
High Flow By-pass	100m^3/s (MUSIC Default)

[2] Landscaping water demand was calculated based on the Green Star Potable Water Calculator.

Parameter	Input
Storage Properties	
Extended detention depth	0.20m
Surface Area	25.0m^2
Filter and Media Properties	
Filter Area	25.0m^2
Filtration Depth	0.5m (MUSIC Default)
Infiltration Properties	
Exfiltration Rate	0.00mm/hr (Melbourne Water MUSIC Guidelines 2018)
Advanced Properties	
Vegetation	Vegetated with Effective Nutrient Removal Plants
Lined Base	Yes
Overflow Weir Coefficient	2.00 (MUSIC Default)
Number of CSTR Cells	3 (MUSIC Default)

Details of the raingarden(s), including location, dimensions, and plant types, will be provided in the Landscape Documentation prepared for the development.

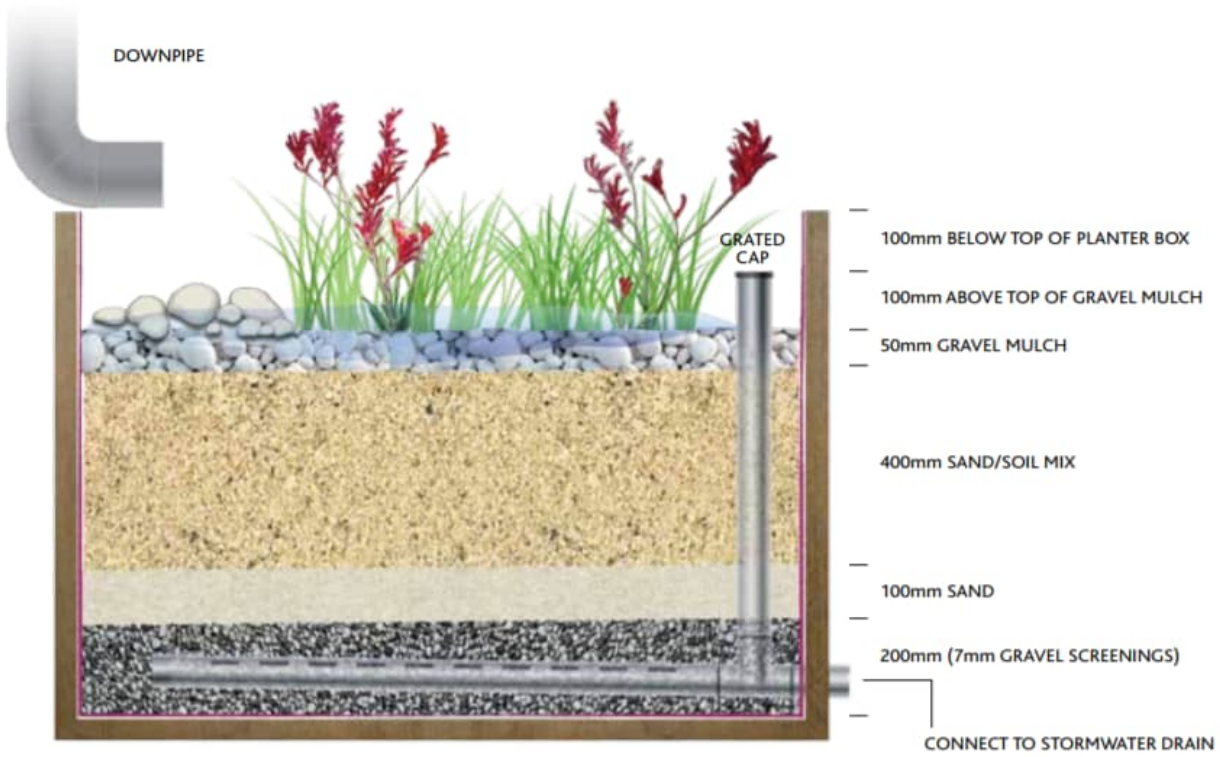


Figure 8: Example cross-sectional view of proposed planter box raingardens (Source: Melbourne Water)

Treatment Node: Gross Pollutant Trap

Atlan Ecoceptor (Series 1500 24L/s) (or equivalent)

Parameter	Input
Node Name	Atlan Ecoceptor (Series 1500 24L/s)
Inlet Properties	
Low Flow By-pass	0.0000m^3/s (Specified by Atlan)
High Flow By-pass	0.0240m^3/s (Specified by Atlan)
Treatment Properties	
Target Element	**Capture Efficiency** (Atlan Performance Specifications)
Total Suspended Solids	71% (Specified by Atlan)
Total Phosphorus	69% (Specified by Atlan)
Total Nitrogen	47% (Specified by Atlan)
Gross Pollutants	95% (Specified by Atlan)

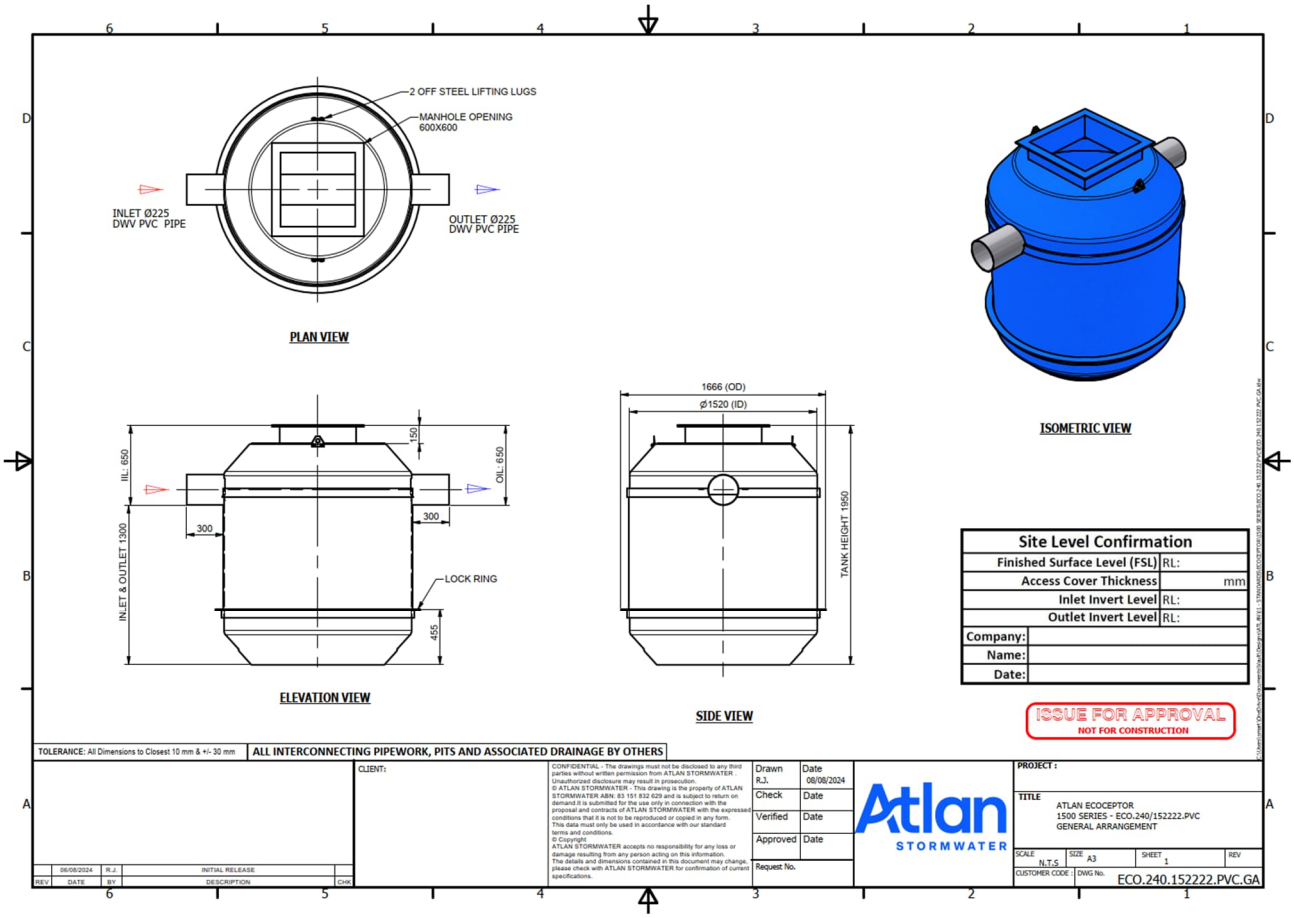


Figure 9: Atlan Ecoceptor schematic (https://atlanstormwater.com/au/ecoceptor/)

Stormwater System Maintenance

The proposed stormwater management devices will require regular maintenance and monitoring to ensure they function as designed. An operation maintenance manual will be prepared for the site. The following section outlines key maintenance tasks and recommended frequency. The property owner will be responsible for continuous implementation of stormwater management device maintenance.

Rainwater Tank System

The standard maintenance activities that typically take place as part of an ongoing maintenance schedule for the rainwater tank system are as follows:

Rainwater tank system element	Frequency	Maintenance Task
Rainwater tanks – Minor service	Quarterly	• Check for any damage/compression • Check that supporting base is free of cracks and movement • Empty and clean first flush diverters • Remove and clean inlet and outlet/overflow strainers • Check correct operation of potable mains back up switch • Check that mesh covers have not deteriorated and intact • Check for mosquito infestation
Rainwater tanks – Major service	Every 2 years	• Clean tank to remove accumulated sludge
Pumps	Every 6 months	• Service water pump to prolong life
Roof and gutters	Every 6 months	• Clean out of leaves/debris

Raingardens

The standard maintenance activities that typically take place as part of an ongoing maintenance schedule for the raingardens are as follows:

Raingarden system element	Frequency	Maintenance Task
Plants	As required	• Replace plants when necessary • Remove weeds as required
Gravel mulch	As required	• Repair erosion by rearranging gravel/rocks after initial heavy rain events if required
Downpipe	As required	• Remove any sediment/build-up from the downpipe if blocked
Roof and gutters	Every 6 months	• Clean out of leaves/debris

Atlan Ecoceptor (or equivalent)

Regular maintenance of the Atlan Ecoceptor (or equivalent) system is required to ensure proper ongoing performance. Basic maintenance activities depend on regular visual inspections, which may trigger silt removal or filter replacement, depending on TSS accumulation.

The standard maintenance activities that typically take place as part of an ongoing maintenance schedule for the Atlan Ecoceptor (or equivalent) are detailed below.

Activity	Frequency	Maintenance Detail
Visual Inspection	One month after installation	• Initial inspection to determine the volume of trapped silt and pollutants, which is useful in determining the frequency of ongoing inspections/cleaning operations
Chamber clean	As required based on initial inspections, and following excessive rain	• Lift the external lid, insert suction hose into the chamber.

Disposal of Waste Materials

The accumulated pollutants found in the stormwater treatment systems must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes.

Stormwater Runoff Treatment During the Construction Stage

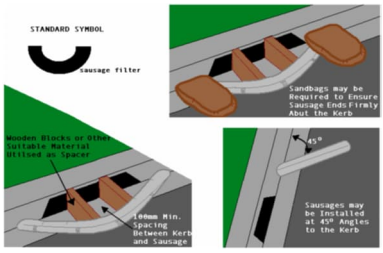
Treatment – Various

Stormwater management in the construction stage will include measures which will be put in place to minimise the likelihood of contaminating stormwater discharge from the site as well as reduce the velocity of the flows generated from the building as it is being constructed. This will mean ensuring buffer strips are in place, and the site will be kept clean from any loose rubbish. More information is available from "*Keeping Our Stormwater Clean – A Builder's Guide*" by Melbourne Water[3]. Typical pollutants that are generated from a construction site during a rainfall event include:

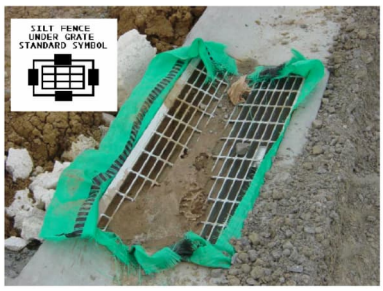
- Dust
- Silt
- Mud
- Gravel
- Stockpiled materials
- Spills/oils
- Debris/litter

To reduce the impacts and minimise the generation of these pollutants the following measures are proposed. The symbols embedded within each image are typically used for Construction Environmental Management Plans.

