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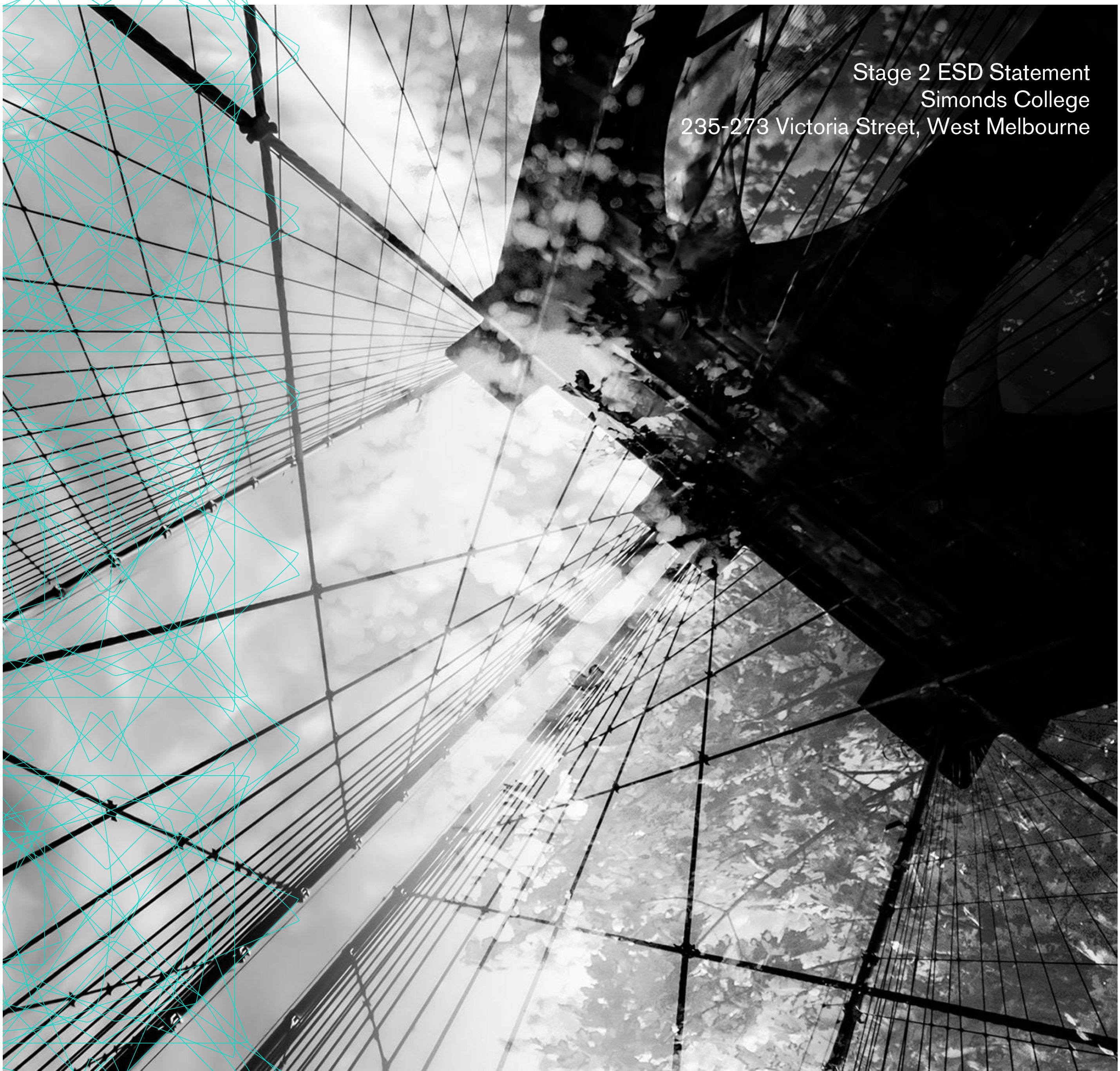

Stage 2 ESD Statement
Simonds College
235-273 Victoria Street, West Melbourne

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SUSTAINABLE DEVELOPMENT
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Proposed Simonds College Redevelopment
235-273 Victoria Street, West Melbourne

Stage 2 ESD Statement

ADVERTISED
PLAN

November 2021

S4200 Stage 2 ESD Statement.V1

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Version	Date of Issue	Description	Author	Approved
V1	12-11-2021	For Council Approval	PC	BdW

1. Introduction

This ESD Statement has been prepared to assist the design, construction and operation of the proposed Stage 2 Simonds College redevelopment at 235-273 Victoria Street, West Melbourne.

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 Melbourne City Council, 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 Chandler Architecture.

1.1 Site Description

The site at 235-273 Victoria Street, West Melbourne is on the north-western fringe of the CBD. It is bounded by Chetwynd, Victoria, William and Howard Streets, and bordered by residential properties to the south. The site is within a predominantly mixed-use locality, with commercial and residential properties opposite on Chetwynd Street.

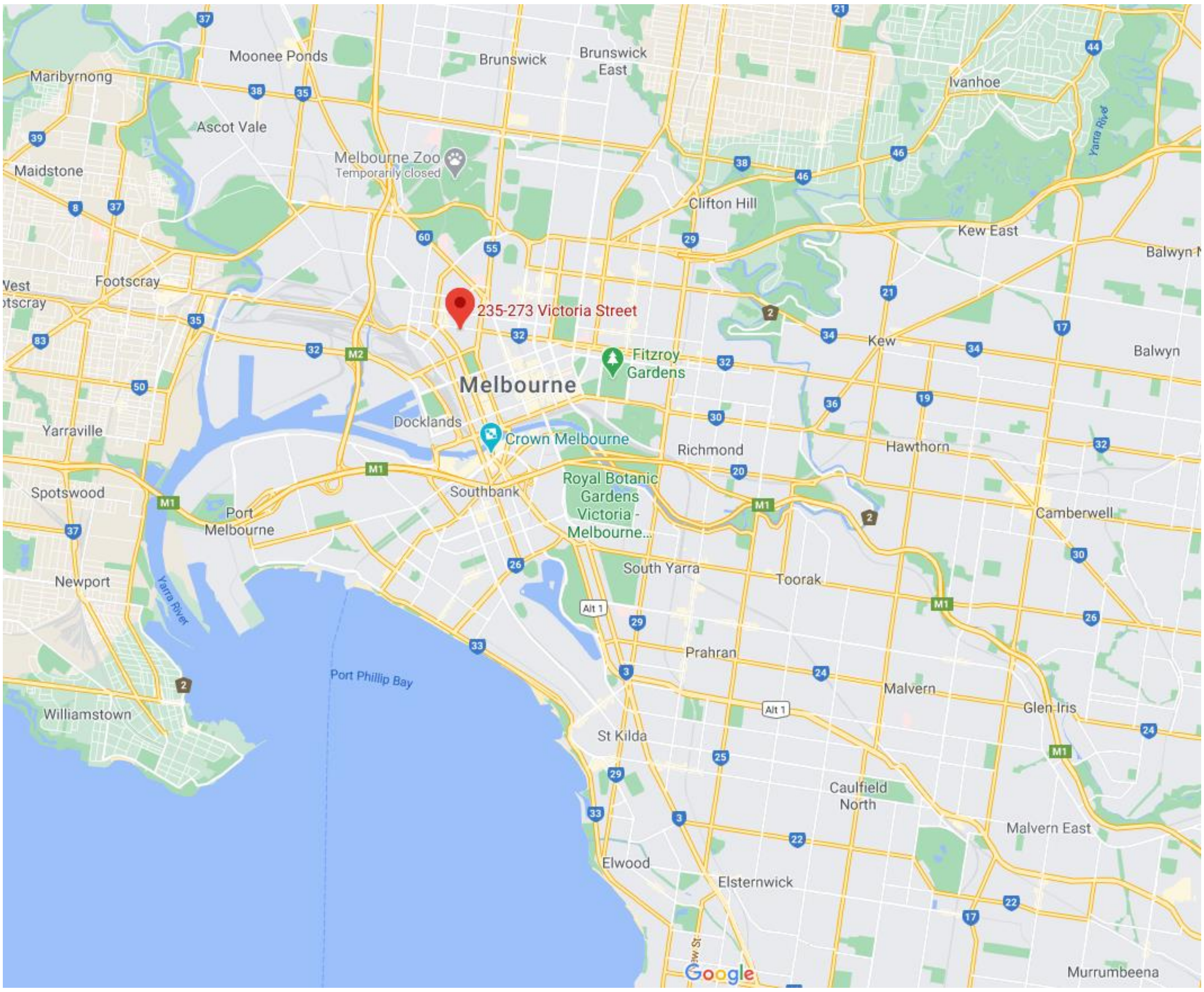


Figure 1: Location of 235-273 Victoria Street, West Melbourne in relation to the Melbourne CBD (Source: Google Maps)

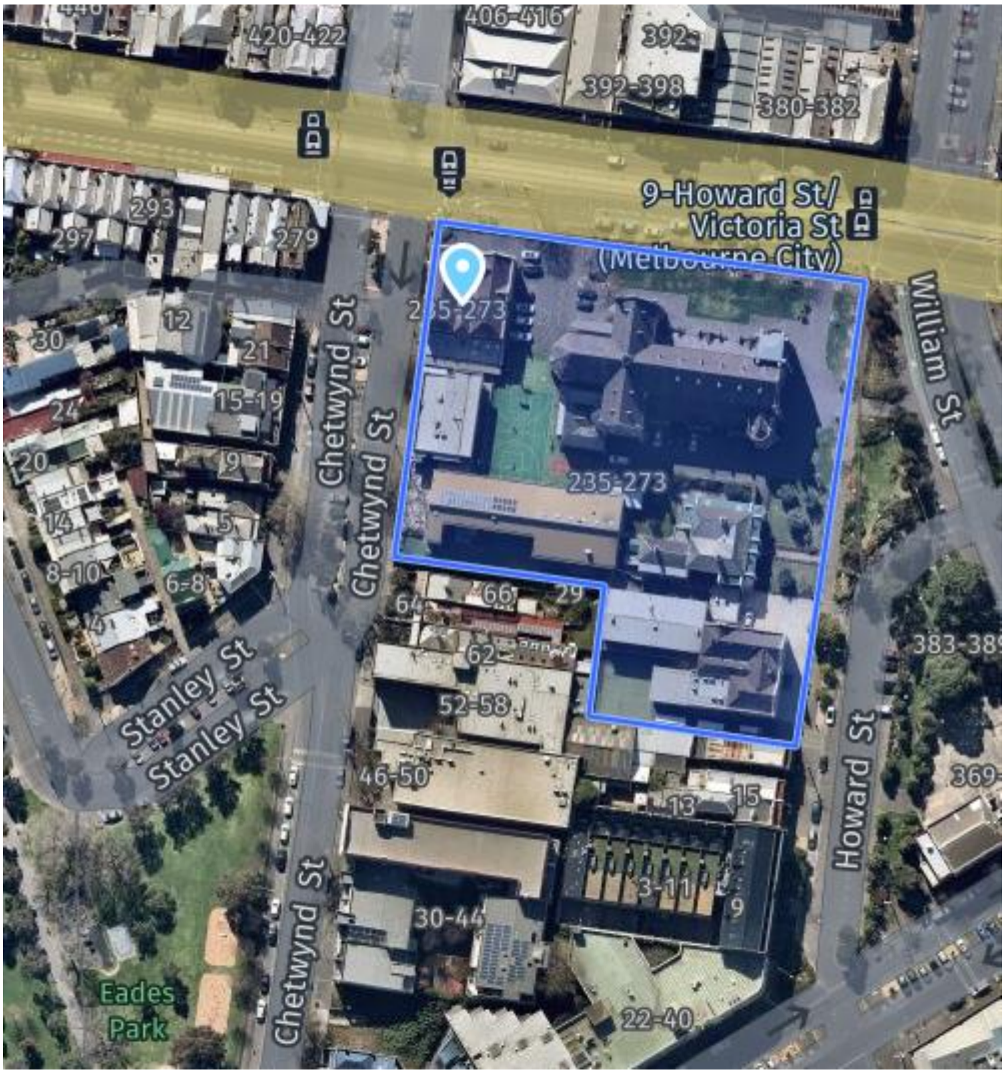


Figure 2: Aerial image of the development site at 235-273 Victoria Street, West Melbourne (Source: Nearmap, mark-up by SDC)

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	4,098m².
Stage 2 Site Area	1,878m². Buildings B & C to be demolished. Construction of Building 2 (5 levels, all new). Gross Floor Area (GFA) approx. 6,169m².

The area of each stage of the redevelopment has been marked up in Figures 3 & 4.

Key to Figure 3:

