IGS INTEGRATED GROUP SERVICES

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ESD Services
Sustainable Management Plan

300 City Road Stage (Stage 1B)
Southbank

Project No: 20018
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Level 4, 108 Elizabeth Street,
Melbourne VIC 3000
Web: www.igs.com.au

Document Control

Version	Date	Issue	Author		Reviewer	
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03	08/12/2023	General Update and Issue for Planning Application Review	Li Huan	LH	Slav Angelovski	SA

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1. Executive Summary

The proposed mixed-use development at 300 City Road has been designed to meet the objectives of the Melbourne Planning Scheme Clause 15.01-2L-01 Energy and resource Efficiency, Clause 19.03-3L Stormwater management (Water sensitive urban design) and

The analysis set out in this report demonstrates that the proposed development has the design potential to meet the policy requirements of Melbourne Planning Scheme Clause 15.01-2L-01 and Clause 19.03-3L Stormwater Management (Water Sensible Urban Design).

- **Retail Component: (GFA < 2,000 m²)**
  The retail portion within the development will exceed Clause 15.01-2L-01 retail premises performance measures requirement as summarised below:

  - Compliance with NCC2019 Section J Energy efficiency requirements.
  - Water efficiency: 3 points under the Green Star Design and As Built rating tool Version 1.3; and
  - A Waste Management Plan (WMP) will be prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans.

- **Office Component: (GFA < 2,000 m²)**
  The office portion within the development will exceed Clause 15.01-2L-01 office premises performance measures requirement as summarised below:

  - Compliance with NCC2019 Section J Energy efficiency requirements.
  - Water efficiency: 3 points under the Green Star Design and As Built rating tool Version 1.3; and
  - A Waste Management Plan (WMP) will be prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans.

- **Residential Component – Apartments (GFA > 5000m2)**
  The residential portion within the development will exceed Clause 15.01-2L-01 performance measures on accommodation as summarised below:

  - 5.5 Star Minimum and 7 Star Average NatHERS rating for all apartments.
  - Water efficiency: 3 points under the Green Star Design and As Built rating tool Version 1.3; and
  - A Waste Management Plan (WMP) will be prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans; and
  - Benchmark Green Star 5 Star Design Potential under the current Green Star Design and As Built rating tool Version 1.3.

- **Overall Development**

  - The stormwater has been designed to meet the objectives and application requirement set out in 19.03-3L Stormwater Management (Water Sensible Urban Design). of the Melbourne Planning Scheme; and
  - A Waste Management Plan (WMP) will be prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans.

Based on the level of information available at this stage of the design process, the development has met the design potential of the Planning Scheme 15.01-2L-01 and 19.03-3L and the project team will ensure the performance outcomes proposed in this Sustainable Management Plan will be implemented prior to occupancy at no cost to the City of Melbourne and to the satisfaction of the Responsible Authority.

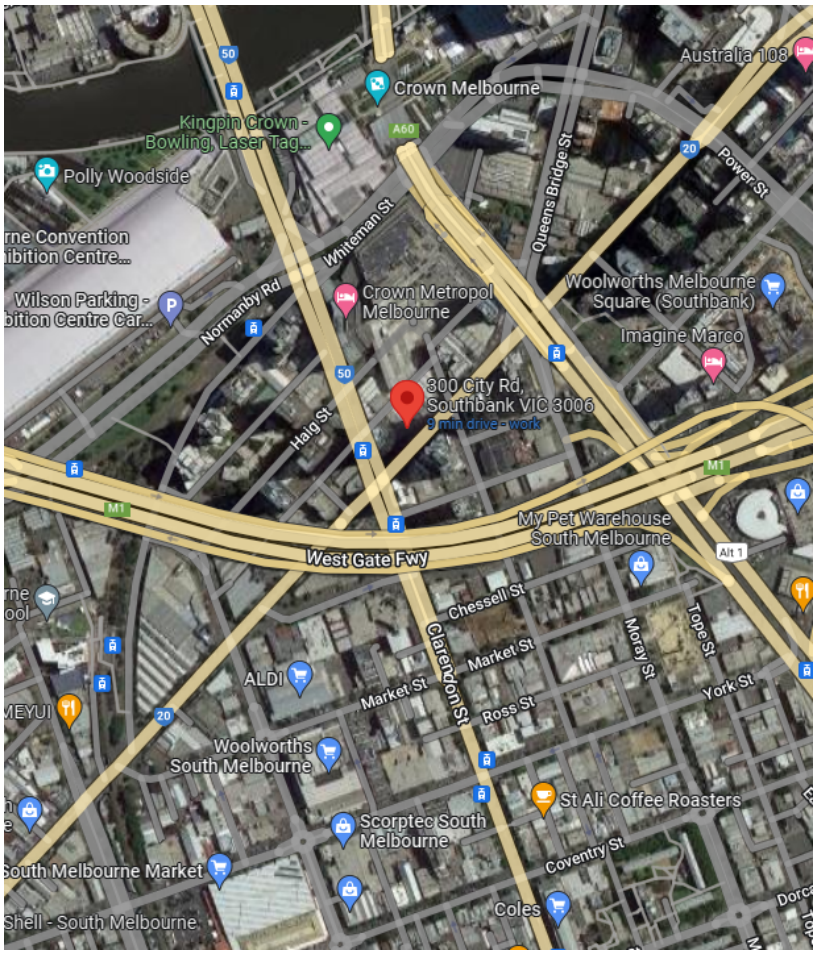
2. Introduction

IGS has been engaged to assess environmentally sustainable development outcomes from the proposed mixed-use development at 300 City Road, Southbank and to demonstrate its compliance with Melbourne Planning Scheme Clause 15.01-2L-01 Energy and resource Efficiency and Clause 19.03-3L Stormwater Management (Water Sensible Urban Design).

The development is within the City of Melbourne and the ESD initiatives proposed for this development are based on the architectural plans dated on 21/11/2023 for Town Planning Endorsement.

The Site

The proposed 30-storey commercial development is located at 300 City Road, Southbank with convenient access to the gardens, entertainment and recreational facilities, schools and public transport. There are train stations and tram stops located within 1000m walking distance from the development and the development has achieved a ranking of 'walker's paradise via Walkscore.com.



The development is located within the City of Melbourne and consists of:

- Basement 01: Carpark;
- Lower Ground: Café Tenancy, Bike Storage and Services;
- Upper Ground: Café Tenancy and Services;
- Level 01: IMG Office and Services;
- Level 02: Function Spaces, Store and Amenities;
- Level 03-8: Residential Apartments;
- Level 09: Residential Apartments and Plant Room;
- Level 10 – Level 29: Residential Apartments
- Level 30 Roof: Roof Plant Service

3. Summary of key ESD Initiatives

The following key ESD initiatives have been incorporated in the preliminary design of this project:

- 20kL rainwater harvesting system for whole development non-residential components and communal area toilet flushing and landscaping irrigation;
- Thermally enhanced building fabric, high thermal performance aluminium frames (or equivalent) and double-glazed windows for the whole development;
- Energy efficient air-conditioning system for the whole development;
- Energy efficient LED light fittings or equivalent to main functional spaces where possible and applicable;
- Water efficient amenity fixtures and fittings;
- Reduced car parking provision to encourage alternative sustainable transport;
- Environmentally preferable internal finishes;
- More than 90% of PVC compliant to Best Practice Guidelines; and
- Provisions of a Building User's Guide for tenants to optimise the building's environmental performance.

The information presented in this report demonstrates the development has the design potential to comply with Melbourne Planning Scheme Clause 15.01-2L-01 and Clause 19.03-3L for the whole 300 City Road, Southbank Mixed-Use development.

- For Retail component, the energy efficiency design will exceed NCC 2019 Section J and the water efficiency design will achieve 3 points in Wat-1 credit (Category 18 Potable Water) under the Green Star Design and As Built Version 1.3 rating tool;
- For Office component, the energy efficiency design will exceed NCC 2019 Section J and the water efficiency design will achieve 3 points in Wat-1 credit (Category 18 Potable Water) under the current Green Star Design and As Built Version 1.3 rating tool;
- For Residential component, the energy efficiency design will achieve 5.5 Stars minimum and 7 Stars average NatHERS rating; will achieve 3 points in Wat-1 credit (Category 18 Potable Water) under the current Green Star Design and As Built Version 1 rating tool and a 5-Star Green Star benchmark under the current Green Star Design and As Built Version 1.3;
- A Waste Management Plan will be prepared in accordance with the current version of the City of Melbourne Planning Guideline; and
- Overall, the stormwater design will meet the objectives and application requirement set out in Clause 19.03-3L Stormwater Management (Water Sensible Urban Design). of the Melbourne Planning Scheme.

4. Non – Residential Compliant to Eco-City Goals

The proposed non-residential component at 300 City Road, Southbank has been designed to meet the objectives and Eco-City Goals of the Melbourne Planning Scheme Clause 15.01-2L-01 Energy and resource efficiency.

The tables below summarise the Melbourne Planning Scheme Clause 15.01-2L-01 Energy and resource efficiency Eco-City goals for retail and demonstrate how the proposed retail component will meet these goals.

4.1 Proposed Retail Component Compliant to Eco-City Goals

The 300 City Road, Southbank, Melbourne development retail component total GFA is below 2,000m^2.

Melbourne Planning Scheme Clause 15.01-2L-01 requires the retail component performance in line with Clause 15.01-2L-01 – Table 1 performance measures summarised below.

Type of Building		Eco-City Goal Performance Measures		
		Energy Efficiency	Water Efficiency	Waste Efficiency
Retail Component	Up to 2,000m^2 GFA	Compliance with the energy efficiency requirements of the Sustainable Design Scorecard or equivalent	5 points for Water-1 credit under the current version of the Green Building Council of Australia's Green Star – Retail rating tool or equivalent	A WMP prepared in accordance with the current version of the City of Melbourne's Guidelines for WMP

The table below summarises how the retail components will meet energy, water and operational waste efficiency Eco-city targets.

Retail Component	Eco-City Goal Performance Measures	Proposed Office Component ESD Strategies	Compliant (Yes / No)
Energy Efficiency	Compliance with energy efficiency requirements of the sustainable design scorecard (SDS) or equivalent.	The proposed development will exceed NCC 2019 Section J energy efficiency requirements.	Yes
Water Efficiency	Water efficiency – 5 points for Water Use credit under current version of the Green Building Council of Australia or equivalent, e.g. achieve Water Use Credit under the current Green Star rating tool.	The water fixtures within minimum WELS rating as shown will be installed within the development: - WELS 3-star showers (≤ 7.0 litres/minute) - WELS 4-star toilets (4.5/3 litre flush) - WELS 5-star basin taps (≤ 6 litres/minute) - WELs 5 Star Urinals (≤ 0.8 litres /flush) Rainwater tank proposed for rainwater collection and re-use for toilet flushing and landscaping irrigation and 80% of the fire testing water to be recycled and re-used. In total, 30% Reduction in Potable Water usage compared to a reference building and achieve Water Use credit under the current Green Star rating tool.	Yes

Waste Efficiency	A Waste Management Plan will be prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans	A WMP will be prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans	Yes

4.2 Proposed Office Component Compliant to Eco-City Goals

The 300 City Road, Southbank, Melbourne development office component total GFA is below 2,000m^2.

Melbourne Planning Scheme Clause 15.01-2L-01 requires the office component performance in line with Clause 15.01-2L-01 – Table 1 performance measures summarised below.

Type of Building		**Eco-City Goal Performance Measures**		
		Energy Efficiency	**Water Efficiency**	**Waste Efficiency**
Office Component	Up to 2,000m^2 GFA	Compliance with energy efficiency requirements of the sustainable design scorecard (SDS) or equivalent.	3 points for Water-1 credit under the current version of the Green Building Council of Australia's Green Star – Office rating tool or equivalent	A WMP prepared in accordance with the current version of the City of Melbourne's Guidelines for WMP

The table below summarises how the retail components will meet energy, water and operational waste efficiency Eco-city targets.

Office Component	**Eco-City Goal Performance Measures**	**Proposed Office Component ESD Strategies**	**Compliant (Yes / No)**
Energy Efficiency	Compliance with energy efficiency requirements of the sustainable design scorecard (SDS) or equivalent.	The proposed development will exceed NCC 2019 Section J energy efficiency requirements.	Yes
Water Efficiency	Water efficiency – 3 points for Water Use credit under current version of the Green Building Council of Australia or equivalent, e.g. achieve Water Use Credit under the current Green Star rating tool.	The water fixtures within minimum WELS rating as shown will be installed within the development: - WELS 3-star showers (≤ 7.0 litres/minute) - WELS 4-star toilets (4.5/3 litre flush) - WELS 5-star basin taps (≤ 6 litres/minute) - WELs 5 Star Urinals (≤ 0.8 litres /flush) Rainwater tank proposed for rainwater collection and re-use for toilet flushing and landscaping irrigation and 80% of the fire testing water to be recycled and re-used. Minimum 3 points are targeted in Potable Water usage reduction under Green Star Design & As Built v1.3.	Yes

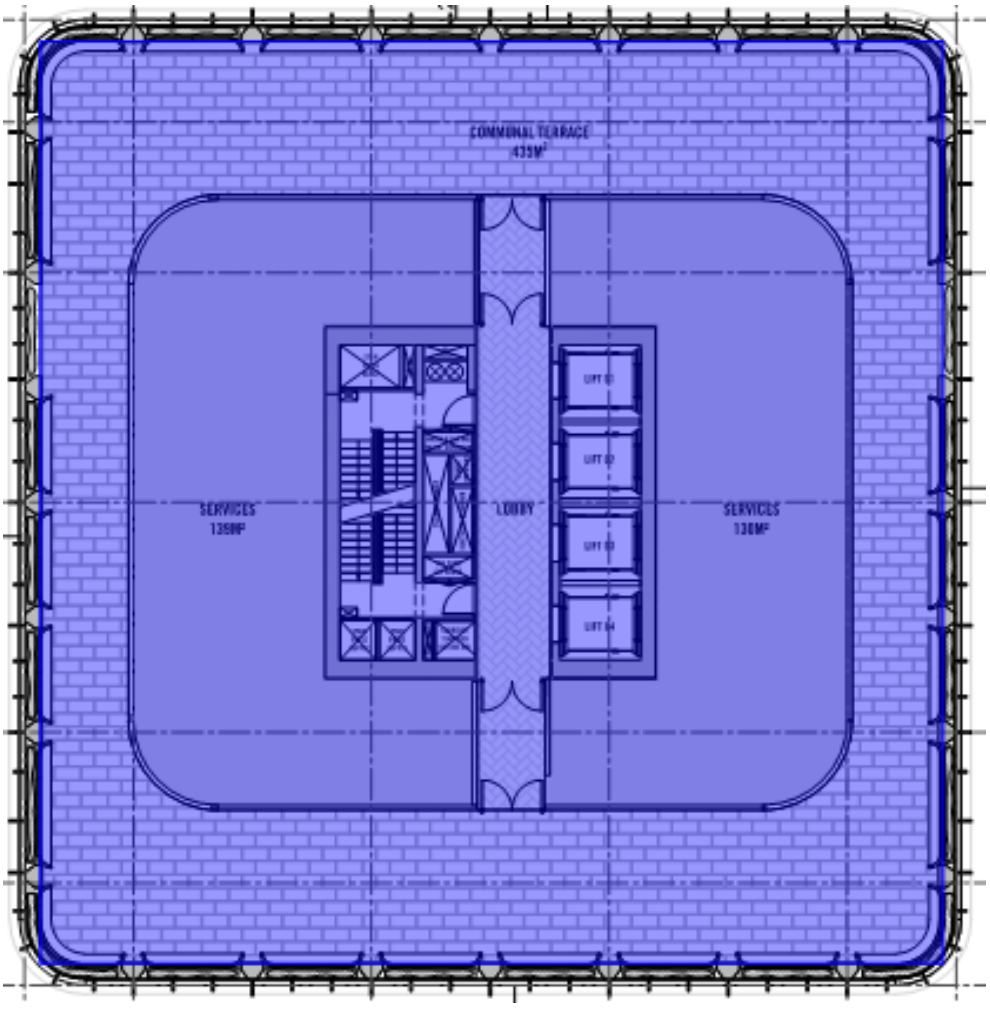
Waste Efficiency	A Waste Management Plan will be prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans	A WMP will be prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans	Yes

4.3 Rainwater Harvesting and Re-use

A rainwater harvesting system will be installed comprising:

- Rainwater harvesting from the roof areas;
- A total storage volume of 20,000 litres rainwater tank; and
- Re-use of rainwater for office, retail and communal area toilet flushing and landscaping irrigation

The rainwater harvesting system described above in conjunction with the water efficient fixtures and fittings and minimum 3 points are targeted in Potable Water usage reduction under Green Star Design & As Built v1.3.



Roof Catchment Area

5. Accommodation Compliant to Eco-City Goals (Apartments)

The proposed residential component at 300 City Road, Southbank has been designed to meet the objectives and Eco-City Goals of the Melbourne Planning Scheme Clause 15.01-2L-01 Energy and resource efficiency.

The tables below summarise the Melbourne Planning Scheme Clause 15.01-2L-01 Energy and resource efficiency Eco-City goals for the accommodation components and demonstrate how the proposed accommodation component will meet these goals.

5.1 Proposed Residential Components Compliant to Eco-City Goals

The 300 City Road, Southbank, Melbourne residential components total GFA is more than 5,000m^2. Melbourne Planning Scheme Clause 15.01-2L-01 requires the accommodation components performance in line with Clause 15.01-2L-01 performance measures summarised below.

Type of Building		Eco-City Goal Performance Measures		
		Energy Efficiency	Water Efficiency	Waste Efficiency
Accommodation	More than 5,000 m^2 GFA	Comply with Building Code of Australia	1 point for Wat-1 credit under a current version of the Green Building Council of Australia's Green Star – Multi Unit rating tool or equivalent.	A WMP prepared in accordance with the current version of the City of Melbourne's Guidelines for WMP.

The table below summarises how the accommodation components will meet energy, water and operational waste Eco-city targets.

Accommodation	Eco-City Goal Performance Measures	Proposed Accommodation Component ESD Strategies	Compliant (Yes / No)
Energy Efficiency	Comply with Building Code of Australia	Achieve 5.5 Star minimum, 7 Star Average NatHERS rating and Energy Use Credit under Green Star rating tool Design and As Built V1.3 (Credit 25).	Yes
Water Efficiency	Water efficiency - 1 points for Wat-1 credit under current version of the Green Building Council of Australia or equivalent, e.g. achieve Water Use Credit under the current Green Star rating tool.	The water fixtures within minimum WELS rating as shown will be installed within the development: - WELS 3-star showers (≤ 7.0 litres/minute) - WELS 4-star toilets (4.5/3 litre flush) - WELS 5-star basin taps (≤ 6 litres/minute) - WELs 5 Star Urinals (≤ 0.8 litres /flush) Rainwater tank proposed for rainwater collection and re-use for communal facilities toilet flushing and landscaping irrigation and 80% of the fire testing water to be recycled and re-used. Minimum 3 points are targeted in Potable Water usage	Yes

		reduction under Green Star Design & As Built v1.3.	
Waste Efficiency	A Waste Management Plan will be prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans	A WMP will be prepared in accordance with the current version of the City of Melbourne's Guidelines for Waste Management Plans	Yes

5.2 5-Star Green Star Target

The accommodation component gross floor area (GFA) is over 5,000m^2 and in line with Melbourne Planning Scheme Clause 15.01-2L-01, the mixed-use development will target a Green Star 5 Star design under the current Green Star Design and As Built rating tool Version 1.3.

6. Sustainable Design Initiatives – 5 Star Green Star

A 5-Star Green Star sustainable design is targeted under Green Star Design and As Built V1.3 to form the base level of sustainable performance for the proposed commercial development.

This section is focusing on implementing Green Star Design and As Built V1.3 environmental categories throughout the design and construction process to a 5-Star Green Star equivalent design which represents "Australian Excellence'' sustainable design.

A summary of the targeted Green Star credits of the proposed development is tabulated below.

Green Star Category	Targeted Score
Management	13
Indoor Environment Quality	12
Energy	5
Transport	6
Water	3
Material	10
Land Use & Ecology	3
Emissions	3
Innovation	9
Overall score	**64 (60+ for a 5-Star Green Star design)**

A minimum of 60 points will be achieved to a 5-star Green Star design. An alternative assemblage of the Green Star targeted credits is considerable on condition that the performance outcome meets the Melbourne Planning Scheme Clause 15.01-2L-01 and 19.03-3L.

6.1 Management

- A Green Star accredited professional to be engaged as a primary member in the design team to offer advice from the schematic phase through to construction completion;
- The building contractor to undertake a comprehensive services and maintainability review prior to construction with reviews and outcomes summarised in a 'Service and Maintainability Report'. An air permeability Performance Testing will be carried out by a suitably qualified practitioner in accordance with an approved standard.
- Quality monitoring and commissioning to be performed by all building services contractors and all commissioning works to be carried out in accordance with CIBSE/ASHRAE standard and manufacturer's specifications. These requirements have been included in the building services specifications (i.e. Electrical, Mechanical, BMS and Hydraulics Services);
- 12-month extended commissioning and building tuning process to be undertaken after the development construction is completed. These requirements have been included in the building services specifications (i.e. Electrical, Mechanical, BMS and Hydraulics Services);
- OH&M manual to be provided for all nominated systems;
- A project specific climate adaption plan to be prepared by a qualified professional and solutions to be included into the building design and construction;
- The building contractor to develop a Building User's Guide, set environmental performance targets and available to all relevant stakeholders;
- Facility management team to commit to environmental performance target and performance measurement procedures will take place and extend the life of the finishes to all common areas to at least 10 years, barring minor wear and tear or minor repairs;
- Accessible sub-metering to be provided to major energy and water uses to monitor building energy and water consumption and sources;
- Metering and monitoring strategy to be implemented with the initiative of accessible sub-metering provided to all major energy and water uses; BMS provided to capture and process the data produced by the installed energy and water meters; and electricity and water report provided through online portal;
- The building contractor to provide an Environmental Management Plan (EMP) in line with NSW Environmental Management System Guidelines or with AS/NZS ISO 14001 during construction period;

- The building contractor will have programs and policies in place to promote health and wellbeing on-site and target both physical and mental health outcomes; and
- A waste auditor engaged to prepare a Waste Management Plan (WMP) in accordance with the current version of the City of Melbourne's Guidelines for WMP and Green Star requirement on Waste in Operation.

6.2 Indoor Environment Quality

- Adequate accessibility for maintenance; and ductwork system cleaning prior to occupation and use in accordance with AIRAH, ASHRAE, ACRR or SMACNA standards; and Occupied spaces to be provided with outdoor air with a rate of 50% greater than the minimum required by AS 1668.2:2012;
- Dedicated exhaust system to be installed to eliminate the pollutants;
- An acoustic consultant to be engaged for the acoustic design to ensure the space to reduce the persistence of sound to a level suitable to the activities in the space and minimise crosstalk between rooms;
- Energy efficient lighting design to give preference of flicker free light fittings, good illuminance values for the entire development; glare from lamps to be reduced; and lighting control to be provided in their immediate environment;
- Thermally enhanced external windows proposed to achieve at least 40% of the nominated area receives high levels of daylight and at least 60% of the nominated area with a clear line of sight to a high quality of external view;
- Low Volatile Organic Compound (VOC) paints, floor covering, adhesive and sealant to be used in the project and over 50% of paints (by volume) have a maximum TVOC content of 5g/L; and
- At least 95% of all engineered wood products meet stipulated formaldehyde limits or no new engineered wood products are used in the building.
- Preliminary daylight modelling has been undertaken during design to validate the daylight performance of the building and at least 60% of occupied spaces are targeted to meet the daylight requirement.

  Refer to Appendix D – Daylight Modelling Report for details.

6.3 Energy

It is proposed:

- Mechanical Services for retail, office and communal spaces:
  - Energy efficient water-cooled chiller to target a full load EER of above 6.0 or water cooled variable refrigerant flow (VRF) air conditioning system with full load EER of above 5.0; and
  - Pumps with a motor efficiency of above 90% and fans with a total efficiency of above 75%.