Gravel Sausage filters – to be placed at the entrance of pits/side stormwater inlets. These permeable sacks will filter the suspended soils and sediments and any other litter carried by the stormwater to prevent the pollutants entering the system.



Silt Fences Under Grates - Silt fence material may be placed under the grate of surface-entry inlets to prevent sediment from entering the stormwater system.



Temporary Rumble Grids – these are designed to open the tread on tires and vibrate mud and dirt off the vehicle (in particular the chassis). This will heavily minimise the amount of soil/dirt deposited on local roads where it can be washed (by rainfall or other means) into the stormwater drains.

[3] For copies, please contact Melbourne Water on 131 722.

Appendix 3 – Green Star VOC and Formaldehyde Limits

Table 5: Maximum Volatile Organic Compound Levels for construction materials (Source: Green Building Council Australia – Green Star Design and As Built v1.3 2019 Manual)

Product Type/Sub Category	Max TVOC Content (g/L of ready-to-use-product)
Paints, Adhesives and Sealants	
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	16
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
Carpets	
Total VOC limit	0.5 mg/m² per hour
4-PC (4-Phenylcyclohexene)	0.05mg/m² per hour
ISO 16000 / EN 13419 - TVOC at three days	0.5 mg/m² per hour
ISO 10580 / ISO/TC 219 (Document N238) - TVOC at 24 hours	0.5 mg/m² per hour

Table 6: Maximum Formaldehyde levels for processed wood products. (Source: Green Building Council Australia – Green Star Design and As Built v1.3 2019 Manual)

Formaldehyde emission limit values for different testing methods	
Test Method	**Emission Limit/ Unit of Measurement**
AS/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/m²hr
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1 mg/m²hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m²hr (at 3 days)
ASTM D6007	≤0.12mg/m³
ASTM E1333	≤0.12mg/m³
EN 717-1 (also known as DIN EN 717-1)	≤0.12mg/m³
EN 717-2 (also known as DIN EN 717-2)	≤3.5mg/m²hr

Appendix 4 – Daylight Assessment Results & Assumptions

Sustainable Development Consultants (SDC) have reviewed the design for the proposed building at 251-265 Lygon Street & 1A Pitt Street, Brunswick East, and provided advice regarding the predicted level of internal daylight within the regularly occupied spaces.

Daylight access for this development has been assessed using a combination of Daylight Modelling Methodology and BESS built-in calculations tool.

Daylight Modelling Methodology

The program DesignBuilder is a comprehensive analysis software package which uses the accurate physics-based Radiance simulation engine that utilise material types and finishes, glazing properties, reflectance off internal and external surfaces as well as local weather, latitude and longitude coordinates for the proposed site.

The analysis grid points are determined at floor surface level. Results are presented using Daylight Factor (DF) which is the percentage (%) of the available daylight under a design sky. The simulation was undertaken using the Uniform Cloudy Sky for Melbourne.

All building fabric which may overshadow the internal areas of the proposed development, such as the screens, overhangs, balustrades and neighbouring buildings have been built in the model to provide an accurate simulation of the available light under the current proposed conditions.

Below is a list of the regularly used spaces included in the assessment:

- Retail Tenancy Spaces
- Retail Tenancy Spaces Rear
- Level 1's apartments' living rooms / studios and bedrooms (units 1.01 to 1.22)
- Level 2's apartments' internal living rooms / studios and bedrooms (units 2.13 to 2.23)

Additional spaces within the building such as bathrooms and amenities, corridors and service areas are not deemed primary occupied spaces and have been excluded from the assessment. This also includes approximately 30% of the floor area within the retail spaces, which has been designated as back-of-house and has been excluded from the calculations.

Note: The results presented are derived from an earlier version of the drawing set. While minor geometric or layout modifications have since been incorporated into the current drawings, these changes do not affect the daylighting performance of the spaces assessed. Accordingly, from a daylighting analysis perspective, the previous and current drawing sets are considered equivalent, and the results remain representative of the final design intent.

Below are 3D images of the rendered view of the daylight model for the proposed development. Note that the colour is for display purposes only.

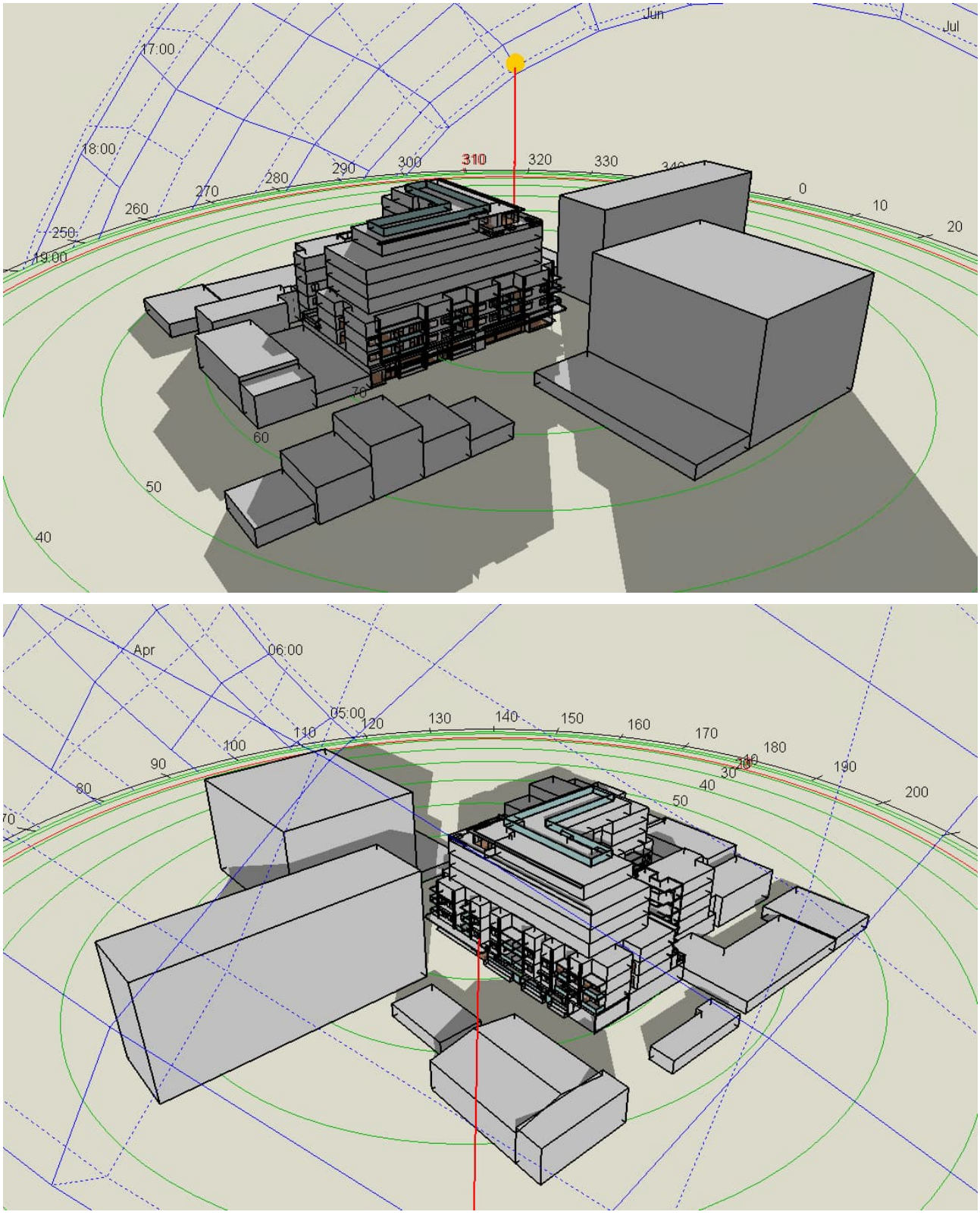


Figure 10: Renders of daylight model for the proposed development showing the sun-path at 3pm on 15th July

Design and Performance

External glazing for the proposed development was modelled with the following Visible Light Transmittance (VLT) values:

Residential and Common Areas	VLT
Fixed Windows	0.72
Awning Windows	0.49
Sliding Doors	0.60
Hinged Doors	0.54

Fenestration systems that can achieve these values can be found in argon-filled low-E double-glazed glass in standard aluminium frame.

Retail Areas	VLT
Fixed Windows	0.55
Sliding Doors	0.48
Hinged Doors	0.40

Fenestration systems that can achieve these values can be found in argon-filled low-E double-glazed glass in standard aluminium frame.

Other building fabric elements were modelled with the following reflectivity:

Building Fabric Element	Reflectivity
External Walls	0.40
Plasterboard Lining	0.80
Plasterboard Ceiling	0.80
Carpet	0.30
Timber	0.30
Vinyl	0.30
Ground	0.20
Neighbouring Buildings	0.40

All external surfaces are modelled in detail with elements that could overshadow or reflect light into the building deemed important for the assessment included in the model, including neighbouring buildings.

Daylight Modelling Methodology Results

The images in this section are lux/daylight factor maps exported from the modelling program DesignBuilder which were produced by the Radiance simulation engine. Please note that they are graphical representation of the results only, for accurate results please refer to the summaries in the following Tables.

The table below presents a breakdown of the predicted daylight factors achieved in each space.

Table 7: Floor Area achieving the minimum threshold Daylight Factor

Zone	Nominated Floor Area (m^2)	Floor Area Above Threshold (m^2)	Percentage of Floor Area Above Threshold (m^2)
Building Manager's Office	14.0	0.0	0.0
Dining Room Common Area	18.1	18.1	100.0

Zone	Nominated Floor Area (m^2)	Floor Area Above Threshold (m^2)	Percentage of Floor Area Above Threshold (m^2)
Main Common Area	41.7	41.7	100.0
Retail Tenancies	746.2	209.4	28.1
Total Non-Residential Areas	**816.0**	**269.1**	**33.0%**
APT 101 Living Room	28.3	28.3	100.0
APT 102 Living Room	22.9	22.9	100.0
APT 103 Living Room	33.9	15.8	46.8
APT 104 Living Room	31.0	19.1	61.5
APT 105 Living Room	29.7	11.9	40.0
APT 106 Living Room	24.7	23.8	96.7
APT 107 Living Room	23.6	22.4	94.9
APT 108 Living Room	24.6	22.2	90.1
APT 109 Living Room	24.6	24.2	98.1
APT 110 Living Room	25.0	23.9	95.7
APT 111 Living Room	25.5	23.6	92.6
APT 112 Living Room	24.5	24.5	100.0
APT 113 Living Room	22.3	19.9	89.1
APT 114 Living Room	26.5	19.3	72.9
APT 115 Living Room	25.6	14.0	54.5
APT 116 Living Room	23.4	15.0	64.0
APT 117 Living Room	22.2	1.0	4.3
APT 118 Living Room	21.3	18.9	88.7
APT 119 Living Room	22.2	18.7	84.2
APT 120 Living Room	20.5	18.9	92.6
APT 121 Living Room	29.6	17.0	57.4
APT 122 Living Room	23.7	0.0	0.0
APT 123 Living Room	25.2	2.9	11.4
APT 213 Living Room	22.3	20.6	92.0
APT 214 Living Room	26.5	20.2	76.1
APT 215 Living Room	26.5	1.8	6.8
APT 216 Living Room	25.2	18.8	74.5
APT 217 Living Room	22.2	2.6	11.9
APT 218 Living Room	21.3	21.0	98.4
APT 219 Living Room	22.3	19.8	88.9
APT 220 Living Room	20.5	20.1	98.1
APT 221 Living Room	29.6	20.2	68.3
APT 222 Living Room	23.7	0.0	0.0