Stage 1 = Red, 1,627.7m²
Stage 2 = Blue, 1,877.9m²
Stage 3 = Yellow, 592.4m²

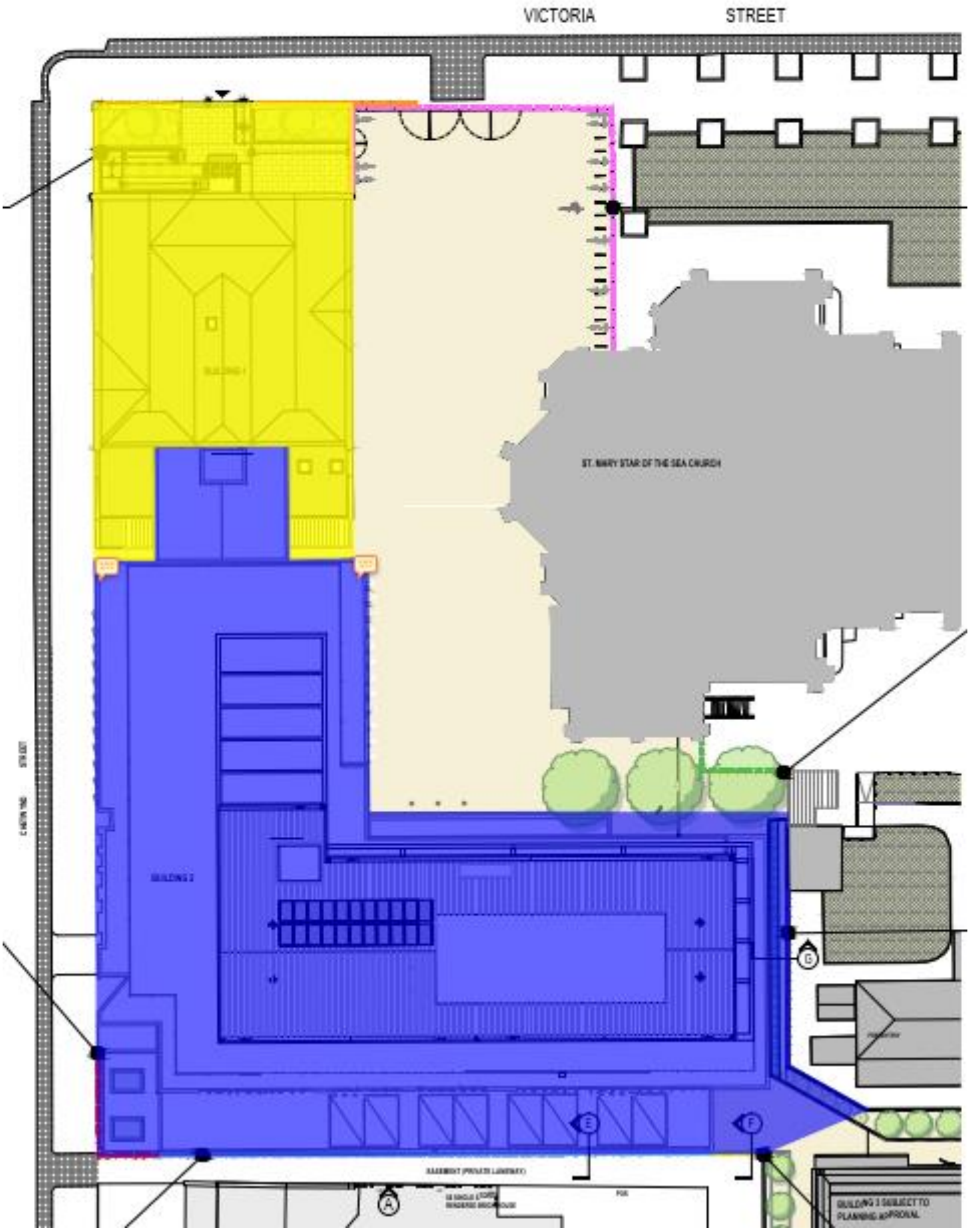


Figure 3: Stages 2 & 3 Site Delineation

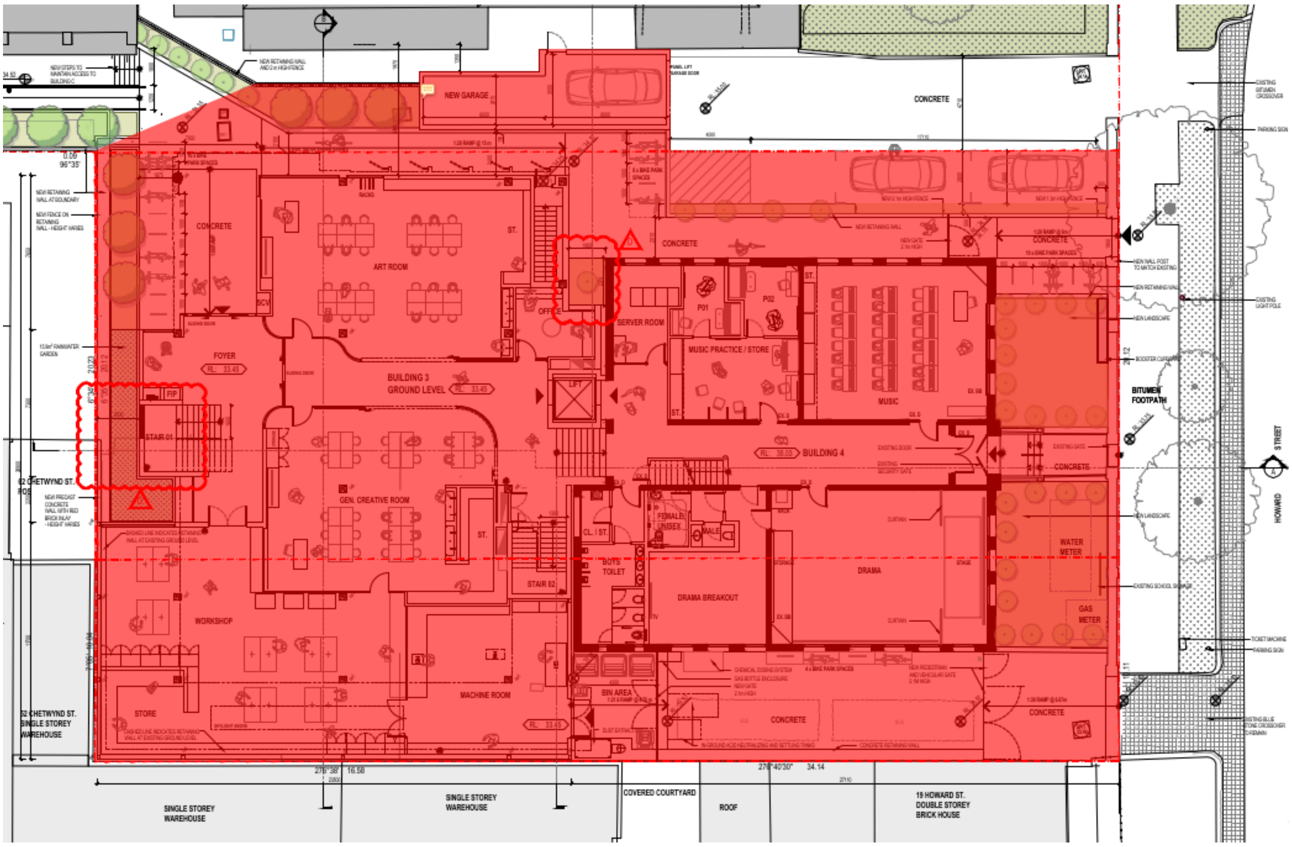


Figure 4: Stage 1 Site Delineation

1.3 City of Melbourne Requirements

The City of Melbourne is committed to becoming an environmentally sustainable city. Critical to achieving this commitment is for development to meet appropriate environmental design standards, including the eco-city goals and standards as detailed in *Future Melbourne Community Plan 2008*.

The City of Melbourne expects that this 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 22.19 *Energy, Water and Waste Efficiency,* this project is required to satisfy the objectives as set out within the following categories, where applicable:

- Energy Efficiency
- Water Resources
- Indoor Environment Quality
- Stormwater Management
- Transport
- Waste Management
- Urban Ecology

This requires an Environmentally Sustainable Design (ESD) Statement which demonstrates how for this project, the relevant policy objectives will be achieved.

Based on Stage 2 GFA of over 5,000m², this portion of the development is required to achieve:

- 5 points for the Ene-1 credit under a current version of the Green Building Council of Australia's Green Star – Education rating tool or equivalent; and
- 3 points for the Wat-1 credit under a current version of the Green Building Council of Australia's Green Star – Education rating tool or equivalent, and
- A Waste Management Plan prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans, and
- A 5 Star rating under a current version of Green Star – Education rating tool or equivalent.

The City of Melbourne also requires that this project address the following relevant planning scheme provisions:

- Clause 19.03-3S *Integrated Water Management*
- Clause 21.05 *Environment and Landscape Values*
- Clause 22.23 *Stormwater Management (WSUD)*
- Clause 52.17 *Native Vegetation*
- Clause 52.34 *Bicycle Facilities*
- Clause 53.18 *Stormwater Management in Urban Development*
- Clause 54.03 *Site Layout and Building Massing*
- Clause 56.07 *Integrated Water Management*

In July 2019, the City of Melbourne 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, the assessment tools that have been adopted for this project are set out below.

1.4.1 GREEN STAR DESIGN & AS BUILT V1.3

The Green Star Design & As-built tool was created by the Green Building Council of Australia (GBCA) to help assess and benchmark new developments against a thorough set of criteria, specifically designed to reward best practice and innovative sustainable design approaches. The tool includes nine (9) different categories which cover all areas of building design and some ongoing operation. These are:

- Management;
- Energy;
- Indoor Environment Quality;
- Water;
- Materials;
- Transport;
- Land Use and Ecology;
- Emissions; and
- Innovation.

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 Leader". This project is aiming to achieve a benchmarked “5-star Green Star rating", which requires a minimum of 60 points.

The results of the Green Star benchmark assessment can be found in Appendix 3 – Green Star Design & As Built Scorecard.

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 – MUSIC Assessment and WSUD Report. Note that the MUSIC assessment was completed with a site-wide approach, encompassing Stages 1-3 within the one assessment.

1.5 Overview of Assessments

The following ESD assessments are being undertaken by SDC in response to the planning requirements:

Overall: Project-wide stormwater assessment, using eWater’s MUSIC tool, to gauge requirements to achieve Urban Stormwater Best Practice Environmental Guidelines as stipulated by CSIRO (1999).

Stage 2: Building 2

- ESD Statement detailing the suite of environmentally sustainable design measures proposed for implementation.
- 5-star Green Star Design & As Built v1.3 benchmarking assessment.
- Green Star Design & As Built v1.3 Potable Water Calculator to gauge requirements to achieve a minimum of 3 points.
- Energy Modelling to enable the Green Star Design & As Built v1.3 Greenhouse Gas Emissions Calculator to be completed, to achieve a minimum of 5 points.

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 Green Star benchmark have a credit reference number next to them, e.g. (Building Commissioning 2.2). Some initiatives without the Green Star 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 Building Management

The development will aim to promote the adoption of environmental management initiatives at different stages of the project – not just in the project design stage.

Design Requirements	Responsibility & Implementation	Project Stage
Green Star Accredited Professional (GSAP) (1.1)		
One of the project's consultants will be a GSAP. They will advise through the design and construction phases of the project.	ESD Consultant	Design Development
Environmental Performance Targets (2.0)		
Documented targets will be set for the environmental performance of the building. These targets (energy and water) will be monitored and reported on to help guide and improve on performance in the nominated areas.	ESD Consultant / Services Consultants	Design Development
Services and Maintainability Review (2.1)		
An Independent Commissioning Agent will facilitate a review of the design (prior to construction) and create a checklist of items reviewed and recommendations made. This will require input from Simonds College, being responsible for the ongoing operations/ maintenance of the project post construction.	Builder / Services Consultants / ICA	Design Development / Commissioning
Building Commissioning (2.2)		
All building systems should be fully commissioned in accordance with CIBSE or ASHRAE codes before handover. All services proposed for the development will be reviewed prior to install for the servicing and maintainability requirements, they will be fully commissioned in accordance with best practice commissioning guidelines.	Builder / Services Consultant	Commissioning
Building Systems Tuning (2.3)		
All building systems will need to be tuned following practical completion and prior to occupation. The commitment must include monthly adjustment and measurements with quarterly reporting for the first 12 months following occupation, and a review of building system manufacturer warranties.	Builder / Services Consultant	Commissioning
Independent Commissioning Agent (2.4)		
An Independent Commissioning Agent (ICA) is to be appointed to advise, monitor, and verify the commissioning and tuning of the nominated building systems throughout the design, tender, construction, commissioning and tuning phases.	Builder / ICA	Commissioning
Implementation of a Climate Adaptation Plan (3.1)		
A Climate Adaptation Plan will be prepared as a means of future-proofing the development to be prepared to handle a changing climate over two timescales (i.e. 2030, 2070), and specific design responses which have been put in place to adapt for the future. Any high-risk items identified will be required to be addressed in the final design of the building.	Builder / ESD Consultant	Commissioning
Building Information (4.1)		
A comprehensive operations and maintenance manual will be developed and made available to the facilities management team. A Building Log Book will be developed by the Builder, in line with CIBSE TM31: *Building Log Book Toolkit.* A Building Users Guide to be prepared, outlining relevant and current building user information. It should take into account the passive design features of the facility. The information should include descriptions of	ESD Consultant / Services Contractors / Builder	Post Occupancy

Design Requirements	Responsibility & Implementation	Project Stage
systems installed in the building, sustainable transport in the area as well as sustainable building operation suggestions relevant to building users. Training of facility managers must occur, and logbooks of maintenance should be recorded periodically. These documents will be required to be handed over to demonstrate that they have been created and also are in line with the required guidelines.		
Environmental Building Performance (5.1)		
The building design will have performance targets set for at least two of the following environmental building performance metrics: • Greenhouse gas emissions – commitment in kg/CO_2/m^2; • Potable water usage – kL/person; • Operational waste – kg/person; and/or • Indoor environment quality – complete occupant comfort surveys, HVAC systems targets and thermal and lighting comfort. The selected targets will be monitored and reported against.	Building Operator	Design Development
Metering and Monitoring (6.0, 6.1)		
The design will include electronic metering systems that will be integrated into the building to monitor and report on energy and water consumption and control the building central services. This should be compiled as a 'Metering and Monitoring Strategy,' identifying the following end uses: Energy: • HVAC • Domestic Hot Water • Interior Lighting • Exterior Lighting • Lift • Solar PV Water: • Amenities • Irrigation • Rainwater Tank usage Energy and water consumption will be monitored and reported against set performance targets for the building. These will be updated periodically to ensure the building performance has continuous improvement. A Metering and Monitoring Strategy will be required to be prepared outlining this. Recommended to be provided as an educational tool for students by providing a real-time display in a main foyer/corridor.	Services Consultant	Design Development
Construction Environmental Management (7.0)		
As part of the construction process, the contractor will implement a project-specific Best Practice Environmental Management Plan—this must be in line with *NSW EMS Guidelines*. This will be in place before starting works and throughout the construction process.	Builder	Construction Documentation
Formalised Environmental Management System (7.1)		
The building contractor for the project will hold an EMS certified by a third-party organisation that provides compliance to AS/NZS ISO 14001 or another relevant Standards. Alternatively, have an EMS in line with ISO 14001 standards as a minimum.	Builder	Construction Documentation

Design Requirements	Responsibility & Implementation	Project Stage
Evidence of this accreditation will be required.		
High Quality Staff Support (Credit 7.2)		
High quality staff support will be put in place for site workers to promote mental and physical health outcomes and knowledge on sustainable practices. This may be through on-site, off-site and/or online educational programs. Examples include Beyond Blue, Headspace, and Mates in Construction. At least three distinct issues must be addressed, including mental health (e.g. heathy eating, active lifestyle, depression, suicide prevention, alcohol, tobacco). Additionally, on-site training for all contractors and subcontractors, who are present on site for at least three days, covering information on sustainability and the role site workers play in delivering a sustainable building, is to be provided.	Builder	Construction Documentation

2.2 Indoor Environment Quality

Indoor Environment Quality (IEQ) within the buildings will be improved through various initiatives which help to create a healthy indoor environment free from toxins with ample supply of daylight and outside air.

Design Requirements	Responsibility & Implementation	Project Stage
Ventilation System (9.1)		
All air handling equipment in the project will meet the following conditions: • Full compliance with ASHRAE Standard 62.1:2013 for minimum separation distances between pollution sources and outdoor air intakes (to mitigate entry of outdoor pollutants); • Will be easily maintained and cleaned; and • Will be cleaned prior to use and occupation.	Services Consultant	Design Development
Provision of Outdoor Air (9.2)		
Outdoor air rates provided at 100% greater than the minimum required by AS 1668.2:2012.	Services Consultant	Design Development
Exhaust or Elimination of Pollutants (9.3)		
Canteen, science and food technology exhaust ducts will be directly discharged from the building with no recirculation component. Printer/photocopy equipment located in an enclosed space with dedicated exhaust riser directly to outside.	Services Consultants / Architect	Design Development
Internal Noise Levels (10.1)		
The design of the development will achieve internal ambient noise levels suitable and relevant to the activity type in relevant spaces (no more than 5dB(A) above the lower figure in the range recommended in Table 1 of AS/NZ2107: 2016).	Acoustic Consultant	Design Development
Reverberation (10.2)		
The design of the development will have the potential to reduce reverberation to a level suitable for the activity type in the relevant spaces: below the maximum stated in the relevant standard (Table 1 of AS2107:2016).	Acoustic Consultant	Design Development

Design Requirements	Responsibility & Implementation	Project Stage
Acoustic Separation (10.3)		
The development design will address noise transmission in enclosed spaces. Partitions will be constructed to achieve a weighted sound reduction index (R_w) of at least 45 (for all partitions without a door) and 35 (for all partition types that contain a door). An acoustic report will be required to demonstrate that these requirements are met.	Acoustic Consultant	Design Development
Minimum Lighting Comfort (11.0)		
All luminaires will be installed with high-frequency ballasts. All lights selected will be flicker-free and will accurately address the perception of colour in the space, by having a minimum Colour Rendering Index (CRI) of 80.	Electrical Engineer	Construction Documentation
General Illuminance and Glare Reduction (11.1)		
For learning spaces, Best Practice lighting levels will be met and will be in accordance with AS 1680.1:2006 for different space types. Internal lights are fitted with baffles, louvres or diffusers to obscure any direct light source so as to cut out glare.	Electrical Engineer	Design Development
Surface Illuminance (11.2)		
Sufficient illuminance will be provided for task areas such as the classrooms and over bathroom basins within the development to ensure that there is adequate light to carry out tasks in these areas.	Electrical Engineer	Design Development
Glare Reduction – (12.0)		
Glare into the building will be controlled via the provision of shading from the roof (for the Third Floor) as well as blinds provided to all unshaded windows. External mechanical roller blinds would also provide a significant reduction in heat gain during these periods.	Architect	Design Development
Daylight (12.1)		
The development is provided with plenty of natural light via the provision of windows to all learning spaces, and skylights to the basketball court. Internal amenity is enhanced through light-coloured internal finishes to maximise natural light levels.	Architect	Design Development
External Views (12.2)		
Access to a 'high quality' external view is provided to at least 60% of the occupied areas.	Architect	Design Development
Volatile Organic Compounds (13.1, 30C)		
All paints, adhesives and sealants, flooring, and wall and ceiling coverings will not exceed the limits outlined in Appendix 2. Alternatively, products with no VOCs will be selected. Paints such as eColour, or equivalent, should be considered. 50% of paints (by volume) to be specified as ultra-low VOC, with maximum TVOC content of 5g/L.	Architect	Construction Documentation
Formaldehyde Minimisation (13.2)		
All engineered wood products will have 'low' formaldehyde emissions, certified as E0 or better. Alternatively, products with no formaldehyde will be specified. Emissions limits are listed in Appendix 4 – Green Star VOC and Formaldehyde Limits. Products such as Ecological Panel – 100% post-consumer recycled wood (or similar) will be considered for use within the development.	Architect	Construction Documentation

Design Requirements	Responsibility & Implementation	Project Stage
Thermal Comfort (14.1)		
Thermal comfort Predicted Mean Vote (PMV) targets of the National Construction Code (NCC 2019) and Green Star to apply to all conditioned spaces.	ESD Consultant Mechanical Engineer	Design Development

2.3 Energy Efficiency

Energy usage of the campus redevelopment will be minimised by the installation of an efficient hot water system, heating and cooling systems, lighting, and best practice building envelopes.