  Mechanical Services for residential apartments:
  - Air cooled or water cooled variable refrigerant flow (VRF) air conditioning system or equivalent is proposed to the development with minimum energy rating equivalent to 4-Star in both heating and cooling and rated capacities within 20% of design capacities for heating and 15% of design capacities for cooling.

- Electrical Services for retail, office and communal spaces:
  - Lighting power density to target:
    Lobby and Corridor - 4.0 W/m^2;
    Back of House - 3.0 W/m^2;
    Indoor carparks - 1.5 W/m^2;
    Office - 5.5 W/m^2;
    Other supporting facilities – 4 W/m^2
  - Automatic lighting control (e.g. motion sensors) to car parks, corridor and other transit and common areas.

  Electrical Services for residential apartments:
  - Energy efficient LED light fittings to all dwellings as much as practicable throughout the development with lighting power density to be 10% better than NCC 2019 Section J6.2 requirement; room lighting to be controlled by independent switches.

- Domestic Hot Water System
  - Electric Heat Pump Type Domestic Hot Water System with Full Load COP of 4.0

- Lifts
  - All passenger lifts motor power rating is targeted to equal to or below Green Star reference building maximum allowable motor power rating and all passenger lifts are equipped with regenerative break and power off feature.

Refer to Appendix B – Green Star GHG Calculator – NatHERS Pathway and NatHERS Modelling Report for details.

6.4 Transportation

- The provision of reduced car parking for the development;
- 15% of parking is for fuel efficient vehicles or 5% of parking is for electric vehicles & charging facilities; and
- The provision of secure bicycle facilities on ground for the building users and visitors.

6.5 Potable Water

6.5.1 Movement and Place

- At least 30% reduction in the potable water consumption with the following initiatives:
  - The water fixtures and fittings (where applicable) are selected to be within one star of the WELS rating as referenced below.

Fixtures and Fittings	WELS rating
Taps	6 Star
Urinals	6 Star
Toilet	5 Star
Showers	3 Star
Clothes Washing Machine	5 Star
Dishwasher	6 Star

  - Water sensible landscaped design in conjunction with rainwater harvesting and reuse;
  - 20kL rainwater harvesting tank to be used for toilet flushing and landscaping irrigation; and
  - Fire testing water collection and re-use to be considered.

Refer to Appendix C – Green Star Potable Water Calculator for more details.

6.6 Materials

- At least 95% building steel to be sourced from a Responsible Steel Maker and:
  - For steel framed buildings, at least 60% of the fabricated structural steelwork is supplied by a steel fabricator / steel contractor accredited to the Environmental Sustainability Charter of the Australian Steel Institute (ASI); or
  - For concrete framed buildings, at least 60% of all reinforcing bar and mesh is produced using energy-reducing processes in its manufacture.
- Existing building structure to be generally retained and incorporated in the design and reflect the diverse history of the site;
- At least 95% of timber are certified by PEEC or FSC with CoC certification;
- At least 90% of total cost of PVC content to be either supplied by "best practice" supplier or reduced through replacement of alternative materials; and
- 90% of the waste generated during construction and demolition to be diverted from landfill.

6.7 Land Use & Ecology

- The building has occupied a minimum of 75% of the site during the time of site purchase.
- Light roofing materials, including shading structures, to have the following:
  - for roof pitched < 15°, a three-year SRI > 64
  - for roof pitched >15°, a three-year SRI > 34

6.8 Emission

- For stormwater, it is targeted the post-development peak event discharge from the site not to exceed the pre-development peak event discharge; and the following stormwater pollutant reduction targets are met:
  - Total Suspended Solids - 80%;
  - Gross Pollutants - 90%;
  - Total Nitrogen - 45%;
  - Total Phosphorus - 60%;
  - Total Petroleum Hydrocarbons - 90%; and
  - Free oils - 90%.

Refer to Appendix E – Stormwater management plan & MUSIC Modelling report for details.

6.9 Innovation

The following innovative strategies and / or solutions are considered in the design:

- 50% of internal paints to have a maximum TVOC of 5g/L;
- A (Pre- and Post-) building occupant satisfactory survey will be undertaken for more than 10% of the total occupants of affordable housing and residential apartments;
- Provision of the sustainable site offices (addressing 75% of the 18 sustainability items in the credit checklist) are proposed and used by the majority of the construction workers on site;
- The building contractor to include the Construction Air Quality provision in the Construction Management Plan;
- A Green Cleaning Policy or equivalent mechanism is to be in place during the building performance period;
- A Sustainable Procurement Framework is to be produced in line with ISO 20400:2017 Sustainable Procurement or the Australia and New Zealand Government Framework for Sustainable Procurement;
- Onsite Stormwater treatment to meet Table B pollutants reduction target and exceed Green Star Benchmark;

Pollutant	Reduction Target (% of the typical urban annual load)		
	A	B	C
Total Suspended Solids (TSS)[1]	80%	80%	90%
Gross Pollutants	85%	90%	95%
Total Nitrogen $(TN)_2$	30%	45%	60%
Total Phosphorus $(TP)_2$	30%	60%	70%
Total Petroleum Hydrocarbons$_3$	60%	90%	90%
Free Oils$_3$	90%	90%	98%

- Building Owner to engage an environmental professional to undertake quarterly test for the presence of the dissolved metals or metalloids after the project completion.
- A Maintenance Guide is to be produced to provide the best practice operational procedures to maintain landscaped area, hard surfaces and exteriors in line with the Green Star Performance Guidelines.

7 Targeted Green Star Design and As Built Rating

With inclusion of all ESD initiatives summarised above, the proposed design will achieve and overall 60+ point to a 5-Star Green Star sustainable design and demonstrates 'Australian Excellence' if awarded.

Category	Points Available	Points Targeted
Management	14	13
Indoor Environment Quality	17	12
Energy	22	5
Transport	7	6
Water	12	3
Materials	12	10
Land Use & Ecology	6	3
Emissions	5	3
Innovation	10	9
Total Core Points	**100**	**64**

8 Conclusion

This report provides a summary of sustainable design features, which are integrated into the design of the proposed development, in order to meet the objectives of the Melbourne Planning Scheme Clause 15.01-2L-01 Energy and resource efficiency and Clause 19.03-3L Stormwater Management (Water Sensible Urban Design).

In terms of the building performance, the proposed development will be designed to include the followings:

- For retail and office component, the energy efficiency design will exceed NCC 2019 Section J with credit achievement in Wat-1 credit under the current Green Star Design and As Built rating tool Version 1.3;
- For residential component, the energy efficiency design will achieve a minimum 5.5 star and average 7-star NatHERS rating and achieve 3 points in Wat-1 credit (Category 18 Potable Water) under the Green Star Design and As Built rating tool Version 1.3 and a 5-Star Green Star benchmark under the current Green Star Design and As Built rating tool Version 1.3;
- A Waste Management Plan will be prepared in accordance with the current version of the City of Melbourne Planning Guideline; and
- Overall, the stormwater design will meet the objectives and application requirement set out in Clause 19.03-3L Stormwater Management (Water Sensible Urban Design) of the Melbourne Planning Scheme.

Therefore, the proposed development has been designed to meet the objectives of Melbourne Planning Scheme Clause 15.01-2L-01 Energy and resource efficiency a and Clause 19.03-3L Stormwater Management (Water Sensible Urban Design) fas addressed and the project team will ensure the performance outcomes proposed in this ESD statement report be implemented prior to occupancy at no cost to the City of Melbourne and be to the satisfaction of the Responsible Authority.

Appendix A – Green Star Matrix

Green Star - Design & As Built Scorecard

Project:	Mixed-Use Development	Round:	1
Targeted Rating:	5 Star - Australian Excellence		

Points Available (Targeted)	Project Score (Targeted)
100.0	64.0

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA		POINTS AVAILABLE	POINTS TARGETED
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	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	0
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	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

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA		POINTS AVAILABLE	POINTS TARGETED
Indoor Environment Quality					17	
Indoor Air Quality	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes		1	0
		9.2	Provision of Outdoor Air	☐ A. Comparison to Industry Standards ☐ B. Performance Based Approach ☐ C. Natural Ventilation	2	1
		9.3	Exhaust or Elimination of Pollutants	☐ A. Removing the Source of Pollutants ☐ B. Exhausting the Pollutants Directly to the Out	1	1
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels		1	1
		10.2	Reverberation		1.00	1
		10.3	Acoustic Separation	A. Sound Reduction	1.00	0
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
			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	0
		11.3	Localised Lighting Control		1.00	1
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	2
		12.2	Views		1	1
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
			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
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	0
		14.2	Advanced Thermal Comfort	☐ A. Naturally Ventilated Spaces ☐ B. Mechanically Ventilated Spaces ☐ C. Residential Spaces	1	0

				☐ D. Industrial spaces	
Total				**17**	**11**

Energy				**22**	
Greenhouse Gas Emissions	B. NatHERS Rating Pathway	15A.0	Conditional Requirement: Prescriptive Pathway	-	Complies
		15A.1	Building Envelope	0	
		15A.2	Wall-Glazing Construction and Retail Display Glazing	0	
		15A.3	Lighting	0.00	
		15A.4	Ventilation and Air Conditioning	0	
		15A.5	Domestic Hot Water	0	
		15A.6	Transition Plan	0	
		15A.7	Fuel Switching	0	
		15A.8	On-Site Storage	0	
		15A.9	Vertical Transportation	0	
		15A.10	Off-Site Renewables	0	
		15B.0	Conditional Requirement: NatHERS Pathway	-	Complies
		15B.1	Thermal and Energy Performance	6	1
		15B.2 Building Services and Appliances	15B.2.1 Lighting	1	1
			15B.2.2 Ventilation and Air Conditioning ☐ A. Mechanically Conditioned Spaces ☐ B. Spaces With Mechanical Heating Only ☐ C. Naturally Ventilated Spaces	2	2
			15B.2.3 Domestic Hot Water	2	1
			15B.2.4 Appliances & Equipment	1	
			15B.2.5 Fuel Switching	1	
			15B.2.6 On-Site Storage	1	
			15B.2.7 Vertical Transportation	1	
			15B.2.8 Passive Laundry Facilities	1	
			15B.2.9 Unoccupied Areas	1	
			15B.2.10 Off-Site Renewables	5	
		15C.0	Conditional Requirement: BASIX Pathway	-	
		15C.1	BASIX Greenhouse Gas Reductions	0	
		15C.2	Off-Site Renewables	0	
		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	-	
		15E.1	GHG Emissions Reduction: Building Fabric	0	
		15E.2	GHG Emissions Reduction	0	
		15E.3	Off-Site Renewables	0	
		15E.4	District Services	0	
		15E.5 Additional Prescriptive Measures	15E.5.1 Transition Plan	0	
			15E.5.2 Fuel Switching	0	
			15E.5.3 On-Site Storage	0	
		15H.0	Conditional Requirement: Industrial Prescriptive Pathway	-	
		15H.1	Building Envelope	0	
		15H.2	Wall-Glazing Construction	0	
		15H.3 Lighting	15H.3.1 Internal Lighting	0	
			15H.3.2 External Lighting	0	
		15H.4	Ventilation and Air Conditioning	0	
		15H.5	Domestic Hot Water	0	
		15H.6	Transition Plan	0	
		15H.7	Fuel Switching	0	
		15H.8	On-site Storage	0	
		15H.9	Provision of Structure for PV	0	
		15H.10	Off-site Renewables	0	
		15I.0	Conditional Requirement: On-site Renewables Pathway	-	
		15I.1	On-site Renewable Energy	0	
Peak Electricity Demand Reduction	B. Performance Pathway	16A	Prescriptive Pathway: On-Site Energy Generation	0	
		16B	Modelled Performance Pathway: Reference Building	2	

Total						**18**	**5**

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
		17B.3	Low Emission Vehicle Infrastructure	A. Parking for Fuel-Efficient Vehicles		1	1
		17B.4	Active Transport Facilities			1	
		17B.5	Walkable Neighbourhoods	A. Proximity to Amenities		1	1
		17C.1	Access by Public Transport			0	
		17C.2	Reduced Car Parking Provision			0	
		17C.3	Low Emission Vehicle Infrastructure	☐ A. Parking for Fuel-Efficient Vehicles ☐ B. Parking for Electric Vehicles ☐ C. Parking for Car Share Vehicles ☐ D. No Parking Spaces Provided ☐ E. Low Emission Facility Transport		0	
		17C.4	Active Transport Facilities			0	
		17C.5	Proximity to Amenities			0	
Total						**7**	**6**

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

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	A. Course Aggregate Reduction		0.5	0.5
		19B.2 Steel	A. Reduced Mass of Steel Framing			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	
		19C.1 Concrete	19C.1.1 Portland Cement Reduction			0	
			19C.1.2 Water Reduction			0	
			19C.1.3 Aggregates Reduction	A. Course Aggregate Reduction		0	
		19C.2 Steel	19C.2.1 Reduced Mass of Steel Framing	A. High Strength Steel		0	
			19C.2.2 Reduced Mass of Steel Reinforcement			0	
		19C.3	Building Reuse	19C.3.1 Façade Reuse		0	
				19C.3.2 Structure Reuse		0	
		19C.4	Structural Timber	19B.4.0 Responsible Sourcing		-	
				19B.4.1 Reduced Embodied Impacts		0	
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
		20.2	Timber	☐ A. Certified Timber ☐ B. Reused Timber		1	1
		20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	A. Products That Do Not Contain PVC		1	1
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	3
		22.0	Reporting Accuracy	A. Compliance Verification Summary		-	Complies

Construction and Demolition Waste	A. Fixed Benchmark	22A	Fixed Benchmark		1	1
		22B	Percentage Benchmark		0	
Total					**12**	**11**

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	-	Complies
		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	1
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island	25.1	Heat Island Effect Reduction		1	1
Total					**6**	**3**

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	A. Natural Ventilation	28A	Natural Ventilation		1	
		28B	Waterless Heat Rejection Systems		0	
		28C	Water-Based Heat Rejection Systems		0	
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration	29.1	Refrigerants Impacts	A. Calculating TSDEI	1	
Total					**5**	**3**

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		
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	10	2
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		2
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	30E	Global Sustainability		5
Total				**10**	**9**

TOTALS	**TARGETED**
CORE POINTS	**55.0**
INNOVATION POINTS	**9.0**
NA POINTS	**0.0**
POINTS AVAILABLE	**100.0**
PROJECT SCORE	**64.0**

Appendix B – Green Star GHG Emissions Calculator and NatHERS Report

Green Star Design & As Built

Greenhouse Gas Emissions Calculator

greenstar Developed by the Green Building Council of Australia

User Input Cells

This calculator addresses criterion '15B GHG Emissions Reduction - NaTHERS Pathway' and '16A Prescriptive Pathway - Onsite Energy Generation'.

15B NatHERS Pathway

15B.0 Conditional Requirement

Targeted Green Star Rating	**5 Star**	

15B.1 Thermal and Energy Performance

Project input

Legislated Minimum Development Average Rating	6	star
Legislated Minimum Worst-Case Apartment Rating	5	star
Project Average Energy Intensity	83	MJ/m²
Project Worst-Case Energy Intensity	130	MJ/m²
NatHERS Climate Zone	21	
Ventilation and Comfort strategy	Mechanical Heating/Cooling	
Which is provided? Heating, cooling or both?	Both	
If Mixed, proportion of apartments with natural ventilation		
Building total nominal occupancy		

Benchmark Building Information

Minimum Average Benchmark	**6.5**	**star**
Minimum Worst-Case Benchmark	**5.5**	**star**
Benchmark Energy Intensity	**98.0**	**MJ/m²**
Worst Case Energy Intensity Benchmark	**131.0**	**MJ/m²**
Energy Intensity at NatHERS 10-star	**2.0**	**MJ/m²**
Energy Intensity Conditional Requirement met?	**PASS**	
Worst Case Unit Conditional Requirement met?	**PASS**	
Performance Improvement	**16%**	

15B.2 Building Services and Appliances

15B.2.1 Lighting

Lighting power density is reduced by at least 10% below the maximum lighting power density allowable in Table J6.2a in both sole-occupancy units and all common areas accessible by residents	Yes
Independent light switching is provided to each room of each sole-occupancy unit. Where open-plan living, dining and kitchen areas are provided, each functional area is separately switched	Yes
All common areas accessible by residents are provided with automated lighting control system(s), such as occupant detection and daylight adjustment.	Yes

15B.2.2 Ventilation and Air Conditioning

15B.2.2A Mechanically Conditioned Spaces — **Yes**

Please enter the energy star rating for the air conditioning equipment (as per AS 3823.2-2013); and	4	star

The rated cooling or heating capacity of the unit does not exceed the design cooling or heating load, whichever is greater, by more than 15% or the project team has demonstrated that they have selected the unit with the closest capacity available on the market.	Yes	
15B.2.2B Spaces With Mechanical Heating Only	**Yes**	
Please enter the energy star rating for the heating equipment (as per AS 3823.2-2013, AS 4552-2005 or AS 4556-2011 as appropriate); and	4	star
The rated capacity of the heating equipment does not exceed the design heating load by more than 20%.	Yes	
15B.2.2C Natural Ventilated Spaces	**No**	
Compliance is achieved with the *Provision of Outdoor Air* (9.2C) criterion	Select option	
Effective cross ventilation is provided in all apartments	Select option	
Ceiling fan installed in all apartments	Select option	
15B.2.3 Domestic Hot Water		
Please enter the total capacity of installed solar thermal heating system (total RECs)		
The domestic hot water systems are powered by one of the following heat sources: • Renewable Energy; • Electric heat pump with a minimum coefficient of performance (COP) of 3.5 under design conditions; or • Waste heat or heat recovered from another process.	Electric heat pump (COP>=3.5)	
15B.2.4 Appliances and Equipment		
Refrigerators achieve a minimum Energy Rating of 1 star below the maximum available rating	Select option	
Washing machines achieve a minimum Energy Rating of 1 star below the maximum available rating	Select option	
Clothes dryers achieve a minimum Energy Rating of 1 star below the maximum available rating	Select option	
Dishwashers achieve a minimum Energy Rating of 1 star below the maximum available rating	Select option	
15B.2.5 Fuel Switching		
No fossil fuels are burned on site to generate electricity, heating, or cooling	Select option	
At least 15% of energy required by the building annually is generated by on site renewable solutions; or	Select option	
Three points have been achieved from 15B.1	Select option	
Is there a minor amount of fossil fuel (less than 1%) used on site for purposes where it can be demonstrated that there are no commercial alternatives (e.g. cooking or emergency generators).	Select option	
Have Renewable Energy Certificates equal to these emissions been purchased and retired to offset the minor amount of fossil fuels used on the site? **(If there are no minor amounts of fossil fuel (less than 1%) used on site as per above, please select NA here)**	Select option	
15B.2.6 On-site Storage		
A renewable energy storage procurement and use strategy has been developed and demonstrates that the storage is sized to match the requirements of the building and that value will be provided to the project	Select option	
The stored renewable energy is used to reduce the peak electricity demand;	Select option	
A project installs and uses electricity storage such that on-site or off-site renewable energy not instantaneously used by the building is able to be stored and used by the building at a later time	Select option	
15B.2.7 Vertical Transportation		
The minimum lift energy efficiency is class A or B in accordance with ISO 25745-2;	Select option	
The lift idle and standby energy performance level is 1 in accordance with ISO 25745-2	Select option	
The minimum escalator energy performance is class A+ to A+++ in accordance with ISO 25745-3.	Select option	
15B.2.8 Passive Laundry Facilities		
95% of all dwellings have been provided with external drying balconies; or	Select option	
95% of all units contain an internal, or external clothesline or hoists as follows: 1.) 4m total line length minimum for studios,1 and 2 bedroom units and; 2.) 6 m total line length minimum for 3 or more bedroom units.;	Select option	
15B.2.9 Unoccupied Areas		
Common Areas		
95% of the net floor area of the common lobbies meet the requirements of 'Provision of Outdoor Air' criterion (9.2C); and	Select option	
The openable size of windows must be 5% or more of the net floor area on a floor by floor basis	Select option	
Enclosed Car Parking		
Vehicle exhaust criterion of the *'Exhausting the Pollutants Directly to the Outside'* criterion (9.3C) has been achieved through natural ventilation ***(Where enclosed car parking is not provided, this requirement is considered 'not applicable please select NA)***	Select option	
15B.2.10 Off-site Renewables		
Off-site Renewable electricity percentage as stipulated within the building's power supply contract		

Length of Off-site Renewables electricity contract period (in years)	

15B CREDIT SCORE	
15B.0 Conditional Requirement	**Conditional Requirement Met**
15B.1 Thermal and Energy Performance	1
15B.2.1 Lighting	1
15B.2.2 Ventilation and Air Conditioning	2
15B.2.3 Domestic Hot Water	1
15B.2.4 Appliances and Equipment	0
15B.2.5 Fuel Switching	0
15B.2.6 On-site Storage	0
15B.2.7 Vertical Transportation	0
15B.2.8 Passive Laundry Facilities	0
15B.2.9 Unoccupied Areas	0
15B.2.10 Off-site Renewables	0
TOTAL POINTS ACHIEVED	**4.8**
TOTAL POINTS AVAILABLE	**16**

IGS INTEGRATED GROUP SERVICES

Value | Innovation | Trust

NCC 2019 NatHERS ASSESSMENT REPORT

300 City Road,
Southbank

Project No: 20018
Date: 04/12/2023

Level 4, 108 Elizabeth Street
Melbourne VIC 3000
Web: www.igs.com.au

Document Control

Version	Date	Issue	Author		Reviewer	
00	27/05/2022	Issue for Review	Li Huan	LH	Slav Angelovski	SA
01	25/11/2022	Updated Issue for Review	Li Huan	LH	Slav Angelovski	SA
02	04/12/2023	Draft Issue for Review	Li Huan	LH	Slav Angelovski	SA

Table of Contents

1. Summary

Thermal performance assessment of the Class 2 apartments using accredited FirstRate5 Version 5.3.1 (3.13) software has been conducted on sample apartments to NCC 2019 Section J0.2 requires all apartment to achieve a minimum rating of 5.0 stars and an average rating of 6.0 stars.

NCC 2019 Volume 1 Section J0.2 requires all Class 2 apartment units to achieve a minimum rating of 5.0 stars individually and an average (all apartments) rating of 6.0 stars.

As part of Melbourne City Council planning permit condition, Green Star Design and As Built v1.3 rating tool is referenced, and the residential apartments will achieve an average rating of above 7.0 stars.

From the assessment, the sample apartments have achieved a minimum rating of 5.5 stars and an average star rating of above 7.0-Star

Based on the NatHERS modelling results, the sample apartments will meet the NCC 2019 Energy Efficiency Requirement and achieve Green Star Design and As Built v1.3 NatHERS requirements.

The following residential thermal performance assessor details are provided for building permit purposes.

Assessor's Name:	Li Huan
Accreditation Number:	DMN/12/1395
AAO:	FirstRate5 House Energy Rating Organization

Refer to Appendix 1 for NatHERS star rating results. The official star rating certificate can be provided by FirstRate5 House Energy Rating Organization on request and at the client's cost of $100 (+GST) per certificate which includes $30(+GST) per certificate application required by FirstRate5 House Energy Rating Organization and $70(+GST) for processing, uploading per energy model and downloading per certificate. The certificate can be generated no later than three (3) months after the report is issued.

2. Overview

Project: 300 City Road, Southbank

Applicable NCC: 2019

NatHERS Climate Zone: 21 Melbourne RO

NCC Classification and Verification method:

- Class 2 – Apartments with shared underground carpark spaces
- Class 2 building fabric and services – NCC 2019 deemed-to-satisfy provisions, Part J0.

Reference Documents: This report has been based upon review of a set of Architectural Drawings dated 21/11/2023 Issued for TP Amendment.