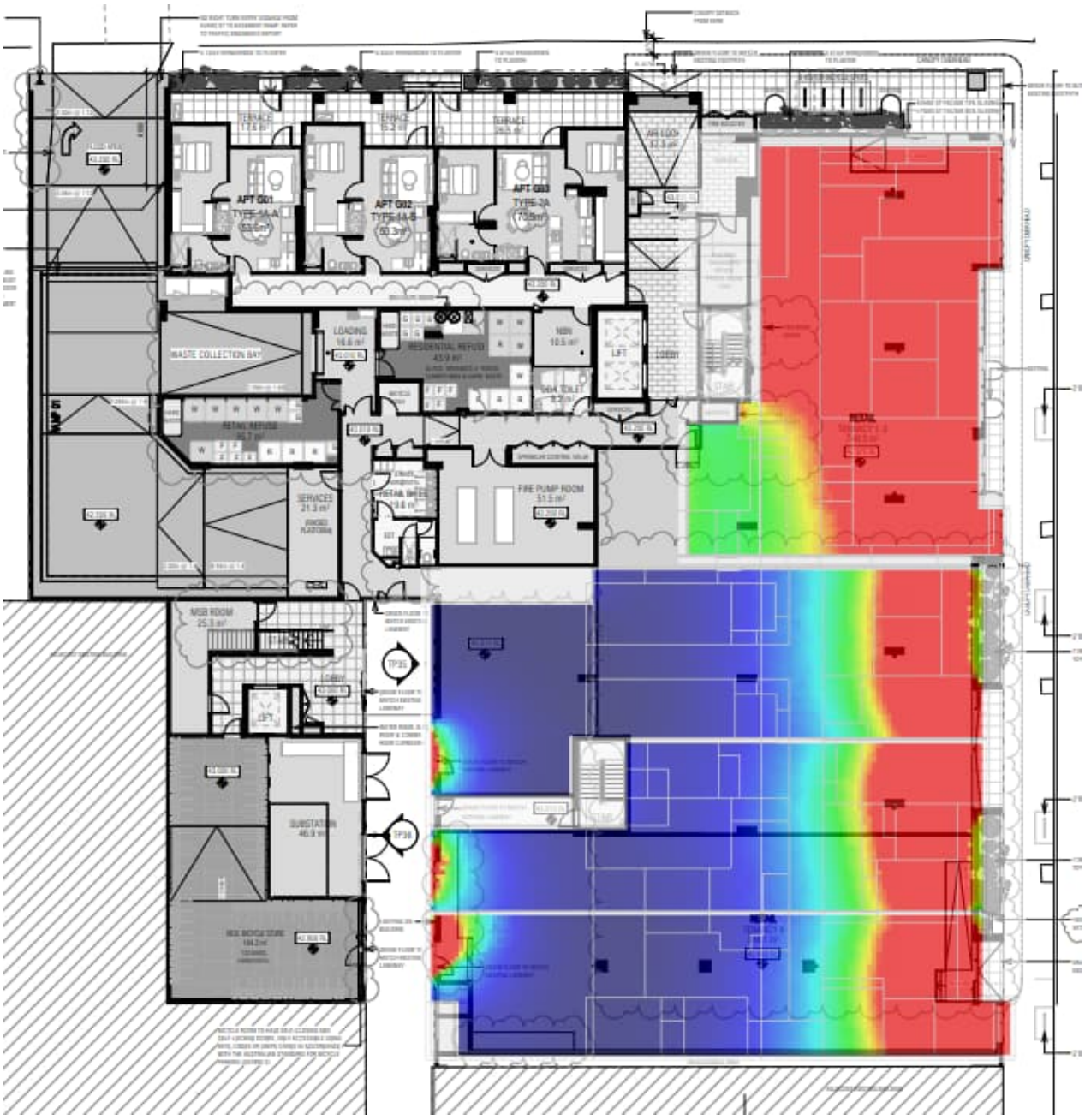
Zone	Nominated Floor Area (m^2)	Floor Area Above Threshold (m^2)	Percentage of Floor Area Above Threshold (m^2)
APT 223 Living Room	27.5	15.5	56.2
APT G01 Living Room	23.7	21.4	90.3
APT G02 Living Room	22.3	20.8	93.2
APT G03 Living Room	26.2	16.0	61.1
Total Living Rooms Achieving a DF Greater Than 1% to 90% of Floor Area	**37 Total Living Rooms**		**15 Compliant Living Rooms**
APT 101 Bed 1	9.1	9.1	100
APT 101 Bed 2	10.3	10.3	100
APT 102 Bed 1	10.6	10.6	100
APT 103 Bed 1	10.2	10.2	100
APT 103 Bed 2	12.7	7.4	57.8
APT 104 Bed 1	9.5	9.5	100
APT 104 Bed 2	13.2	7.8	59.1
APT 105 Bed 1	11.0	11.0	100
APT 105 Bed 2	15.2	10.7	70.4
APT 106 Bed 1	9.9	9.9	100
APT 106 Bed 2	11.4	11.4	100
APT 107 Bed 1	10.2	10.2	100
APT 108 Bed 1	10.2	10.2	100
APT 109 Bed 1	10.2	10.2	100
APT 110 Bed 1	10.2	10.2	100
APT 111 Bed 1	9.0	9.0	100
APT 111 Bed 2	13.1	13.1	100
APT 112 Bed 1	11.1	11.1	100
APT 112 Bed 2	9.5	9.5	100
APT 113 Bed 1	11.1	11.1	100
APT 113 Bed 2	9.7	9.7	100
APT 114 Bed 1	10.9	10.9	99.2
APT 115 Bed 1	10.3	0.3	2.5
APT 116 Bed 1	11.8	10.4	88.6
APT 117 Bed 1	12.1	7.9	65.3
APT 118 Bed 1	13.3	13.3	100
APT 119 Bed 1	13.3	13.3	100
APT 120 Bed 1	12.7	12.2	95.7
APT 121 Bed 1	10.6	10.6	100
APT 121 Bed 2	10.2	10.2	100
APT 122 Bed 1	13.3	13.3	100

Zone	Nominated Floor Area (m^2)	Floor Area Above Threshold (m^2)	Percentage of Floor Area Above Threshold (m^2)
APT 123 Bed 1	13.2	13.2	100
APT 123 Bed 2	10.1	3.9	38.2
APT 213 Bed 1	11.1	11.1	100
APT 213 Bed 2	9.7	9.7	100
APT 214 Bed 1	10.9	10.9	100
APT 215 Bed 1	8.6	2.0	23.3
APT 215 Bed 2	10.3	10.3	100
APT 216 Bed 1	13.8	7.7	55.8
APT 217 Bed 1	12.1	10.1	83.3
APT 218 Bed 1	13.3	13.3	100
APT 219 Bed 1	13.3	13.3	100
APT 220 Bed 1	12.7	12.4	97.9
APT 221 Bed 1	10.6	10.6	100
APT 221 Bed 2	10.2	10.2	100
APT 222 Bed 1	13.3	13.3	100
APT 223 Bed 1	12.7	12.7	100
APT 223 Bed 2	10.1	7.2	70.9
APT G01 Bed 1	12.6	12.6	100
APT G02 Bed 1	12.6	12.6	100
APT G03 Bed 1	9.2	9.2	100
APT G03 Bed 2	10.7	10.7	100
Total Bedrooms Achieving a DF Greater Than 0.5% to 90% of Floor Area	**52 Total Bedrooms**		**41 Compliant Bedrooms**

Daylight Contour Maps

Non-Residential Areas:

The following images present the daylight factor maps for the non-residential portions of the development. In the figures below any floor areas shown as red has over 2% daylight factor (desired daylight in commercial and common areas).



Daylight Factor Retail

Figure 11: Daylight Access Ground Floor – Retail

Daylight Factor Common Areas

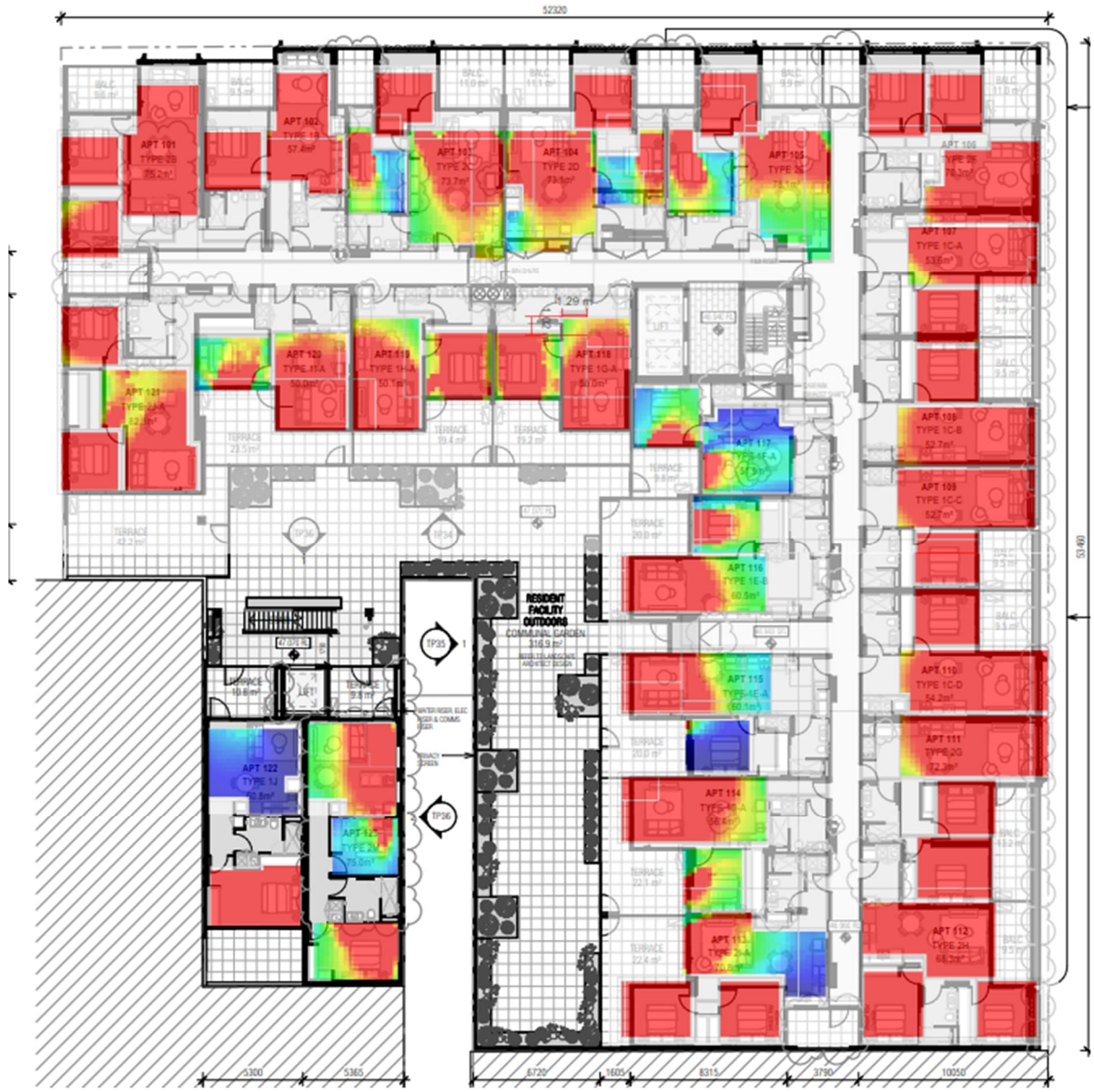
Figure 12: Daylight Access Level 07 – Common Areas

Residential Areas:
The following images present the daylight factor maps for the residential portion of the development modelled, with a colour scale ranging from a 0.5 to 1% daylight factor. The figures below have the following colour scale:

- Red; over 1% daylight factor (desired daylight in bedrooms and living zones).
- Green to Red; over 0.5% and less than 1% daylight factor (desired daylight in bedrooms, small amounts acceptable in living zones (<10% of the floor area)).
- Black to Aqua; 0.0% and less than 0.5% daylight factor (non-compliant areas).