Design Requirements	Responsibility & Implementation	Project Stage
Building Envelope (15E)		
All new building envelope facades (walls and glazing) are to be designed to meet the requirements of the NCC 2019 Façade Calculator (or better than the allowance). Floor and ceiling insulation are to meet the requirements of Section J of the NCC 2019 at a minimum. Additionally, preliminary JV3 energy modelling will be undertaken during the detailed design phase to identify the building fabric requirements necessary to achieve a minimum of 5 points in the Green Star Design & As Built v1.3 Greenhouse Gas Emissions Calculator.	ESD Consultant Architect	Construction Documentation
Heating and Cooling Systems (15E)		
Heating and cooling will be provided by energy efficient air conditioners, selected to achieve an EER/COP of minimum 3.5.	Mechanical Engineer	Design Development
Hot Water Systems (15E)		
Hot water in the development will be provided via electric instantaneous systems (within one-star of best available). This will be installed at points of use, minimising distribution heat losses. All pipework will be insulated to further minimise distribution heat losses.	Hydraulic Engineer	Design Development
Indoor Lighting		
Energy consumption from artificial lighting throughout the development will be reduced by using LED lighting and by optimising daylight diffusion through light-coloured internal surfaces (particularly walls, furniture and ceilings). Lighting levels must not exceed the maximum wattages listed in Table J6.2a of the 2019 BCA without the use of any adjustment factor. Lighting energy consumption will be reduced both by energy efficient fittings, and the use of daylight sensors.	Electrical Engineer	Design Development
External Lighting		
External lighting will be LED and will have controls (e.g. motion detectors and timers) to minimise consumption during off-peak times (i.e. when the school is closed).	Electrical Engineer	Design Development
Electrical Appliances		
Electrical appliances (other than air-conditioning) should have an energy rating no less than 1.5 star below the highest available energy rating under the E3 Program. Refer to http://www.energyrating.gov.au/ for current ratings. The number of fridges and fridge locations will be limited.	Services Consultant	Design Development

Design Requirements	Responsibility & Implementation	Project Stage
Peak Electricity Demand Reduction & Solar PV (16B, 30A)		
Peak electricity demand will be reduced with the addition of roof-mounted solar photovoltaic arrays. This will generate green energy and offset the HVAC and internal lighting loads of the development. With usage patterns over the peak daytime period of solar energy production (10am-2pm), and high expected usage rates, the more solar PV that can be installed on both Buildings 2 and 3, the better. It is recommended that the PV array be increased in size as much as possible given the space limitations. A minimum of 15% of total building energy is to be supplied by solar PV. Installation must follow CEC guidelines and AS/NZS5033 and consider the use of non-penetrative fixings for rooftop PV. Solar PV systems to have remote monitoring and be integrated to the Building Management System (BMS). These measures will help to reduce the peak demand of the building.	Architect/ Services Consultant	Design Development
Lift		
The design places the lift adjacent to the stairs, making it easier for users to have the choice of using the stairs. Energy efficient lifts will be specified that include measures to specifically reduce stand-by consumption such as: • Switching off control devices when the lift is not in motion & using a more efficient power supply unit; • LED lights and display; and • Suspension specifically designed to reduce friction.	Service Consultant	Design Development
Building Sealing		
All windows, doors, exhaust fans and pipe penetrations will be constructed to minimise air leakage as required by the provisions outlined in Section J3 of the 2019 BCA. This will include the use of seals around operable windows and doors as well as caulking to pipe penetrations, and the addition of self-closing louvers or dampers to exhaust fans.	Architect	Design Development
Building Management System (BMS)		
A BMS will be installed capable of both gathering and reporting usage data from all meters and alerting the facilities management team in case of atypical or high usage. It is proposed that the BMS will form part of the central monitoring and control systems. The BMS will be commissioned at its installation. Alerts and automatic report generation must be set up and provided to the building manager.	Services Consultant	Design Development
Refrigerant Pollution		
Refrigerants to be selected to have zero ozone depletion potential (ODP) and a global warming potential (GWP) of less than 10 in all systems.	Services Consultant	Design Development
BMS HVAC Tuning and Sensors		
Rooms used intermittently (e.g. meeting rooms) will have their own HVAC systems and will include controls and thermostats for those rooms. Wider heating and cooling setpoint design criteria to be implemented with at least a 2°C - 3°C dead band.	Services Consultant	Design Development

Design Requirements	Responsibility & Implementation	Project Stage
All HVAC systems to have time schedules, linked to the BMS. The BMS will allow cooling and heating lockouts based on outside air temperatures or calendar.		

2.4 Transport

The 235-273 Victoria Street, West Melbourne proposed redevelopment 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 considers 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 two 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 West Melbourne achieves a Walk score of 97 out of 100 – “Walker’s Paradise” and a Transit Score of 100 out of 100 – “Rider’s Paradise”, which indicate that the building users can complete most daily errands without requiring a car and that transit is convenient for most trips.

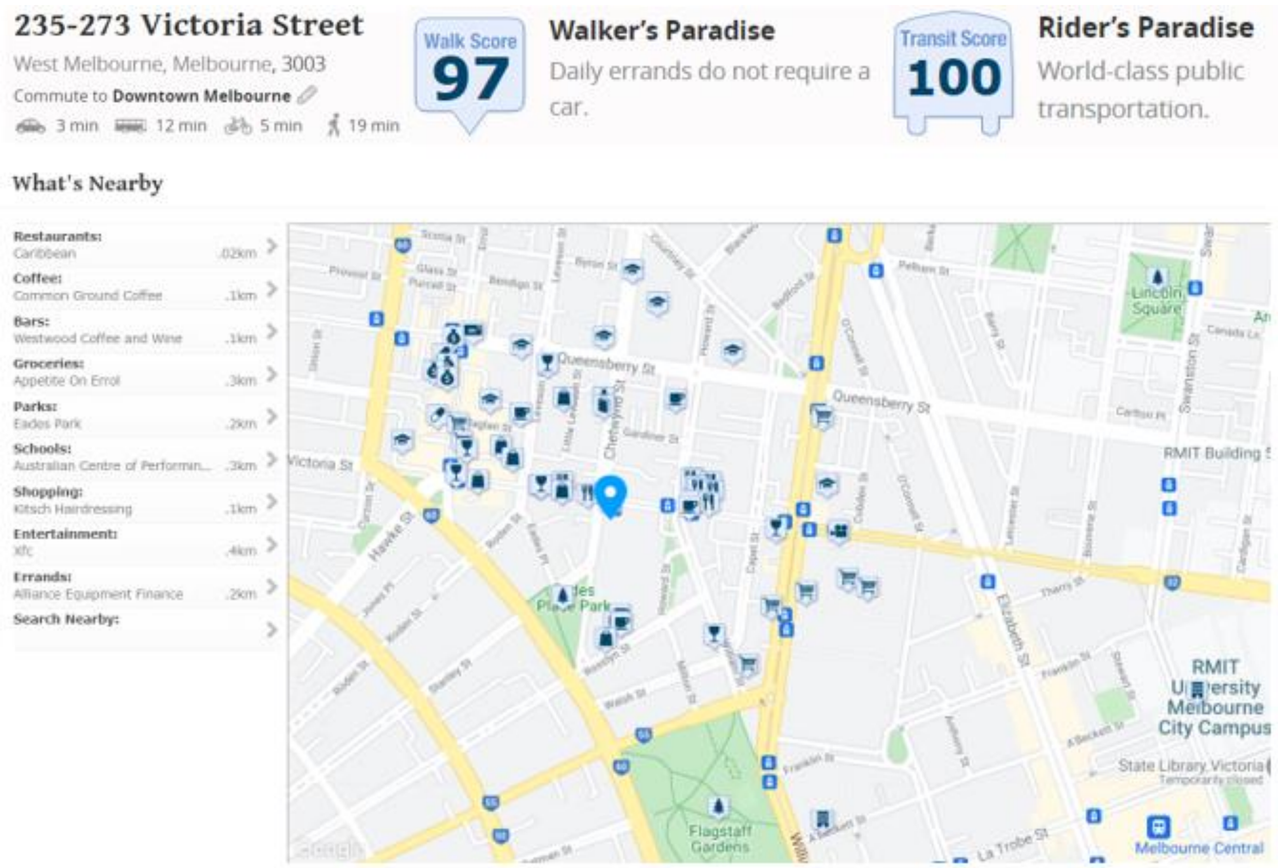


Figure 5: Walk Score results and map showing amenities surrounding 235-273 Victoria Street, West Melbourne. (Source: walkscore.com)

Design Requirements	Responsibility & Implementation	Project Stage
Access to Public Transport (17B.1)		
The development site has direct access within 1km walking distance to the following public transport options: V-Line Train Line: • Southern Cross station • Southern Cross coach terminal Metro Train Line: • Melbourne Central and Flagstaff City Loop stations • Parkville and Arden stations (under construction) Tram Routes: • 57: West Maribyrnong – Flinders Street Station • 58: Toorak – West Coburg Bus Routes: • 951: City - Glenroy • 219/220: Gardenvale – Sunshine • 216: Brighton Beach - Sunshine	Inherent in Location	
Reduced Car Parking Provision (17B.2)		
Compliant as designed.	Architect	Design Development
Low-Emission Transport (17B.3)		
Two motorbike parking spaces are provided at Basement level. Minimum 5% of car parking spaces to be dedicated to electric vehicles. These spaces are to be clearly designated with different coloured line markings (e.g. green) and highly visible signage, with charging infrastructure provided for each space.	Architect / Electrical Engineer	Design Development
Active Transport Facilities		
A total of 52 new spaces will be provided for the storage of bicycles for Stage 2 (for Stage 1 and 2 combined there is to be 90 new spaces): • 16 spaces for staff (at Basement level), and • 36 spaces for students (surrounding the new Multipurpose Play Area bordering Victoria Street). Additionally, end of trip facilities with showers, changing areas and lockers are provided for staff at Basement level.	Architect	

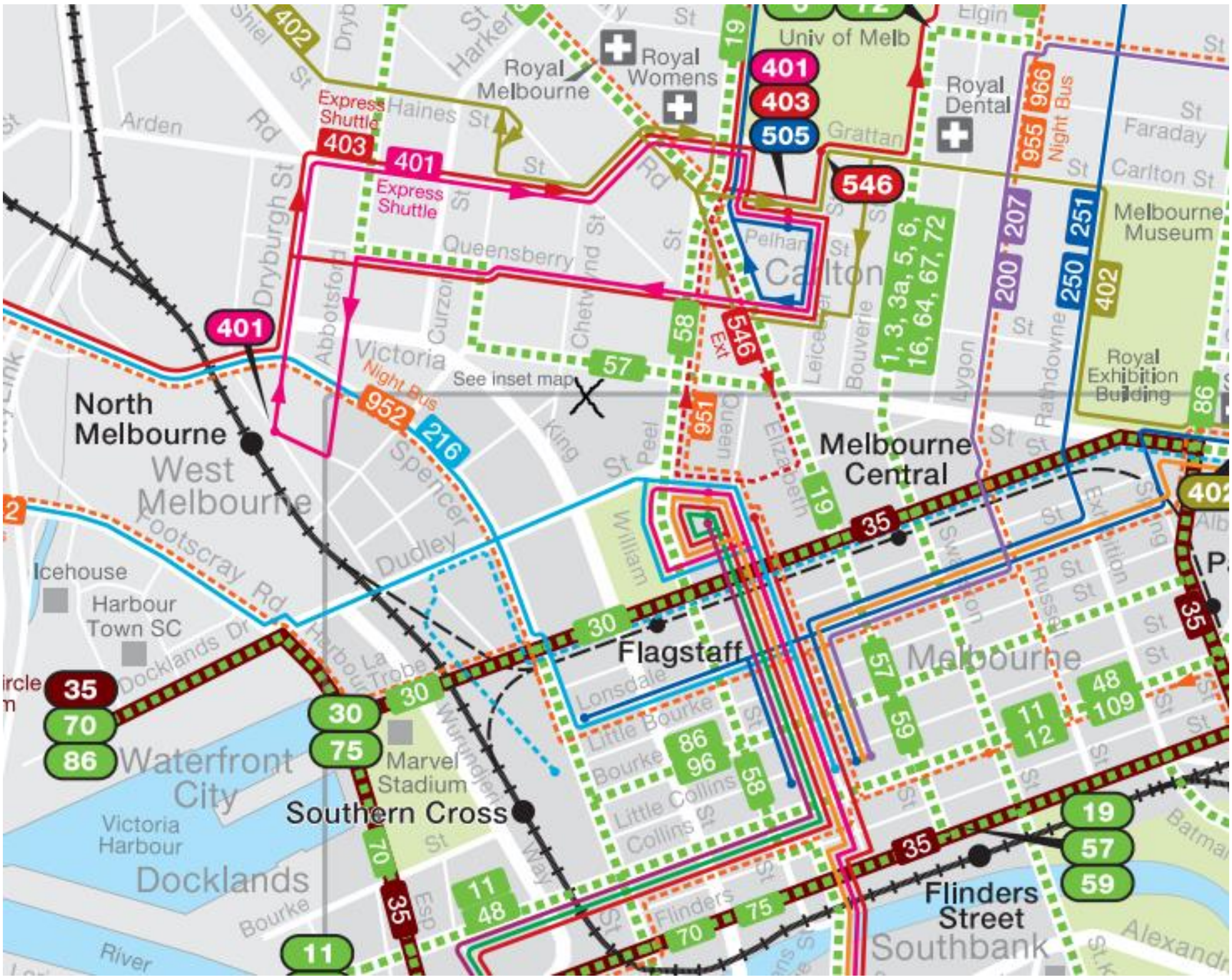


Figure 6: PTV Local Area Map indicating the public transport options surrounding 235-273 Victoria Street (black X)

2.5 Water Resources & Stormwater Treatment

Water will be used efficiently across the development through efficient fixtures and fittings, and collection and use of rainwater which helps to reduce mains water requirements and diverts stormwater.

Design Requirements	Responsibility & Implementation	Project Stage
Potable Water Reduction – Efficient Fixtures (18A)		
Efficient water fittings and fixtures will be installed to reduce the volume of mains water used. The following Water Efficiency Labelling Scheme (WELS) star ratings will be specified: • Wash hand basin taps: flowrate ≤ 4.5L/min (6 Star); • Toilets: dual flush, 3/4.5 L/flush (≥ 4 Star); • Urinals: ≤ 0.8 L/flush (6 Star); • Showers: flowrate ≤ 7.5 L/min (3 Star); and • Dishwashers: ≥ 4 Star WELS	Architect / Services Consultant	Design Development

Design Requirements	Responsibility & Implementation	Project Stage
Rainwater Collection and Reuse (18A, 26.1, 26.2)		
Rainwater runoff from suitable roof area from Buildings 2 and 3 will be collected and stored in a rainwater tank with a minimum effective storage capacity of 15kL. The collected water will be used for toilet and urinal flushing throughout Buildings 1 & 2, as well as irrigation of landscaped areas. The tank has been sized appropriately to reduce peak stormwater flows and prepare for the effects of climate change and associated potential for the increased frequency of heavy rainfall events. Refer Appendix 2 – MUSIC Assessment and WSUD Report.	Civil / Hydraulic Engineer	Design Development
Water Efficient Landscaping (18A)		
A sub-surface drip irrigation system, with moisture sensor override if required, will be installed along with the use of mulch (min. depth of 75mm). A variety of indigenous species will be included in the landscaping of the site. This will help to enhance local biodiversity, reduce potable water demand, and encourage native birds to visit the space.	Landscape Designer	Construction Documentation
Stormwater – Pollution Reduction Target (26.1)		
Post-development ARI discharge from the site is not to exceed pre-development peak ARI event discharge, based on a 5-year design ARI.	Civil Engineer	Design Development
Stormwater – Pollution Reduction Target (26.2, 30C)		
The proposed redevelopment site achieves a compliant site-wide MUSIC result. This result can be attributed to the rainwater collection and re-use systems, and to raingardens which filter stormwater prior to discharge. Refer Appendix 2 – MUSIC Assessment and WSUD Report. This result demonstrates stormwater discharged from the site meets the minimum pollution reduction targets in accordance with Clause 22.23 along with Green Star credit 26.2 Column B. Improvements in stormwater pollution reduction outcomes beyond minimum levels has been achieved as modelled, allowing an additional point to be targeted as an innovation credit.	Architect / Services Engineer / ESD Consultant	Design Development
Waterless HVAC Systems (28)		
Air-conditioning units will use air-cooled condenser components which will help to reduce the development's overall water usage while also preventing the growth and spread of legionella bacterium, which thrive in warm stagnant water.	Services Consultant	Construction Documentation
Fire Test Water Reuse (18A)		
Minimum 80% of test water from the fire sprinkler system is to be captured for reuse.	Fire Services Consultant	Design Documentation

2.6 Building Materials

The development will aim to promote the use of recycled materials and materials with lower embodied energy and environmental impacts.