3. Modelling Inputs Assumptions

Building Fabric Thermal Performance

Element	Type	Description	Added Insulation	Total System R-value
Walls	All	Refer architectural drawings	-	-
	Internal	Walls adjoining a corridor	R1.5	R1.8
	Internal	Walls adjoining neighbouring unit	N/A	-
	Internal	Cast Concrete Walls adjoining lift shaft/Stairwell	R1.5	R1.8
	Internal	All other internal walls	N/A	-
	External	Exposed External Walls	R2.5	R2.8
Floor	Typical Floor	Suspended Concrete Slab to commercial/communal space/exposed area	R2.0	R2.3
		Suspended Concrete Slab to neighbor apartment – All other units	N/A	-
	Coverings	Tiles – Wet areas, as per drawings Carpet – Bedrooms Timber – Kitchen	Nil	
Ceilings		Suspended Concrete Slab adjoining neighbour/conditioned area – All other apartments	N/A	-
		Concrete Deck Roofs	R2.5	R2.8
Seals		All windows and externally facing doors are weather stripped.	Nil	-
Exhaust Fans		Each kitchen area has 1 sealed exhaust fan. 1 sealed exhaust fan is provided for all bathrooms.	Nil	-
LED Downlights		All recessed downlights to be IC-4 rated or equivalent	Nil	-
Shading		Balconies protruding on the level above and adjacent building.	Nil	-

Note: ***Total System R-Value including allowance for thermal bridging must be calculated to NCC 2019 Volume One Section J1.2 requirements.***

Windows Thermal Performance

Element	Type	Description
Windows (Typical)	Frame	AS (Improved) Aluminium Frames or equivalent
	External Glazing	Double Glazed
	Overall Window System Properties	Uw ≤ 3.2 SHGCw = 0.25 ± 5%

4. NatHERS Assessment Results

Location	Building Apartment Number	Number of Apartments	NatHERS Rating	Energy (MJ/m²)			Net Conditioned Floor Area (m²)
				Total	Heating	Cooling	
Level 6	601	27	6.9	83.1	60.4	22.7	63.1
Level 6	602	27	8.4	39.8	13.8	26	41.4
Level 6	603	27	7.3	73.4	48.8	24.6	63.1
Level 6	604	5	8.3	45.2	22.1	23.1	47.5
Level 6	605	5	8.3	45.2	22.1	23.1	47.5
Level 6	606	27	6.1	109.9	89	20.9	63.1
Level 6	607	27	7.3	73.6	56.9	16.7	41.4
Level 6	608	27	6.1	110.2	95.6	14.6	63.1
Level 6	609	5	7.7	63.3	45.4	17.9	47.5
Level 6	610	5	7.7	63.3	45.4	17.9	47.5
Level 30	3001	1	6.3	104.5	81.7	22.8	85.8
Level 30	3002	1	7.3	74.9	45.1	29.8	41.4
Level 30	3003	1	6.7	92.5	68.2	24.3	85.8
Level 30	3004	1	5.5	130	106.9	23.1	63.1
Level 30	3005	1	6.2	108.1	92	16.1	65.4
TOTALS		**187**		**82.7**	**61.8**	**20.9**	
WEIGHTED AVERAGE					**7.01**		
CALCULATED MINIMUM					**5.5**		

Appendix C – Green Star Potable Water Calculator

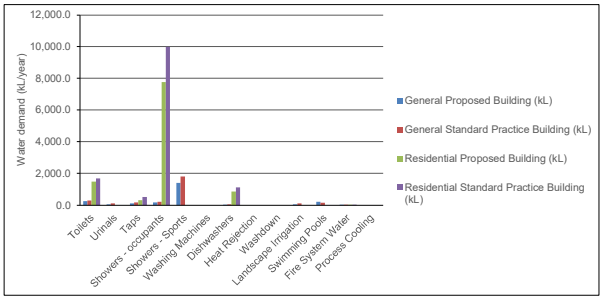
Potable Water, Performance Pathway (18A)

Project Type	*General & Residential*

SUMMARY OF WATER DEMAND

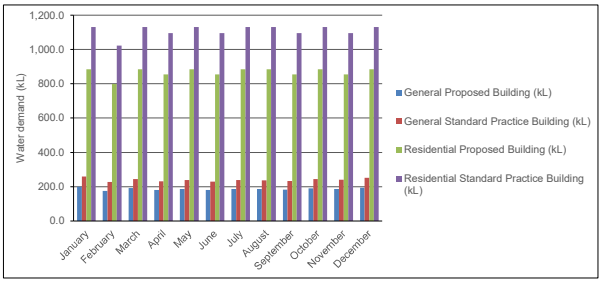
Summary of demand from each Potable water use

Water system	General		Residential	
	Proposed Building (kL)	Standard Practice Building (kL)	Proposed Building (kL)	Standard Practice Building (kL)
Toilets	253.3	289.5	1,470.6	1,680.7
Urinals	44.5	111.4	0.0	0.0
Taps	94.0	156.6	308.3	513.8
Showers - occupants	161.8	208.0	7,764.0	9,982.3
Showers - Sports	1,400.0	1,800.0	0.0	0.0
Washing Machines	0.0	0.0	0.0	0.0
Dishwashers	29.5	39.3	842.1	1,123.7
Heat Rejection	0.0	0.0	0.0	0.0
Washdown	0.0	0.0	0.0	0.0
Landscape Irrigation	39.4	99.7	0.0	0.0
Swimming Pools	195.9	149.2	0.0	0.0
Fire System Water	24.0	24.0	24.0	24.0
Process Cooling	0.0	0.0	0.0	0.0
Total	2,242.4	2,877.7	10,408.9	13,324.5



Summary of demand from all Potable water uses per month

Water system	General		Residential	
	Proposed Building (kL)	Standard Practice Building (kL)	Proposed Building (kL)	Standard Practice Building (kL)
January	199.0	258.6	884.0	1,131.7
February	175.9	228.4	798.5	1,022.2
March	191.3	244.9	884.0	1,131.7
April	181.3	232.2	855.5	1,095.2
May	187.1	237.9	884.0	1,131.7
June	181.1	230.2	855.5	1,095.2
July	187.1	238.2	884.0	1,131.7
August	187.1	237.4	884.0	1,131.7
September	182.1	233.0	855.5	1,095.2
October	190.2	245.0	884.0	1,131.7
November	186.3	240.8	855.5	1,095.2
December	193.8	251.0	884.0	1,131.7
Total	2,242.4	2,877.7	10,408.9	13,324.5



RESULTS

Points Achieved (Weighted by Water Usage)

Space Type	Water Usage (Proposed Project)	Water Usage (Reference Project)	Proportion of Reference Project to Whole Building	Weighted Points Achieved
General	2242.378368	2877.674968	18%	0.7
Residential	10408.92733	13324.48461	82%	2.6
TOTAL	**12651.3057**	**16202.15958**	**100%**	**3.3**
Total				

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	**4.7**

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)	
Retail	371	7 days a week	Class 6 shop or shopping centre	3.5	Please select	70%
Commercail	772	7 days a week	Class 5,Class 7 Class 8 or Class 9a	3.5	Please select	70%
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
Non occupied areas		n/a	n/a			
TOTAL AREA	1143					

Water systems checklist

Please provide responses to the following questions. Detailed inputs will be requested further on in the calculator.

WATER USES - ALL QUESTIONS MUST BE ANSWERED

1. Sanitation

Are fixtures and fittings provided for building occupant sanitation?	**Yes**
Does the project provide for sports activities?	**Yes**
Have showers been installed for post/pre activity use?	**Yes**

2. White Goods

Does the project include any dishwashers or washing machines?	**Yes**

3. Heat rejection

Does the project utilise water based heat rejection (building cooling)?	**No**
Does the project have cooling towers?	**Please Select**
Does the project contain any other water cooled systems that are not conventional	**Please Select**

4. Wash Down

Does the project include washdown areas?	**No**

5. Landscape irrigation

Are there any landscaped areas within the project?	**Yes**
Are any irrigation systems included in the project?	**Yes**

6. Swimming Pools

Are there any swimming pools within the project?	**Yes**

7. Fire Protection System

Does the project include a fire protection system?	**Yes**

8. Process cooling

Does the project include any water based process cooling?	**No**

WATER REUSE - ALL QUESTIONS MUST BE ANSWERED

9. Water Reclamation

Does any water collection, reclamation and/or reuse occur on the project site?	**Yes**
Does the project include rainwater capture and reuse systems?	**Yes**
Does the project include greywater capture, treatment and reuse systems?	**No**
Does the project include blackwater capture, treatment and reuse systems?	**No**
Does the project include other stormwater reuse or an off-site supply of non-potable water?	**No**

Rainfall data

Select the average rainfall data location for the project	**Melbourne (1998 - 2007) (mm)**

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%	253.3	289.5

(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.)

Urinals on auto timer

Enter average L/flush	
Enter number of urinals on autotimer	
Percentage of total number of 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	Select star rating	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%	44.5	111.4

(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				
Kitchen Taps		6 Star	4.5	50%		
Sink Taps		6 Star	4.5	50%		
<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%	94.0	156.6

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

SHOWERS - OCCUPANTS

Shower demand by occupants (reference)	10.0%
Shower demand by occupants (current)	10.0%

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				
Shower - General	7	Select star rating	7	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%	161.8	208.0

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

SHOWERS - SPORTS FACILITIES

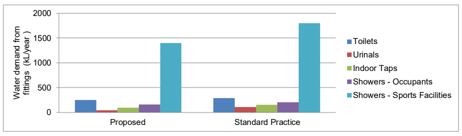
Indicate the number of people expected to participate in sporting activities each day. (Use an average based on weekly figures if required)	200
Indicate the number of days/year that the sports facilities are in use	200

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				
Showers -Gym	7	Select star rating	7	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%	1400.0	1800.0

(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	253.3	289.5
Urinals	44.5	111.4
Indoor Taps	94.0	156.6
Showers - Occupants	161.8	208.0
Showers - Sports Facilities	1400.0	1800.0
TOTAL	1953.6	2565.5



2. WHITE GOODS

Water demand from washing machines

The project team is to provide documentary evidence in accordance with the water calculator guide and technical manual to substantiate the number of cycles per year. Otherwise, leave blank and a default value will be applied.

WASHING MACHINES

Description	Water efficiency (Enter manually OR nominate WELS Star Rating)		Machine capacity (kg)	Water efficiency used in calculations (L/kg)	Number of each type	Number of cycles per year (leave blank if unknown)	Proportion of water per cycle that is sourced from DHW (%)	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
	Manufacturer's data (L/kg)	WELS Star Rating selection							
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
				Total	0			0.00	0.0

Water demand from dishwashers

DISHWASHERS

Description	Water efficiency (Enter manually OR nominate WELS Star Rating)		Machine capacity (number of place settings)	Water efficiency used in calculations (L/cycle)	Number of each type	Number of cycles per year (leave blank if unknown)	Proportion of water per cycle that is sourced from DHW (%)	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
	Manufacturer's data (L/cycle)	WELS Star Rating selection							
DISHWASHERS		5 Star	14	11.5	7			29.5	39.3
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
				Total	7			29.47	39.3

3. HEAT REJECTION

This section requires outputs from the energy simulation undertaken for Conditional Requirement and Greenhouse Gas Emissions (Credit 15).

GENERAL INFORMATION

Proposed Building

Site elevation (m above sea level)	
Maximum combined cooling tower air flow (L/s)	
Peak building cooling load (kW)	

Standard Practice Building

Select one of the following building types:	
Standard Practice HVAC system type assumed for Energy and Water Category	
Maximum combined cooling tower air flow (L/s)	
Peak building cooling load (kW)	

Water demand from cooling towers

Does the project rely on cooling towers for heat rejection? Please respond in the general section.

EVAPORATION

Month	Proposed Building monthly cooling load (kWh/month)	Average dry bulb temperature (°C)	Average relative humidity (%)	Standard Practice Building monthly cooling load (kWh/month)
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

Visit the Bureau of Meteorology's website to obtain average dry bulb and relative humidity data relevant to your site:
http://www.bom.gov.au/climate/data/index.shtml?bookmark=200

DRIFT

	Proposed Building	Standard Practice Building
Condenser Water Δt (°C)		
Drift coefficient (%)		

(as per the requirements of the Greenhouse Gas Emissions Calculator Guide)
(as required in AS3666.1 clause 4.4)

BLEED

	Proposed building	Standard Practice Building

Cycles of concentration			Standard practice cycles of concentration

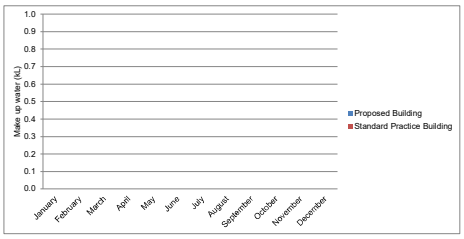
	Proposed Building				Standard Practice Building			
Month	Evaporation (kL)	Drift (kL)	Bleed (kL)	TOTAL kL/month	Evaporation (kL)	Drift (kL)	Bleed (kL)	TOTAL kL/month
January				0.00	0.00	0.00	0.00	0.00
February				0.00	0.00	0.00	0.00	0.00
March				0.00	0.00	0.00	0.00	0.00
April				0.00	0.00	0.00	0.00	0.00
May				0.00	0.00	0.00	0.00	0.00
June				0.00	0.00	0.00	0.00	0.00
July				0.00	0.00	0.00	0.00	0.00
August				0.00	0.00	0.00	0.00	0.00
September				0.00	0.00	0.00	0.00	0.00
October				0.00	0.00	0.00	0.00	0.00
November				0.00	0.00	0.00	0.00	0.00
December				0.00	0.00	0.00	0.00	0.00
Total (kL/year)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Water demand from heat rejection systems that are not conventional cooling towers

Month	Water demand per month (kL/month)
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	
Total make up water (kL/year)	0

RESULTS: WATER DEMAND FROM HEAT REJECTION

Month	Proposed Building (kL)	Standard Practice Building (kL)
January	0.0	0.0
February	0.0	0.0
March	0.0	0.0
April	0.0	0.0
May	0.0	0.0
June	0.0	0.0
July	0.0	0.0
August	0.0	0.0
September	0.0	0.0
October	0.0	0.0
November	0.0	0.0
December	0.0	0.0
Total make up water (kL/year)	0.0	0.0



4. WASHDOWN

Washdown hoses

Description	Hose Flowrate (L/min)	Number of Hoses	Average daily use (minutes)	Proposed daily consumption (kL)	Standard Practice daily consumption (kL)
			Total	0	0.0

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). Please see pages 17-22 of the Green Star- Calculator Guide for further details.)

Climate data

Month	Rainfall (mm)	Evapotranspiration (point potential) (mm)
January	33.6	270
February	50.2	210
March	26.3	120
April	50.0	90
May	39.3	60
June	40.9	60
July	36.3	60
August	45.1	60
September	41.6	90
October	55.2	150
November	50.2	180
December	53.0	210

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
Roof Planters (Final Area TBC)	120	0%	0.35	Sprinklers - Night (75%)	
				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%)	

RESULTS: WATER DEMAND FROM IRRIGATION

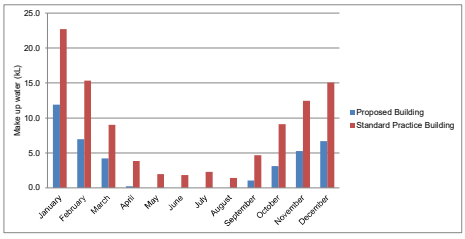
Landscape irrigation requirements per zone

Note: The irrigation requirement for a particular zone will only be computed once every field related to that zone has been completed in the table above.

Zone name and description	Proposed Building (kL)	Standard Practice Building (kL)
Roof Planters (Final Area TBC)	39.4	99.7
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
Total	39.4	99.7

Landscape irrigation requirements per month

Month	Proposed Building (kL)	Standard Practice Building (kL)
January	11.9	22.7
February	6.9	15.3
March	4.2	9.0
April	0.2	3.8
May	0.0	2.0
June	0.0	1.8
July	0.0	2.3
August	0.0	1.4
September	1.0	4.6
October	3.1	9.1
November	5.3	12.5
December	6.7	15.1
Total	39.4	99.7



6. SWIMMING POOLS

GENERAL INFORMATION

Is the swimming pool outdoor or indoor	Indoor
Enter the project height above sea level (m)	103

CLIMATE DATA

Climate data not required for Indoor Pools

Month	Rainfall (mm)	Evapotranspiration (point potential) (mm)

Is a pool cover provided	Yes
Enter the volume of the swimming pool (m^3)	135
Enter the surface area of the swimming pool (m^2)	90
Enter the annual **minimum** pool hall exhaust air volume based on the requirements of AS1668.2 (m^3)	7095600
Enter the annual proposed design pool hall exhaust air volume (m^3)	7095600
Enter the average pool hall temperature while pool exhaust is operating	28
Enter the water consumption for filter cleaning (backwash) (L)	4000
Enter the number of times/year that filter cleaning will take place	12

Reference swimming pool water consumption (L/day)	408.7
Proposed swimming pool water consumption (L/day)	536.8

Visit the Bureau of Meteorology's website to obtain rainfall and evapotranspiration data relevant to your site:
http://www.bom.gov.au/climate/data/index.shtml

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)	12
Volume discharged per test (L)	10000
Proportion of water captured per test (%)	80%
Requirements met	Yes

8. PROCESS COOLING

Is all water based process cooling provided by closed loop systems?	

The following information is only required for open loop process cooling systems

Evaporation losses (L/day)	
Water discharged to sewer (L/day)	
Percentage of open loop process cooling water demand sourced from non-potable (reclaimed) water	

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					
Showers - occupants					
Showers - sports					
Laundries					
Dishwashers					
Heat rejection					
Washdown					
Landscape irrigation	100%				0%
Fire protection systems					
Swimming pools					
Process cooling					

Note:

- Where fittings or systems are supplied with water from more than one source, it is assumed that the they are first supplied with water from any greywater and blackwater systems, followed by rainwater, stormwater and off-site reclaimed water systems.

- If there is insufficient rain/grey/black water to service the indicated percentage of each water use, mains water will applied by the calculator to make up the difference.

WATER DEMAND FROM OTHER WATER SYSTEMS (NOT INCLUDED IN THE CALCULATOR) WHICH ARE COMPLETELY OR PARTIALLY SOURCED BY RECLAIMED WATER

Note: The demand for reclaimed water from water uses assessed under other credits will be met before any water uses assessed under the Potable Water Credit.

Month	**Water demand (kL)**		
	<Enter description of any other uses of rainwater or re-used water>	<Enter description of any other uses of rainwater or re-used water>	<Enter description of any other uses of rainwater or re-used water>
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			

Note: This table only needs to be filled in if reclaimed water is used to meet the demand of these end uses.

If reclaimed water is not used for these end uses, leave these cells blank.

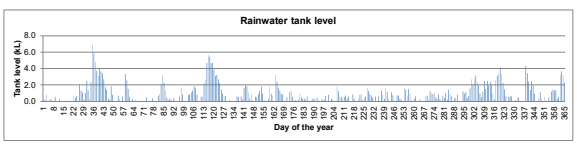
When reclaimed water is used, enter the total demand for each month regardless of whether it is fully or partially met by the reclaimed water supply. In the table below, the percentage of the demand met by reclaimed water/connected to the reclaimed water supply is entered.

DISTRIBUTION OF WATER SOURCES FOR OTHER WATER SYSTEMS

Water system	**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 use)
<Enter description of any other uses of rainwater or re-used water>					
<Enter description of any other uses of rainwater or re-used water>					
<Enter description of any other uses of rainwater or re-used water>					

Rainwater collection

Rainfall collection area (m2)		650
Run-off co-efficient	Flat roof without gravel	0.8
Storage capacity (kL)		20,000
Rainwater tank reliability %		53%



Greywater collection

Water system	**% discharge water collected for re-use**
Toilets	
Urinals	
Indoor taps	
Showers - occupants	
Showers - sport	
Washing machines	

Dishwashers	
Cooling tower bleed +other heat rejection	
Washdown	
Fire protection systems	
Swimming pools	
Process cooling	

OTHER WATER SOURCES e.g. Chiller condensate, cooling tower washdown or sewer mining etc...

Month				Total collected (kL)

Blackwater collection

Water system	% discharge water collected for re-use
Toilets	
Urinals	
Indoor taps	
Showers - occupants	
Showers - sport	
Washing machines	
Dishwashers	
Cooling tower bleed +other heat rejection	
Washdown	
Fire protection systems	
Swimming pools	
Process cooling	

Other sources e.g. Chiller condensate, cooling tower washdown or sewer mining etc.

Month				Total collected (kL)

Stormwater and off-site reclaimed water supply

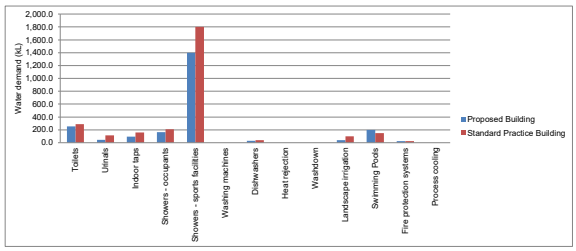
Month	Stormwater collected for re-use (kL)	Off-site reclaimed water supplied to site (kL)
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		

WATER DEMAND SUMMARY

Total water demand summary for each system and per month

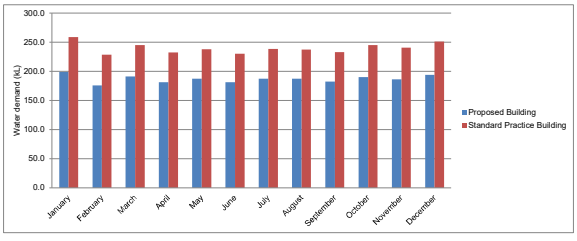
TOTAL WATER DEMAND FOR EACH SYSTEM

Water system	Proposed Building (kL)	Standard Practice Building (kL)
Toilets	253.3	289.5
Urinals	44.5	111.4
Indoor taps	94.0	156.6
Showers - occupants	161.8	208.0
Showers - sports facilities	1,400.0	1,800.0
Washing machines	0.0	0.0
Dishwashers	29.5	39.3
Heat rejection	0.0	0.0
Washdown	0.0	0.0
Landscape irrigation	39.4	99.7
Swimming Pools	195.9	149.2
Fire protection systems	24.0	24.0
Process cooling	0.0	0.0
Total	2,242.4	2,877.7



TOTAL WATER DEMAND PER MONTH

Month	Proposed Building (kL)	Standard Practice Building (kL)
January	199.0	258.6
February	175.9	228.4
March	191.3	244.9
April	181.3	232.2
May	187.1	237.9
June	181.1	230.2
July	187.1	238.2
August	187.1	237.4
September	182.1	233.0
October	190.2	245.0
November	186.3	240.8
December	193.8	251.0
Total	2,242.4	2,877.7



POTABLE WATER RESULTS

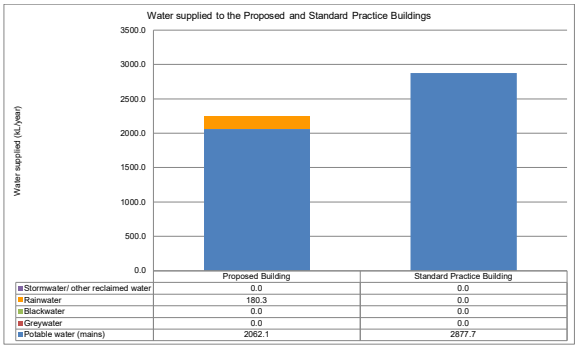
	Proposed Building						Standard Practice Building
Month	Total water demand	Rainwater used to meet demand	Greywater used to meet demand	Blackwater used to meet demand	Stormwater and off-site reclaimed water used	Potable water demand	Potable water demand
January	199	10	0	0	0	189	259
February	176	20	0	0	0	156	228
March	191	9	0	0	0	182	245
April	181	16	0	0	0	165	232
May	187	15	0	0	0	172	238
June	181	14	0	0	0	167	230
July	187	10	0	0	0	177	238
August	187	14	0	0	0	173	237
September	182	13	0	0	0	169	233
October	190	18	0	0	0	172	245
November	186	21	0	0	0	165	241
December	194	19	0	0	0	175	251
Total	2,242	180	0	0	0	2,062	2,878

Percentage reduction in Potable Water Consumption compared to the Standard Practice Building	**28%**

Points Achieved - General	**3.7**
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%	2878	0.0
5%	2734	1.1
15%	2446	2.2
25%	2158	3.3
35%	1870	4.4
45%	1583	5.5
55%	1295	6.6
65%	1007	7.7
75%	719	8.8
85%	432	9.9
95%	144	11.0



	Proposed Building	Standard Practice Building
Stormwater/ other reclaimed water	0.0	0.0
Rainwater	180.3	0.0
Blackwater	0.0	0.0
Greywater	0.0	0.0
Potable water (mains)	2062.1	2877.7

Outputs from this calculator required for Ene-Conditional Requirement and Credit 15: Greenhouse Gas Emissions.