Daylight Factor Living Rooms and Bedrooms

Figure 13: Daylight Access Ground Floor – Living Room sand Bedrooms



Daylight Factor Living Rooms and Bedrooms

Figure 14: Daylight Access Level 1 – Living Rooms and Bedrooms

Daylight Factor Living Rooms and Bedrooms

Figure 15: Daylight Access Level 2 – Living Rooms and Bedrooms

BESS Daylight Access

The following apartments have been assessed using the BESS best-practice simple daylight access methodology:

- Level 2's apartments' external living rooms and bedrooms (units 2.01 to 2.12)
- Level 3's apartments' living rooms / studios and bedrooms
- Level 4's apartments' living rooms and bedrooms
- Level 5's apartments' living rooms and bedrooms
- Level 6's apartments' living rooms and bedrooms
- Level 7's apartments' living rooms and bedrooms

Living rooms / studios and bedrooms are considered to achieve best-practice daylight amenity when they have the following characteristics:

- Rooms are within 8m of a window (or 5m if south facing)
- Floor-to-ceiling height of at least 2.7m
- Glazing to have a Visual Light Transmittance (VLT) of at least 60%
- There are no major obstructions in front of the window
- The rooms comply with the BESS building separation tables

65 out of 74 living rooms / studios and 126 out of 133 bedrooms assessed via BESS have the above characteristics and are thus deemed compliant (auto-pass) with the BESS residential daylight requirements. The remaining living rooms / studios (9) and bedrooms (7) have been individually assessed for compliance using the floor area, daylight entry angles and orientation.

The results in the table below show that 3 living rooms and 4 bedrooms are deemed non-compliant.

Table 8: BESS best practice simple daylight assessment results

Dwelling	Designation	Quantity	Floor Area	Vertical Angle	Horizontal Angle	Window Area	Orientation	Compliant?
321	Living	1	26.2	50	115.6	6.48	S	Yes
319 & 320	Living	2	24.4	60.5	83.9	6.48	S	Yes
318	Living	1	24.4	180	78.8	6.48	S	Yes
315 & 313	Living	2	26.2	33.4	74.8	4.32	W	No
314	Living	1	25.6	60.5	50.6	6.48	W	Yes
322 & 418	Living	2	25.3	0	67.8	7.83	N	No
323 & 419	Living	2	25.5	39.1	180	5.76	E	Yes
415 & 416	Living	2	24.2	180	92	6.48	S	Yes
412 & 413	Living	2	27.5	33.4	81.2	6.48	W	Yes
515, 615	Living	2	24.5	180	113.5	6.48	S	Yes
516 & 616	Living	2	24.5	180	93.5	6.48	S	Yes
708	Living	1	27.9	48.7	82.9	6.24	S	Yes
201, 301 & 321	Bedroom	3	10.4	14.4	135.9	4.86	S	Yes

Dwelling	Designation	Quantity	Floor Area	Vertical Angle	Horizontal Angle	Window Area	Orientation	Compliant?
203, 204, 205, 303, 304 & 305	Bedroom	6	12.8	180	35.6	3.24	N	Yes
212, 312 & 313	Bedroom	3	11.1	22.2	65	3.24	W	Yes
317, 414, 514 & 614	Bedroom	4	11.9	33.4	62.95	6.48	S	Yes
707	Bedroom	1	10.4	180	91.3	2.43	W	Yes