Design Requirements	Responsibility & Implementation	Project Stage
Insulation		
All insulants used on site must have a zero Ozone Depletion Potential in processing and manufacturing.	Builder	Construction
Concrete – (19B.1)		
The Portland Cement content of new concrete should be reduced by a minimum of 40% through a replacement with supplementary cementitious materials such as fly-ash, slag or metakaolin. The mix water will also be recycled water or rainwater for at least 50% of the mix and 25% of all fine aggregate is to be manufactured sand (not virgin sand from a quarry). Documentation of all concrete will be required for submission including mix properties technical summaries. A further recommendation is that Holcim concrete be investigated for use as they now have a full EPD on concrete in Australia.	Builder / Structural Engineer	Construction
Structural Steel (19B.2)		
The project will include a reduction in the mass of new steel framing by 5% when compared to standard practice or by specifying high strength steel. A qualified Structural Engineer will be required to demonstrate compliance by way of a short report including calculations.	Structural Engineer	Construction
Responsible Steel Maker (20.1.0)		
At least 95% (by mass) of all steel is to be provided by a responsible steel maker with valid ISO 14001 EMS in place, and who is a member of the World Steel Association's Climate Action programme.	Builder	Construction Documentation
Responsible Steel Fabricator (20.1A)		
For a steel-framed building, at least 60% of structural steelwork is to be supplied by a steel fabricator/steel contractor accredited to the Environmental Sustainability Charter of the Australian Steel Institute.	Builder	Construction Documentation
Timber (20.2)		
All new timber used in the development will be Forest Stewardship Council (FSC) or Program for the Endorsement of Forest Certification (PEFC) certified or recycled/reused.	Builder / Architect	Construction Documentation
Cables, pipes, floors and blinds (20.3)		
All standard uses of cables, pipes, flooring and blinds within the development will either not contain any PVC or will be sourced from a manufacturer/supplier that adheres to the Green Building Council of Australia's *Best Practice Guidelines for PVC in the Built Environment*.	Builder/ Services Consultant	Construction Documentation
Flooring (21.1)		
All flooring will be manufactured from materials/products certified under any of the following: • Carpet Institute of Australia Limited, Environmental Certification Scheme (ECS) v1.2; • Ecospecifier GreenTag GreenRate V3.1; • Good Environmental Choice (GECA); and/or	Builder/ Architect	Construction Documentation

Design Requirements	Responsibility & Implementation	Project Stage
• The Institute for Market Transformation to Sustainability (MTS) Sustainable Materials Rating Technology Standard Version 4.0 – SMaRT 4.0. Alternatively, floor coverings and joinery must be durable, include some eco-preferred content, be modular and/or come from a manufacturer with a product stewardship program and ISO 14001certification.		

Figure 7: Examples of approved environmental labels for products which may be incorporated into the development

Product Transparency and Sustainability (21.1)		
The project will target a minimum of at least 3% of the project value of products and meet transparency and sustainability requirements are under one of the following initiatives: A. Reused products; B. Recycled content products; C. Environmental Product Declarations; D. Third-Party Certification; or E. Stewardship Programs. Examples of opportunities under these initiatives are: • Re-used formwork (A) • Reinforcing rod, bar, mesh and wire from InfraBuild (C) • Steel – Welded Beams and Columns from Bluescope (D) • Colorbond steel from Bluescope (D) • Hot Rolled structural steel products from InfraBuild (C) • Structural Steel products from Hyundai Steel (C) • Many Laminex products (D) • InterfaceFlor and Onterra (and other) Carpets (D)	Architect/ Builder	Construction Documentation
Urban Heat Island Effect Reduction (25.1)		
Selection of light-coloured roofing materials with a three-year Solar Reflectance Index (SRI) greater than 64 (roof pitch <15˚) and light-coloured terrace/balcony paving with a three-year SRI greater than 34. This can be achieved through the selection of a light colour such as Colorbond 'Surfmist'. Solar Panels are also considered to meet this requirement.	Architect	Design Development

2.7 Urban Ecology

Design Requirements	Responsibility & Implementation	Project Stage
Vegetation		
A portion of the site is covered with vegetation through the inclusion of planters and raingardens across the development. It is recommended that a variety of indigenous species be included in the landscaping of the site. This will help to enhance local biodiversity and encourage native birds to visit the space, whilst also facilitating on-site stormwater infiltration.	Architect / Landscape Architect	Design Development
Raingardens		
Raingarden bioretention systems have been included to filter rainwater draining from the trafficable terraces and suitable roof areas. Such systems, designed with appropriate indigenous vegetation, contribute to local habitat improvement and the provision of attractive spaces.	Architect / Landscape Architect	Design Development
Sustainable Sites (24)		
At the time of purchase, the site did not include old-growth forest, or a wetland of "High National Importance", or did not impact on a Matter of National Significance or have to be referred to the Federal Environment Minister as a "controlled action". Considered compliant as an existing developed site.	N/A – Inherent in location	
Light Pollution to Neighbouring Bodies (27.0)		
The projects lighting design must comply with AS4282:1997 '*Control of the Obtrusive Effects of Outdoor Lighting*' and not shine into the night sky or towards a neighbour, with conditions applied to the site boundary.	Architect/ Electrical Engineer	Schematic Design
Light Pollution to Night Sky (27.1)		
Light pollution is minimised by either: A. No external luminaire on the project will have an Upward Light Output Ratio (ULOR) exceeding 5%, relative to its mounted orientation, OR B. Direct illuminance from external luminaires on the project produces a maximum initial point illuminance value no greater than: • 0.5 Lux to the site boundary, and • 0.1 Lux to 4.5 metres beyond the site into the night sky.	Electrical Consultant	Design Development

2.8 Waste Management

The development will aim to manage waste emissions from the building in an efficient manner, seeking to reduce and reuse waste where possible.

<table>
<tr><th>Design Requirements</th><th>Responsibility & Implementation</th><th>Project Stage</th></tr>
<tr><td colspan="3">Construction Waste Management</td></tr>
<tr><td>The builder will develop a construction waste management plan (CWMP) for the construction phase. This will include the following:
• Waste generation;
• Any waste systems;
• Minimisation Strategy;
• Performance / Reduction targets;
• Bin quantity and size;
• Collection frequency;
• Signage; and
• Monitoring and reporting including frequency and method.
The CWMP will require that all hazardous substances, pollutants and contaminants must be managed and disposed of in accordance with all state regulatory requirements. Where these materials are treated, or used on site, they must be in accordance with a sanctioned remediation process.
The CWMP may form part of a broader Construction Environmental Management Plan (CEMP).</td><td>Builder</td><td>Construction Documentation</td></tr>
<tr><td colspan="3">Operational Waste (8A, 30C)</td></tr>
<tr><td>A waste management plan will be prepared by Leigh Design, and include the following:
• Waste generation;
• Any waste systems;
• Minimisation Strategy;
• Performance / Reduction targets;
• Bin quantity and size;
• Collection frequency;
• Waste contractors;
• Signage; and
• Monitoring and reporting including frequency and method.
In addition, the following prescriptive Green Star requirements must be met:
• 90% of waste generated onsite diverted from landfill (via reuse or recycling);
• Separation of Waste Streams;
• Dedicated Waste Storage Area; and
• Access to Waste Storage Area</td><td>Services Consultant</td><td>Construction Documentation</td></tr>
<tr><td colspan="3">Construction and Demolition Waste Reporting Accuracy (Credit 22.0)</td></tr>
<tr><td>The waste contractors and waste processing facilities servicing the project demonstrate compliance with the Green Star Construction and Demolition Waste Reporting Criteria.</td><td>Builder</td><td>Construction Documentation</td></tr>
<tr><td colspan="3">Construction and Demolition Waste (22A)</td></tr>
<tr><td>A maximum 5kg per sqm of GFA of the waste generated during construction and demolition by weight will be sent to landfill.</td><td>Builder</td><td>Construction</td></tr>
</table>

3. Conclusion

As set out in this ESD Statement, Stage 2 of the proposed Simonds College redevelopment at 235-273 Victoria Street, West Melbourne will meet best practice Environmentally Sustainable Design requirements through the initiatives outlined in this report including the use of energy efficient systems to reduce greenhouse gas emissions, rainwater reuse tanks and efficient fittings to reduce potable water consumption, and measures to reduce waste not only during building operation, but also during demolition and construction.

The initiatives that have been included within this ESD Statement all have a proven track record of serving their individual purpose and can be easily maintained with any failures obvious to school staff and the facilities management team. This helps to ensure the ongoing sustainability of the building, as the systems installed in the beginning are maintained for purpose throughout the life of the building.

Appendix 1 – Green Star Design & As Built Potable Water Calculator

Potable Water, Performance Pathway (18A) - All projects, except Hotels & Residentials

Links to - Project information:	Building occupancy, areas and operation	Water systems checklist	Rainfall data		
Links to - Water systems:	1. Sanitation	2. Whitegoods	3. Heat rejection	4. Washdown	5. Landscape irrigation
	6. Swimming pools	7. Fire protection systems	8. Process cooling		
Links to - Reclaimed water sources:	Reclaimed water sources	Rainwater collection	Greywater collection	Blackwater collection	Stormwater and off-site reclaimed water supply
Links to - Results:	Total water demand for each system	Total water demand per month	Potable water results	Domestic hot water	Discharge to sewer

Weighted Points Achieved	5.9

Instructions: Enter information into light blue cells

For details on what information is required and how this information is used to calculate the reduction in potable water consumption against the Standard Practice Benchmark, please refer to the Green Star - Potable Water Calculator Guide, available from the GBCA website.

GENERAL

Building occupancy, areas and operation

Space type description	Area (m²)	Peak days of operation (remaining days assumed off-peak)	Occupancy profile	Maximum design occupancy used in water use calculations (m²/person) (Enter manually OR use default)		Percentage of building users who occupy the space continually for periods greater than one hour.
				Proposed Building design occupancy (m2/person)	Default design occupancy (Not applicable for residential areas)	
Meeting room/office	101	5 days a week	Class 9b School	10	Please select	100%
General Classroom	1643.3	5 days a week	Class 9b School	2	Please select	100%
Practical	341	5 days a week	Class 9b School	5	Please select	100%
Gym	726.4	5 days a week	Class 9b School	3	Please select	100%
Multipurpose	109.4	5 days a week	Class 9b School	1	Please select	100%
Library - reading space	212.9	5 days a week	Class 9b School	2	Please select	50%
Library -storage	39.2	5 days a week	Class 9b School	30	Please select	5%
Kitchen	43.7	Please Select	Please Select	10	Please select	100%
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
Non occupied areas	2951.7	n/a	n/a			
TOTAL AREA	6168.6					

1. SANITATION

Water demand from sanitation fixtures and fittings (Annual water demand from fixtures and fittings is calculated using assumed usage rates based on the space types and occupancies entered above. See pages 10-13 of the Green Star - Potable Water Calculator Guide for further details.)

TOILETS

Description	Water efficiency (Enter manually OR nominate WELS Star Rating)		Water efficiency used in calculations (L/flush)	Percentage of each type	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
	Manufacturer's data (L/flush)	WELS Star Rating selection				
Toilets		4 Star	3.5	100%		
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
			Total	100%	1264.5	1445.1

(The Standard Practice Benchmark is based on 3 StarWELS rated toilets)

URINALS

Are urinals installed?	Yes
Would urinals normally be installed in the building type?	Yes

(Note: if "No" is selected, the project team should provide justification within the short report as to why the standard practice building does not have urinals.)

Description	Water efficiency (Enter manually OR nominate WELS Star Rating)		Water efficiency used in calculations (L/min)	Percentage of each type	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
	Manufacturer's data (L/min)	WELS Star Rating selection				
Urinals	0.8	6 Star	1	100%		
<enter description here>		Select star rating				
<enter description here>		Select star rating				
<enter description here>		Select star rating				
<enter description here>		Select star rating				
<enter description here>		Select star rating				
<enter description here>		Select star rating				
<enter description here>		Select star rating				
<enter description here>		Select star rating				
<enter description here>		Select star rating				
			Total	100%	222.3	555.8

(The Standard Practice Benchmark is based on 3 Star WELS rated urinals)

INDOOR TAPS

Description	Water efficiency (Enter manually OR nominate WELS Star Rating)		Water efficiency used in calculations (L/min)	Percentage of each type	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
	Manufacturer's data (L/min)	WELS Star Rating selection				
Taps		6 Star	4.5	100%		
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
			Total	100%	469.0	781.6

(The Standard Practice Benchmark is based on 4 Star WELS rated taps)

SHOWERS - OCCUPANTS

Shower demand by occupants (reference)	2.3%
Shower demand by occupants (current)	2.3%

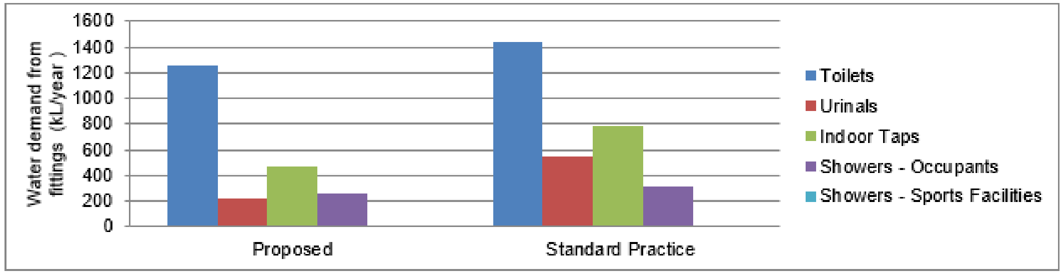
For residential buildings: Enter 100% for both "reference" and "current" shower demand
For other building Types: Use the reference and proposed building bicycle accommodation percentage from the Sustainable Transport Calculator, or percentages determined under 17.B.4 'Active Transport Facilities' criterion to determine the number of building occupants that are likely to shower each day.

Description	Water efficiency (Enter manually OR nominate WELS Star Rating)		Water efficiency used in calculations (L/min)	Percentage of each type	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
	Manufacturer's data (L/min)	WELS Star Rating selection				
<enter description>	7.5	3 Star	7.5	100%		
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
			Total	100%	264.1	316.9

(The Standard Practice Benchmark is based on 3 Star WELS rated showers)

RESULTS: WATER DEMAND FROM FITTINGS

	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
Toilets	1264.5	1445.1
Urinals	222.3	555.8
Indoor Taps	469.0	781.6
Showers - Occupants	264.1	316.9
Showers - Sports Facilities	0.0	0.0
TOTAL	2219.8	3099.4



5. LANDSCAPE IRRIGATION

(The irrigation requirement for the site is calculated for each month of the year, for each landscaped 'zone' in the site (a zone being a landscaped area that has the same soil type, irrigation system and as far as possible, types of plants).