The annual domestic hot water usage figures determined in this calculator must be used in the energy modelling required for Ene-Conditional Requirement and Credit 15: Greenhouse Gas Emissions to estimate the domestic hot water energy requirement of the Proposed and Standard Practice Buildings. For more details see the Green Star - Greenhouse Gas Emissions Calculator Guide, available www.gbca.org.au.

The estimates of annual hot water consumption usage of the Proposed Building are based on the water efficiency of the fittings entered into this calculator. The estimates for the Standard Practice Building are based on the Standard Practice Building's fittings - for further details see the Green Star - Potable Water Calculator Guide, available www.gbca.org.au.

NOTE: THESE FIGURES CAN ONLY BE USED IF the 'Building input, areas and operation' and 'Water consumption due to fittings' sections of THIS CALCULATOR are COMPLETED.

	Proposed Building	Standard Practice Building
Annual Domestic Hot Water Usage (kL/year)	827.86	1082.29

DISCHARGE TO SEWER

SEWERAGE REDUCTION DUE TO WATER RECYCLING

Percentage reduction in discharge to sewer compared to Standard Practice Building	**20.7%**

An innovation point may be claimed for a 90% of greater reduction in flow to sewer

Innovation Point Achieved	**0**

Potable Water, Performance Pathway (18A) - Residential Buildings Only

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	**4.2**

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)	
Residential Apartments	17875	7 days a week	Class 1 or 2 Residential	25	Please select	100%
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
Non occupied areas		n/a	n/a			
TOTAL AREA	17875					

Water systems checklist

Please provide responses to the following questions. Detailed inputs will be requested further on in the calculator.

WATER USES - ALL QUESTIONS MUST BE ANSWERED

1. Sanitation

Are fixtures and fittings provided for building occupant sanitation?	**Yes**
Does the project provide for sports activities?	**No**
Have showers been installed for post/pre activity use?	**No**

2. White Goods

Does the project include any dishwashers or washing machines?	**Yes**

3. Heat rejection

Does the project utilise water based heat rejection (building cooling)?	**No**
Does the project have cooling towers?	**No**
Does the project contain any other water cooled systems that are not conventional	**No**

4. Wash Down

Does the project include washdown areas?	**No**

5. Landscape irrigation

Are there any landscaped areas within the project?	**No**
Are any irrigation systems included in the project?	**No**

6. Swimming Pools

Are there any swimming pools within the project?	**No**

7. Fire Protection System

Does the project include a fire protection system?	**Yes**

8. Process cooling

Does the project include any water based process cooling?	**No**

WATER REUSE - ALL QUESTIONS MUST BE ANSWERED

9. Water Reclamation

Does any water collection, reclamation and/or reuse occur on the project site?	**No**
Does the project include rainwater capture and reuse systems?	**No**
Does the project include greywater capture, treatment and reuse systems?	**No**
Does the project include blackwater capture, treatment and reuse systems?	**No**
Does the project include other stormwater reuse or an off-site supply of non-potable water?	**No**

Rainfall data

Select the average rainfall data location for the project	**Melbourne (1998 - 2007) (mm)**

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%	1470.6	1680.7

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

URINALS

Are urinals installed?	No
Would urinals normally be installed in the building type?	No

(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.)

Urinals on auto timer

Enter average L/flush	
Enter number of urinals on autotimer	
Percentage of total number of 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				
<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				
<enter description here>		Select star rating				
			Total	0%	0.0	0.0

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

Total must add to 100%

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				
Kitchen Taps		6 Star	4.5	50%		
Sink Taps		6 Star	4.5	50%		
<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%	308.3	513.8

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

SHOWERS - OCCUPANTS

Shower demand by occupants (reference)	100.0%
Shower demand by occupants (current)	100.0%

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				
Showers	7	3 Star	7	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%	7764.0	9982.3

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

SHOWERS - SPORTS FACILITIES

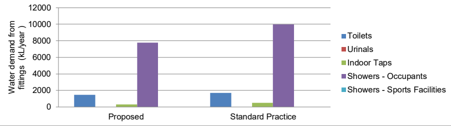
Indicate the number of people expected to participate in sporting activities each day. (Use an average based on weekly figures if required)	
Indicate the number of days/year that the sports facilities are in use	

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				
			Total	0%	0.0	0.0
				Total must add to 100%		

(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	1470.6	1680.7
Urinals	0.0	0.0
Indoor Taps	308.3	513.8
Showers - Occupants	7764.0	9982.3
Showers - Sports Facilities	0.0	0.0
TOTAL	9542.9	12176.8



2. WHITE GOODS

Water demand from washing machines

The project team is to provide documentary evidence in accordance with the water calculator guide and technical manual to substantiate the number of cycles per year. Otherwise, leave blank and a default value will be applied.

WASHING MACHINES

Description	Water efficiency (Enter manually OR nominate WELS Star Rating)		Machine capacity (kg)	Water efficiency used in calculations (L/kg)	Number of each type	Number of cycles per year (leave blank if unknown)	Proportion of water per cycle that is sourced from DHW (%)	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
	Manufacturer's data (L/kg)	WELS Star Rating selection							
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
				Total	0			0.00	0.0

Water demand from dishwashers

DISHWASHERS

Description	Water efficiency (Enter manually OR nominate WELS Star Rating)		Machine capacity (number of place settings)	Water efficiency used in calculations (L/cycle)	Number of each type	Number of cycles per year (leave blank if unknown)	Proportion of water per cycle that is sourced from DHW (%)	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
	Manufacturer's data (L/cycle)	WELS Star Rating selection							
DISHWASHERS		5 Star	14	11.5	200			842.1	1123.7
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
				Total	200			842.05	1123.7

3. HEAT REJECTION

This section requires outputs from the energy simulation undertaken for Conditional Requirement and Greenhouse Gas Emissions (Credit 15).

GENERAL INFORMATION

Proposed Building

Site elevation (m above sea level)	
Maximum combined cooling tower air flow (L/s)	
Peak building cooling load (kW)	

Standard Practice Building

Select one of the following building types:	
Standard Practice HVAC system type assumed for Energy and Water Category	
Maximum combined cooling tower air flow (L/s)	
Peak building cooling load (kW)	

Water demand from cooling towers **The project team has indicated that there are no water based heat rejection systems included in the project. Please complete the Standard Practice cooling load.**

Please enter the average air temperature, relative humidity and heat rejection load for the standard practice building.

EVAPORATION

Month	Proposed Building monthly cooling load (kWh/month)	Average dry bulb temperature (°C)	Average relative humidity (%)	Standard Practice Building monthly cooling load (kWh/month)
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

Visit the Bureau of Meteorology's website to obtain average dry bulb and relative humidity data relevant to your site:
http://www.bom.gov.au/climate/data/index.shtml?bookmark=200

DRIFT

	Proposed Building	Standard Practice Building	
Condenser Water Δt (°C)			(as per the requirements of the Greenhouse Gas Emissions Calculator Guide)
Drift coefficient (%)			(as required in AS3666.1 clause 4.4)

BLEED

	Proposed building	Standard Practice Building

Cycles of concentration			Standard practice cycles of concentration

	Proposed Building				Standard Practice Building			
Month	Evaporation (kL)	Drift (kL)	Bleed (kL)	TOTAL kL/month	Evaporation (kL)	Drift (kL)	Bleed (kL)	TOTAL kL/month
January				0.00	0.00	0.00	0.00	0.00
February				0.00	0.00	0.00	0.00	0.00
March				0.00	0.00	0.00	0.00	0.00
April				0.00	0.00	0.00	0.00	0.00
May				0.00	0.00	0.00	0.00	0.00
June				0.00	0.00	0.00	0.00	0.00
July				0.00	0.00	0.00	0.00	0.00
August				0.00	0.00	0.00	0.00	0.00
September				0.00	0.00	0.00	0.00	0.00
October				0.00	0.00	0.00	0.00	0.00
November				0.00	0.00	0.00	0.00	0.00
December				0.00	0.00	0.00	0.00	0.00
Total (kL/year)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Water demand from heat rejection systems that are not conventional cooling towers

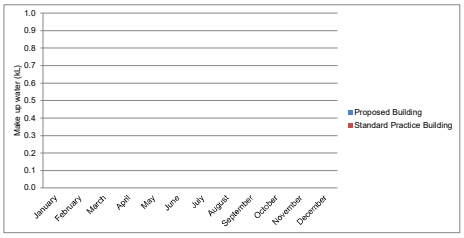
THE PROJECT TEAM HAS INDICATED THAT

Please proceed to following section.

Month	Water demand per month (kL/month)
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	
Total make up water (kL/year)	0

RESULTS: WATER DEMAND FROM HEAT REJECTION

Month	Proposed Building (kL)	Standard Practice Building (kL)
January	0.0	0.0
February	0.0	0.0
March	0.0	0.0
April	0.0	0.0
May	0.0	0.0
June	0.0	0.0
July	0.0	0.0
August	0.0	0.0
September	0.0	0.0
October	0.0	0.0
November	0.0	0.0
December	0.0	0.0
Total make up water (kL/year)	0.0	0.0



4. WASHDOWN

Washdown hoses

Description	Hose Flowrate (L/min)	Number of Hoses	Average daily use (minutes)	Proposed daily consumption (kL)	Standard Practice daily consumption (kL)
			Total	0	0.0

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). Please see pages 17-22 of the Green Star- Calculator Guide for further details.)

Climate data

Month	Rainfall (mm)	Evapotranspiration (point potential) (mm)

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

RESULTS: WATER DEMAND FROM IRRIGATION

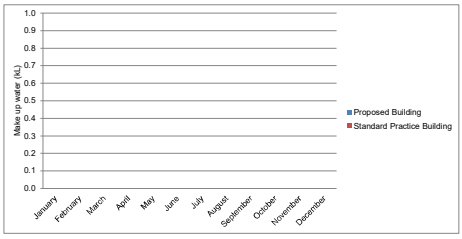
Landscape irrigation requirements per zone

Note: The irrigation requirement for a particular zone will only be computed once every field related to that zone has been completed in the table above.

Zone name and description	Proposed Building (kL)	Standard Practice Building (kL)
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
Total	0.0	0.0

Landscape irrigation requirements per month

Month	Proposed Building (kL)	Standard Practice Building (kL)
January	0.0	0.0
February	0.0	0.0
March	0.0	0.0
April	0.0	0.0
May	0.0	0.0
June	0.0	0.0
July	0.0	0.0
August	0.0	0.0
September	0.0	0.0
October	0.0	0.0
November	0.0	0.0
December	0.0	0.0
Total	0.0	0.0



6. SWIMMING POOLS

GENERAL INFORMATION

Is the swimming pool outdoor or indoor	
Enter the project height above sea level (m)	

CLIMATE DATA

Enter climate data relevant to the project location

Month	Rainfall (mm)	Evapotranspiration (point potential) (mm)

Is a pool cover provided	
Enter the volume of the swimming pool (m^3)	
Enter the surface area of the swimming pool (m^2)	
Enter the annual **minimum** pool hall exhaust air volume based on the requirements of AS1668.2 (m^3)	
Enter the annual proposed design pool hall exhaust air volume (m^3)	
Enter the average pool hall temperature while pool exhaust is operating	
Enter the water consumption for filter cleaning (backwash) (L)	
Enter the number of times/year that filter cleaning will take place	

Reference swimming pool water consumption (L/day)	0.0
Proposed swimming pool water consumption (L/day)	0.0

Visit the Bureau of Meteorology's website to obtain rainfall and evapotranspiration data relevant to your site:
http://www.bom.gov.au/climate/data/index.shtml

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)	12
Volume discharged per test (L)	10000
Proportion of water captured per test (%)	80%
Requirements met	Yes

8. PROCESS COOLING

Is all water based process cooling provided by closed loop systems?	

The following information is only required for open loop process cooling systems

Evaporation losses (L/day)	
Water discharged to sewer (L/day)	
Percentage of open loop process cooling water demand sourced from non-potable (reclaimed) water	

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)

Note:

- Where fittings or systems are supplied with water from more than one source, it is assumed that the they are first supplied with water from any greywater and blackwater systems, followed by rainwater, stormwater and off-site reclaimed water systems.

- If there is insufficient rain/grey/black water to service the indicated percentage of each water use, mains water will applied by the calculator to make up the difference.

WATER DEMAND FROM OTHER WATER SYSTEMS (NOT INCLUDED IN THE CALCULATOR) WHICH ARE COMPLETELY OR PARTIALLY SOURCED BY RECLAIMED WATER

Note: The demand for reclaimed water from water uses assessed under other credits will be met before any water uses assessed under the Potable Water Credit.

Month	**Water demand (kL)**		

Note: This table only needs to be filled in if reclaimed water is used to meet the demand of these end uses.

If reclaimed water is not used for these end uses, leave these cells blank.

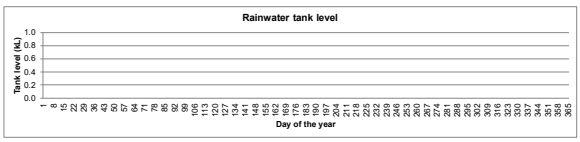
When reclaimed water is used, enter the total demand for each month regardless of whether it is fully or partially met by the reclaimed water supply. In the table below, the percentage of the demand met by reclaimed water/connected to the reclaimed water supply is entered.

DISTRIBUTION OF WATER SOURCES FOR OTHER WATER SYSTEMS

Water system	**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 use)

Rainwater collection

Rainfall collection area (m2)		
Run-off co-efficient		
Storage capacity (kL)		
Rainwater tank reliability %		



Greywater collection

Water system	**% discharge water collected for re-use**
Toilets	
Urinals	
Indoor taps	
Showers - occupants	
Showers - sport	

Washing machines	
Dishwashers	
Cooling tower bleed +other heat rejection	
Washdown	
Fire protection systems	
Swimming pools	
Process cooling	

OTHER WATER SOURCES e.g. Chiller condensate, cooling tower washdown or sewer mining etc...

Month				Total collected (kL)

Blackwater collection

Water system	% discharge water collected for re-use
Toilets	
Urinals	
Indoor taps	
Showers - occupants	
Showers - sport	
Washing machines	
Dishwashers	
Cooling tower bleed +other heat rejection	
Washdown	
Fire protection systems	
Swimming pools	
Process cooling	

Other sources e.g. Chiller condensate, cooling tower washdown or sewer mining etc...

Month				Total collected (kL)

Stormwater and off-site reclaimed water supply

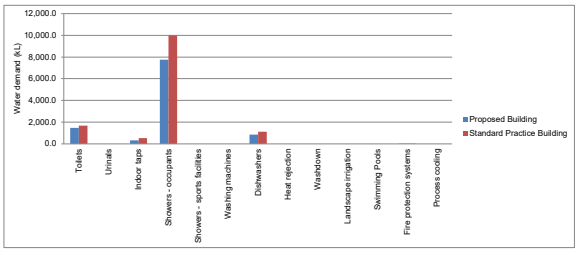
Month	Stormwater collected for re-use (kL)	Off-site reclaimed water supplied to site (kL)
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		

WATER DEMAND SUMMARY

Total water demand summary for each system and per month

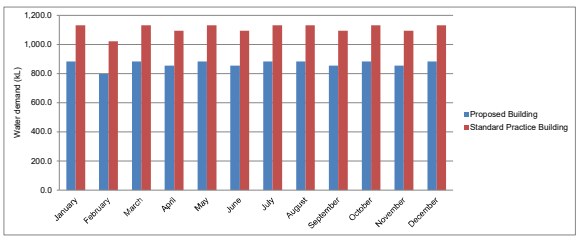
TOTAL WATER DEMAND FOR EACH SYSTEM

Water system	Proposed Building (kL)	Standard Practice Building (kL)
Toilets	1,470.6	1,680.7
Urinals	0.0	0.0
Indoor taps	308.3	513.8
Showers - occupants	7,764.0	9,982.3
Showers - sports facilities	0.0	0.0
Washing machines	0.0	0.0
Dishwashers	842.1	1,123.7
Heat rejection	0.0	0.0
Washdown	0.0	0.0
Landscape irrigation	0.0	0.0
Swimming Pools	0.0	0.0
Fire protection systems	24.0	24.0
Process cooling	0.0	0.0
Total	10,408.9	13,324.5



TOTAL WATER DEMAND PER MONTH

Month	Proposed Building (kL)	Standard Practice Building (kL)
January	884.0	1,131.7
February	798.5	1,022.2
March	884.0	1,131.7
April	855.5	1,095.2
May	884.0	1,131.7
June	855.5	1,095.2
July	884.0	1,131.7
August	884.0	1,131.7
September	855.5	1,095.2
October	884.0	1,131.7
November	855.5	1,095.2
December	884.0	1,131.7
Total	10,408.9	13,324.5



POTABLE WATER RESULTS

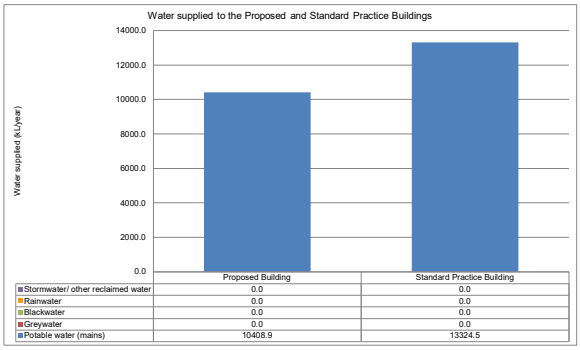
	Proposed Building						Standard Practice Building
Month	Total water demand	Rainwater used to meet demand	Greywater used to meet demand	Blackwater used to meet demand	Stormwater and off-site reclaimed water used	Potable water demand	Potable water demand
January	884	0	0	0	0	884	1,132
February	798	0	0	0	0	798	1,022
March	884	0	0	0	0	884	1,132
April	856	0	0	0	0	856	1,095
May	884	0	0	0	0	884	1,132
June	856	0	0	0	0	856	1,095
July	884	0	0	0	0	884	1,132
August	884	0	0	0	0	884	1,132
September	856	0	0	0	0	856	1,095
October	884	0	0	0	0	884	1,132
November	856	0	0	0	0	856	1,095
December	884	0	0	0	0	884	1,132
Total	10,409	0	0	0	0	10,409	13,324

Percentage reduction in Potable Water Consumption compared to the Standard Practice Building	**22%**

Points Achieved - General	**3.2**
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%	13324	0.0
8%	12325	1.1
15%	11326	2.2
23%	10326	3.3
30%	9327	4.4
38%	8328	5.5
45%	7328	6.6
53%	6329	7.7
60%	5330	8.8
68%	4330	9.9
75%	3331	11.0



	Proposed Building	Standard Practice Building
Stormwater/ other reclaimed water	0.0	0.0
Rainwater	0.0	0.0
Blackwater	0.0	0.0
Greywater	0.0	0.0
Potable water (mains)	10408.9	13324.5

Outputs from this calculator required for Ene-Conditional Requirement and Credit 15: Greenhouse Gas Emissions.

The annual domestic hot water usage figures determined in this calculator must be used in the energy modelling required for Ene-Conditional Requirement and Credit 15: Greenhouse Gas Emissions to estimate the domestic hot water energy requirement of the Proposed and Standard Practice Buildings. For more details see the Green Star - Greenhouse Gas Emissions Calculator Guide, available www.gbca.org.au.

The estimates of annual hot water consumption usage of the Proposed Building are based on the water efficiency of the fittings entered into this calculator. The estimates for the Standard Practice Building are based on the Standard Practice Building's fittings - for further details see the Green Star - Potable Water Calculator Guide, available www.gbca.org.au.

NOTE: THESE FIGURES CAN ONLY BE USED IF the 'Building Input, Areas and Operation' and 'Water Consumption due to fittings' sections of THIS CALCULATOR are COMPLETED.

	Proposed Building	Standard Practice Building
Annual Domestic Hot Water Usage (kL/year)	4036.14	5248.04

DISCHARGE TO SEWER

SEWERAGE REDUCTION DUE TO WATER RECYCLING

Percentage reduction in discharge to sewer compared to Standard Practice Building	**21.9%**

An innovation point may be claimed for a 90% of greater reduction in flow to sewer

Innovation Point Achieved	**0**

Appendix D – Daylight Report

IGS INTEGRATED GROUP SERVICES

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Mixed-Use Building
GREEN STAR DAYLIGHT ACCESS MODELLING REPORT

300 City Road,
Southbank VIC 3006

Project No: 20018
Date: 04/12/2023

Level 4, 108 Elizabeth Street,
Melbourne VIC 3000
Web: www.igs.com.au

Document Control

Version	Date	Issue	Author		Reviewer	
00	30/05/2022	Issue for Review	Earnest Joseph	EJ	Li Huan	LH
01	25/11/2022	Issue for Review	Earnest Joseph	EJ	Li Huan	LH
02	04/12/2023	Stage 1B Issue for Review	Earnest Joseph	EJ	Li Huan	LH

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1. Executive Summary

IGS was engaged to undertake a daylight simulation on 300 City Road, Southbank mixed-use development to identify the Green Star Credit 12.1 Daylight – daylight availability compliances.

Green Star 12.1 Daylight requires a percentage of the nominated area receives high levels of daylight with daylight factor (DF) above 2.0% for commercial spaces (hotel, commercial tenancies & communal facilities) and daylight factor (DF) above 1.5% for residential spaces.

Up to 2 points are available for commercial spaces as following:

- For 40% of the nominated area with DF above 2.0% - 1 point;
- For 60% of the nominated area with DF above 2.0% - 2 points.

Up to 2 points are available for residential spaces as following:

- For 40% of the nominated area with DF above 1.5% - 1 point;
- For 60% of the nominated area with DF above 1.5% - 2 points.

A daylight modelling was undertaken on both commercial spaces and residential spaces under the Uniform Cloudy Sky with a constant value of luminance level of 10,000 lux and the daylight modelling result is tabulated and summarised:

The modelling result has demonstrated that the 57% of commercial spaces achieves a daylight factor of above 2.0% and 77% of residential spaces achieves a daylight factor of above 1.5%.

In line with Green Star 12.1 Daylight credit criteria, more than 60% of the total nominated area (commercial spaces and residential spaces) comply with Green Star 12.1 daylight requirement, and hence 2 points are targeted.

2. Introduction

2.1 Key Assumptions

The proposed external windows visible light transmissions (VLTs) are recommended to be:

- Non – Residential External windows: VLT ≥ 30%
- Residential External windows: VLT ≥ 40%
- All internal windows: VLT ≥ 85%

Finishes Reflectance Values

The following reflectance values are used for the building finishes daylight availability modelling.

- Floor covering reflectance = 0.5
- Walls and Internal Partitions reflectance= 0.8
- Ceiling reflectance = 0.9
- Surrounding Buildings reflectance =0.2.

2.2 Sky Model

The Uniform Cloudy Sky of horizontal external illuminance of 10,000 Lux is used for daylight availability simulation. A Uniform Cloudy Sky represents a sky with a constant value of luminance. The values are derived from a statistical analysis of outdoor illuminance levels. They represent a horizontal illuminance level that exceeds 85% of the time between the hours of 9am and 5pm throughout the year. Thus, they also represent that the building has been designed to meet the modelled daylight levels for at least 85% of the daytime annually.

2.3 Building Shape

The building physical shape is modelled in accordance with the architectural drawings package issued on 21/11/2023 for TP Amendment.