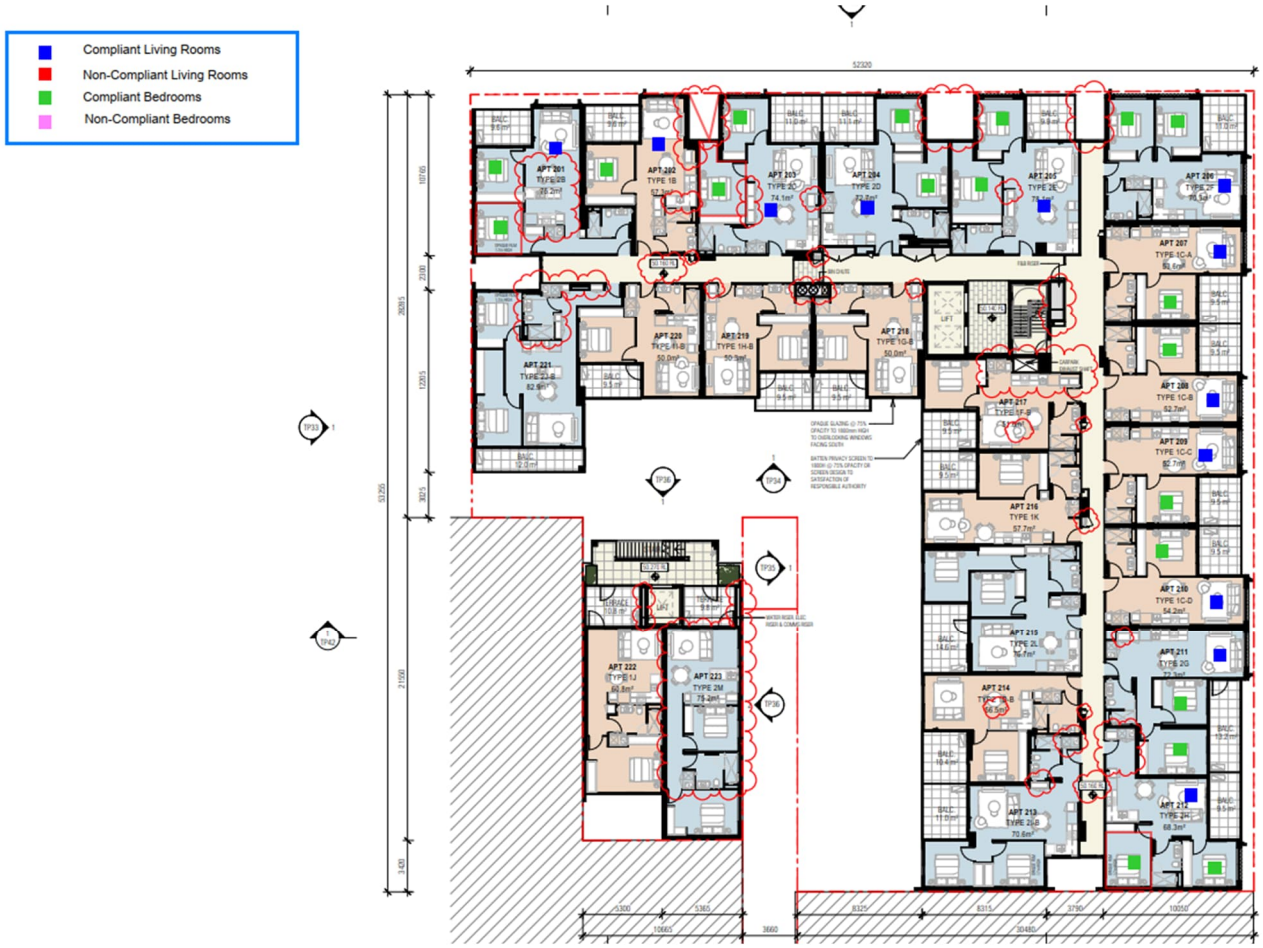


Figure 16: Daylight Access Level 2 – Living Rooms and Bedrooms

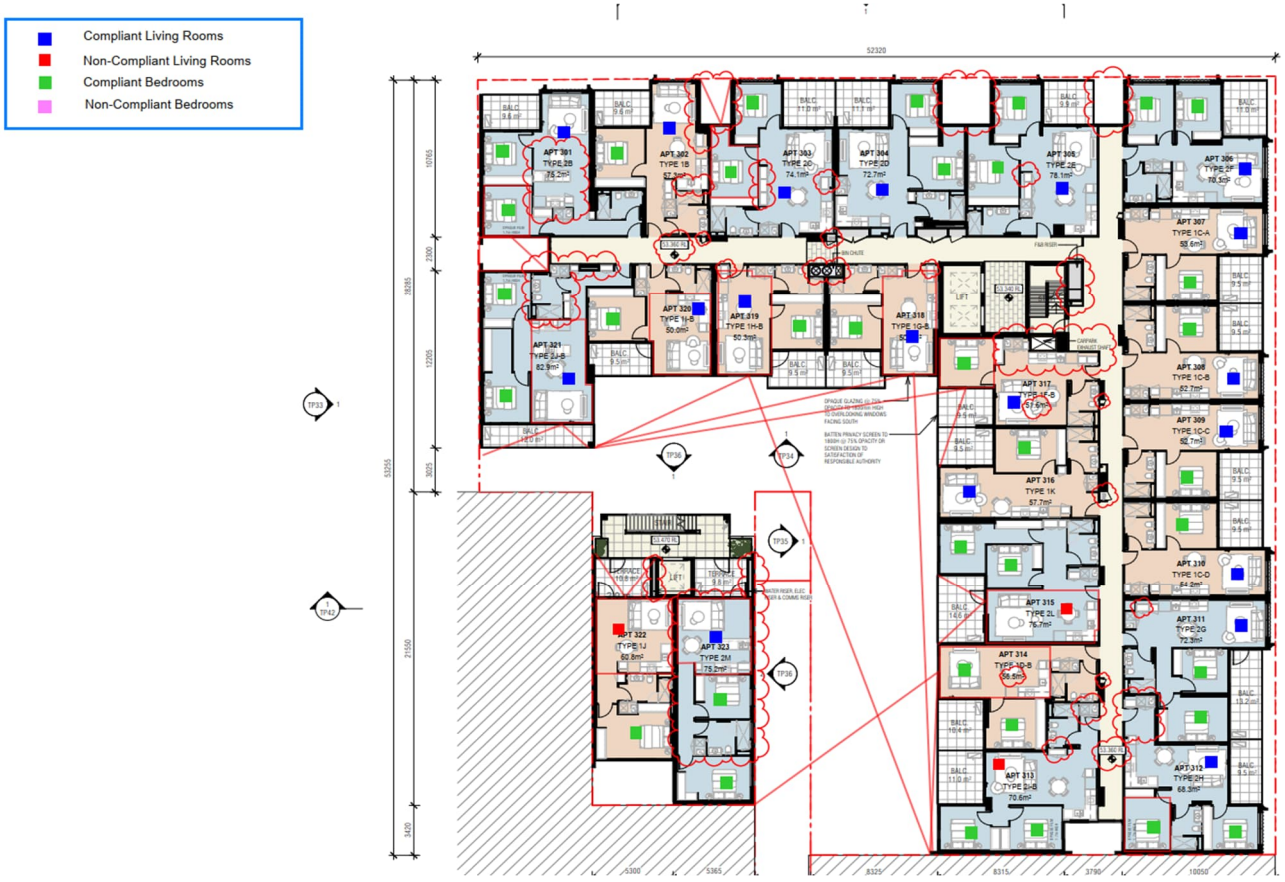


Figure 17: Daylight Access Level 3 – Living Rooms and Bedrooms

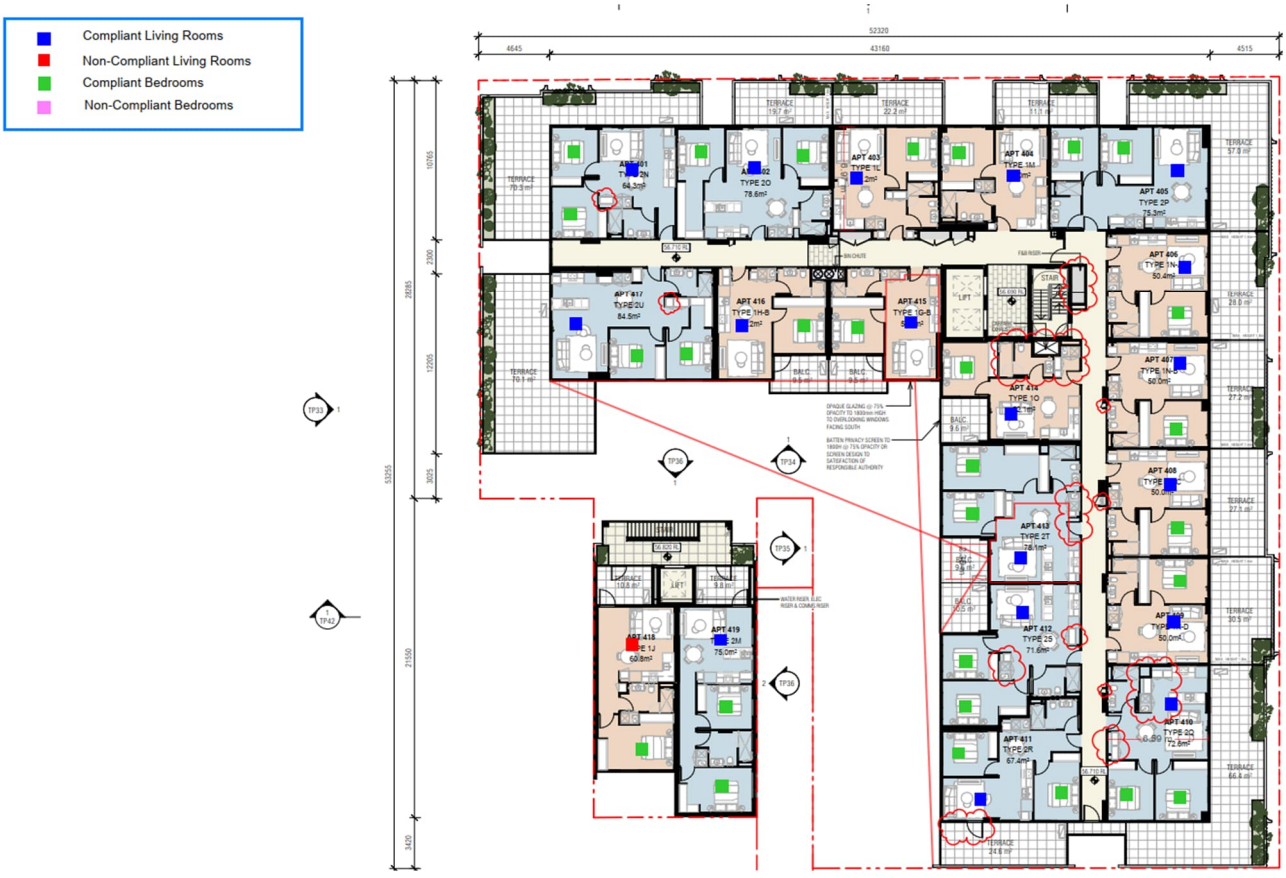


Figure 18: Daylight Access Level 4 – Living Rooms and Bedrooms

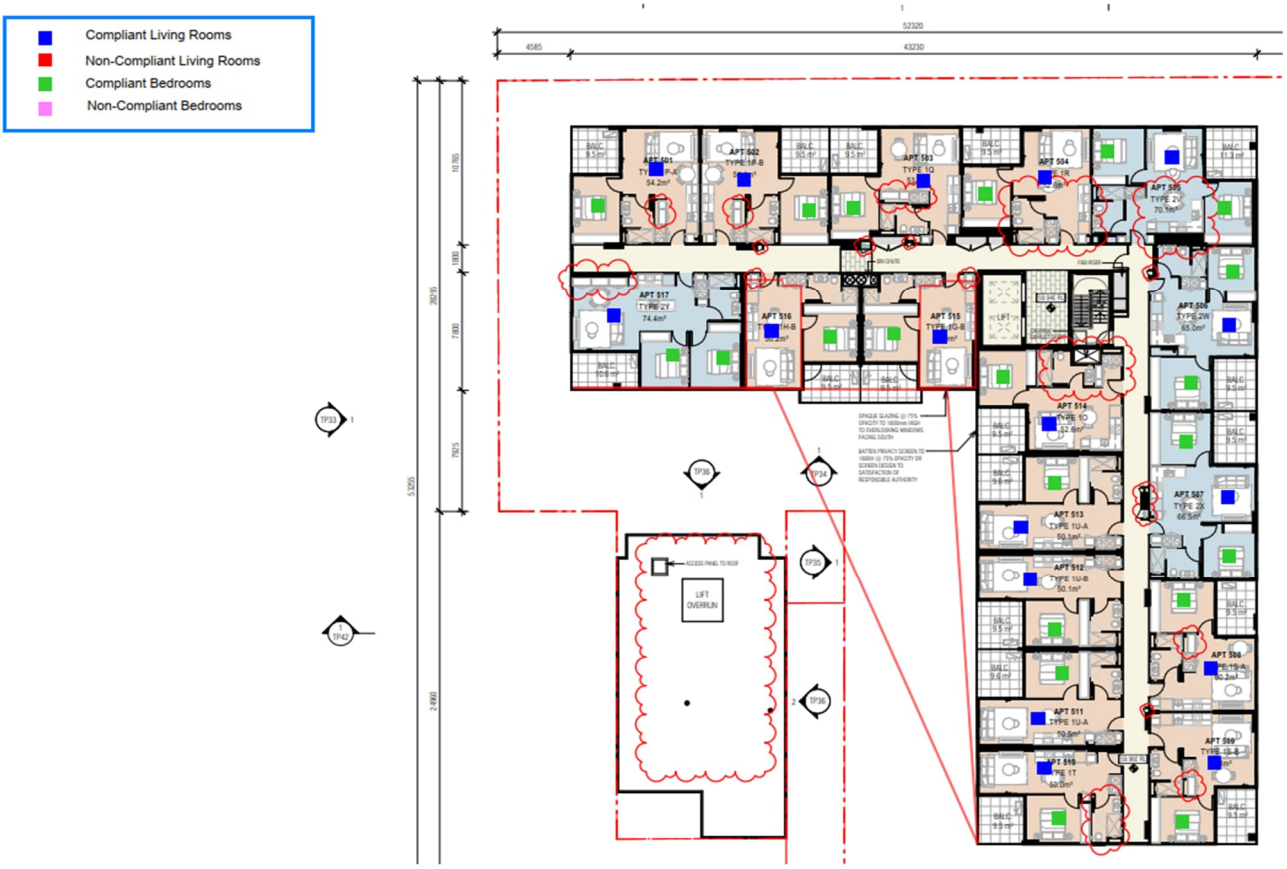


Figure 19: Daylight Access Level 5 – Living Rooms and Bedrooms

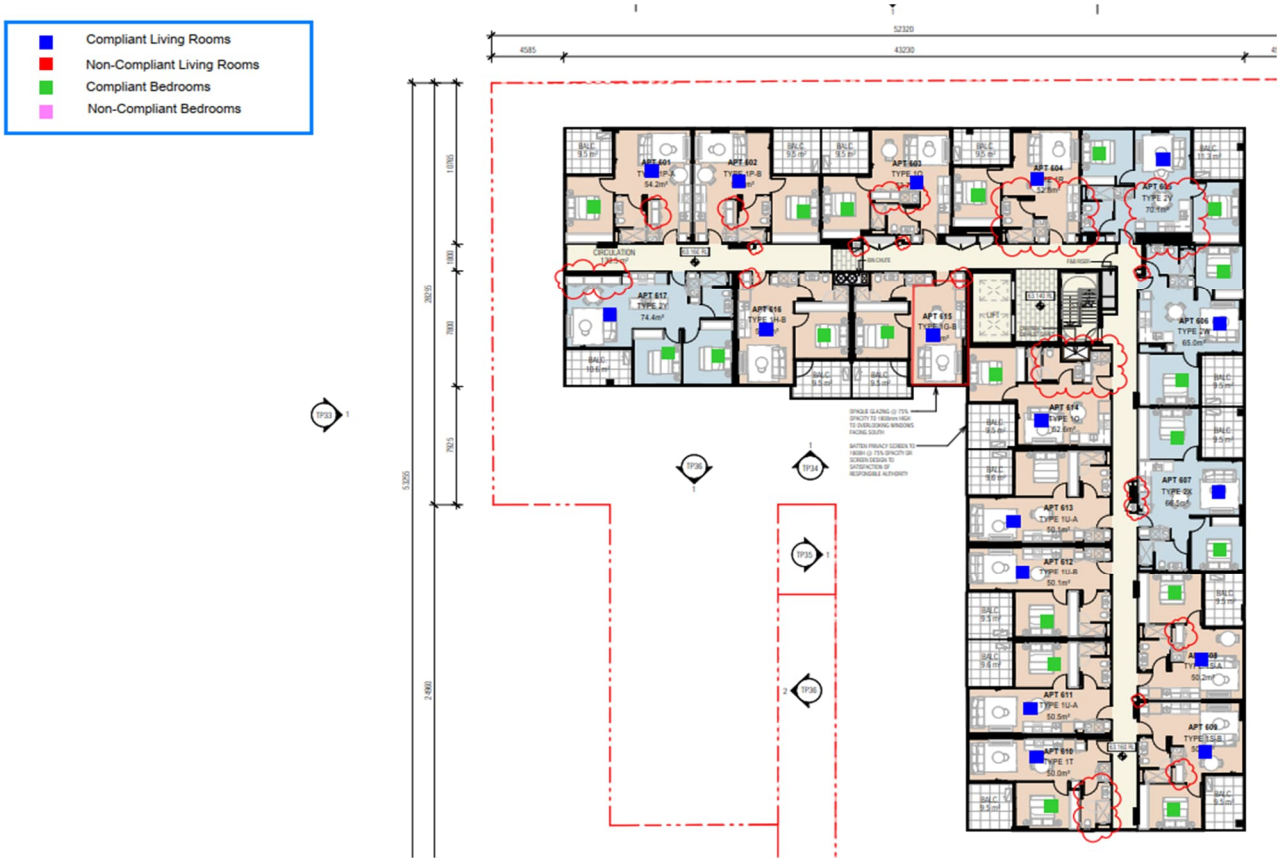


Figure 20: Daylight Access Level 6 – Living Rooms and Bedrooms

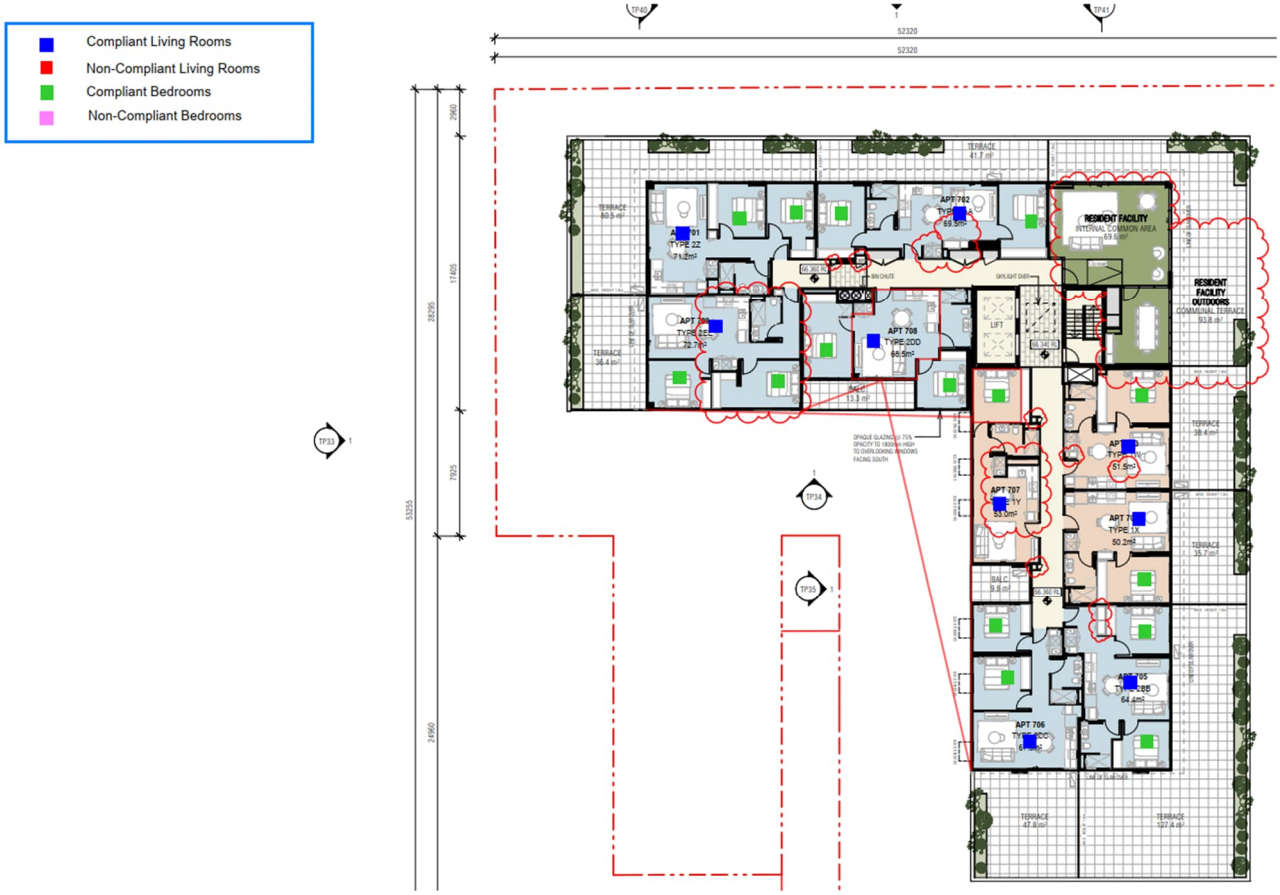


Figure 21: Daylight Access Level 7 – Living Rooms and Bedrooms

Combined Daylight Modelling Methodology and BESS Access Results

Table 9: Summary of Daylight Analysis Result for the commercial and residential portions of the development