Climate data

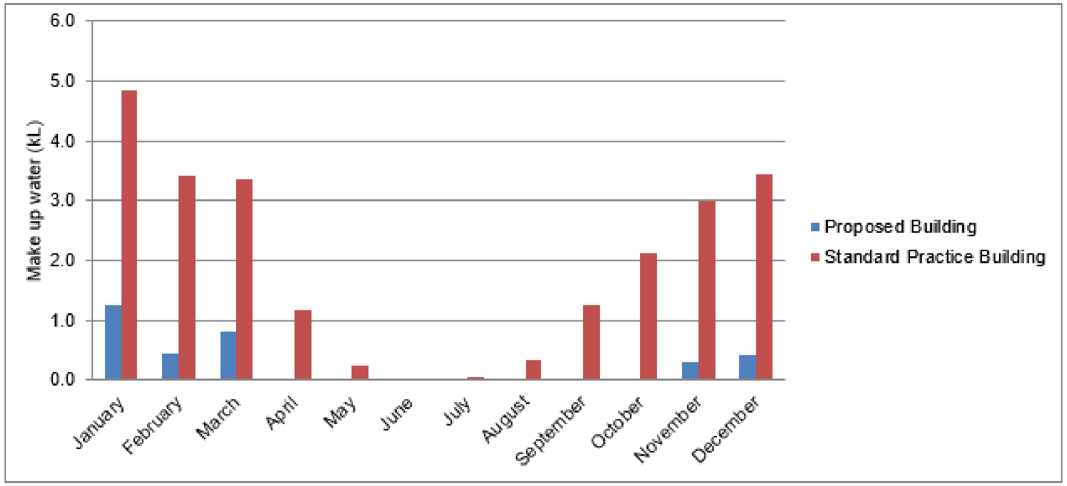
Month	Rainfall (mm)	Evapotranspiration (point potential) (mm)
January	33.6	190
February	50.2	160
March	26.3	135
April	50.0	88
May	39.3	47
June	40.9	33
July	36.3	38
August	45.1	56
September	41.6	82
October	55.2	124
November	50.2	147
December	53.0	164

Landscape zones

Name and description	Area of zone (m^2)	Percentage of zone undercover (%)	Weighted average crop coefficient in zone	Common irrigation systems water application efficiency	User determined application efficiency
Landscaping	38.8	0%	0.25	Drip - Under mulch (85%)	
				Please select	
				Please select	
				Please select	
				Please select	
				Please select	
				Please select	
				Please select	
				Please select	
				Please select	
Standard practice landscape irrigation assumptions:	(Same as Proposed Building)	(Same as Proposed Building)	(0.6)	(75%)	

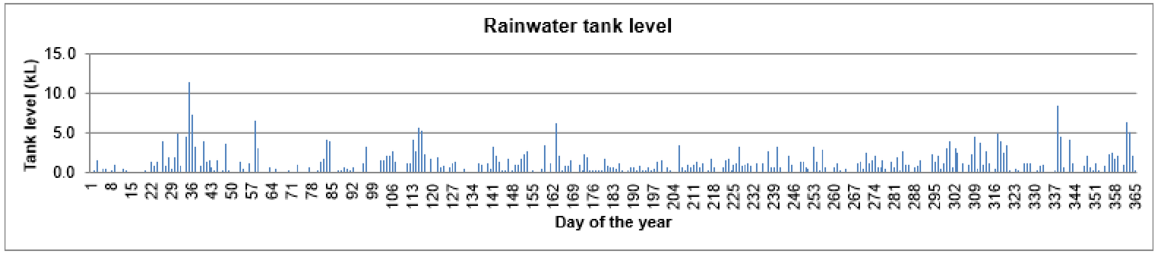
Landscape irrigation requirements per month

Month	Proposed Building (kL)	Standard Practice Building (kL)
January	1.2	4.9
February	0.5	3.4
March	0.8	3.4
April	0.0	1.2
May	0.0	0.2
June	0.0	0.0
July	0.0	0.1
August	0.0	0.3
September	0.0	1.3
October	0.0	2.1
November	0.3	3.0
December	0.4	3.4
Total	3.2	23.3



Rainwater collection

Rainfall collection area (m2)		1,270
Run-off co-efficient	Flat roof without gravel	0.8
Storage capacity (kL)		15
Rainwater tank reliability %		24%



7. FIRE PROTECTION SYSTEMS

Is the building required under part E of the National Construction Code (formerly the Building Code of Australia) to have sprinklers installed as part of its fire protection system?	Yes
Does the building's sprinkler system discharge water during testing?	Yes
Is greater than 80% of discharged water captured for reuse?	Yes
Testing frequency (enter number of tests per year)	1
Volume discharged per test (L)	100000
Proportion of water captured per test (%)	80%
Requirements met	Yes

RECLAIMED WATER

Reclaimed water sources

Note: All systems entered into this calculator must comply with local EPA requirements.

DISTRIBUTION OF WATER SOURCES

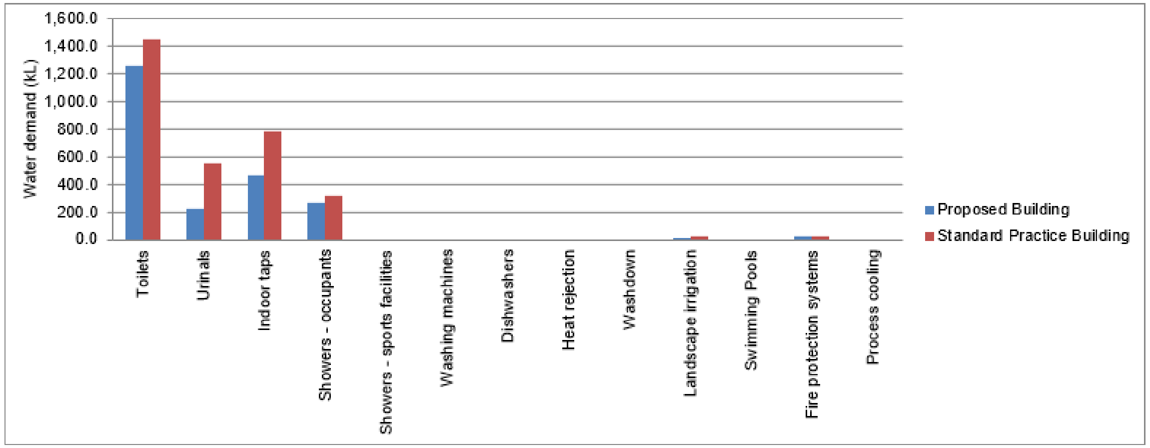
Water fittings / systems	Percentage of fittings/systems connected to the following water sources				
	Rainwater	Greywater	Blackwater	Stormwater recycling or other off-site reclaimed water	Mains water only (this column must be completed - enter a figure between 0% and 100% for each water system)
Toilets	100%				0%
Urinals	100%				0%
Indoor taps	0%				100%
Showers - occupants	0%				100%
Showers - sports	0%				100%
Laundries	0%				100%
Dishwashers	0%				100%
Heat rejection	0%				100%
Washdown	0%				100%
Landscape irrigation	100%				0%
Fire protection systems	0%				100%
Swimming pools	0%				100%
Process cooling	0%				100%

WATER DEMAND SUMMARY

Total water demand summary for each system and per month

TOTAL WATER DEMAND FOR EACH SYSTEM

Water system	Proposed Building (kL)	Standard Practice Building (kL)
Toilets	1,264.5	1,445.1
Urinals	222.3	555.8
Indoor taps	469.0	781.6
Showers - occupants	264.1	316.9
Showers - sports facilities	0.0	0.0
Washing machines	0.0	0.0
Dishwashers	0.0	0.0
Heat rejection	0.0	0.0
Washdown	0.0	0.0
Landscape irrigation	3.2	23.3
Swimming Pools	0.0	0.0
Fire protection systems	20.0	20.0
Process cooling	0.0	0.0
Total	2,243.0	3,142.7



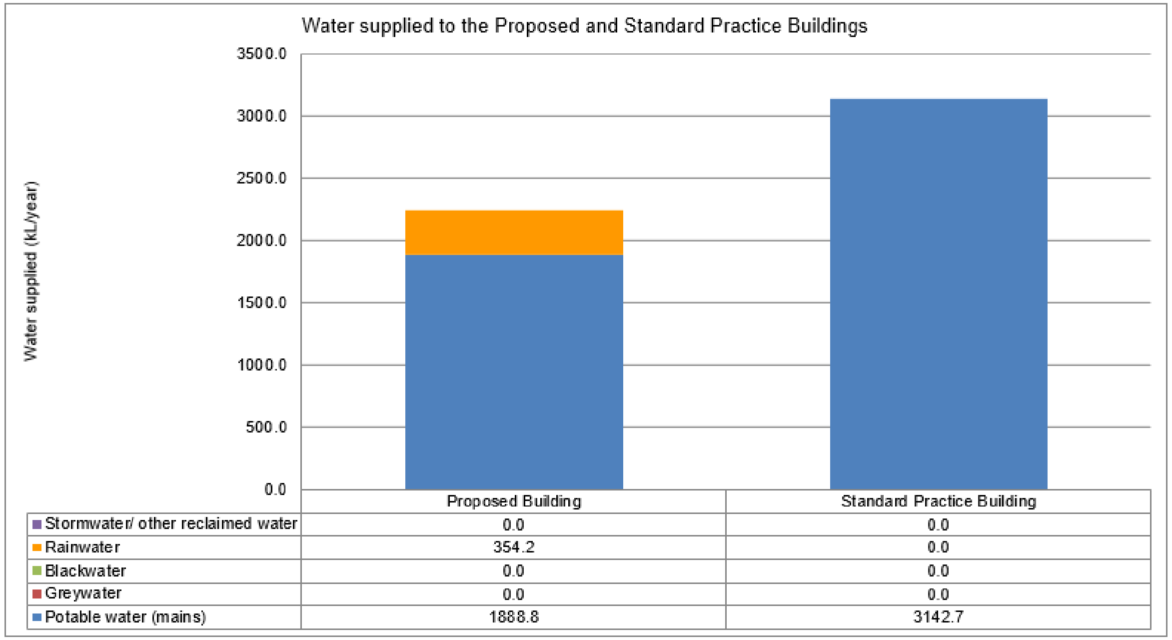
ADVERTISED PLAN

Percentage reduction in Potable Water Consumption compared to the Standard Practice Building	**40%**

Points Achieved - General	**4.9**
Points Achieved - Fire protection systems	**1**
Points Achieved - Process cooling	**N/A**

POINTS ALLOCATION

Percentage reduction compared to Standard Practice building	kL/year	Points awarded
0%	3143	0.0
5%	2986	1.1
15%	2671	2.2
25%	2357	3.3
35%	2043	4.4
45%	1728	5.5
55%	1414	6.6
65%	1100	7.7
75%	786	8.8
85%	471	9.9
95%	157	11.0



Appendix 2 – MUSIC Assessment and 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 off the impervious surfaces into the stormwater drains.

The City of Melbourne recognises the importance of stormwater management and the effects on the surrounding environment. Part of this ESD Masterplan addresses how the proposed development responds to the principles and requirements of Water Sensitive Urban Design (WSUD). The main objectives for WSUD are:

- To achieve the best practice water quality performance objectives as set out in the Urban Stormwater Best Practice Environmental Management Guidelines, Victoria Stormwater Committee 1999 (as amended). Currently, these water quality performance objectives are:
    - 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; and
    - Litter - 70% reduction of typical urban annual load.
- To promote the use of water sensitive urban design, including stormwater use.
- To mitigate the detrimental effect of development on downstream waterways, by the application of best practice stormwater management through water sensitive urban design for new developments.
- To minimise peak stormwater flows and stormwater pollutants to improve the health of water bodies, including creeks, rivers and bays.
- To reintegrate urban water into the landscape to facilitate a range of benefits including microclimate cooling, local habitat and provision of attractive spaces for community use and wellbeing.

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 model – which is an industry accepted tool – was used to determine the treatment effectiveness of these initiatives.

The stormwater assessment has been completed as a site-wide approach, encompassing Stages 1, 2 and 3 in one MUSIC assessment to achieve compliance for the overall site. Additionally, separate Green Star Potable Water Calculators have been completed for each of the three stages of development to ensure that individual compliance can be achieved for each stage with Clause 22.19.

Site Characteristics

For the purposes of the stormwater assessment, the site has been delineated into the basic surface types listed below:

- Site area of 4098.0m^2;
- Roof area of 2,553.2m^2;
- Terrace area of 734.9m^2;
- Permeable area (separate to raingardens) of 172.6m^2, and
- Raingarden area of 52.9m^2.

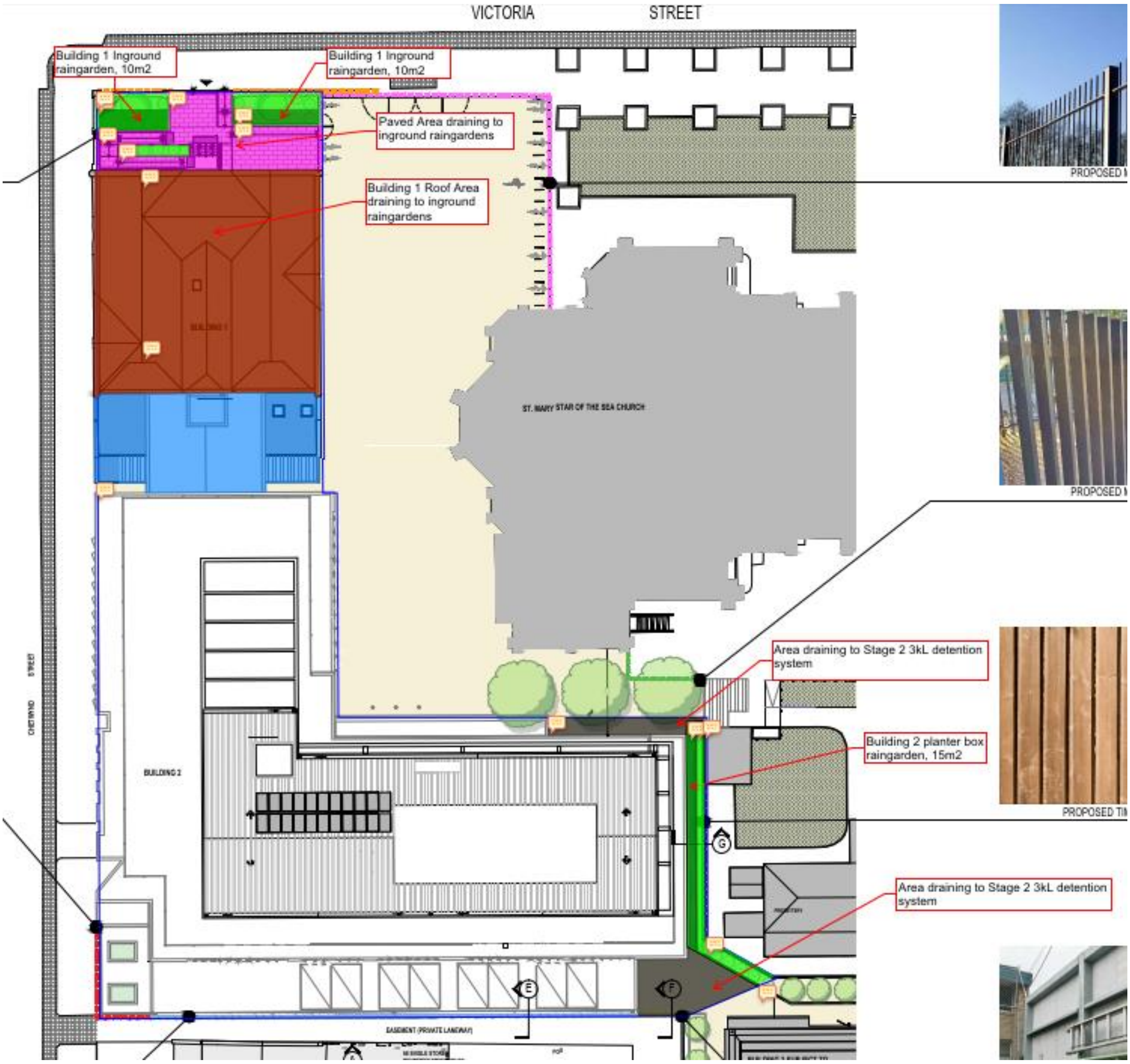


Figure 8: Site delineation (Stages 2 & 3)