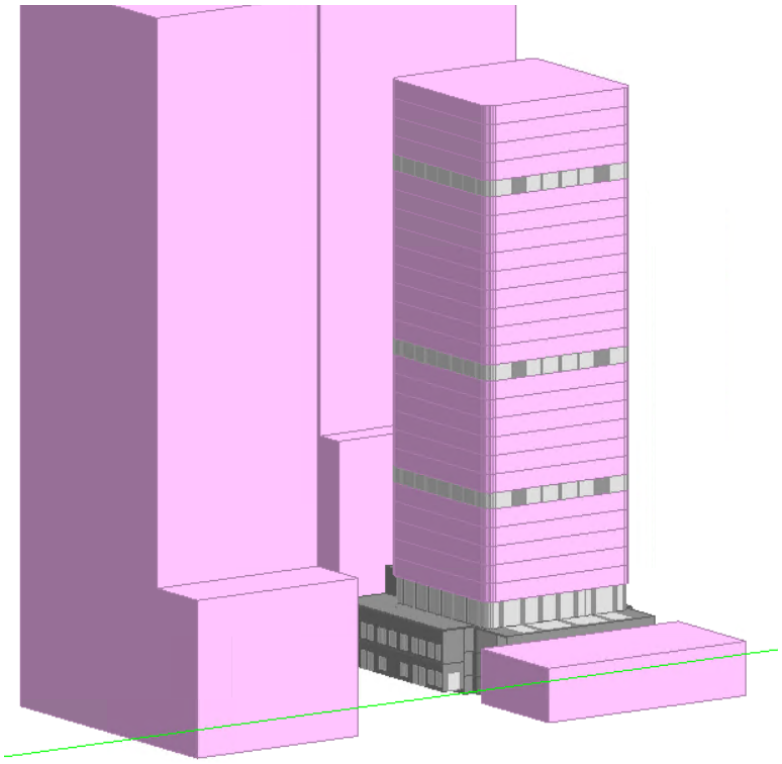

Figure 1 – Building Mode

3. Green Star Daylight Compliance – Non - Residential

3.1 Lower Ground Floor Non – Residential Daylight Contour Plot

Below is the daylight contour plot extracted from Design Builder daylight modelling result showing daylight availability across Lower ground of the building.

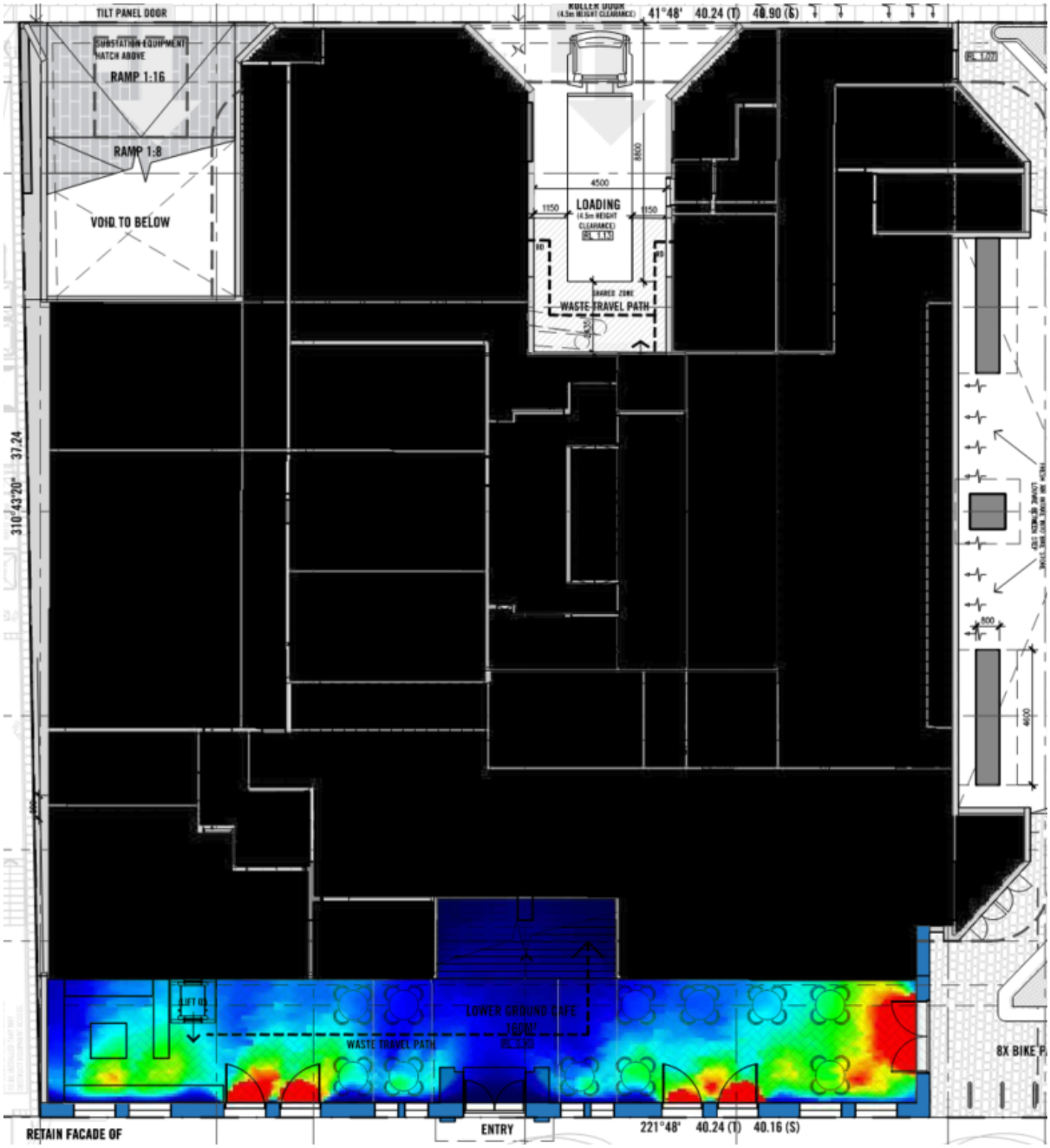

Figure 2 – Lower Ground Floor Daylight Contour Plot

3.2 Upper Ground Floor Non – Residential Daylight Contour Plot

Below is the daylight contour plot extracted from Design Builder daylight modelling result showing daylight availability across Upper ground of the building.

Figure 3 – Upper Ground Daylight Contour Plot

3.3 Level 01 Floor Non – Residential Daylight Contour Plot

Below is the daylight contour plot extracted from Design Builder daylight modelling result showing daylight availability across Level 01 of the building.

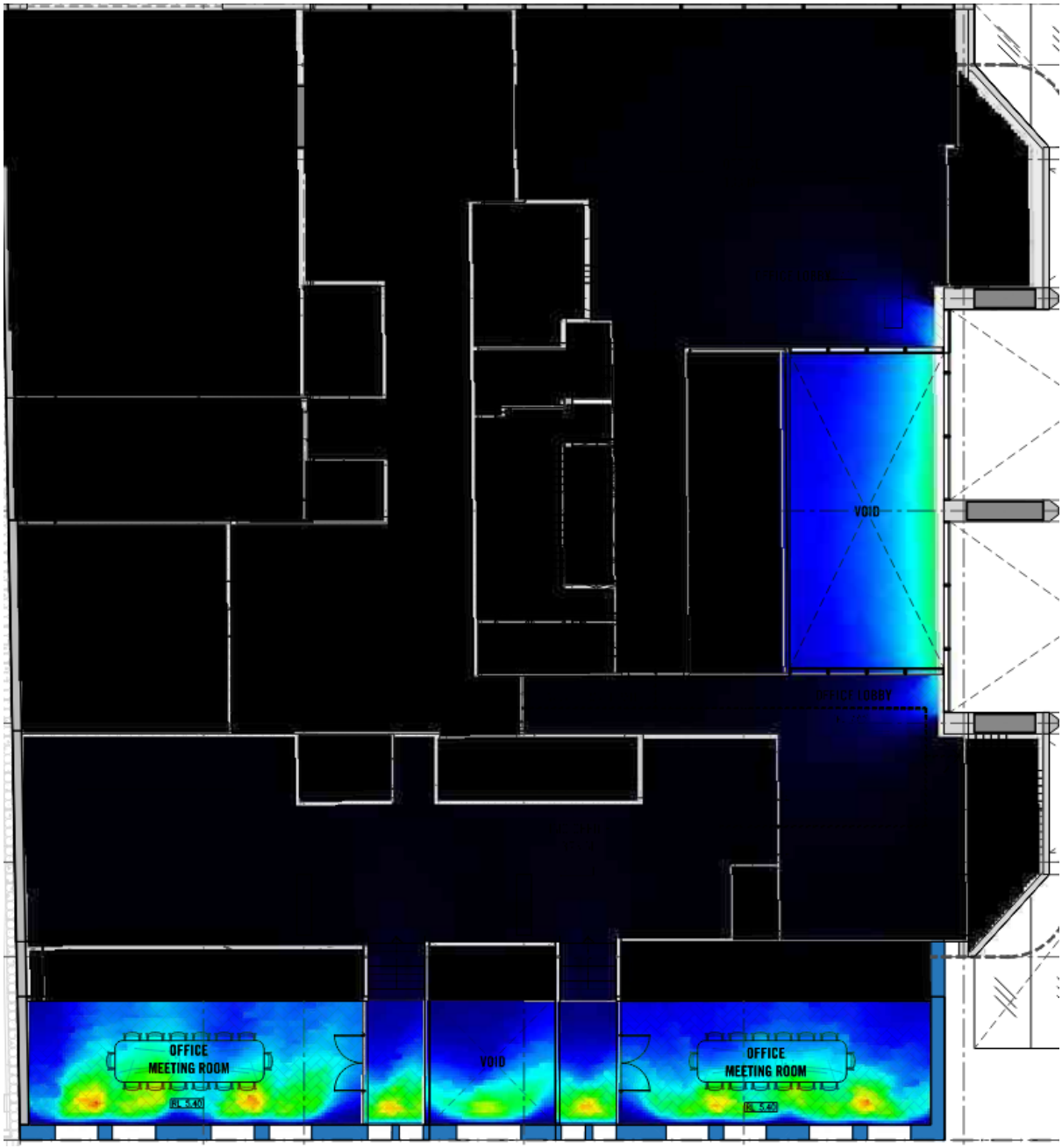

Figure 4 – Level 01 Daylight Contour Plot

3.4 Level 02 Non – Residential Daylight Contour Plot

Below is the daylight contour plot extracted from Design Builder daylight modelling result showing daylight availability across Level 02 of the building.

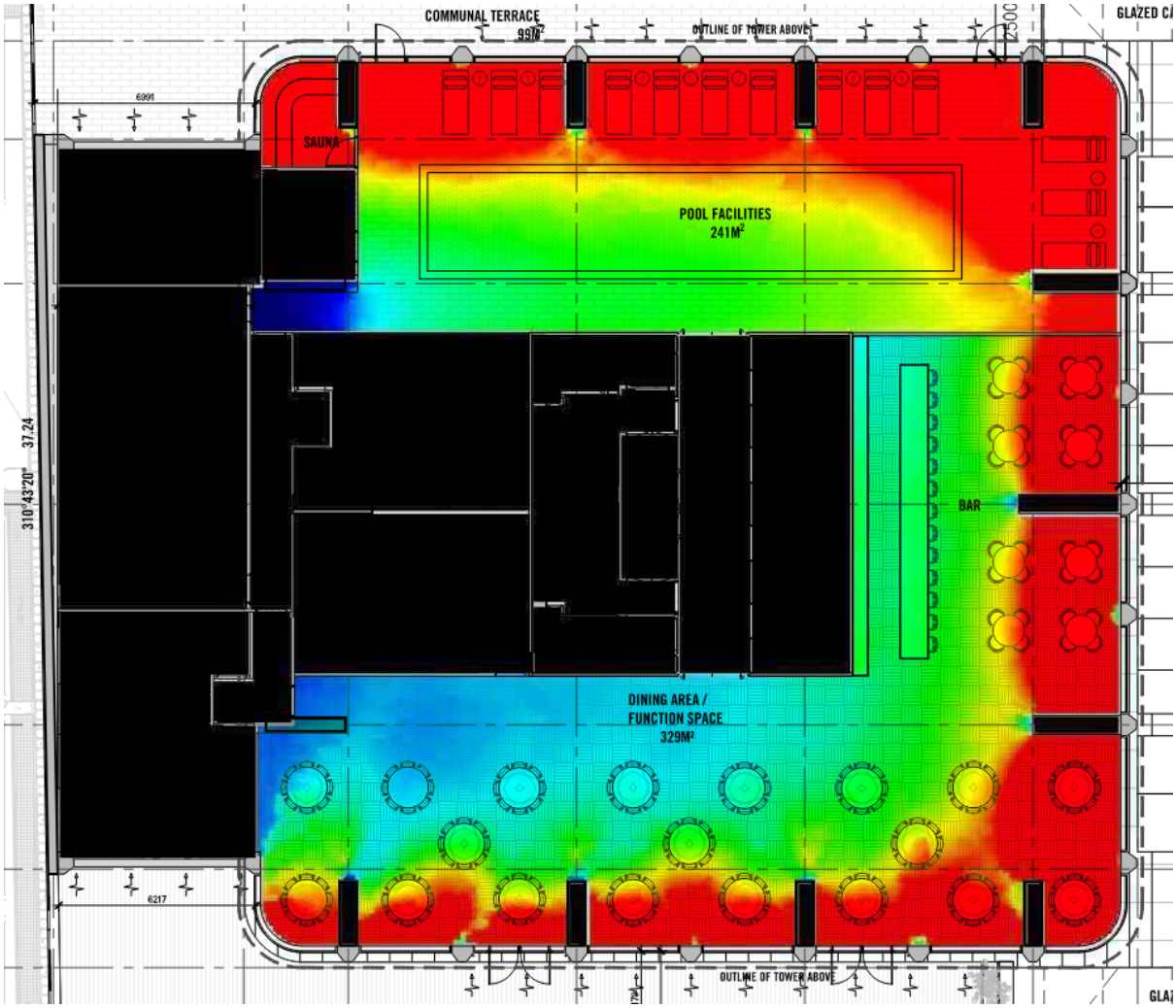

Figure 5 – Level 02 Daylight Contour Plot

3.5 Non – Residential Spaces Daylight Result – Summary Table

Daylight availability output of the Non – Residential at 300 City Road is tabulated below:

Level	Zone	Total Floor area (m2)	Floor Area above Threshold (m2)	Floor Area above Threshold (%)
Lower Ground	Cafe Lower	141.3	33.9	24%
Upper Ground	Cafe Upper	208.0	0.0	0%
Level 01	IMG Office	150.8	0.0	0%
Level 01	Office Meeting Room 01	46.4	9.8	21%
Level 01	Office Meeting Room 02	42.9	7.2	17%
Level 02	Sauna	8.8	8.8	100%
Level 02	Pool Facilities	206.2	194.2	94%
Level 02	Bar and Dining	311.3	216.9	70%
Total		**1115.8**	**470.8**	**42%**

4. Green Star Daylight Compliance – Residential

4.1 Level 08 Representative Floor Daylight Contour Plot

Below is the daylight contour plot extracted from Design Builder daylight modelling result showing daylight availability across Level 08 of the building. This floor is representative from Level 03 to Level 09.

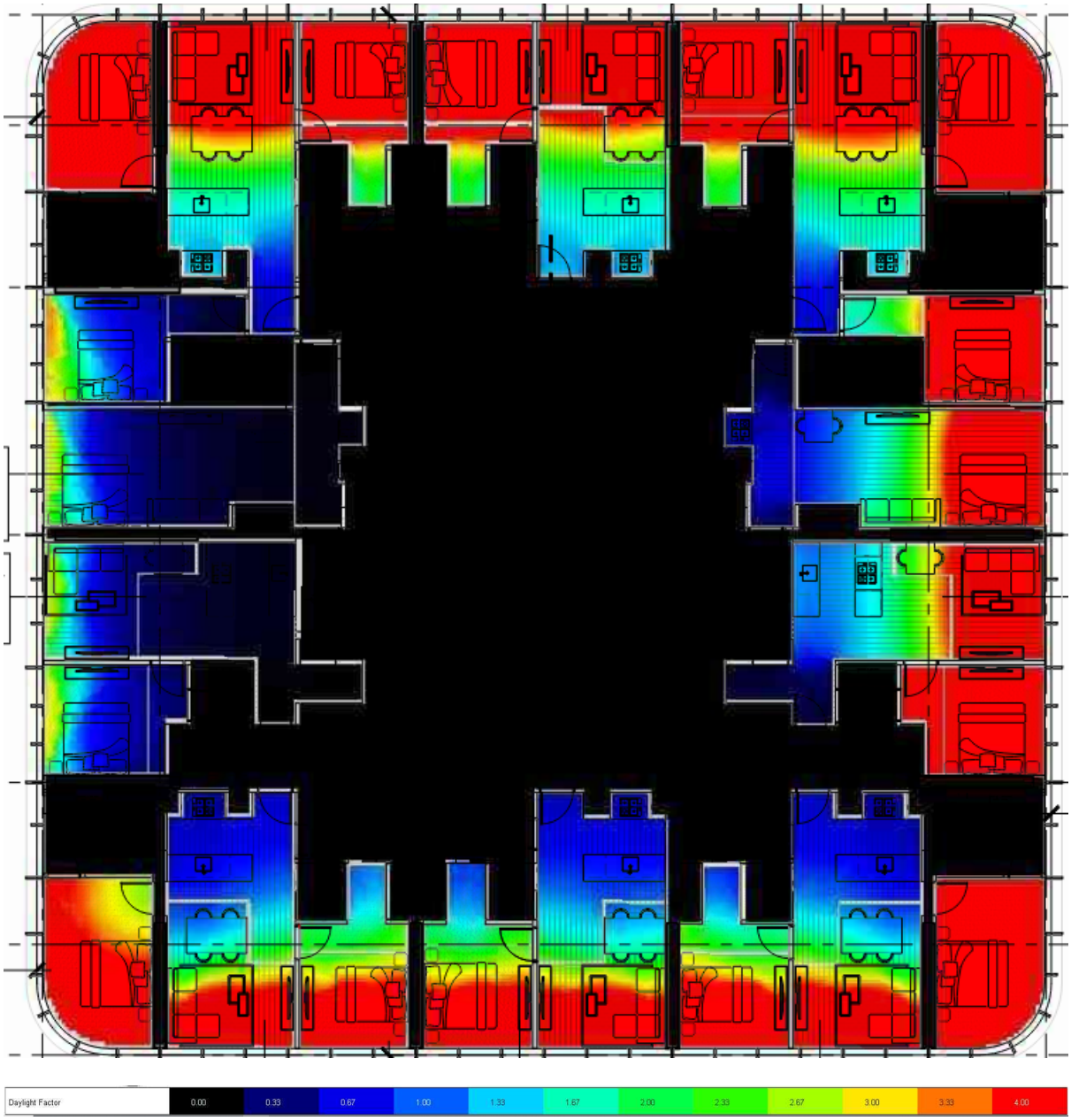

Figure 6 - Level 08 Daylight Contour Plot

4.2 Level 15 Representative Floor Daylight Contour Plot

Below is the daylight contour plot extracted from Design Builder daylight modelling result showing daylight availability across Level 15 of the building. This floor is representative from Level 10 to Level 19.

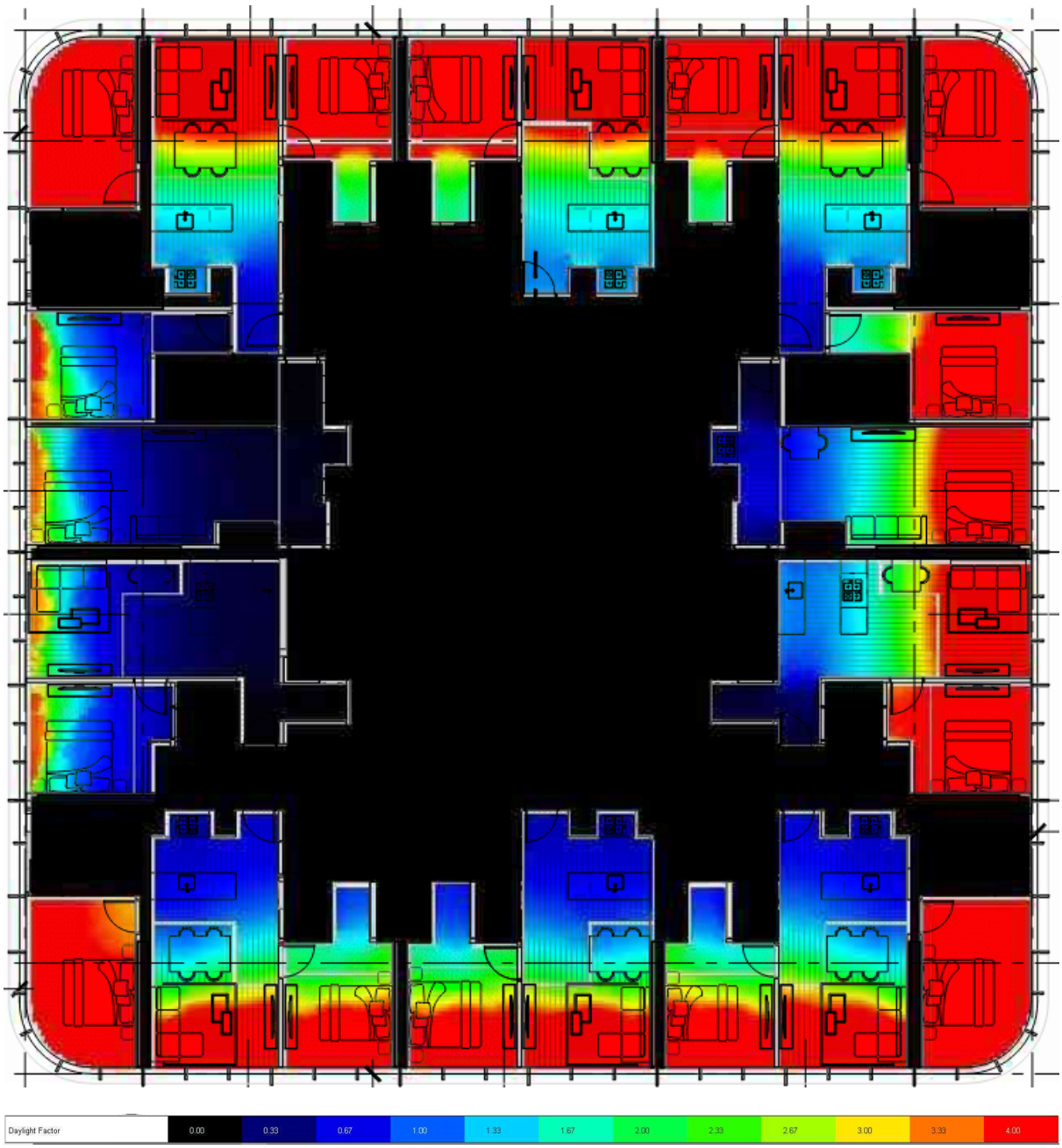

Figure 7 - Level 15 Daylight Contour Plot

4.3 Level 25 Representative Floor Daylight Contour Plot

Below is the daylight contour plot extracted from Design Builder daylight modelling result showing daylight availability across Level 25 of the building. This floor is representative from Level 20 to Level 29.