	Daylight Factor	Total Floor Area (m^2)	Floor Area Above Threshold (m^2)	Floor Area Above Threshold (%)
Daylight Modelling Methodology Total Non-Residential Areas	**2%**	**816.0**	**269.1**	**33.0%**
	Daylight Factor	**Total Number of Rooms**	**Number of Compliant Rooms**	**Percentage of Complaint Rooms (%)**
Daylight Modelling Methodology Living Areas	1%	37	15	-
BESS Daylight Methodology Living Areas	1%	97	93	-
Total Living Areas	**1%**	**134**	**108**	**80.6%**
Daylight Modelling Methodology Bedrooms	0.5%	52	41	-
BESS Daylight Methodology Bedrooms	0.5%	138	138	-
Total Bedrooms	**0.5%**	**190**	**179**	**94.2%**

Appendix 5 – Preliminary Section J Assessment

The proposed building is to comply with the Building Code of Australia (BCA) 2019 Amendment 1 Section J using Verification Method JV2 – *Green Star*. This report outlines the predicted Australian Building Codes Board (ABCB) Section J greenhouse gas emissions (in kg CO_2e per year) for the proposed residential development at 251-265 Lygon Street & 1A Pitt Street, Brunswick East, and assesses its performance against a reference building with specifications consistent with the "Green Star Buildings – Energy Use" specifications.

Verification Method JV2 states, for a Class 2 (Common Area) and Class 6 building, compliance with JP1 is verified when:

i. *the building complies with the simulation requirements, and is registered, for a Green Star Buildings rating; and*
ii. *the annual greenhouse gas emissions of the proposed building are less than 90% of the annual greenhouse gas emissions of the reference building; and*
iii. *in the proposed building, a thermal comfort level of between a Predicted Mean Vote of -1 to +1 is achieved across not less than 95% of the floor area of all occupied zones for not less than 98% of the annual hours of operation of the building; and*
iv. *the building complies with the additional requirements in Specification JVb.*

The energy assessment has been carried out in accordance with the BCA 2019 Amendment 1 Section J – Energy Efficiency provisions and the Australian Building Codes Board 'Protocol for Building Energy Analysis Software'.

The simulation results have been determined using a combination of computer modelling and estimated energy usage assessment. The results within this report confirm that the predicted annual greenhouse gas emissions of the JV2 simulations are as follows:

REFERENCE BUILDING Building with DTS Fabric and DTS Services GHG Emissions ($kgCO_{2e}$ / Annum)	INTERMEDIATE BUILDING Building with Proposed Fabric and DTS Services GHG Emissions ($kgCO_{2e}$ / Annum)	PROPOSED BUILDING Building with Proposed Fabric and Proposed Services (including Solar PV) GHG Emissions ($kgCO_{2e}$ / Annum)
300,590	297,898	227,831

Below is an image of the DesignBuilder energy model in isometric view of the proposed development.

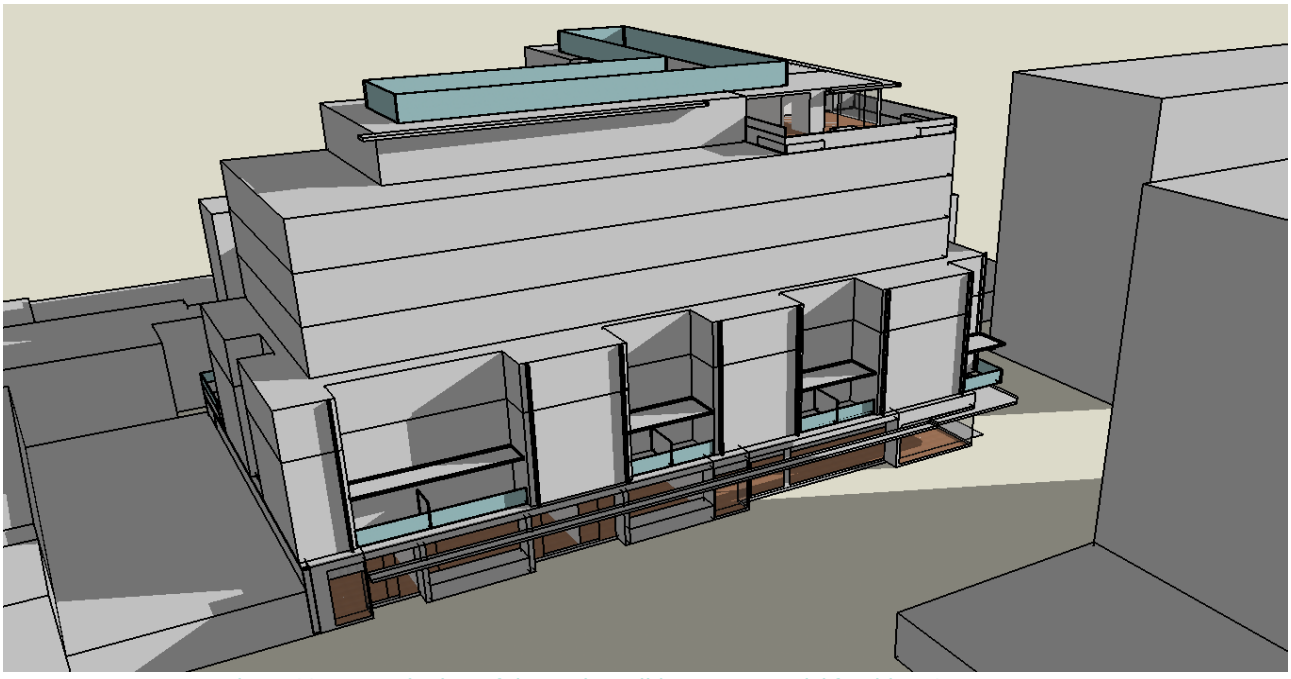


Figure 22: Isometric view of the DesignBuilder energy model for this JV2 assessment

The modelling parameters used in the preliminary assessment for the retail tenancies and common areas are summarised in the table below.

Please note: This assessment has been completed using Town Planning documentation and represents one possible option. As such, it is not suitable for the purpose of demonstrating compliance for the Building Permit and is for information only.

Building Element	Comments
Walls	Thermal envelope walls have been modelled as concrete panel walls, and plasterboard stud walls. All walls forming the thermal envelope have been modelled with added 90mm R2.5 bulk insulation installed between the steel stud members. Cold-shell Retail Tenancy walls shown on the plans without a lining have been modelled as uninsulated. All solar absorptance values have been modelled with an added 0.05 to represent dirt and debris, as per the 'Energy Use calculation guide: Guidance on calculation methods for the Energy Use credit'. The solar absorptance values of the external walls have been modelled in accordance with the Finishes Legend provided in the drawings. *Note: All wall insulation is required to run up to the roof/ceiling insulation to form an unbroken thermal barrier.*
Floors	Ground Floor floors that are part of the thermal envelope and are over the unconditioned Basement areas have been modelled as concrete slab with added under floor thermal insulation with added R2.05 thermal insulation. All other internal floors do not require added thermal insulation.
Roof & Ceiling	Roofs of the retail spaces and resident facility have been modelled as suspended concrete slab with plasterboard ceiling tiles. All exposed ceilings / roof systems which form part of the thermal envelope of the retail tenancies will require insulation to achieve a total system R-value of 3.2. All exposed ceilings / roof systems which form part of the thermal envelope of resident facility will require added R3.65 thermal insulation.

<table>
<tr><th>Building Element</th><th>Comments</th></tr>
<tr><td>Windows and Glazed Doors</td><td>All windows / glazed doors forming part of the thermal envelope have been modelled as per the floor plans and elevations provided. Dimensions were measured from provided drawings.

External glazing that forms part of the thermal envelope of the level 7 resident facility have been modelled with the following thermal performance values for glass and frame combined:

Table 10: Thermal performance values modelled for the resident external windows and doors

<table><tr><th></th><th>U-value</th><th>SHGC</th></tr><tr><td>Fixed Windows</td><td>2.7</td><td>0.486</td></tr><tr><td>Sliding Doors</td><td>3.3</td><td>0.442</td></tr></table>
These fenestration performance values are based on clear Low-e double-glazing in aluminium frames.

External glazing that forms part of the thermal envelope of the retail spaces have been modelled with the following thermal performance values for glass and frame combined:

Table 11: Thermal performance values modelled for the retail external windows and doors

<table><tr><th></th><th>U-value</th><th>SHGC</th></tr><tr><td>Fixed Windows</td><td>2.973</td><td>0.302</td></tr><tr><td>Hinged Doors</td><td>4.404</td><td>0.244</td></tr><tr><td>Sliding Doors</td><td>3.193</td><td>0.283</td></tr></table>
These fenestration performance values are based on clear Low-e double-glazing in aluminium frames.

Alternative glass and frame combinations may also be used provided they meet the thermal performance values above.</td></tr>
<tr><td>Blinds</td><td>Blinds are required for all external glazing in the level 7 resident facility to meet NCC thermal comfort requirements and the Minimum Expectations of Credit 11 (Light Quality), specifically to manage external glare in daylit spaces.

The blinds must have a Visible Light Transmittance (VLT) of 10% or less.</td></tr>
<tr><td>External Shading</td><td>External overhangs / shading features that provide shading to the building have been modelled as per proposed design. No changes are proposed.</td></tr>
<tr><td>Sealing</td><td>A seal to restrict air infiltration must be fitted to each edge of a door and operable window in accordance with Provision J3.4, other than glazed elements which comply with AS 2047.

All entry doors leading to conditioned spaces must be fitted with a self-closing device.