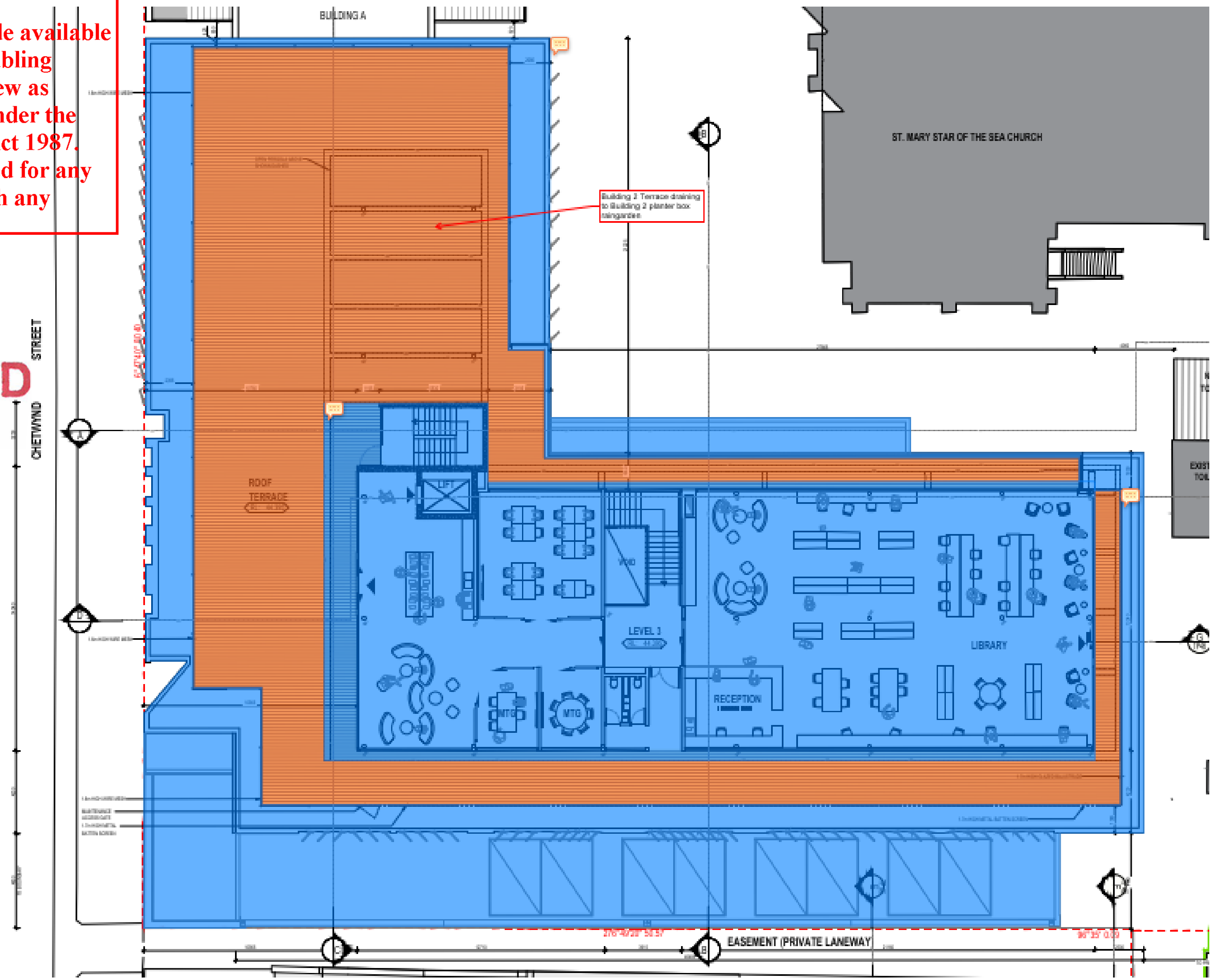


Figure 9: Site delineation (Stage 2)

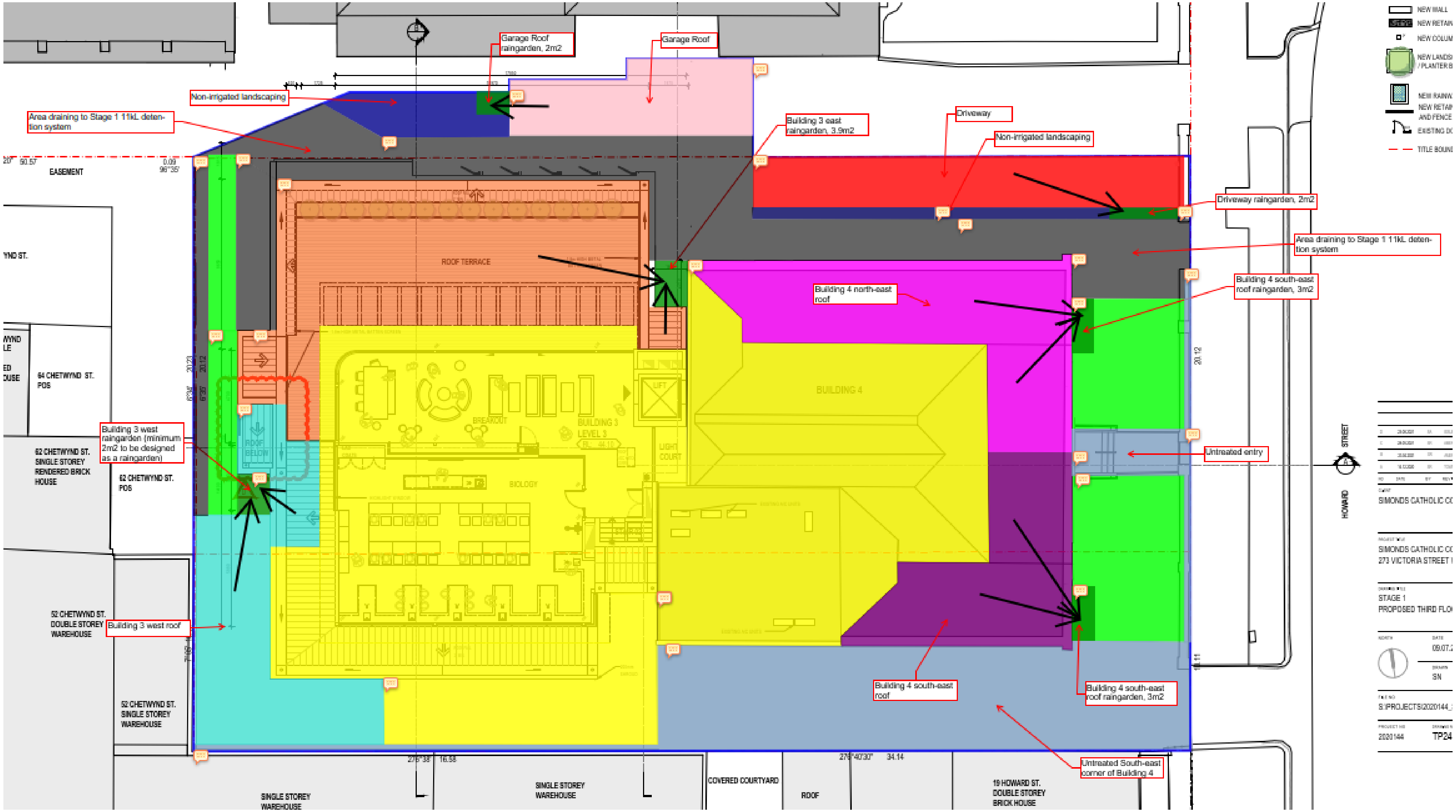


Figure 10: Site delineation (Stage 1)

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 (dark blue line)	4,098.0m^2	Detailed below (covers all three stages).
Building 1 Roof Area (brown)	377.7m^2	Entire Building 1 roof and paved area to the north of Building 1 drain to inground raingardens for filtration prior to diversion to the legal point of discharge, with a total minimum area of 20m^2 (shown as 2 x 10m^2 raingardens in Figure 8).
Building 1 Paved Area (pink)	82.6m^2	
Building 2 Roof Area (blue)	1,270.0m^2	Rainwater will be collected from suitable areas of Building 2, along with the new link between Buildings 1 & 2, a total roof area of 1,270m^2, and stored in a 15kL rainwater tank. The stored water will be used for irrigation, and for the flushing of all toilets and urinals throughout Buildings 1 & 2. Any overflow from the rainwater tanks will be discharged to the Legal Point of Discharge (LPD) onsite.
Building 2 Trafficable Terrace Area (orange)	570.2m^2	Terrace areas are to drain to a minimum 15.0m^2 Raingarden for filtration, and subsequently discharge to the Legal Point of Discharge (LPD) onsite.
Buildings 3 & 4 Roof Area (yellow)	611.4m^2	Rainwater will be collected from suitable roof areas of Building 3 and Building 4 and stored in a 15kL rainwater tank. The stored water will be used for irrigation, and for the flushing of all toilets and urinals throughout Buildings 3 & 4. Any overflow from the rainwater tanks will be discharged to the Legal Point of Discharge (LPD) onsite.
Building 3 West Roof Area (turquoise)	84.0m^2	Roof areas are to drain to a 2m^2 Raingarden for filtration, and subsequently discharge to the Legal Point of Discharge (LPD) onsite.
Building 3 Trafficable Terrace Area (orange)	164.7m^2	Terrace areas are to drain to a 3.9m^2 Raingarden for filtration, and subsequently discharge to the Legal Point of Discharge (LPD) onsite.
Building 4 north-east Roof Area (pink)	99.1m^2	North-east roof area of Building 4 is to drain to a minimum 4m^2 Raingarden for filtration, and subsequently discharge to the Legal Point of Discharge (LPD) onsite.
Building 4 south-east Roof Area (purple)	67.2m^2	South-east roof area of Building 4 is to drain to a minimum 4m^2 Raingarden for filtration, and subsequently discharge to the Legal Point of Discharge (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.

Surfaces	Area	Required Treatment
Garage Roof (light pink)	42.5m^2	Garage roof to drain to a minimum 2m^2 Raingarden for filtration, and subsequently discharge to the Legal Point of Discharge (LPD) onsite.
Driveway (red)	57.0m^2	Driveway to drain to a 2m^2 in-ground Raingarden for filtration, and subsequently discharge to the Legal Point of Discharge (LPD) onsite
Building 4 Entry and south-east corner of Building 4 (grey)	171.8	Untreated area discharging to the Legal Point of Discharge (LPD) onsite.
Raingardens (dark green)	Building 1: 20m^2 (e.g. 2 x 10m^2) Building 2: 15m^2 Building 3: 2m^2 + 3.9m^2 Building 4: 4m^2 + 4m^2 Garage: 2m^2 Driveway: 2m^2	Planter-box raingardens located near to the terraces of Buildings 2 and 3, and to the roofs of Buildings 3 and 4, and the garage roof, from where water will be drained for filtration/bioretention, and subsequently discharge to the Legal Point of Discharge (LPD) onsite. In-ground raingarden located adjacent to the driveway, and to the north of Building 1 draining the paved area and Building 1 roof, to which water will be drained for filtration/bioretention, and subsequently discharge to the Legal Point of Discharge (LPD) onsite.
Area draining to Stage 1 Detention System (black)	174.2m^2	These areas are to drain to a minimum 11kL detention system prior to diversion to the legal point of discharge.
Area draining to Stage 2 Detention System (black)	59.1m^2	These areas are to drain to a minimum 3kL detention system prior to diversion to the legal point of discharge.
Remaining untreated area (unmarked)	41.1m^2	Untreated area discharging to the Legal Point of Discharge (LPD) onsite.
Permeable Irrigated Landscaping (light green)	144.6m^2	Permeable surfaces: no treatment required.
Permeable Non-Irrigated Landscaping (dark blue)	28.0m^2	Permeable surfaces: no treatment required.

Reuse Demand

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

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

Stage	Toilets (kL/year)	Urinals (kL/year)	Total (kL/year)
1 (Buildings 3 & 4)	601.2	132.1	733.2
2 (Building 2)	1,264.5	222.3	1,486.8
3 (Building 1)	42.4	9.3	51.7
Total	1,908.1	363.7	2,271.7

The Potable Water Calculator assumes toilet and urinal flushing water demand based on the projected occupancy of each building.

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

Refer Appendix 1 – Green Star Design & As Built Potable Water Calculator.

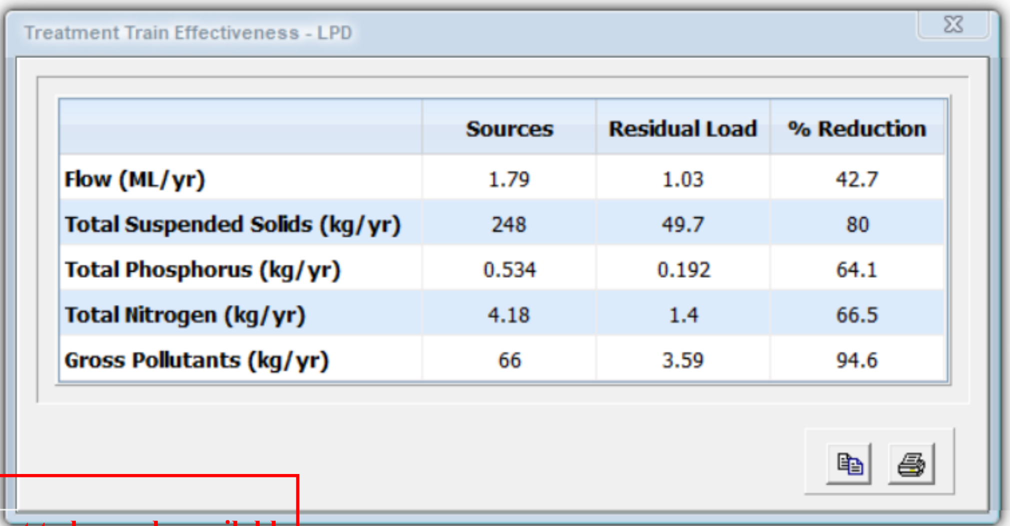
Stormwater Quality Modelling Results

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 targets

Pollutant Load	Required Load Reduction	Calculated Load Reduction
Total Suspended Solids	80%	80.0%
Total Phosphorus	45%	64.1%
Total Nitrogen	45%	66.5%
Gross Pollutants/Litter	70%	94.6%


Treatment Train Effectiveness - LPD

	Sources	Residual Load	% Reduction
Flow (ML/yr)	1.79	1.03	42.7
Total Suspended Solids (kg/yr)	248	49.7	80
Total Phosphorus (kg/yr)	0.534	0.192	64.1
Total Nitrogen (kg/yr)	4.18	1.4	66.5
Gross Pollutants (kg/yr)	66	3.59	94.6

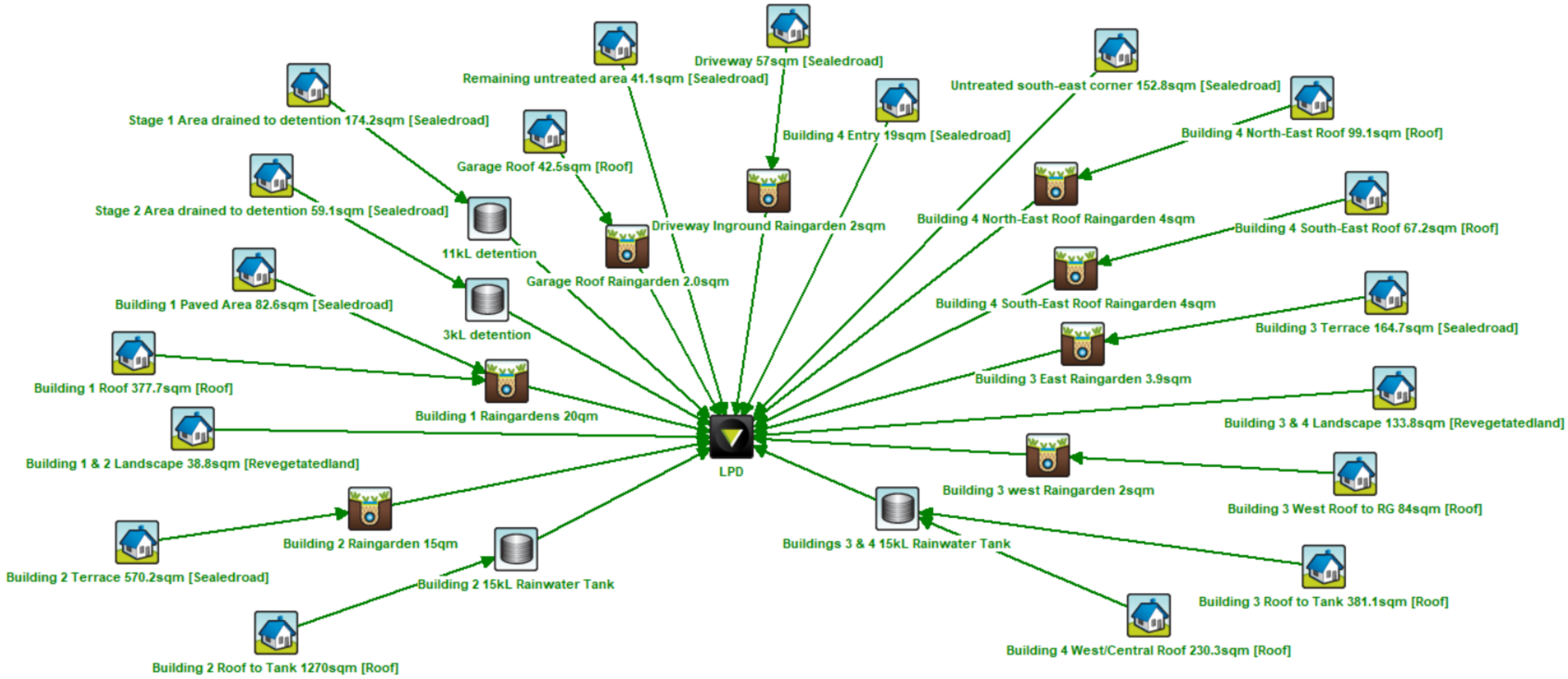


Figure 11: MUSIC interface layout of the stormwater treatment network and rainwater collection and reuse system. All flows will subsequently discharge to the legal point of discharge.