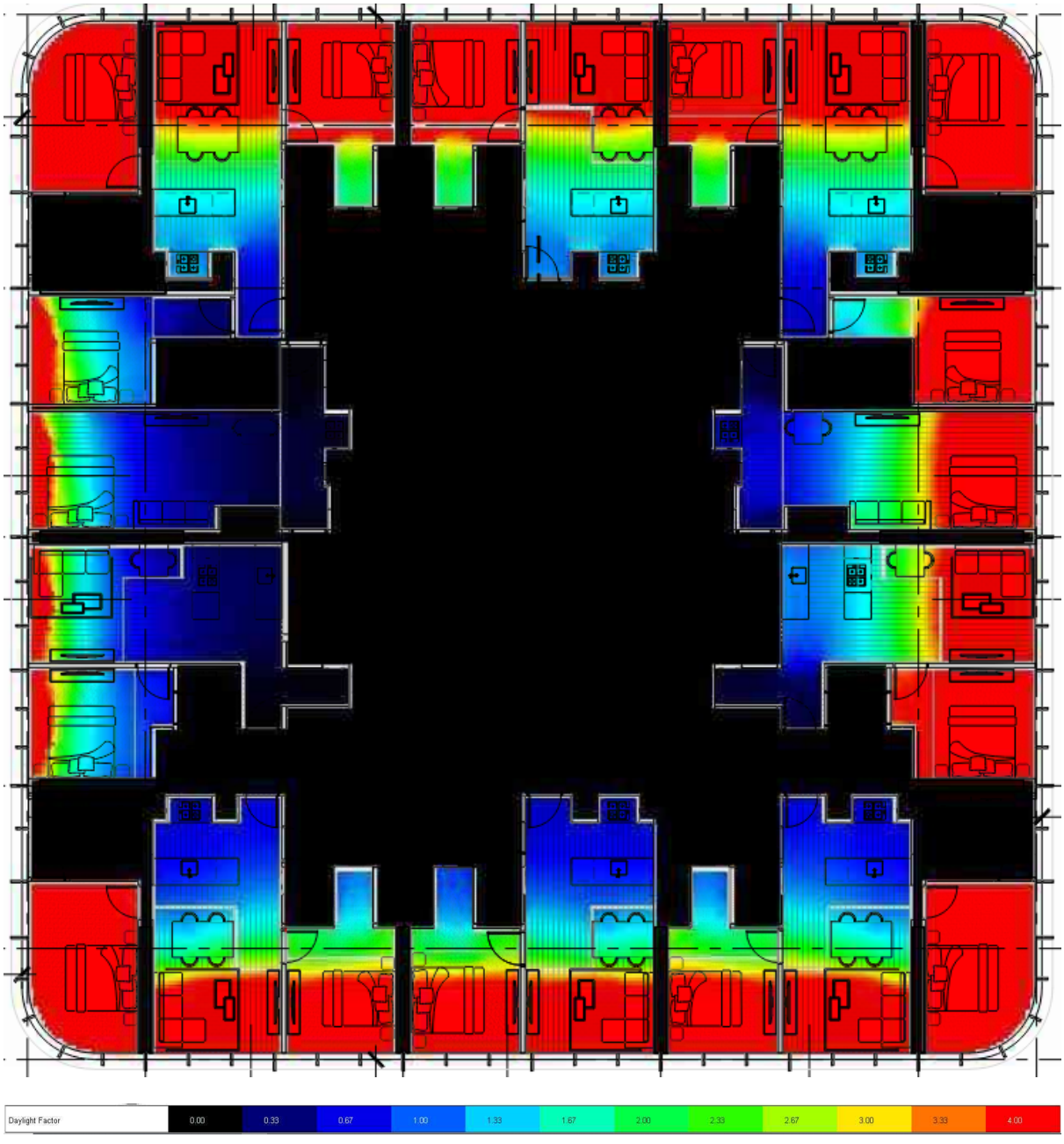

Figure 8 - Level 25 Daylight Contour Plot

4.4 Residential Living Rooms Daylight Result – Summary Table

The daylight availability output of the residential living rooms is tabulated below:

Level	Zone	No. of Floor Representing	Total Floor area (m2)	Floor Area above Threshold (m2)	Floor Area above Threshold (%)
Level 08	801-LIV	7	11.4	11.4	100%
Level 08	802-LIV	7	14.2	14.2	100%
Level 08	803-LIV	7	22.0	16.7	76%
Level 08	804-LIV	7	10.0	10.0	100%
Level 08	805-LIV	7	12.4	10.4	84%
Level 08	806-LIV	7	11.5	10.2	88%
Level 08	807-LIV	7	12.3	10.1	82%
Level 08	808-LIV	7	10.1	2.5	25%
Level 08	809-LIV	7	22.0	2.7	12%
Level 08	810-LIV	7	14.1	14.1	100%
Level 15	1501-LIV	10	11.4	11.4	100%
Level 15	1502-LIV	10	14.2	14.2	100%
Level 15	1503-LIV	10	22.0	16.6	75%
Level 15	1504-LIV	10	10.0	10.0	100%
Level 15	1505-LIV	10	12.4	10.7	87%
Level 15	1506-LIV	10	11.5	10.2	88%
Level 15	1507-LIV	10	12.3	10.5	85%
Level 15	1508-LIV	10	10.1	3.6	35%
Level 15	1509-LIV	10	22.0	3.8	17%
Level 15	1510-LIV	10	14.1	14.1	100%
Level 25	2501-LIV	10	11.4	11.4	100%
Level 25	2502-LIV	10	14.2	14.2	100%
Level 25	2503-LIV	10	22.0	16.6	76%
Level 25	2504-LIV	10	10.0	10.0	100%
Level 25	2505-LIV	10	12.4	11.2	90%
Level 25	2506-LIV	10	11.5	10.6	92%
Level 25	2507-LIV	10	12.3	11.0	90%
Level 25	2508-LIV	10	10.1	5.5	55%
Level 25	2509-LIV	10	22.0	5.7	26%
Level 25	2510-LIV	10	14.1	14.1	100%

Total Area (m^2)	**419**
Total Compliant Area (m^2)	**317**
Total Compliant Area (%)	**76%**

4.5 Residential Bedrooms Daylight Result – Summary Table

The daylight availability output of the residential living rooms is tabulated below:

Level	Zone	No. of Floor Representing	Total Floor area (m2)	Floor Area above Threshold (m2)	Floor Area above Threshold (%)
Level 08	801-BED1	7	8.8	8.8	100%
Level 08	802-BED1	7	8.2	8.2	100%
Level 08	802-BED2	7	13.9	13.9	100%
Level 08	802-BED3	7	10.2	10.2	100%
Level 08	804-BED1	7	8.6	8.6	100%
Level 08	805-BED1	7	8.3	8.3	100%
Level 08	805-BED2	7	13.9	13.9	100%
Level 08	806-BED1	7	8.7	8.7	100%
Level 08	807-BED1	7	8.3	8.3	100%
Level 08	807-BED2	7	14.0	14.0	100%
Level 08	808-BED1	7	8.9	2.6	29%
Level 08	810-BED1	7	14.0	14.0	100%
Level 08	810-BED2	7	10.5	3.4	33%
Level 08	810-BED3	7	8.9	8.9	100%
Level 15	1501-BED1	10	8.8	8.8	100%
Level 15	1502-BED1	10	8.2	8.2	100%
Level 15	1502-BED2	10	13.9	13.9	100%
Level 15	1502-BED3	10	10.2	10.2	100%
Level 15	1504-BED1	10	8.6	8.6	100%
Level 15	1505-BED1	10	8.3	8.3	100%
Level 15	1505-BED2	10	13.9	13.9	100%
Level 15	1506-BED1	10	8.7	8.7	100%
Level 15	1507-BED1	10	8.3	8.3	100%
Level 15	1507-BED2	10	14.0	14.0	100%
Level 15	1508-BED1	10	8.9	3.6	40%
Level 15	1510-BED1	10	14.0	14.0	100%
Level 15	1510-BED2	10	10.5	4.2	40%
Level 15	1510-BED3	10	8.9	8.9	100%
Level 25	2501-BED1	10	8.8	8.8	100%
Level 25	2502-BED1	10	8.2	8.2	100%
Level 25	2502-BED2	10	13.9	13.9	100%
Level 25	2502-BED3	10	10.2	10.2	100%
Level 25	2504-BED1	10	8.6	8.6	100%
Level 25	2505-BED1	10	8.3	8.3	100%
Level 25	2505-BED2	10	13.9	13.9	100%
Level 25	2506-BED1	10	8.7	8.7	100%
Level 25	2507-BED1	10	8.3	8.3	100%
Level 25	2507-BED2	10	14.0	14.0	100%
Level 25	2508-BED1	10	8.9	5.6	63%

Level 25	2510-BED1	10	14.0	14.0	100%
Level 25	2510-BED2	10	10.5	6.2	59%
Level 25	2510-BED3	10	8.9	8.9	100%

Total Area (m²)	**435**
Total Compliant Area (m²)	**403**
Total Compliant Area (%)	**93%**

4.6 Overall Residential Daylight Result – Summary Table

The below table summarises the total daylight availability in the bedrooms and living rooms of the residential apartments.

Zone	Total Area	Total Compliant Area	Compliance Percentage
Living Rooms	419	317	76%
Bedrooms	435	403	93%
Total	**855**	**720**	**84%**

5. Conclusion

Overall daylight availability output of the proposed mixed-use development is tabulated below:

Functional Space	Assessed Area (m^2)	Compliant Area (m^2)	% of Compliant	Green Star 12.1 Daylight Targeted Points
Commercial Space	1115.8	470.8	**60%**	**2**
Residential Space	855	720		
Total	**1970.8**	**1190.8**		

The modelling result has indicated 60% of the Green Star nominated spaces (commercial spaces and residential spaces) comply with Credit 12.1 daylight requirement, and hence 2 points can be targeted.

.

Appendix E – Stormwater Management Plan

IGS INTEGRATED GROUP SERVICES

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STORMWATER MANAGEMENT PLAN

300 City Road,
Southbank VIC 3006

Project No: 20018
Date: 04/12/2023

Level 4, 108 Elizabeth Street
Melbourne VIC 3000
Web: www.igs.com.au

Document Control

Version	Date	Author		Reviewer	
00	10/12/2020	Barmak Ibrahimi	BI	Slav Angelovski	SA
01	25/11/2022	Li Huan	LH	Slav Angelovski	SA
02	04/12/2023	Li Huan	LH	Slav Angelovski	SA

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Appendices

1 Confidentiality

1.1 Conferee

This entire document has been presented to Integrated Group Services (IGS) as **commercial-in-confidence** on the basis that it should not be disclosed in any part or whole to any third party without written consent from IGS.

This document contains:

- **Intellectual Property** – Material and design that are commercially sensitive intellectual property
- **Pricing Schedule** - Information from SPEL Total Stormwater and details about commercially sensitive pricing

1.2 Request for Information

Please direct all enquiries regarding this submission to:

Li Huan | ESD Leader
Integrated Group Services
Level 4, 108 Elizabeth Street
Melbourne Victoria 3000

Telephone: + 61 3 8609 6601
Mob: +61 403 188 167
Email: li.huan@igs.com.au

2 Executive Summary

Integrated Group Services (IGS) has been commissioned to prepare a Conceptual Stormwater Management Plan (CSMP) for the proposed precinct development located at 300 City Road Southbank, VIC.

The stormwater quality modelling was undertaken using the MUSIC version 6.2 software. The modelling results (see **Table 2.1**) indicate the 90%, 80%, 60% and 45% reduction targets for Gross Pollutants (GP), Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN) respectively can be achieved.

Table 2.1: Treatment Train Effectiveness

Pollutant	Inflows (kg/yr)	Outflows (kg/yr)	Reduction Achieved (%)	Reduction Target (%)
Flow (ML/yr)	0.88	0.445	**49.5**	0
Total Suspended Solids	183	21.2	**88.4**	80
Total Phosphorus	0.367	0.0481	**86.9**	60
Total Nitrogen	2.56	0.735	**71.3**	45
Gross Pollutants	31.9	0.355	**98.9**	90

Stormwater management for the site is achieved using the following devices:

- One (1) x SPEL Hydrosystem (HS – 400/1)
- 30kL Rainwater Tank

3 Overview

3.1 Introduction

This report has been prepared by Integrated Group Services (IGS) be considered part of a Development Application (DA) for a proposed precinct development located at 300 City Road Southbank, VIC. The site is located within the catchment of the Melbourne City Council.

3.2 Site Locality

The subject site is bounded by St. Hubert's Road to the north. Situated in Melbourne City Council the site has a total area of 0.151ha (see **Figure 3.1**).

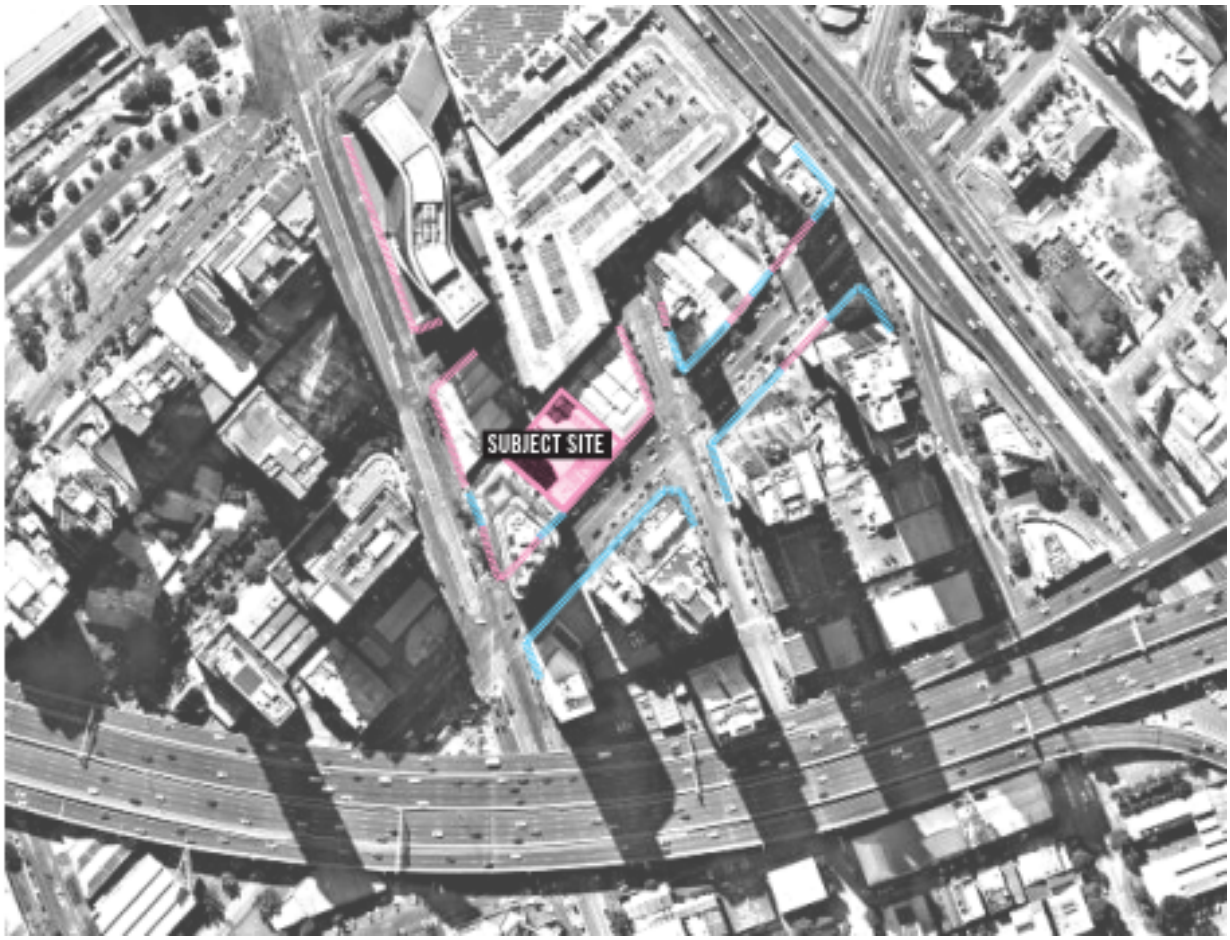
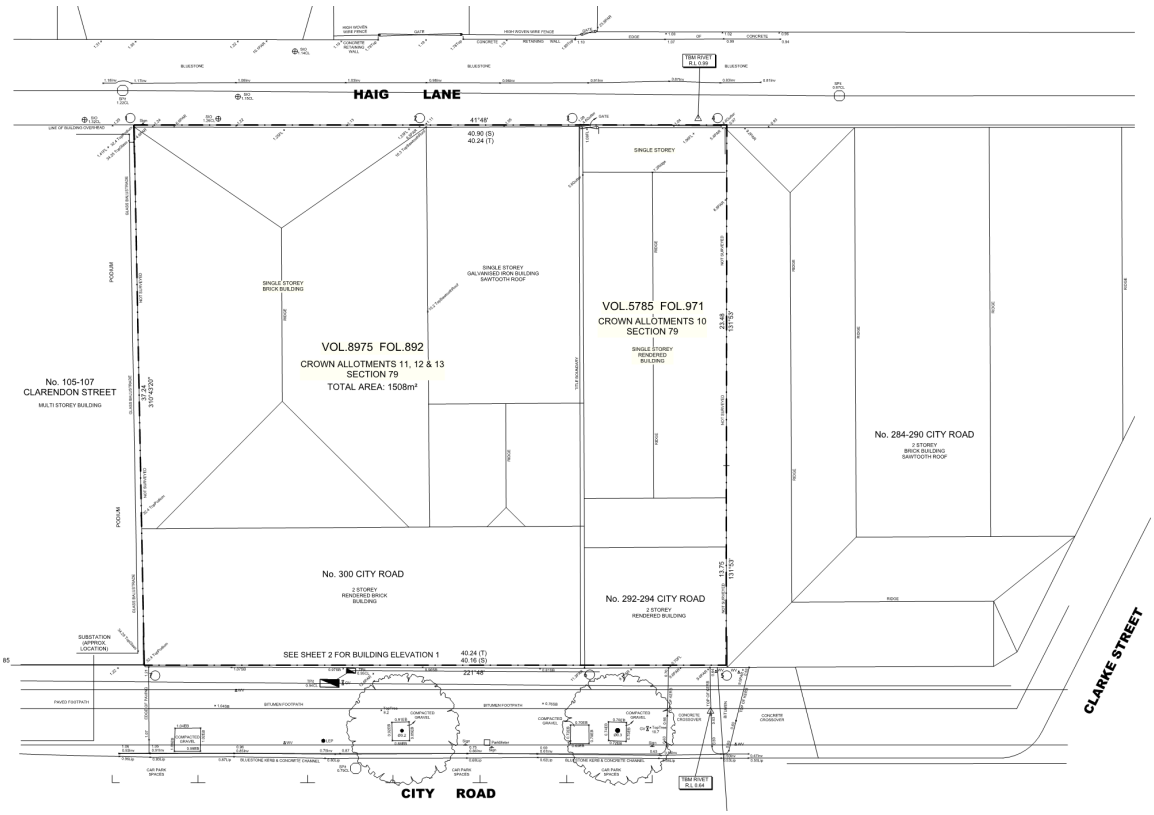


Figure 3.1 Site Location

3.3 Site Layout

The proposed development is presented on **Figure 3.2**.

Figure 3.2 Proposed Site Layout



4 Quality Management – Operational Controls

4.1 Water Quality Objectives

Melbourne Water (2018) requires treatment of stormwater so that annual pollutant loads achieve targets set out in the Best Practice Environmental Management Guidelines (BPEMG). These are:

- 80% reduction in Total Suspended Solids (TSS) from typical urban loads;
- 45% reduction in Total Nitrogen (TN) from typical urban loads;
- 60% reduction in Total Phosphorus (TP) from typical urban loads; and
- 90% reduction in Gross Pollutants (GP) from typical urban loads.

4.2 Treatment Train

Based on the site characteristics and the range of available Stormwater Quality Improvement Devices (SQIDs), this study has developed an overall concept that will satisfy the requirements of downstream environmental protection. **Figure 4.1** shows a schematic representation of the proposed treatment train elements.

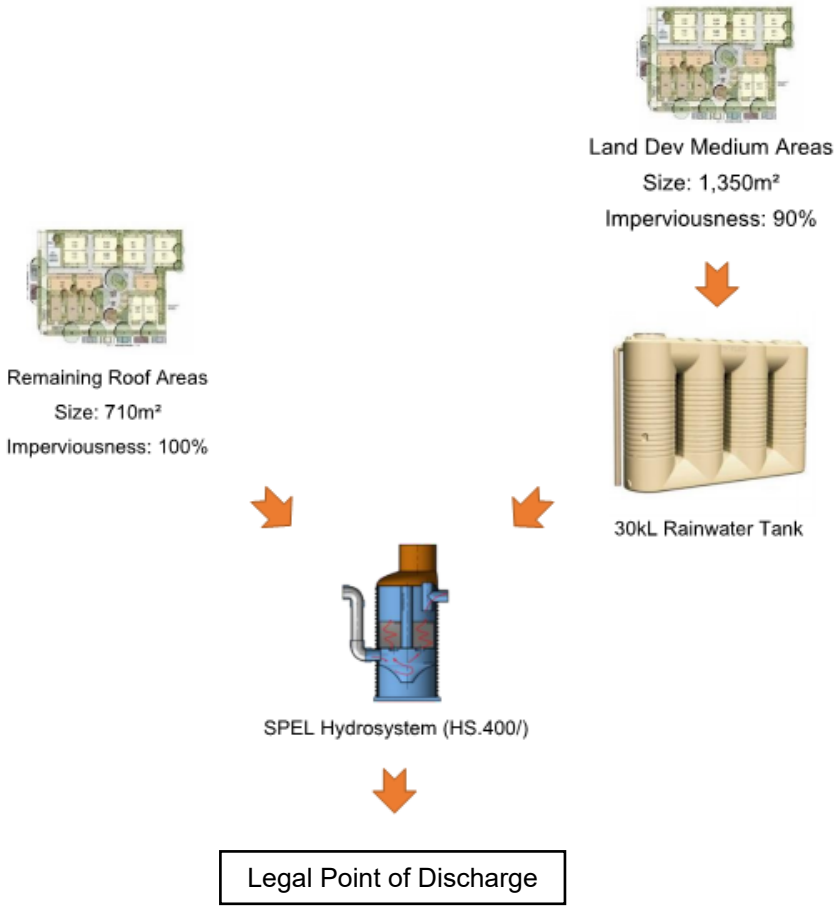


Figure 4.1 Treatment Train Schematic

4.3 SPEL Hydrosystem – General Information

SPEL Hydrosystem is a specialist stormwater filtration system that is purpose-built to reduce the footprint of WSUD on constrained projects.

This innovative approach to stormwater treatment uses an up-flow filtration process. With minimal head drop required between inlet and outlet, these devices are suitable for installation on flat sites or low gradient developments. The stormwater is treated within the unit by the following processes: sedimentation, filtration, adsorption, and precipitation. The Hydrosystem has been extensively laboratory and field tested for the removal of pollutants – including heavy metals, total suspended solids (TSS), and nutrients (Phosphorous and Nitrogen).