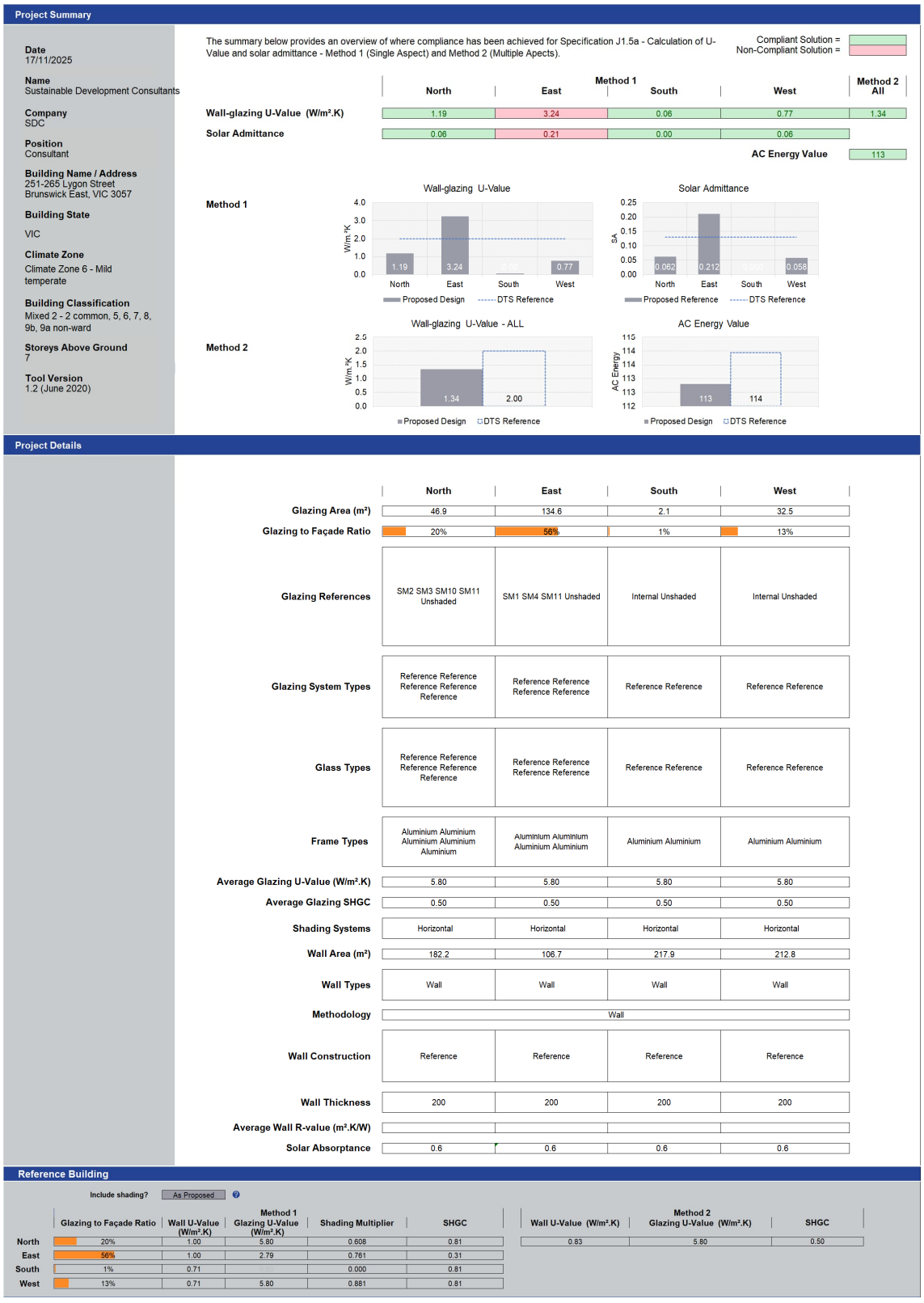
Exhaust fans serving any conditioned spaces must be fitted with self-closing dampers.

Roofs, ceilings, walls, floors and any opening such as a window frame, door frame, roof light frame or the like will be constructed to minimise air leakage via the enclosure by internal lining systems or sealed by caulking, skirting, architraves, cornices or the like as per Provision J3.6.</td></tr>
<tr><td>Thermal Construction & Insulation</td><td>Part J1.2 for general thermal construction & installation must be followed, which requires insulation must be installed to comply with AS/NZS 4859.1 and be installed so that it forms a continuous barrier and installed with the required air space. Also, insulation must maintain its position and thickness.</td></tr>
</table>

Building Element	Comments
Artificial Lighting	The default BCA 2019 illumination power density (W/m²) values were modelled to each space in the reference building. The proposed building is required to achieve an overall minimum 10% reduction from the NCC 2019 illumination power density values listed in Table J6.2a
Heating, Ventilation & Air-Conditioning (HVAC)	The systems were zoned as outlined in 'HVAC Zoning' section below. The proposed HVAC systems must have a minimum CoP/EER value to comply with the minimum MEPS requirements All ventilation systems must be selected to meet the DtS requirements of Part J5. In addition, ventilation to retail spaces must provide a 50% increase in outdoor air rates above the minimum required by AS 1668.2:2012.
Solar PV	Space on the roof of the development will be allocated for the provision of a minimum 31kW solar PV system which is to be split between the apartments and common areas. Of this, 15 kW will be dedicated to the residential spaces and 16 kW to the common areas.
Energy Metering and Monitoring	Energy metering and monitoring must be configured to comply with the requirements of both the NCC and the Green Star Buildings tool.
Domestic Hot Water	Domestic hot water for the entire development will be provided via high efficiency electric heat pumps in a central HWS system (with COP≥3.5). All delivery pipework will be suitably insulated.

Preliminary 2019 NCC BCA Façade Calculator

The preliminary BCA Façade Calculator completed for the proposed design is provided below for information purposes only. A full and thorough Part J assessment must be completed once detailed drawings have been developed to ensure all requirements are met for building approval.



Project Summary

Date
17/11/2025

Name
Sustainable Development Consultants

Company
SDC

Position
Consultant

Building Name / Address
251-265 Lygon Street
Brunswick East, VIC 3057

Building State
VIC

Climate Zone
Climate Zone 6 - Mild temperate

Building Classification
Mixed 2 - 2 common, 5, 6, 7, 8, 9b, 9a non-ward

Storeys Above Ground
7

Tool Version
1.2 (June 2020)

The summary below provides an overview of where compliance has been achieved for Specification J1.5a - Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Apects).

Compliant Solution =
Non-Compliant Solution =

	Method 1 North	Method 1 East	Method 1 South	Method 1 West	Method 2 All
Wall-glazing U-Value (W/m².K)	1.19	3.24	0.06	0.77	1.34
Solar Admittance	0.06	0.21	0.00	0.06	
AC Energy Value					113

Method 1

Method 2

Project Details

	North	East	South	West
Glazing Area (m²)	46.9	134.6	2.1	32.5
Glazing to Façade Ratio	20%	56%	1%	13%
Glazing References	SM2 SM3 SM10 SM11 Unshaded	SM1 SM4 SM11 Unshaded	Internal Unshaded	Internal Unshaded
Glazing System Types	Reference Reference Reference Reference Reference	Reference Reference Reference Reference	Reference Reference	Reference Reference
Glass Types	Reference Reference Reference Reference Reference	Reference Reference Reference Reference	Reference Reference	Reference Reference
Frame Types	Aluminium Aluminium Aluminium Aluminium Aluminium	Aluminium Aluminium Aluminium Aluminium	Aluminium Aluminium	Aluminium Aluminium
Average Glazing U-Value (W/m².K)	5.80	5.80	5.80	5.80
Average Glazing SHGC	0.50	0.50	0.50	0.50
Shading Systems	Horizontal	Horizontal	Horizontal	Horizontal
Wall Area (m²)	182.2	106.7	217.9	212.8
Wall Types	Wall	Wall	Wall	Wall
Methodology	Wall			
Wall Construction	Reference	Reference	Reference	Reference
Wall Thickness	200	200	200	200
Average Wall R-value (m².K/W)				
Solar Absorptance	0.6	0.6	0.6	0.6

Reference Building

Include shading? As Proposed

	Glazing to Façade Ratio	Method 1 Wall U-Value (W/m².K)	Method 1 Glazing U-Value (W/m².K)	Method 1 Shading Multiplier	Method 1 SHGC	Method 2 Wall U-Value (W/m².K)	Method 2 Glazing U-Value (W/m².K)	Method 2 SHGC
North	20%	1.00	5.80	0.608	0.81	0.83	5.80	0.50
East	56%	1.00	2.79	0.761	0.31			
South	1%	0.71		0.000	0.81			
West	13%	0.71	5.80	0.881	0.81			

Figure 23: 251-265 Lygon Street & 1A Pitt Street, Brunswick East Facade Calculator Results

Energy Modelling Results

Greenhouse Gas Emissions Results

The DesignBuilder energy performance assessment provides an energy end-use summary and annual greenhouse gas emissions in accordance with the ABCB Protocol for Building Energy Analysis Software and BCA verification method JV2 'Green Star'.

Energy End-Use	REFERENCE BUILDING Building with DTS Fabric and DTS Services	INTERMEDIATE BUILDING Building with Proposed Fabric and DTS Services	PROPOSED BUILDING Building with Proposed Fabric and Proposed Services
Heating	3,703	3,599	8,984
Cooling	30,813	29,258	23,255
Air Handling Units (Supply Fans)	28,053	27,529	27,656
Mechanical Exhaust Fans (Exhaust)	28,283	28,283	28,283
Interior Lighting	125,914	125,914	83,194
Exterior Lighting	2,136	2,136	2,092
Domestic Hot Water	7,804	7,804	6,364
RWT pumps	-	-	5,425
Solar PV System (31kW)	-	-	-20,445
Total Energy Use (kWh/year) (including solar PV)	256,915	254,614	195,017
Total Energy Use (MJ/year) (including solar PV)	924,893	916,609	702,060
% Improvement compared to Reference Building (including solar PV)	-	0.85%	24.09%
Total Energy Use (kWh/year, excluding solar PV)	256,915	254,732	215,461
Total Energy Use (MJ/year, excluding solar PV)	924,893	917,036	775,661
% Improvement compared to Reference Building (excluding solar PV)	-	0.85%	16.14%

Table 12: Summary of energy consumption and greenhouse gas emission results for the simulations

The proposed design is deemed to comply with the emissions requirements of BCA verification method JV2 since the annual greenhouse gas emissions of the Proposed Building are shown to be less than 90% of the annual greenhouse of the Refence Building and therefore achieves the minimum expectation of Green Star Buildings.

Furthermore, as the proposed design achieves a greater than 20% reduction of energy use against the reference building with the inclusion of on-site energy generation (PV solar array) the building meets the Credit Performance target of Green Star Buildings Credit 22 Energy Use.

Thermal Comfort Results

A thermal comfort analysis has been undertaken for the Proposed building (named Alternative 2 above). Zoning, building geometry and services have been modelled as per Alternative 2. Total clothing values have been calculated using individual garment values as per ASHRAE Standard 55-2017, based on garment combinations assumed appropriate for differing temperature ranges.

The modelling outputs below are direct from EnergyPlus and outline for each zone what percentage of occupied hours achieve Predicted Mean Vote (PMV) levels between -1 and +1. Compliance is achieved if the proposed building thermal comfort level of between a PMV of -1 to 1 is achieved across not less than 95% of the floor area of all occupied zones for not less than 98% of the annual hours of operation of the building.

As can be seen in the table below, 100% of spaces achieve a PMV of -1 to 1 for 100% of annual operational hours.

Thermal Comfort Zones	Annual Occupied Hours	Total No. Hours within PMV (Proposed)	Percentage of Compliant Zones
Retail Tenancies	2,781	2,781	100%
Manager Office	2,313	2,313	100%
Resident Facility Lounge	1,460	2,781	100%
Resident Facility Dining/ Meeting	1,460	2,781	100%

Discussion

The results have demonstrated that the proposed design (including assumptions and compliance conditions listed below) will achieve compliance in accordance with JV2 criteria. Overall, the following items have been included in the final design to ensure that a thermally efficient building envelope and energy efficient services are achieved:

- Specification of appropriate insulation to the thermal envelope to assist in thermal regulation of interior conditioned spaces;
- High-performance fenestration system to mitigate heat loss/gain through façade;
- High-performance HVAC with HRV and economy cycle;
- Efficient interior lighting systems to the retail tenancies; and
- High-efficiency electric domestic hot water system.

By incorporating these measures into the proposed development, the building is predicted to achieve an improved outcome when compared with a deemed-to-satisfy building.