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). *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 Airport	1971-1980	6 Min

Source Nodes: Urban

Parameter	Input
Node Name	Building 1 Roof (377.7m^2)
Total Area	0.038ha
Zoning/Surface Type	Roof
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 1 Paved Area (82.6m^2)
Total Area	0.008ha
Zoning/Surface Type	Sealed Road
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 2 Roof to Tank (1,270m^2)
Total Area	0.127ha
Zoning/Surface Type	Roof
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 2 Terrace (570.2m^2)
Total Area	0.057ha
Zoning/Surface Type	Sealed Road
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 3 Roof to Tank (381.1m^2)
Total Area	0.038ha
Zoning/Surface Type	Roof
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 3 West Roof to RG (84.0m^2)
Total Area	0.008ha
Zoning/Surface Type	Roof
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 3 Terrace (164.7m^2)
Total Area	0.016ha
Zoning/Surface Type	Sealed Road
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 4 West/Central Roof (230.3m^2)
Total Area	0.023ha
Zoning/Surface Type	Roof
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 4 North-East Roof (99.1m^2)
Total Area	0.010ha
Zoning/Surface Type	Roof
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 4 South-East Roof (67.2m^2)
Total Area	0.007ha
Zoning/Surface Type	Roof
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Garage Roof (42.5m^2)
Total Area	0.004ha
Zoning/Surface Type	Roof
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Driveway (57.0m^2)
Total Area	0.006ha
Zoning/Surface Type	Sealed Road
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 4 Entry (19.0m^2)
Total Area	0.002ha
Zoning/Surface Type	Sealed Road
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Untreated South-East Corner (152.8m^2)
Total Area	0.015ha
Zoning/Surface Type	Sealed Road
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 1 & 2 Landscape (38.8m^2)
Total Area	0.004ha
Zoning/Surface Type	Revegetated Land
Fraction Impervious	0.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Building 3 & 4 Landscape (133.8m^2)
Total Area	0.013ha
Zoning/Surface Type	Revegetated Land
Fraction Impervious	0.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Area Draining to Stage 1, 11kL Detention (174.2m^2)
Total Area	0.017ha
Zoning/Surface Type	Sealedroad
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Area Draining to Stage 2, 3kL Detention (59.1m^2)
Total Area	0.006ha
Zoning/Surface Type	Sealedroad
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	Remaining Untreated Area (41.1m^2)
Total Area	0.004ha
Zoning/Surface Type	Sealedroad
Fraction Impervious	1.00
Rainfall-Runoff Parameters	Melbourne Water MUSIC Guidelines 2018
Pollutant Flow Concentration Parameters	Melbourne Water MUSIC Guidelines 2018

Treatment Node: Rainwater Tank

Parameter	Input
Node Name	Building 2, 15kL Rainwater Tank
Number of Tanks	1
Total Tank System Properties	
Volume below overflow pipe	15kL
Depth above overflow	0.2m
Surface Area	7.5m^2
Initial Volume	7.5kL
Outlet Properties	
Overflow Pipe Diameter	50.00 mm
Advanced Properties	
Orifice Discharge Coefficient	0.60 (Melbourne Water MUSIC Guidelines 2018)
Number of CSTR Cells	2
Pollutant k & C* Values	Melbourne Water MUSIC Guidelines 2018
Re-use	
Max Drawdown Height	1.9m
Daily Demand	8kL/d (toilet and urinal flushing, based on Green Star Potable Water Calculator and 200 school days/year, for Buildings 1 and 2).
Annual Demand	2.4kL/year for irrigation

Parameter	Input
Node Name	Buildings 3 & 4, 15kL Rainwater Tank
Number of Tanks	1
Total Tank System Properties	
Volume below overflow pipe	15kL
Depth above overflow	0.2m
Surface Area	7.5m^2
Initial Volume	7.5kL
Outlet Properties	
Overflow Pipe Diameter	50.00 mm
Advanced Properties	
Orifice Discharge Coefficient	0.60 (Melbourne Water MUSIC Guidelines 2018)
Number of CSTR Cells	2
Pollutant k & C* Values	Melbourne Water MUSIC Guidelines 2018
Re-use	

Parameter	Input
Max Drawdown Height	1.9m
Daily Demand	3.7kL/d (toilet and urinal flushing, based on Green Star Potable Water Calculator and 200 school days/year, for Buildings 3 and 4).
Annual Demand	63.7kL/year for irrigation

Treatment Node: Detention

Parameter	Input
Node Name	11kL detention (Stage 1)
Number of Tanks	1
Total Tank System Properties	
Volume below overflow pipe	11kL
Depth above overflow	0.2m
Surface Area	5.5m^2
Initial Volume	0kL
Outlet Properties	
Overflow Pipe Diameter	50.00 mm
Advanced Properties	
Orifice Discharge Coefficient	0.60 (Melbourne Water MUSIC Guidelines 2018)
Number of CSTR Cells	2
Pollutant k & C* Values	Melbourne Water MUSIC Guidelines 2018

Parameter	Input
Node Name	3kL detention 9Stage 2)
Number of Tanks	1
Total Tank System Properties	
Volume below overflow pipe	3kL
Depth above overflow	0.2m
Surface Area	1.5m^2
Initial Volume	0kL
Outlet Properties	
Overflow Pipe Diameter	50.00 mm
Advanced Properties	
Orifice Discharge Coefficient	0.60 (Melbourne Water MUSIC Guidelines 2018)
Number of CSTR Cells	2

Parameter	Input
Pollutant k & C* Values	Melbourne Water MUSIC Guidelines 2018

Treatment Node: Bioretention

Parameter	Input
Node Name	Building 1 Inground Raingardens 20.0m^2 (filtering water from the Building 1 Roof and Building 1 Paved Area)
Inlet Properties	
Low Flow By-pass	0m^3/s (MUSIC Default)
High Flow By-pass	100m^3/s (MUSIC Default)
Storage Properties	
Surface Area	20.0 m^2
Extended detention depth	0.30 m
Filtration media depth	0.5m
Advanced Properties	
Vegetation	Vegetated with effective nutrient removal plants
Lined Base	Yes
Weir Coefficient	1.70 (MUSIC Default)
Number of CSTR Cells	3 (MUSIC Default)

Parameter	Input
Node Name	Building 2 Planter Box Raingarden 15m^2 (filtering water from the Building 2 trafficable terrace)
Inlet Properties	
Low Flow By-pass	0m^3/s (MUSIC Default)
High Flow By-pass	100m^3/s (MUSIC Default)
Storage Properties	
Surface Area	15.0 m^2
Extended detention depth	0.30 m
Filtration media depth	0.5m
Advanced Properties	
Vegetation	Vegetated with effective nutrient removal plants
Lined Base	Yes
Weir Coefficient	1.70 (MUSIC Default)
Number of CSTR Cells	3 (MUSIC Default)

Parameter	Input
Node Name	Garage Roof Planter Box Raingarden 2.0m^2 (filtering water from the garage roof)
Inlet Properties	
Low Flow By-pass	0m^3/s (MUSIC Default)
High Flow By-pass	100m^3/s (MUSIC Default)
Storage Properties	
Surface Area	2.0m^2
Extended detention depth	0.30 m
Filtration media depth	0.5m
Advanced Properties	
Vegetation	Vegetated with effective nutrient removal plants
Lined Base	Yes
Weir Coefficient	1.70 (MUSIC Default)
Number of CSTR Cells	3 (MUSIC Default)

Parameter	Input
Node Name	Driveway Inground Raingarden 2.0m^2 (filtering water from the driveway)
Inlet Properties	
Low Flow By-pass	0m^3/s (MUSIC Default)
High Flow By-pass	100m^3/s (MUSIC Default)
Storage Properties	
Surface Area	2.0m^2
Extended detention depth	0.30 m
Filtration media depth	0.5m
Advanced Properties	
Vegetation	Vegetated with effective nutrient removal plants
Lined Base	Yes
Weir Coefficient	1.70 (MUSIC Default)
Number of CSTR Cells	3 (MUSIC Default)

Parameter	Input
Node Name	Building 4 North-East Roof Planter Box Raingarden $4.0m^2$ (filtering water from the Building 4 North-East Roof)
Inlet Properties	
Low Flow By-pass	$0m^3/s$ (MUSIC Default)
High Flow By-pass	$100m^3/s$ (MUSIC Default)
Storage Properties	
Surface Area	$4.0m^2$
Extended detention depth	0.30 m
Filtration media depth	0.5m
Advanced Properties	
Vegetation	Vegetated with effective nutrient removal plants
Lined Base	Yes
Weir Coefficient	1.70 (MUSIC Default)
Number of CSTR Cells	3 (MUSIC Default)

Parameter	Input
Node Name	Building 4 South-East Roof Planter Box Raingarden $4.0m^2$ (filtering water from the Building 4 South-East Roof)
Inlet Properties	
Low Flow By-pass	$0m^3/s$ (MUSIC Default)
High Flow By-pass	$100m^3/s$ (MUSIC Default)
Storage Properties	
Surface Area	$4.0m^2$
Extended detention depth	0.30 m
Filtration media depth	0.5m
Advanced Properties	
Vegetation	Vegetated with effective nutrient removal plants
Lined Base	Yes
Weir Coefficient	1.70 (MUSIC Default)
Number of CSTR Cells	3 (MUSIC Default)

Parameter	Input
Node Name	Building 3 East Planter Box Raingarden 3.9m^2 (filtering water from the Building 3 Terrace/outdoor tiled area)
Inlet Properties	
Low Flow By-pass	0m^3/s (MUSIC Default)
High Flow By-pass	100m^3/s (MUSIC Default)
Storage Properties	
Surface Area	3.9m^2
Extended detention depth	0.30 m
Filtration media depth	0.5m
Advanced Properties	
Vegetation	Vegetated with effective nutrient removal plants
Lined Base	Yes
Weir Coefficient	1.70 (MUSIC Default)
Number of CSTR Cells	3 (MUSIC Default)

Parameter	Input
Node Name	Building 3 West Raingarden 2.0m^2 (filtering water from the Building 3 west roof area)
Inlet Properties	
Low Flow By-pass	0m^3/s (MUSIC Default)
High Flow By-pass	100m^3/s (MUSIC Default)
Storage Properties	
Surface Area	2.0m^2
Extended detention depth	0.30 m
Filtration media depth	0.5m
Advanced Properties	
Vegetation	Vegetated with effective nutrient removal plants
Lined Base	Yes
Weir Coefficient	1.70 (MUSIC Default)
Number of CSTR Cells	3 (MUSIC Default)

Stormwater Runoff from Roof Catchment Areas

Treatment – Rainwater Tanks

Rainwater tanks are considered one of the most practical and effective mechanisms to reduce the quantity and velocity of stormwater leaving a site. Rainwater tanks will capture the stormwater that runs off the roof surfaces as per Figures 8-10 and store it for toilet/urinal flushing re-use throughout the redevelopment site, and for irrigation, effectively reducing the actual volume of water leaving the site. Instead of rainwater being considered as waste and a burden on the infrastructure, it is seen as a resource which has the double benefit of reducing demand on potable water supplies and as a stormwater mitigation initiative.

Treatment – Raingardens

Raingardens are low-maintenance stormwater filtration measures employed to reduce the concentration of pollutants within stormwater leaving a property. Stormwater is captured when running off hard surfaces, in this case the trafficable terrace areas of Buildings 2 & 3, suitable roof areas and the driveway, and subsequently flows through adjacent raingardens encountering various filtration media and appropriate plants[2].

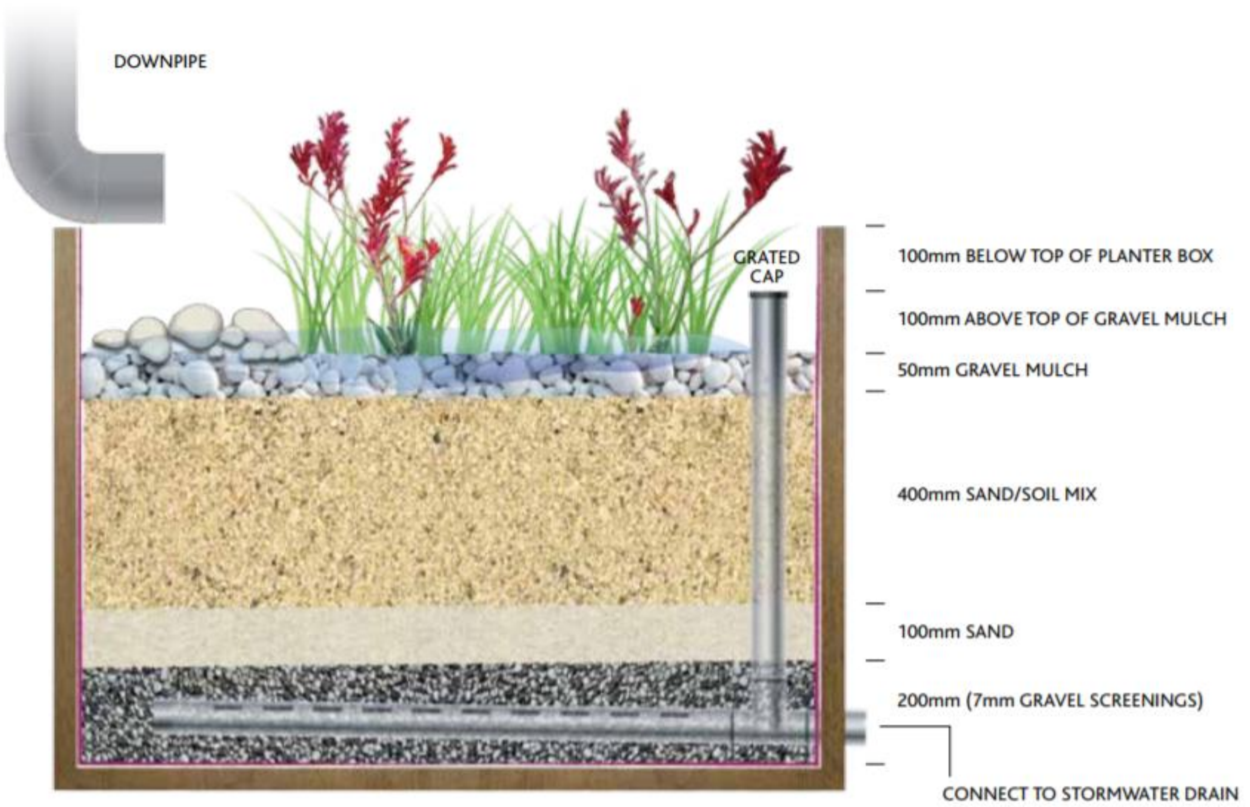


Figure 12: Example cross-sectional view of proposed planter box raingardens (Source: Melbourne Water[2])

[2] Please refer to "Planter box raingarden instruction sheet" and ''Inground raingarden instruction sheet" from "How do I build a raingarden" section of Melbourne Water website https://www.melbournewater.com.au/water-data-and-education/environment-and-sustainability/why-we-need-save-water/tips-saving-water-0 accessed 30 September 2021. It is noted that the cross-sectional composition of the proposed raingardens will resemble Figures 11 & 12.