The treatment efficiencies have been tested for the following stormwater pollutants:

- Gross Pollutants tested efficiency - 100%
- Total Suspended Solids (TSS) - 85%
- Total Phosphorus (TP) – 66%
- Total Nitrogen (TN) – 43%
- Petroleum Hydrocarbon – 82%

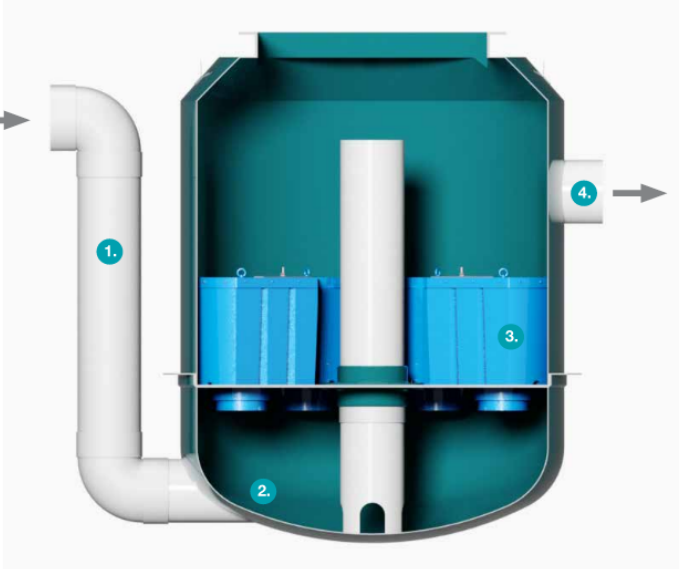
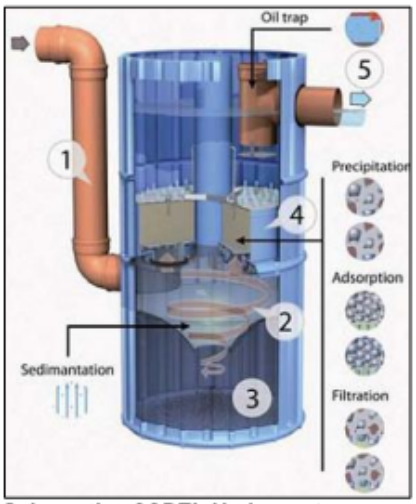


Figure 4.2: Cross section of the SPEL Hydrosystem

Function Principles:

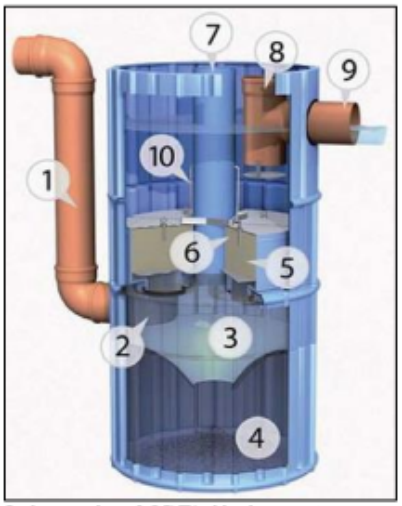
1. The rainwater from the connected area is fed into the basal section of the filter housing. The angled inlet generates a radial flow pattern.
2. The hydrodynamic separator converts turbulent waters into a radial laminar flow pattern, generating particle sedimentation, particularly of the sand fraction.
3. This takes place over an inlet to the lower section of the filter shaft. The sediment is retained in a silt trap chamber below the separator. The silt trap needs to be emptied out at intervals.
4. In the central section of the filter housing is the actual filter,
5. Filter Element: Metal. The filter element filters out the fine materials in an up-flow process and dissolved materials are precipitated and adsorbed. The filter can be backwashed. When exhausted the filter is easily exchanged.
6. The filter element is easily pulled up via shaft openings.
7. Above the filter element is the clean water. It passes via a blockade of light substances and then flows over the outlet into a soak away.



Schematic of SPEL Hydrosystem Process

Product Components:

1. Rainwater Inlet (DN 200).
2. Angled Inlet.
3. Separator Chamber.
4. Silt Trap.
5. Filter Elements (4 No.).
6. Removal Device for Filter Element.
7. Overflow.
8. Blockade of light substances and suction pipe
9. Outlet to storage or to waste.
10. Locking buoyancy control system



Schematic of SPEL Hydrosystem Components

5 Quality Analysis – MUSIC

Water quality modelling has been undertaken of the post-development (mitigated) scenario using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software to demonstrate the load based reduction targets are achieved. A stormwater treatment train has been developed and modelled to determine the effectiveness of the proposed system in achieving the relevant water quality objectives.

5.1 Rainfall and Evapotranspiration Parameters

Table 5.1 summarized the meteorological and rainfall-runoff data used in the MUSIC model.

Table 5.1 Meteorological and Rainfall Runoff Data

Parameter	Value
Rainfall station	86071 – Melbourne City
Time step	6 minute
Modelling period	January 1966 – December 1966
Mean annual rainfall (mm)	678 mm
Evapotranspiration	994 mm

5.2 Catchment Parameters

Based on the proposed land uses within the development, the subject site has been modelled as an urban source node. The rainfall-runoff parameters and pollutant generation parameters are based on parameters recommended by Melbourne Water **(2018) (Tables 5.2 and 5.3).**

Table 5.2 Rainfall Runoff Parameters

Parameter	All Nodes
Rainfall threshold (mm)	1.0
Soil storage capacity (mm)	120
Initial storage (% capacity)	25
Field capacity (mm)	50
Infiltration capacity coefficient a	200
Infiltration capacity exponent b	1
Initial depth (mm)	10
Daily recharge rate (%)	25
Daily base flow rate (%)	5
Daily deep seepage rate (%)	0

Table 5.3: Pollutant Export Parameters for Urban Sites

Catchment ID		Total Suspended Solids [log (mm/L)]		Total Phosphorous [log (mm/L)]		Total Nitrogen [log (mm/L)]	
		Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Landscape	Storm Flow Concentration	1.9	0.333	-0.7	0.242	0.243	0.182
	Base Flow Concentration	0.96	0.401	-0.731	0.36	-0.566	0.363
Hardstand	Storm Flow Concentration	2.431	0.333	-0.301	0.242	0.343	0.205
	Base Flow Concentration	0	0	0	0	0	0
Roof	Storm Flow Concentration	1.301	0.333	-0.886	0.242	0.301	0.205
	Base Flow Concentration	0	0	0	0	0	0

5.3 Treatment Node Parameters

The following sections describe the modelling parameters applied to MUSIC for each of the treatment nodes included as part of the water quality assessment.

5.4 SPEL Hydrosystem Parameters

SPEL engages ongoing site tests for water quality of the Stormceptor devices continually across a wide spectrum of catchments on Australia`s east coast. The SPEL Stormceptor parameters utilised within MUSIC are summarised in **Table 5.6:**

Table 5.6 SPEL Hydrosystem Treatment Node Parameters

Catchment ID	SPEL Hydrosystem
Are the proposed pollutant reduction efficiencies independently verified using a method suited to local conditions?	Yes
Does the data provided include performance results under dry weather flows (to account for potential pollutant leeching?)	Yes
It the assumed high-glow bypass rate consistent with manufacturer specifications?	Yes
High Flow by-pass (m^3/s)	0.0025
Low Flow	0.000
TSS Input (mg/L) Output (mg/L)	1000 150
TN Input (mg/L) Output (mg/L)	100 34
TP Input (mg/L) Output (mg/L)	15 0
Gross Pollutants Input (mg/L) Output (mg/L)	15 0

5.5 MUSIC Results

Results of the MUSIC modelling for the treatment train effectiveness are summarised in **Table 5.6**. The results indicate the 80%, 45%, 45% and 70% reduction target for TSS, TP, TN and gross pollutants respectively are achieved. A screen capture of the MUSIC modelling results is included as **Figure 5.2**.

Table 7.6: Treatment Train Effectiveness

Pollutant	Inflows (kg/yr)	Outflows (kg/yr)	Reduction Achieved (%)	Reduction Target (%)
Flow (ML/yr)	0.88	0.44.5	**49.5**	0
Total Suspended Solids	183	21.2	**88.4**	80
Total Phosphorus	0.367	0.0481	**86.9**	60
Total Nitrogen	2.56	0.735	**71.3**	45
Gross Pollutants	31.9	0.355	**98.9**	90

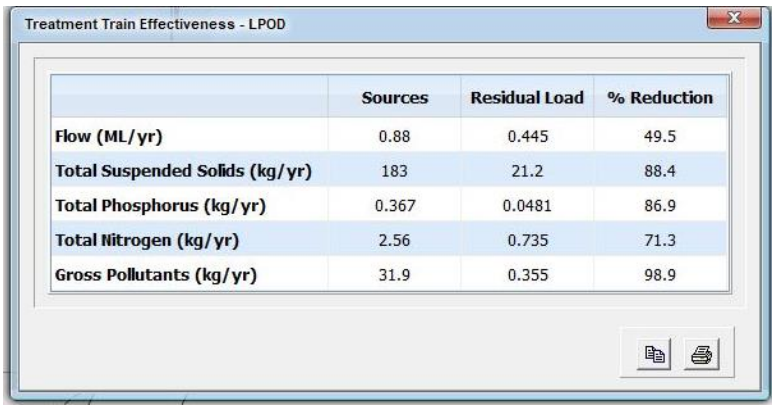


Figure 5.2: Treatment Train Effectiveness

6 Summary and Recommendation

Based on the water quality assessment using the MUSIC software, it is found that the pollutant reduction targets can be achieved by adopting the SQIDs specified in **Table 6.1.**

Table 6.1: Recommended Stormwater Quality Improvement Devices

Stormwater Quality Improvement Device	Quantity
SPEL Hydrosystem (HS 400/1)	1
30kL Rainwater Tank	1

The recommended SQIDs are designed to capture stormwater at the downstream end of the drainage network and treat the runoff prior to discharging into the local waterway. The pollutant reduction targets achieved (as modelled in MUSIC) are summarised in Table 6.2.

Table 6.2: MUSIC modelling results

Pollutant	Inflows (kg/yr)	Outflows (kg/yr)	Reduction Achieved (%)	Reduction Target (%)
Flow (ML/yr)	0.88	0.44.5	**49.5**	0
Total Suspended Solids	183	21.2	**88.4**	80
Total Phosphorus	0.367	0.0481	**86.9**	60
Total Nitrogen	2.56	0.735	**71.3**	45
Gross Pollutants	31.9	0.355	**98.9**	90

7 References

Melbourne Water (2018) *MUSIC Guidelines* – input Parameters and modelling approaches for MUSIC user in Melbourne Water's services area 2018.

Appendix A – SPEL Hydrosystem Product Brochure

SPEL Hydrosystem

Cartridge filter for tertiary stormwater treatment

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SPEL Hydrosystem is a specialist stormwater filtration system that is purpose-built to reduce the footprint of WSUD on constrained projects. Manufactured, designed, and engineered in Australia using fibre-reinforced polymer (FRP) this generational asset is supplied with a 25-year warranty & 100-year design life.

This innovative approach to stormwater treatment uses an up-flow filtration process. With minimal head drop required between inlet and outlet, these devices are suitable for installation on flat sites or low gradient developments. The stormwater is treated within the unit by the following processes: sedimentation, filtration, adsorption, and precipitation.

The Hydrosystem has been extensively laboratory and field tested for the removal of pollutants – including heavy metals, total suspended solids (TSS), and nutrients (Phosphorous and Nitrogen).

APPLICATIONS

- Car parks & shopping centres
- Council depots
- Industrial estates
- Heavy vehicle maintenance
- Transport depots & loading bays
- Tunnels
- Highways & transport corridors
- Recycling yards
- Airport aprons & tarmacs

FEATURES

- Manufactured, designed, and engineered in Australia at our FRP production facility.
- Lightweight, easy to install and minimal on-site lifting requirements (no crane required).
- Reduced on-site footprint.
- Up-flow filtration process suitable for flat sites requiring only 250 mm of hydraulic head.
- Scalable sizes with variable cartridge configurations from 1 to 39 filter cartridges.
- Treatment flow rates from 2.5 litres per second (LPS) to 156 litres per second installed in offline configuration.
- Custom-designed inline systems available.

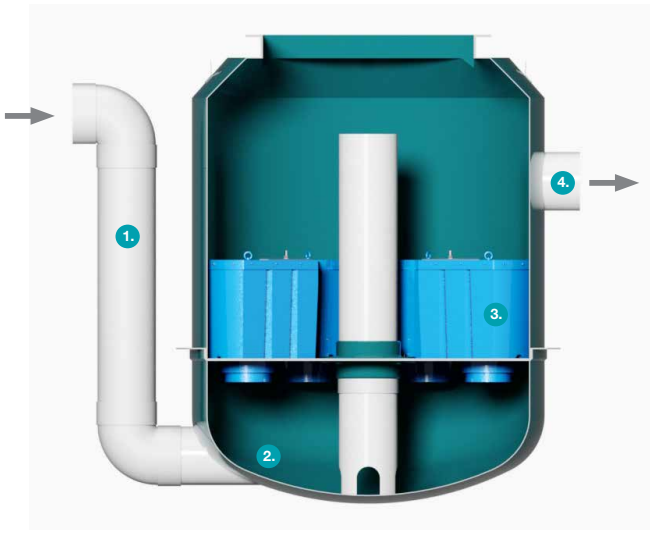
SPECIFICATIONS

Model	NO. CARTRIDGE	TFR	ID (m)	Height (m)	Inlet/ Outlet (mm)
400 SERIES					
HS.400/1	1	2.5 LPS	1.13	1.5	100
HS.400/2	2	5 LPS			
HS.400/3	3	7.5 LPS			
1200 SERIES					
HS.1200/4	4	12 LPS	1.20	2.60	225
1500 SERIES					
HS.1500/4	4	16 LPS	1.50	2.00	225
HS.1500/5	5	20 LPS			
HS.1500/6	6	24 LPS			
1850 SERIES					
SHS.1850/7	7	28 LPS	1.85	2.00	225
2200 SERIES					
HS.2200/7	7	28 LPS	2.20	2.50	225
HS.2200/8	8	32 LPS			
HS.2200/9	9	36 LPS			
2500 SERIES					
HS.2500/10	10	40 LPS	2.50	2.70	300
HS.2500/11	11	44 LPS			
HS.2500/12	12	48 LPS			
HS.2500/13	13	52 LPS			
HS.2500/14	14	56 LPS			
HS.2500/15	15	60 LPS			
HS.2500/16	16	64 LPS			
3000 SERIES					
HS.3000/17	17	68 LPS	3.00	2.85	300
HS.3000/18	18	76 LPS			
HS.3000/19	19	76 LPS			
HS.3000/20	20	80 LPS			
HS.3000/21	20	84 LPS			
3500 SERIES					
HS.3500/22	22	88 LPS	3.50	2.95	375
HS.3500/23	23	92 LPS			
HS.3500/24	24	96 LPS			
HS.3500/25	25	100 LPS			
HS.3500/26	26	104 LPS			
HS.3500/27	27	108 LPS			
HS.3500/28	28	112 LPS			
HS.3500/29	29	116 LPS			
HS.3500/30	30	120 LPS			
HS.3500/31	31	124 LPS			
4000 SERIES					
HS.4000/32	32	128 LPS	4.00	3.25	375
HS.4000/33	33	132 LPS			
HS.4000/34	34	136 LPS			
HS.4000/35	35	140 LPS			
HS.4000/36	36	144 LPS			
HS.4000/37	37	148 LPS			
HS.4000/38	38	152 LPS			
HS.4000/39	39	156 LPS			

Tested Treatment Efficiencies*

Pollutant	Efficiency
Gross Pollutants (GP)	100%
Total Suspended Solids (TSS)	85%
Total Phosphorus (TP)	66%
Total Nitrogen (TN)	43%
Petroleum Hydrocarbon	82%

*Contact Spel to confirm approved performance for the project LGA

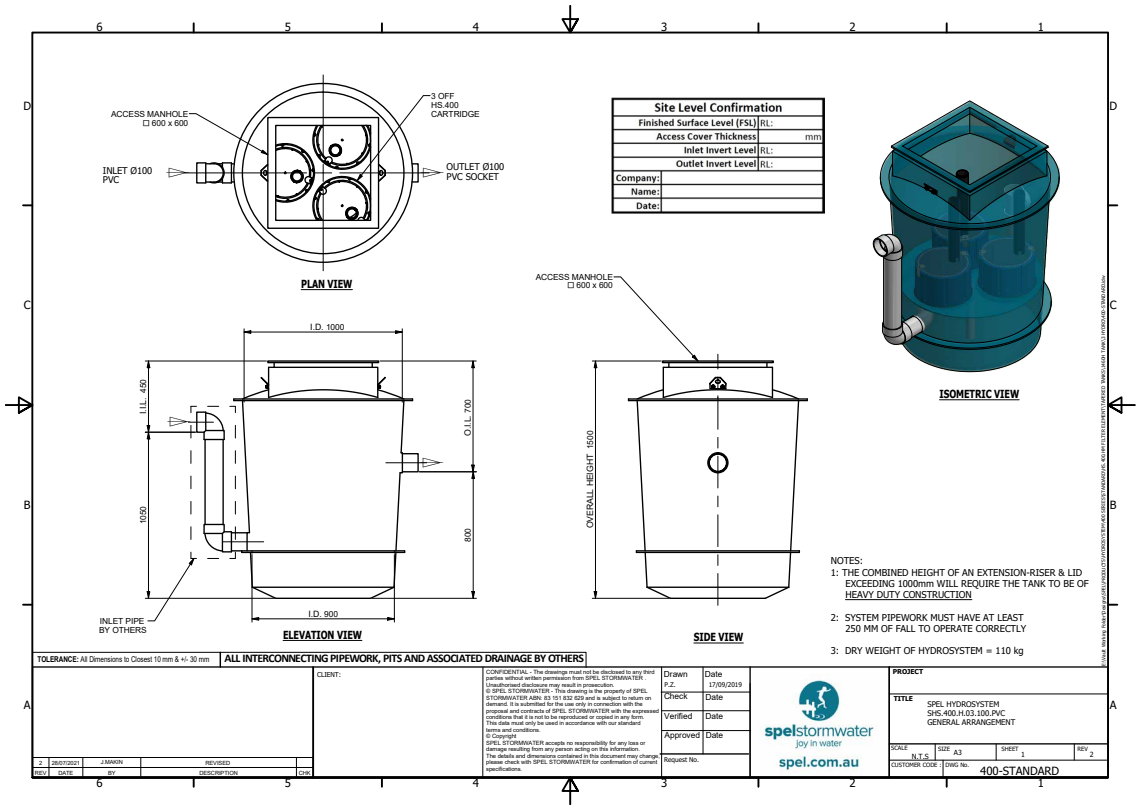


Operating System

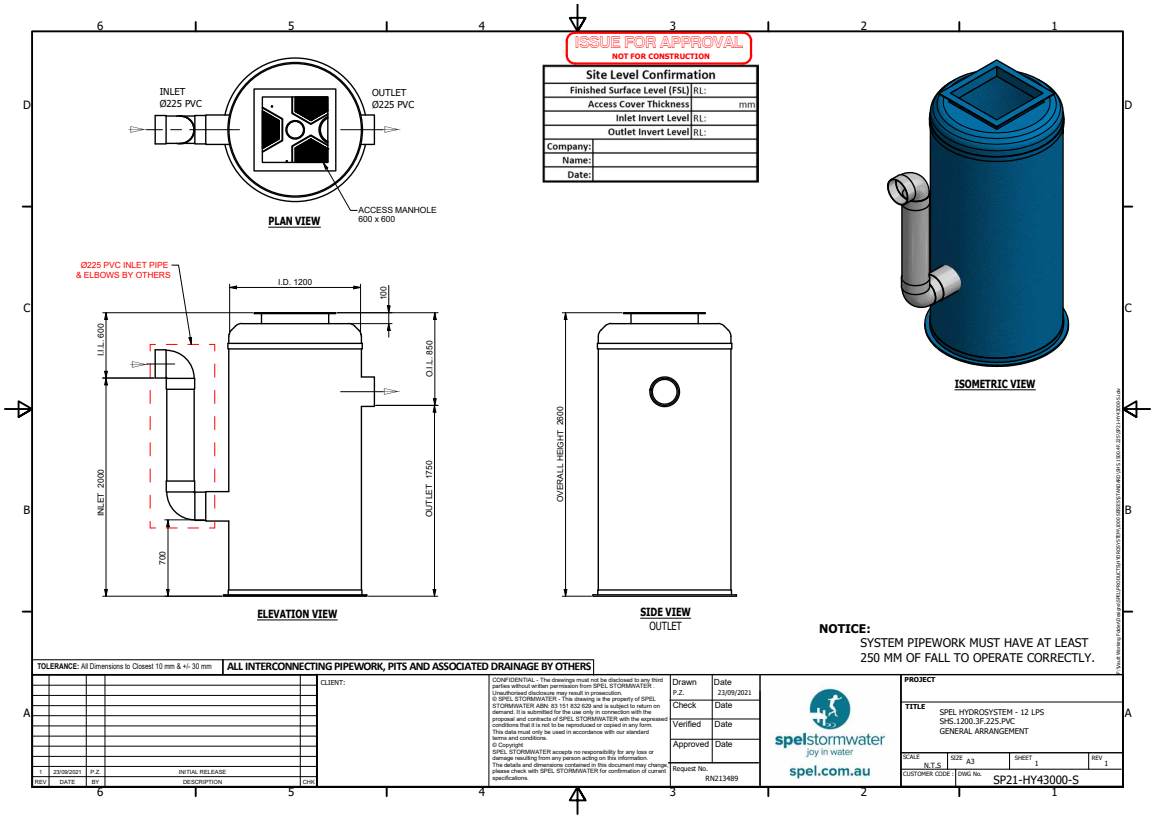
1. Stormwater from catchment enters the offline Hydrosystem inlet.
2. Sediment is retained within the sump area.
3. Filter cartridges operate in an up-flow process. The fine sediment is physically removed, and dissolved pollutants are precipitated and adsorptively bound to the filtration media.
4. Treated water flows from cartridges to outlet and into downstream water network.