Assumptions and Compliance Requirements

The following assumptions were imported into modelling and assessment:

- All wall constructions will meet the thermal performance values outlined within 'HVAC Zoning and Insulation Mark-ups' – *Wall Insulation Requirements (Thermal Envelope)*.
- All roof systems will meet the thermal performance values outlined within 'HVAC Zoning and Insulation Mark-ups' – *Roof Insulation Requirements.*
- All flooring systems will meet the thermal performance values outlined within 'HVAC Zoning and Insulation Mark-ups' – *Floor Insulation Requirements.*
- All glazing systems will meet the thermal performance values outlined within – *Windows and Glazed Doors*.
- The building must be constructed to meet the building sealing requirements of Part J3 or building envelope sealing compliance be demonstrated via JV3 testing pathway.
- Part J1.2 for general thermal construction & installation must be followed.
- The selected air conditioning systems will be required to meet the DTS requirements of Part J5 of the BCA 2019 and any additional requirements to meet greenhouse gas reduction targets.
- Access must be provided to all plant and equipment which requires maintenance as per DTS requirements of Part J8 of the BCA 2019.

Compliance with Performance Requirement JP1

The results of this report confirm that with the proposed building design and system assumptions as outlined in the appendices, the development will achieve BCA Section J (JP1) compliance via Verification Method JV2 'Green Star'. Full compliance with Part J will only be achieved if the building is built as per the design conditions outlined within this report and when the following conditions are met:

(i) The design must include the ability to achieve all the criteria used in the annual greenhouse gas emissions calculation method such as having an automatic operation controlling device capable of turning lighting, and air conditioning plant on and off in accordance with the occupancy and operating profiles used; and

(ii) Compliance with (where applicable):

- (A) J1.2 for general thermal construction & installation; and
- (B) Part J5, J6 & J8 deemed-to-satisfy provisions; and
- (C) BS 7190 for testing a water heater; and
- (D) AS/NZS 3823.1.2 at test condition T1 for testing package air-conditioning equipment not less than 65kWr; and
- (E) AHRI 551/591 for testing a refrigeration chiller.

Appendix 6 – FirstRate5 Assessment Results, Assumptions & Recommendations

The FirstRate5 energy rating program is the primary modelling method used in Victoria to indicate the required energy for heating and cooling based on the building's thermal envelope. It does not take into account any heating or cooling systems installed; it only assesses walls, roof and floor materials, insulation, building orientation, glazing and the area layout.

251-265 Lygon Street & 1A Pitt Street, Brunswick East is located in Climate Zone 21 (Melbourne) and is required by the 2019 Building Code of Australia (BCA) to achieve the following minimum energy performance targets:

Each apartment must achieve a minimum energy rating of 6.0 Star (114MJ/m^2) and collectively achieve an average energy rating of not less than 7.0 Star (83MJ/m^2). The following BCA 2019 heating and cooling load limits apply to each individual dwelling:

- Heating load limit of 120MJ/m^2 (88 MJ/m^2 Class 2 average limit)
- Cooling load limit of 62MJ/m^2 (36 MJ/m^2 Class 2 average limit).

Further, to meet the requirements of Clause 58.03 Standard D6 of the Victoria Planning Provisions, each dwelling must achieve a cooling load of maximum 30MJ/m^2.

Preliminary NatHERS assessments have been conducted on a sample of the proposed apartments. Please see below for details and results of this assessment.

Please note: This assessment has been completed using Town Planning documentation. As such, it is not suitable for the purpose of demonstrating compliance for the Building Permit and is for information only.

Also note that building fabric elements may vary as the plans are refined for building approval. However, the design team is committed to achieving an overall average building energy rating of 7.0 Star for the whole site as a minimum, with no dwelling scoring less than 6.0 Star. This accounts for potential variations in building fabric elements and modelling results during the building approval process and aligns with the Green Star and Homes Victoria requirements.

Table 13: Thermal groups and justification

Sample Dwelling	Thermally Similar	Justification
G01	G02	Same orientation, exposed sides and similar layout.
G03	-	Thermally unique.
101	201, 301	Same orientation, exposed sides and similar layout.
102	202, 302	Same orientation, exposed sides and similar layout.
103	104, 105, 203, 204, 205, 303, 304, 305	Same orientation, exposed sides and similar layout.
106	206, 306	Same orientation, exposed sides and similar layout.
107	108, 109, 110, 207, 208, 209, 210, 307, 308, 309, 310	Same orientation, exposed sides and similar layout.
111	211, 311	Same orientation, exposed sides and similar layout.
112	212, 312, 410	Same orientation, exposed sides and similar layout.
113	213, 313	Same orientation, exposed sides and similar layout.
114	115, 116, 214, 216, 314, 316	Same orientation, exposed sides and similar layout.
117	217, 317	Same orientation, exposed sides and similar layout.
118	119, 120, 218, 219, 220, 318, 319, 320	Same orientation, exposed sides and similar layout.
121	221, 321	Same orientation, exposed sides and similar layout.

Sample Dwelling	Thermally Similar	Justification
122	222, 322	Same orientation, exposed sides and similar layout.
123	223, 323	Same orientation, exposed sides and similar layout.
215	315	Same orientation, exposed sides and similar layout.
401	-	Thermally unique.
403	404	Same orientation, exposed sides and similar layout.
405	402	Same orientation, exposed sides and similar layout.
406	407, 408, 409	Same orientation, exposed sides and similar layout.
411	-	Thermally unique.
413	412	Same orientation, exposed sides and similar layout.
417	517, 617	Same orientation, exposed sides and similar layout.
418	-	Thermally unique.
419	-	Thermally unique.
501	502, 503, 504, 601, 602, 603, 604	Same orientation, exposed sides and similar layout.
505	605	Same orientation, exposed sides and similar layout.
506	507, 606, 607	Same orientation, exposed sides and similar layout.
509	508, 608, 609	Same orientation, exposed sides and similar layout.
510	511, 512, 513, 610, 611, 612, 613	Same orientation, exposed sides and similar layout.
514	414, 614	Same orientation, exposed sides and similar layout.
515	415, 416, 516, 615, 616	Same orientation, exposed sides and similar layout.
701	-	Thermally unique.
702	-	Thermally unique.
703	704	Same orientation, exposed sides and similar layout.
705	-	Thermally unique.
706	-	Thermally unique.
707	-	Thermally unique.
708	-	Thermally unique.
709	-	Thermally unique.

Table 14: The following are the scores achieved by the apartments

Sample Dwelling	Star Rating	Energy Usage (MJ/m²)	Heating Energy (MJ/m²)	Cooling Energy (MJ/m²)	Net Conditioned Floor Area (m²)
G01	8.1	52.5	43.6	8.9	40.7
G03	8.6	35.3	27.5	7.8	56.4
101	8.1	51.1	41.1	10.0	59.2
102	8.6	37.4	20.1	17.3	42.6

Sample Dwelling	Star Rating	Energy Usage (MJ/m²)	Heating Energy (MJ/m²)	Cooling Energy (MJ/m²)	Net Conditioned Floor Area (m²)
103	9.3	17.7	8.6	9.1	59.5
106	8.3	44.3	16.2	28.1	55.6
107	8.1	52.3	28.4	23.9	41.0
111	8.4	41.5	21.8	19.7	60.0
112	8.4	42.3	27.6	14.7	53.7
113	7.9	56.7	43.4	13.3	56.9
114	7.9	56.0	40.3	15.7	44.3
117	8.5	38.3	26.5	11.8	40.0
118	8.3	44.6	31.8	12.8	40.0
121	6.7	92.3	87.8	4.5	64.9
122	7.6	64.6	53.8	10.8	45.4
123	7.2	76.1	67.4	8.7	56.8
215	8.7	34.0	25.2	8.8	64.4
401	8.8	31.6	12.9	18.7	56.7
403	8.9	27.1	6.8	20.3	42.0
405	8.4	39.4	20.7	18.7	62.2
406	8.5	39.0	12.8	26.2	39.1
411	7.2	75.7	57.0	18.7	53.4
413	7.6	65.2	41.3	23.9	64.5
417	7.6	65.7	47.2	18.5	74.1
418	7.0	82.2	65.5	16.7	45.4
419	6.6	93.7	78.1	15.6	56.8
501	8.4	43.0	21.9	21.1	42.1
505	8.4	39.6	20.7	18.9	53.7
506	7.8	60.3	41.5	18.8	53.3
509	7.3	73.0	48.6	24.4	39.5
510	7.2	75.8	50.1	25.7	36.5

Sample Dwelling	Star Rating	Energy Usage (MJ/m²)	Heating Energy (MJ/m²)	Cooling Energy (MJ/m²)	Net Conditioned Floor Area (m²)
514	8.2	48.7	36.2	12.5	38.0
515	8.1	52.1	39.9	12.2	40.0
701	7.9	56.6	31.4	25.2	56.6
702	8.4	41.6	21.7	19.9	57.7
703	7.8	59.5	30.7	28.8	39.0
705	7.4	69.1	42.7	26.4	50.5
706	7.1	80.8	52.1	28.7	55.3
707	6.1	109.6	80.2	29.4	41.6
708	7.4	68.5	52.0	16.5	55.5
709	7.3	75.1	47.7	27.4	61.3
Weighted Average	**7.0**	**52.3**	**34.8**	**17.6**	-

The energy ratings have been completed with the following building fabric elements for all dwellings:

Building Fabric Element	Description
External Walls	All external walls are assumed as concrete and lightweight construction and will be insulated with added R2.0 thermal insulation. Insulation material with minimum 20% recycled material content will be selected.
Party Walls	Party walls between apartments are assumed as double stud walls with R4.0 insulation total (R2.0 to both sides). Party walls between apartments and corridor are assumed as stud wall with R2.0 insulation added. Party walls between apartment and lift/stair core are assumed as concrete with R2.0 insulation.
Internal Walls	No added insulation required to internal walls.
Floors	Floors assumed as 200mm thick concrete slab. Additional R2.0 insulation required to suspended slab floors above basement or elevated above open space.
Floor Coverings	Floor coverings assumed as timber to kitchen/living/halls, tiles to bathrooms and laundries and carpet to bedrooms.
Roof Insulation	Roof assumed as 200mm think concrete slab. Additional R5.0 insulation required for exposed roof (Level 7 apartments). Additional R2.0 insulation required to suspended slab ceilings below balconies/terraces.

<table>
<tr><th>Building Fabric Element</th><th>Description</th></tr>
<tr><td>Windows and Glazing</td><td>The following thermal performance values were used for the windows and glazed doors, which are typical for clear, low-e double glazing in aluminium frames:
<table>
<tr><th>Glazing Type</th><th>U-Value</th><th>SHGC</th></tr>
<tr><td>Fixed Window</td><td>2.7</td><td>0.58</td></tr>
<tr><td>Awning Window</td><td>4.4</td><td>0.40</td></tr>
<tr><td>Sliding Door</td><td>3.1</td><td>0.48</td></tr>
<tr><td>Hinged Door</td><td>3.5</td><td>0.42</td></tr>
</table>
Other glazing system /thermal performance values may also comply but would need to be tested in the models to confirm compliance.</td></tr>
<tr><td>Ceiling Fans</td><td>To reduce the cooling loads, the following apartments will require ceiling fans:
407, 409, 511, 512, 513, 608, 610, 611 and 612 will require a 1200mm ceiling fan in the kitchen/living area.
703 (and 704) will require a 1200mm ceiling fan in the kitchen/living area and the bedroom.
705 will require a 1200mm ceiling fan in the kitchen/living area and all bedrooms.
706 will require a 1400 ceiling fan in the kitchen/living area, and a 1200mm ceiling fan in all bedrooms.
707 will require a 1400 ceiling fan in the kitchen/living area, and a 1200mm ceiling fan in the bedroom.</td></tr>
<tr><td>Building Sealing</td><td>All doors, windows, exhaust fans and openings will be sealed so to not allow for air infiltration in the apartments.

Exhaust fans have been assumed in all kitchens, bathrooms & ensuites, and laundries.</td></tr>
<tr><td>Downlights</td><td>Downlights must be ‘IC’ rated (Insulation Contact) to allow for insulation to be placed over the top and be sealed units to prevent air-leakage. Otherwise, downlight covers must be installed to allow for insulation to be placed over the top and no air leakage between habitable room and ceiling.</td></tr>
</table>