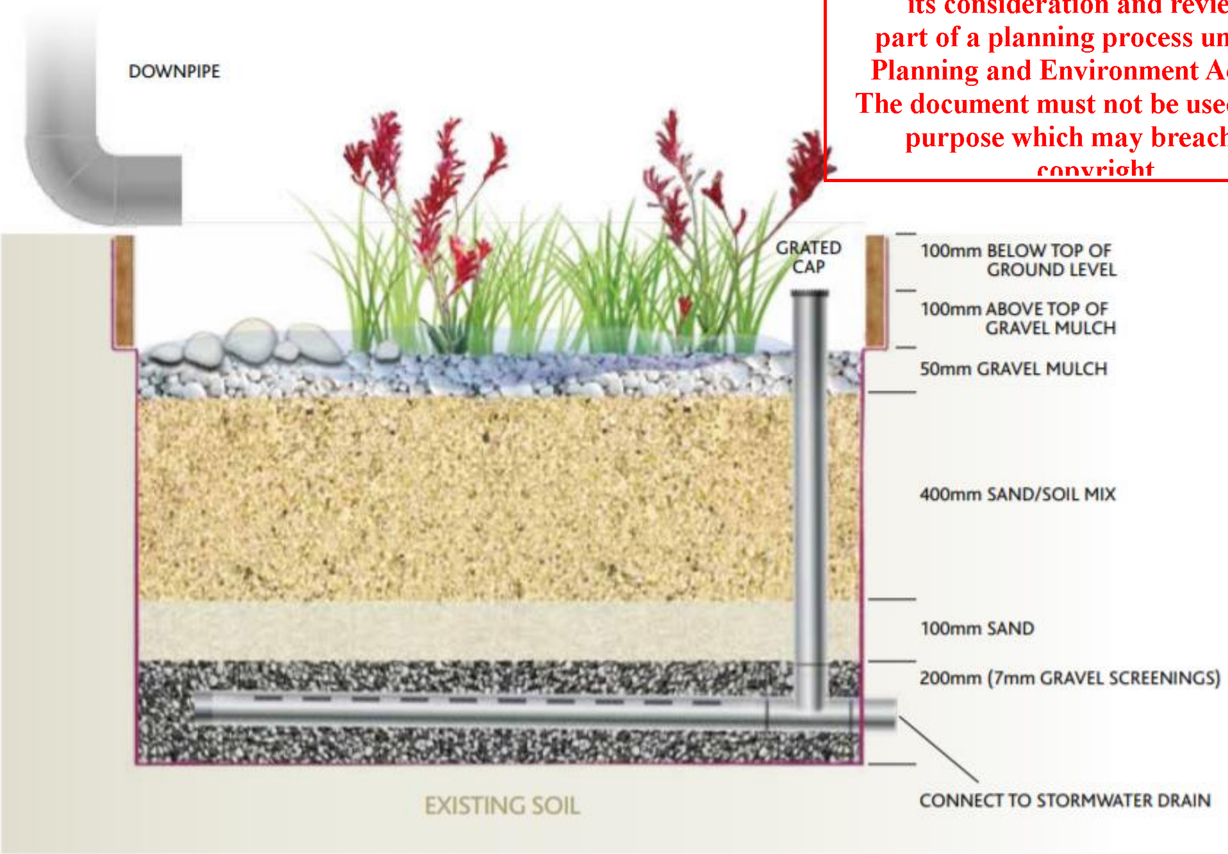


Figure 13: Example cross-sectional view of proposed inground raingarden (Source: Melbourne Water[2])

Raingarden Design

Inground and planter box raingardens are designed to filter runoff from adjacent driveway/roof/terrace areas, as shown in Figures 8 & 10. The carpark is to be shaped to drain into the adjacent inground raingarden through gaps in kerbing. Note that raingardens are to be designed with no more than 50m^2 impervious area draining to each 1m^2 of raingarden filter area.

The following steps are to be taken when constructing the raingardens (refer Figures 11 & 12):

- Excavate with a gentle incline toward the stormwater outlet.
- Line raingarden base and sides with a PVC liner, sealing joins with PVC tape.
- Add 7mm screenings (gravel, which must be free from excess dirt) up to a depth of 50mm.
- Place a 90mm diameter slotted drainage pipe along the centre of the raingarden, capped at one end.
- Connect a 90mm diameter vertical overflow pipe to the slotted drainage pipe, ensuring that the top of the overflow pipe sits 100mm above gravel mulch and 100mm below surrounding ground level.
- Cap the overflow pipe temporarily to prevent soil/filter media from entering during construction.
- Prepare and install a frame for the raingardens, with the top edge level with surrounding ground level. Note that the frame is required to sit higher than the overflow pipe. The PVC liner is to be placed between the frame and surrounding ground.
- Add an additional 150mm depth of 7mm screenings (gravel), covering the drainage pipe.
- Place 100mm of white-washed sand over the gravel layer, pressed firmly.
- Add 400mm depth of a mixture of 4 parts white-washed sand and 1 part topsoil, over the sand layer, pressed firmly.
- Direct pipework into the raingardens.
- Select suitable plant species. 50% of the raingarden is to be planted with plants which are effective pollutant removers, such as:
    - *Carex appressa*
    - *Lomandra longifolia*

- *Juncus flavidus*
- *Melaleuca ericifolia*
- *Goodenia ovata*

The other 50% of raingarden area is to be planted with species which survive well in a dry environment with intermittent wet periods. Suitable native species include:

- *Anigozanthus sp.*
- *Calocephalus lacteus*
- *Dianella sp.*
- *Lomandra sp.*
- *Pattersonia occidentalis*
- *Wahlenbergia communis*

Ensure to plant densely, minimum 6 plants per m^2.

- Following planting, cover with 50mm gravel mulch around the plants. Where pipes enter each raingarden, place some large flat rocks to help spread the incoming water. Note that timber mulch is to be avoided, as it is liable to causing blockages.
- Finally, remove the temporary end cap on the overflow pipe and replace with a 90mm PVC finishing collar with domed pipe grate.

Melbourne Water provides detailed advice on how to build a raingarden, which should be referenced by the landscaping contractor during construction:

https://www.melbournewater.com.au/water-data-and-education/environmental-issues/why-we-need-save-water/tips-saving-water/raingardens

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 Systems

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

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

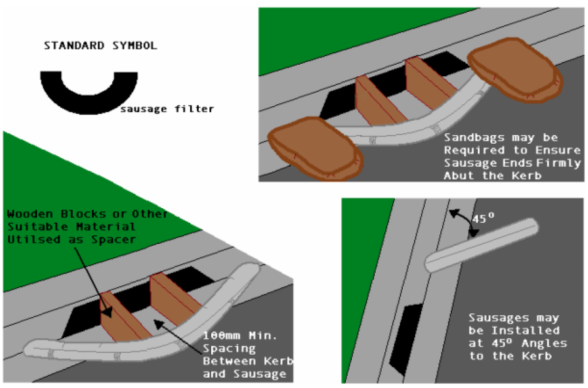
Treatment – Various

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]. The diagram below is an illustration of the various objectives which assist in minimising the impacts of stormwater runoff typical during the construction phase. Typical pollutants that are generated from a construction site during a rainfall event include:

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

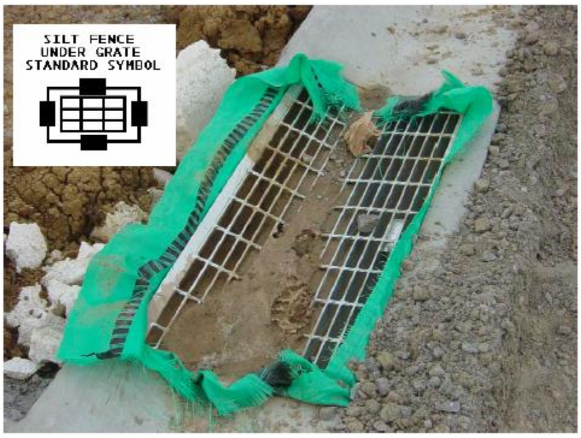
To reduce the impacts and minimise the generation of these pollutants the following measures are proposed. The symbols embedded within each image are typically used for Construction Environmental Management Plans.

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



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

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 streets where it can be washed (by rainfall or other means) into the stormwater drains.

Appendix 3 – Green Star Design & As Built Scorecard

Green Star - Design & As Built Scorecard

Project:	Simonds Catholic College	**Round:**	1
Targeted Rating:	5 Star - Australian Excellence		

Points Available (Targeted)	Project Score (Targeted)	NA Targeted
100.0	66.0	0.0

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA		POINTS AVAILABLE	POINTS TARGETED	NA AVAILABLE
Management					14		
Green Star Accredited Professional	To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended.	1.1	Accredited Professional		1	1	-
Commissioning and Tuning	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	2.0	Environmental Performance Targets		-	Complies	-
		2.1	Services and Maintainability Review		1	1	-
		2.2	Building Commissioning		1	1	-
		2.3	Building Systems Tuning		1	1	-
		2.4	Independent Commissioning Agent		1	1	-
Adaptation and Resilience	To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.	3.1	Implementation of a Climate Adaptation Plan		2	2	-
Building Information	To recognise the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance.	4.1	Building Information		1	1	-
Commitment to Performance	To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	5.1	Environmental Building Performance		1	1	-
		5.2	End of Life Waste Performance	A. Contractual Agreements	1		-
Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems.	6.0	Metering		-	Complies	-
		6.1	Monitoring Systems		1	1	-

Responsible Construction Practices	To reward projects that use best practice formal environmental management procedures during construction.	7.0	Environmental Management Plan		-	Complies	-
		7.1	Environmental Management System		1	1	-
		7.2	High Quality Staff Support		1	1	-
Operational Waste	A. Performance Pathway	8A	Performance Pathway: Specialist Plan		1	1	-
		8B	Prescriptive Pathway: Facilities		0		-
Total					**14**	**13**	

Indoor Environment Quality					**17**		
Indoor Air Quality	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes		1	1	0.0
		9.2	Provision of Outdoor Air	☐ A. Comparison to Industry Standards ☐ B. Performance Based Approach ☐ C. Natural Ventilation	2	2	0.0
		9.3	Exhaust or Elimination of Pollutants	☐ A. Removing the Source of Pollutants ☑ B. Exhausting the Pollutants Directly to the Outside	1	1	0.0
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels		1	1	0.0
		10.2	Reverberation		1.00	1	0.00
		10.3	Acoustic Separation	B. Sound Insulation	1.00	1	0.00
Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.0	Minimum Lighting Comfort		-	Complies	-
		11.1 General Illuminance and Glare Reduction	11.1.1 General Illuminance	☐ A. Non Residential Spaces ☐ B. Residential Spaces	1.00	1	0.00
			11.1.2 Glare Reduction	☐ A. Prescriptive Method 1 ☐ B. Prescriptive Method 2 ☐ C. Performance Method			
		11.2	Surface Illuminance	☐ A. Prescriptive Method ☐ B. Performance Method ☐ C. Residential Spaces (Prescriptive Method)	1.00	1	0.00
		11.3	Localised Lighting Control		1.00		0.00
Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12.0	Glare Reduction	☑ A. Fixed Shading Devices ☑ B. Blinds or Screens ☐ C. Daylight Glare Model	-	Complies	-
		12.1	Daylight	☐ A. Prescriptive Methodology ☐ B. Compliance Using Daylight Factor ☐ C. Compliance Using Daylight Autonomy	2	1	0.0
		12.2	Views		1	1	0.0

Indoor Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	13.1 Paints, Adhesives, Sealants and Carpets	13.1.1 Paints, Adhesives and Sealants	☑ A. Product Certification ☑ B. Laboratory Testing ☐ C. No Paints, Adhesives or Sealants	1.00	1	0.00
			13.1.2 Carpets	☑ A. Product Certification ☑ B. Laboratory Testing ☐ C. No Carpets			
		13.2	Engineered Wood Products	☑ A. Product Certification ☑ B. Laboratory Testing	1.00	1	0.00
Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	☐ A. Naturally Ventilated Spaces ☑ B. Mechanically Ventilated Spaces ☐ C. Residential Spaces	1	1	0.0
		14.2	Advanced Thermal Comfort	☐ A. Naturally Ventilated Spaces ☐ B. Mechanically Ventilated Spaces ☐ C. Residential Spaces ☐ D. Industrial spaces	1		0.0
Total					**17**	**14**	

Energy				**22**		
Greenhouse Gas Emissions	E. Reference Building Pathway	15D.0	Conditional Requirement: NABERS Pathway	-		-
		15D.1	NABERS Energy Greenhouse Gas Emissions Reduction	0		-
		15D.2	Off-Site Renewables	0		-
		15D.3 Additional Prescriptive Measures	15D.3.1 Transition Plan	0		-
			15D.3.2 Fuel Switching	0		-
			15D.3.3 On-Site Storage	0		-
		15E.0	Conditional Requirement: Reference Building Pathway	-	Complies	-
		15E.1	GHG Emissions Reduction: Building Fabric	4	1	-
		15E.2	GHG Emissions Reduction	16	6.1	-
		15E.3	Off-Site Renewables	8		-
		15E.4	District Services	7		-
		15E.5 Additional Prescriptive Measures	15E.5.1 Transition Plan	1		-
			15E.5.2 Fuel Switching	2		-
			15E.5.3 On-Site Storage	1		-

Peak Electricity Demand Reduction	B. Performance Pathway	16A	Prescriptive Pathway: On-Site Energy Generation		0		-
		16B	Modelled Performance Pathway: Reference Building		2	1	-
Total					**22**	**8.1**	

Transport					**10**		
Sustainable Transport	B. Prescriptive Pathway	17A	Performance Pathway		0		-
		17B.1	Access by Public Transport		3	3	-
		17B.2	Reduced Car Parking Provision		1	1	0.0
		17B.3	Low Emission Vehicle Infrastructure	B. Parking for Electric Vehicles	1	1	0.0
		17B.4	Active Transport Facilities		1		-
		17B.5	Walkable Neighbourhoods	A. Proximity to Amenities	1	1	-
		17C.1	Access by Public Transport		0		-
Total					**7**	**6**	

Water					**12**		
Potable Water	A. Performance Pathway	18A	Potable Water - Performance Pathway		12	5.9	-
		18B.1	Sanitary Fixture Efficiency		0		-
		18B.2	Rainwater Reuse		0		-
		18B.3	Heat Rejection		0		-
		18B.4	Landscape Irrigation		0		0.0
		18B.5	Fire Protection System Test Water		0		0.0
Total					**12**	**5.9**	

Materials					**14**		
Life Cycle Impacts	B. Prescriptive Pathway - Life Cycle Impacts	19A.1	Comparative Life Cycle Assessment		0		-
		19A.2	Additional Reporting	☐ A. Additional Life Cycle Impact Reporting ☐ B. Material Selection Improvement ☐ C. Construction Process Improvement ☐ D. LCA Design Review	0		-
		19B.1 Concrete	19B.1.1 Portland Cement Reduction		2	2	-
			19B.1.2 Water Reduction		0.5	0.5	-
			19B.1.3 Aggregates Reduction	B. Fine Aggregate Reduction	0.5	0.5	-
		19B.2 Steel	A. Reduced Mass of Steel Framing	B. Reduction in Mass	1	1	-
		19B.3	Building Reuse	19B.3.1 Façade Reuse	2		-
				19B.3.2 Structure Reuse	2		-
		19B.4	Structural Timber	19B.4.0 Responsible Sourcing	-		-
				19B.4.1 Reduced Embodied Impacts	3		-
Responsible Building Materials	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	20.1	Structural and Reinforcing Steel	20.1.0 Responsible Steel Maker	-	Complies	-
				A. Responsible Steel Fabricator	1	1	0.0
		20.2	Timber	☑ A. Certified Timber ☐ B. Reused Timber	1	1	0.0
		20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	B. Best Practice Guidelines for PVC	1	1	0.0
Sustainable Products	To encourage sustainability and transparency in product specification.	21.1	Product Transparency and Sustainability	☐ A. Reused Products ☐ B. Recycled Content Products ☑ C. Environmental Product Declarations (EPDs) ☑ D. Third Party Certification ☐ E. Stewardship Programs	3	1	-
Construction and Demolition Waste	B. Percentage Benchmark	22.0	Reporting Accuracy	A. Compliance Verification Summary	-	Complies	-
		22A	Fixed Benchmark		0		-
		22B	Percentage Benchmark		1	1	-
Total					**12**	**9**	

Land Use & Ecology					6		
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vulnerable Species	A. EPBC	-		-
		23.1	Ecological Value		3		-
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement		-	Complies	-
		24.1	Reuse of Land	A. Previously Developed Land	1	1	-
		24.2	Contamination and Hazardous Materials	☐ A. Site Contamination ☐ B. Hazardous Materials	1		0.0
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.1	Heat Island Effect Reduction		1	1	-
Total					**6**	**2**	

Emissions					5		
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Stormwater Peak Discharge		1	1	-
		26.2	Stormwater Pollution Targets		1	1	-
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring Bodies		-	Complies	-
		27.1	Light Pollution to Night Sky	A. Control of Upward Light Output Ratio (ULOR)	1	1	-
Microbial Control: Legionella Impacts from Cooling Systems	B. Waterless Heat Rejection Systems	28A	Natural Ventilation		0		-
		28B	Waterless Heat Rejection Systems		1	1	-
		28C	Water-Based Heat Rejection Systems		0		-
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.1	Refrigerants Impacts	A. Calculating TSDEI	1		-
Total					**5**	**4**	

Innovation				10		
Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.	30A	Innovative Technology or Process	10	1	-
Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in	30B	Market Transformation			-
Improving on Green Star Benchmarks	The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points.	30C	Improving on Green Star Benchmarks		3	-
Innovation Challenge	Where the project addresses an sustainability issue not included within any of the Credits in the existing Green Star rating tools.	30D	Innovation Challenge			-
Global Sustainability	Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of this Green	30E	Global Sustainability			-
Total				**10**	**4**	

TOTALS	TARGETED
CORE POINTS	62.0
INNOVATION POINTS	4.0
NA POINTS	0.0
POINTS AVAILABLE	100.0
PROJECT SCORE	66.0

Appendix 4 – 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/Subcategory	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 2: 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