DRAWINGS

Model HS.400

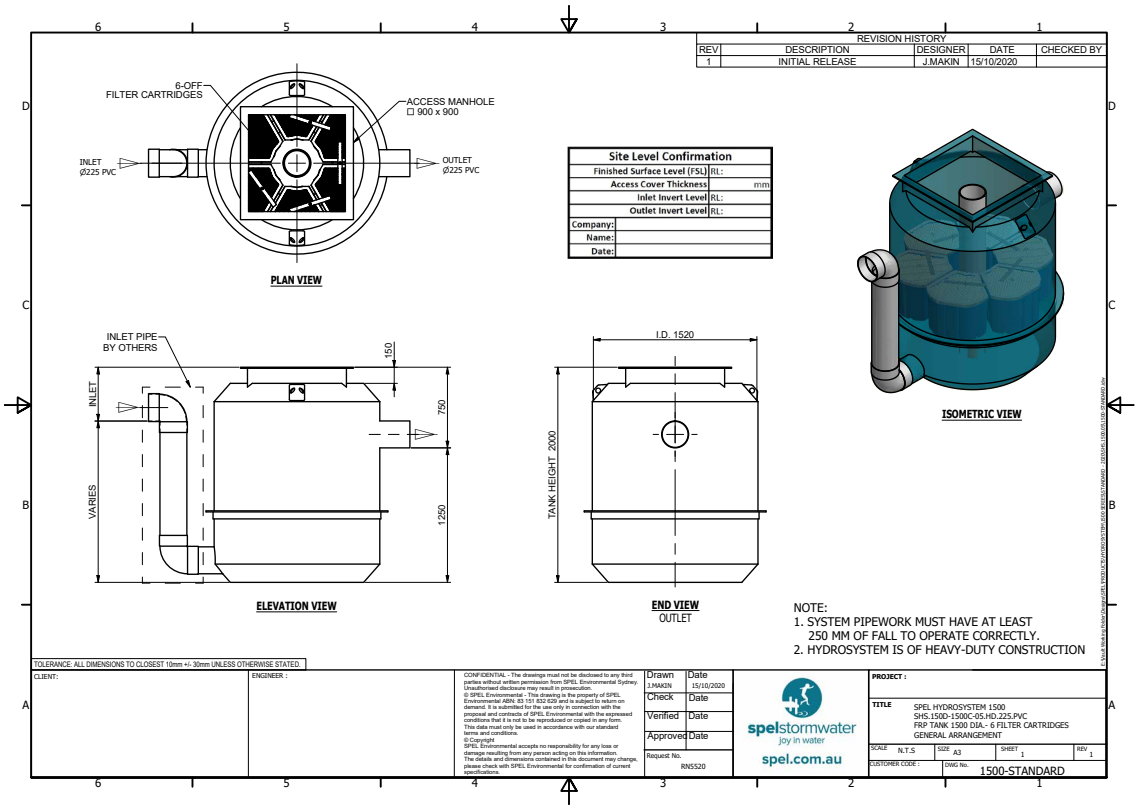


Model HS.1200

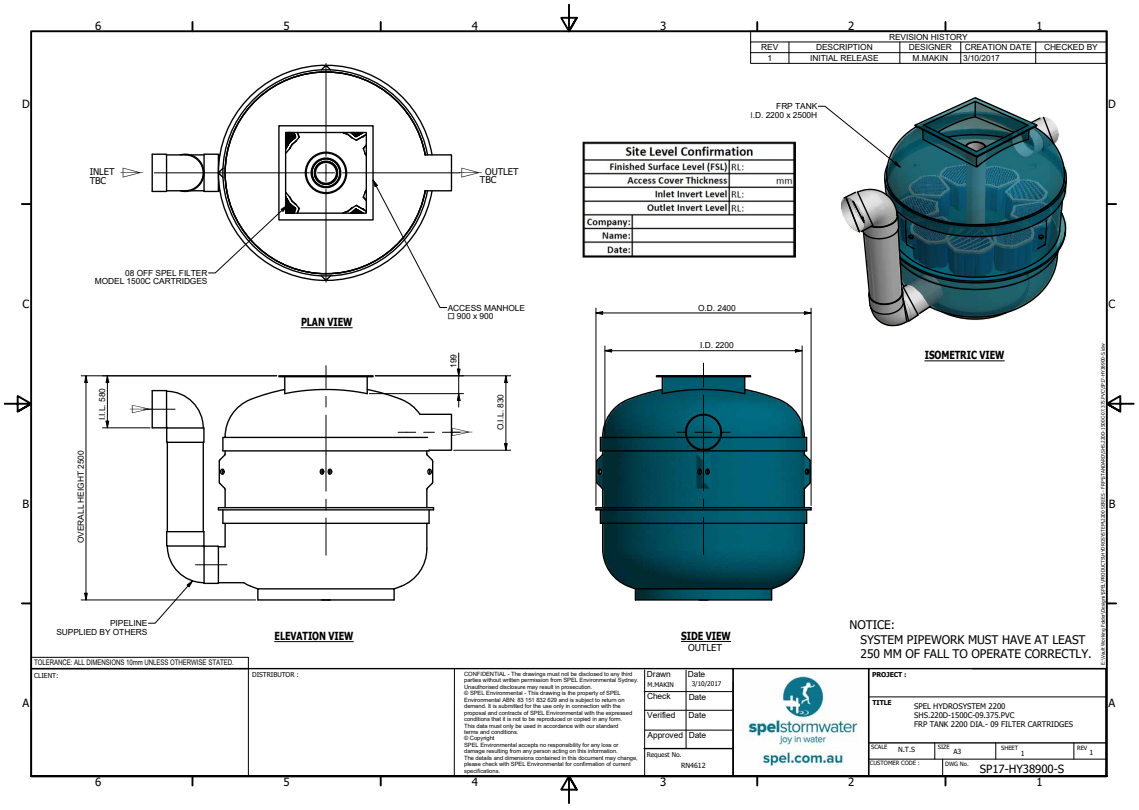


DRAWINGS

Model HS.1500

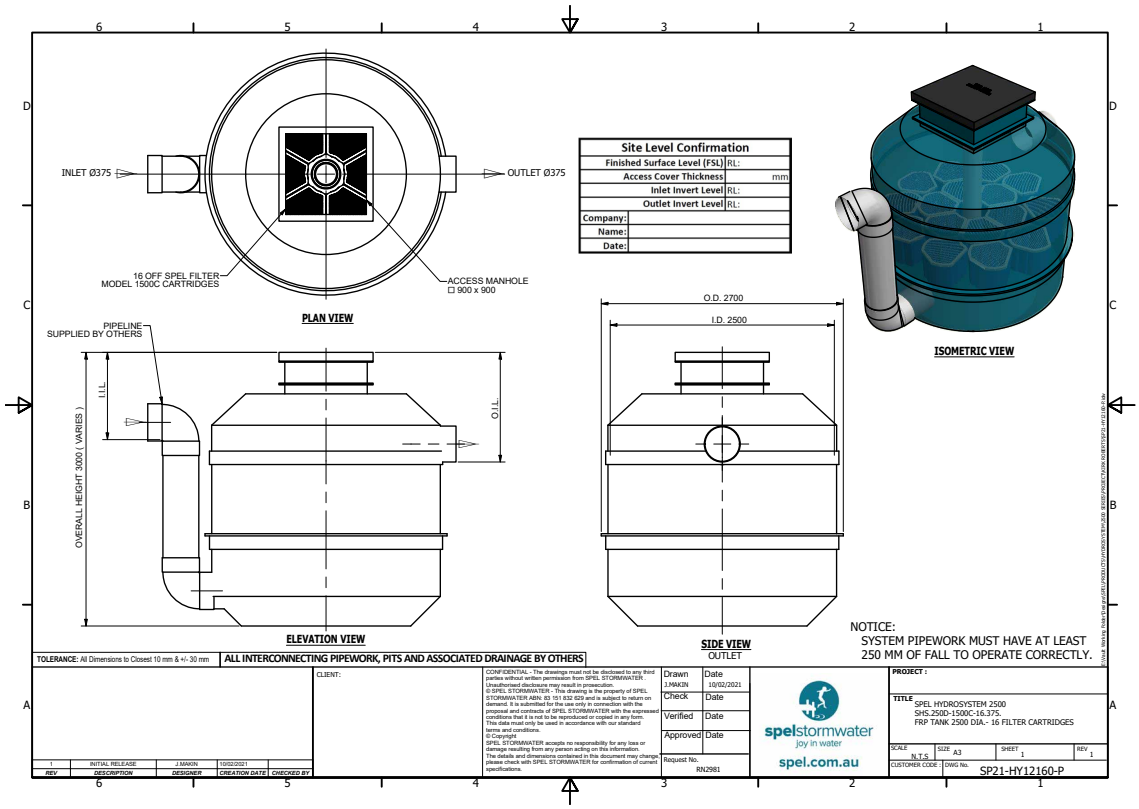


Model HS.2200

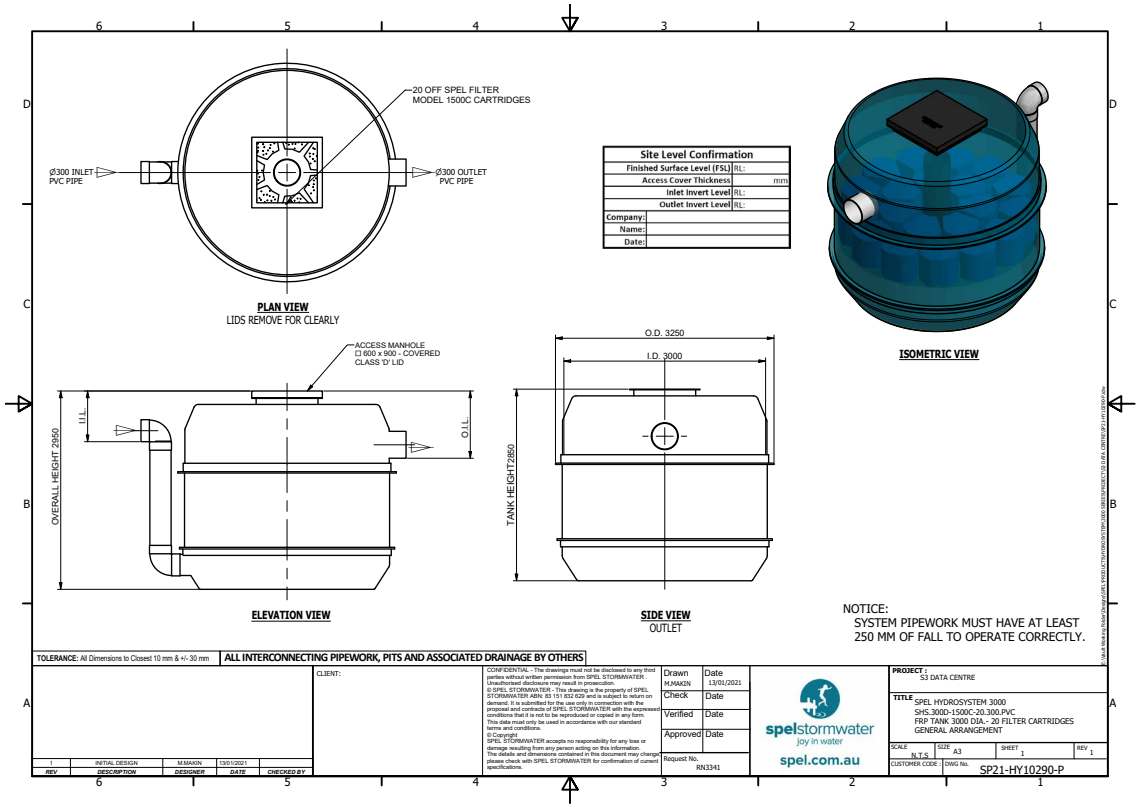


DRAWINGS

Model HS.2500

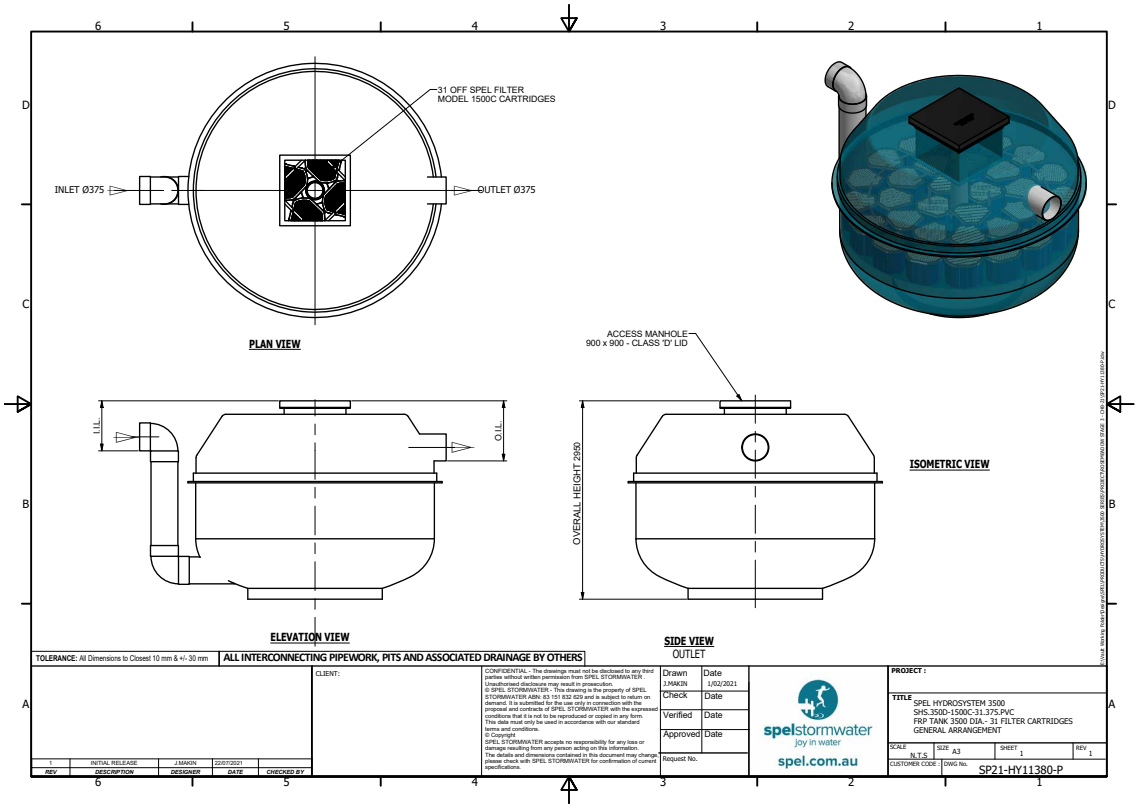


Model HS.3000

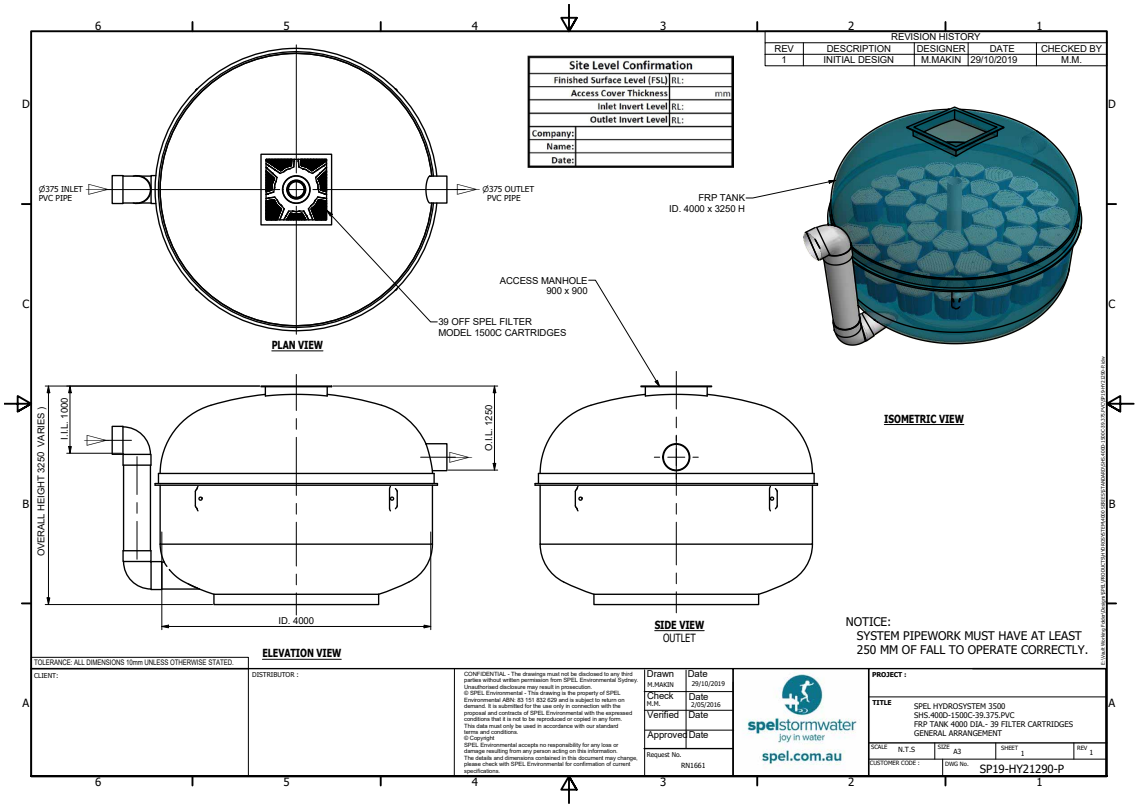


DRAWINGS

Model HS.3500



Model HS.4000



SPEL Hydrosystem

Cartridge filter for tertiary stormwater treatment

NSW HEAD OFFICE 100 Silverwater Rd, Silverwater NSW 2128 PO Box 7138, Silverwater NSW 1811 P: +61 2 8705 0255 P: 1300 773 500 E: nsw.sales@spel.com.au	**QLD MAIN OFFICE** 130 Sandstone Pl, Parkinson QLD 4115 P: +61 7 3271 6960 P: 1300 773 500 I E: qld.sales@spel.com.au **QLD SUNSHINE COAST BRANCH** 19-27 Fred Chaplin Circuit, Bells Creek, QLD 4551 P: 1300 773 500 I E: qld.sales@spel.com.au	**VIC & TAS OFFICE** 897 Wellington Rd Rowville VIC 3178 P: +61 3 5274 1336 P: 1800 810 139 I E: sales@spel.com.au **VIC GEELONG BRANCH** 70 Technology Close, Corio, P: +61 3 5274 1336 P: 1800 810 139 I E: sales@spel.com.au
SA OFFICE 9 Hampden Road, Mount Barker SA 5251 P: 1300 773 500 E: sales@spel.com.au	**WA OFFICE** 2 Modal Crescent Canning Vale WA 6155 P: +61 8 9350 1000 P: 1800 335 550 E: sales@spel.com.au	**NZ OFFICE AUCKLAND** 100 Montgomerie Road Airport Oaks P: +64 9 276 9045 E: sales@spel.com.au
NZ OFFICE WANGANUI 43 Heads Road Wanganu New Zealand P: +64 6 349 0088 I E: sales@spel.com.au	**NZ OFFICE WELLINGTON** 41 Raiha St Porirua Wellington New Zealand P: +64 4 239 6006 I E: sales@spel.com.au	**PHILIPPINES OFFICE METRO MANILA** Unit 2210 Lumiere Residences Pasig Boulevard, Pasig City P: +61 2 8705 0255 P: 1300 773 500 E: sales@spel.com.au
SINGAPORE OFFICE 512 Chai Chee Lane, #06-04 Bedok Industrial Estate, Singapore 469028 P: +61 2 8705 0255 P: 1300 773 500 I E: sales@spel.com.au	**UK OFFICE UNITED KINGDOM** Lancaster Rd Shrewsbury SY1 3NQ UK P: +44 (0)1743 445200 I E: sales@spel.com.au	**USA OFFICE CLEVELAND** 4548 Industrial Parkway Cleveland, Ohio 44135 P: +61 2 8705 0255 P: 1300 773 500 E: sales@spel.com.au

We believe clean water is a right not a privilege and we work to ensure a joy in water experience for you with your children and grandchildren.

spelstormwater
joy in water

100 Silverwater Rd, Silverwater NSW 2128 Australia
Phone: (02) 8705 0255
Email: sales@spel.com.au
spel.com.au

Appendix B – SPEL Device Maintenance Agreement

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VIC 21-1217 MC

292-294 & 296-306 CITY ROAD SOUTHBANK VIC

Estimated and drafted on this date:	22 November 2022

VIC and TAS Office

70 Technology Close, Corio,
VIC 3214
P 1300 773 500
E maintenance@spel.com.au

PHONE: 1300 773 500
EMAIL: maintenance@spel.com.au
OFFICE: 70 Technology Close, Corio, VIC 3214
www.spel.com.au

SPEL STORMWATER QUALITY TREATMENT DEVICE MAINTENANCE AGREEMENT

FOR

VIC 21-1217 MC - 292-294 & 296-306 CITY ROAD SOUTHBANK VIC

This Equipment Maintenance Agreement (the "Maintenance Agreement") is made and effective __/ __/ ____

BETWEEN: SPEL Total Stormwater (the "Service Provider"), of 70 Technology Close, Corio, VIC 3214 (ABN:32 379 724 600) hereafter known as SPEL

AND: _____ (the "Client") of _____

SUMMARY

This 10-year maintenance contract covers the monitoring and servicing of the SPEL Hydrosystem at 292-294 & 296-306 City Road Southbank VIC

Where the Client has requested the provision of maintenance and the Service Provider is willing to provide such services as per the terms of this agreement both parties agree to:

1. WARRANTY

SPEL operational warranty on the SPEL Hydrosystem is in place for as long as there is an active maintenance regime with SPEL on the specified units.

- Excludes construction silt loads
- Excludes unusual/accidental silt loads
- SPEL maintains the site

Goods sold shall only have the benefit of a manufacturer's warranty if the purchaser has complied with the manufacturer's instructions in relation to installation, maintenance and operation of the said goods.

2. MAINTENANCE CALLS

Service Provider agrees to provide maintenance service including two [2] times maintenance visit annually and interim calls as required at the installation address specified above on the equipment listed. All charges specified are those currently in effect and are subject to change only at the time of subsequent annual renewal. The new charges shall become effective upon the date specified in the renewal invoice. Client calls hereunder are restricted to the normal working hours of the Service Provider.

All service commenced outside of Service Provider's normal working hours will be charged at published rates for service time and expense only.

3. SERVICES

The following services are included:

Maintenance Summary

The SPEL Hydrosystem system will be inspected per visit.

The SPEL Hydrosystem change out maintenance process comprises the removal and replacement of each SPEL Hydrosystem cartridge and the cleaning of the silt out of the vault or manhole. In the event these works are required, Client will be notified accordingly of the additional cost of vacuum truck prior to works being undertaken.

The SPEL personnel that enter the tank [if necessary] will be trained in confined space entry.

Life Cycle Cost (LCC) – The maintenance requirements are very site specific and relate to the sediment load and sediment characteristics.

PHONE: 1300 773 500
EMAIL: maintenance@spel.com.au
OFFICE: 70 Technology Close, Corio, VIC 3214
www.spel.com.au

Maintenance Triggers
The basic activities included in the maintenance contract are as follows:

- If there is silt build up, it will need to be vacuumed out as an additional cost. Costing to be confirmed at time of activity and will be additional cost to the standard contract value outlined below.
- TSS accumulation in the filters is what dictates the life cycle of individual filters.

Optimum performance of the equipment covered by this Agreement can be expected only if supplies provided by, or meeting the specifications of Service Provider are used. Service Provider shall have full and free access to the equipment to provide service thereon. If persons other than Service Provider's representatives perform maintenance or repairs, and as a result further work is required by Service Provider to restore the equipment to operating condition, such repairs will be billed at Service Provider's published time and material rates then in effect.

4. ANNUAL RATE FOR SERVICES
4.1 INCLUSIONS

ACTIVITY	FREQUENCY [subject to site characteristics]	COST BREAK-DOWN [subject to CPI index]
Inspection and Maintenance: 1 cartridge Hydrosystem 400/1 - SPEL technician/s onsite, to carry out maintenance of stormwater treatment system, tank and filters, test sludge levels and provide detailed report.	Every six months	$722.00 per annum
Replacement Factors: -SPEL Hydrosystem replacement -Allowance for 1 time replacement of Hydrosystem cartridges throughout the 10-year period. -All old cartridges removed, disposed and replaced. Vault to be cleaned out via vacuum truck prior to installation of new replacements.	Based on experience we estimate the life of the SPEL Hydrosystem Cartridges to be between 5 – 7 years, subject to silt condition on the site.	1 x Labour, travel expenses 1 x SPEL 400/1 Hydrosystem Cartridges Replacement Total once in 10 years = $2,740.00 Per annum = $274.00
SUMMARY		
Replace the Hydrosystem Cartridges in accordance with above in 10 years, turnkey operation		
• Inspection and Maintenance: $722.00 per annum • Replacement Factors: $274.00 per annum • Total Investment Value Per Annum: $996.00 + GST		

The annual rate for maintenance of SPEL Hydrosystem for a 10-year term is $996.00 + GST and shall be paid upon receipt of invoice. The annual rate shall be indexed by CPI + 1% at each annual renewal date. Any payment not made by the 30th day of the month shall be considered overdue and in addition to Service Provider's other remedies, Service Provider may levy a late payment charge equal to 4% per month on any overdue amount. SPEL to send maintenance report per service.

PHONE: 1300 773 500
EMAIL: maintenance@spel.com.au
OFFICE: 70 Technology Close, Corio, VIC 3214
www.spel.com.au

4.2 EXCLUSIONS

ACTIVITY	FREQUENCY [subject to site characteristics]	COST BREAK-DOWN [subject to CPI index]
Vacuum out, removal and disposal of pollutants	When necessary, based on the maintenance inspection and report	**This is an additional cost to the regular maintenance contract and has not been included in the annual rate indicated above.** Costing to be confirmed at time of activity based on extent of pollutants removed and disposed.

5. PAYMENTS

For service as specified above on the equipment listed, the undersigned Client agrees to pay in advance the total annual charge specified above to Service Provider, in accordance with the terms specified on the face of the invoice. There shall be added to the charges provided for in this Agreement amounts equal to any taxes, however designated, levied or based on such charges or on this Agreement, or on the services rendered or parts supplied pursuant hereto, including GST.

6. BINDING AGREEMENT

The undersigned Client represents that he is the owner of the equipment, or that they have the owner's authority to enter into this agreement.

This Agreement is subject to acceptance by Service Provider. It takes effect on the date written above and continues in effect for one year and will remain in force thereafter, with automatic annual renewal at the indexed rates, until cancelled in writing by either party or at the end of contract period – whichever is earlier.

PHONE: 1300 773 500
EMAIL: maintenance@spel.com.au
OFFICE: 70 Technology Close, Corio, VIC 3214
www.spel.com.au

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day and year first above written.

Client Signature

_____
Authorized Signature

Name:

Date:

Billing Entity:

ABN:

Contact:

Phone:

Billing address:

Accounts Email:

SPEL Total Stormwater
70 Technology Close, Corio, VIC 3214

_____
Authorized Signature

Name:

Date: