ADP
Consulting : Engineering

50 Queens Road

Sustainability Management Plan

Prepared for: Altis

Project No: MEL3110
Date: 28 June 2024
Revision: 13

ADP Consulting : Engineering

Project:	50 Queens Road
Location:	50 Queens Road, South Melbourne, VIC, 3004
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Project No:	MEL3110
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Rev	Date	Comment	Author	Signature	Technical Review	Signature	Authorisation & QA	Signature
01	20/5/22	Town Planning	Thomas Miers	TM	Alex Sear	AS	Alex Sear	AS
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04	29/8/22	Response to Council ESD Referral Comments	Thomas Miers	TM	Alex Sear	AS	Alex Sear	AS
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06	21/07/23	Bike Park error correction	Thomas Miers	TM	Alex Sear	AS	Alex Sear	AS
07	10/10/23	Condition 1 Submission	Thomas Miers	TM	Alex Sear	AS	Alex Sear	AS
08	18/10/23	Preliminary Urban Heat Island	Max Anderson	MAX	Thomas Miers	TM	Alex Sear	AS
09	24/10/23	WSUD Report Update	Max Anderson	MAX	Thomas Miers	TM	Alex Sear	AS
10	30/10/23	Pool Efficiency Updates	Max Anderson	MAX	Thomas Miers	TM	Alex Sear	AS
11	14/03/24	Apartment Remix	Max Anderson	MAX	Thomas Miers	TM	Thomas Miers	TM
12	11/04/24	Green Star reference removed	Max Anderson	MAX	Thomas Miers	TM	Thomas Miers	TM
13	28/06/2024	S87A Drawing update	Max Anderson	MAX	Thomas Miers	TM	Thomas Miers	TM

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Executive Summary

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The objective of this report is to describe how best practice ESD will be incorporated in the development, including targets and proposed design approaches, and to demonstrate that the development meets or exceeds the standards required by the Melbourne City Council (MCC) Planning Scheme.

The objective of this report is to describe how best practice ESD will be incorporated in the development, including targets and proposed design approaches, and to demonstrate that the development meets or exceeds the standards required by the Port Phillip City Council (PPCC) Planning Scheme.

Port Phillip Planning Scheme

The site is situated in Melbourne within the municipal boundaries of the City of Port Phillip. The City of Port Phillip has objectives and strategies relating to ESD which are contained in the Planning Scheme;

- Clause 22.12 – Stormwater Management (Water Sensitive Urban Design)
- Clause 22.13 – Environmentally Sustainable Development

These policies and objectives have been taken into consideration throughout this assessment and in our advice given to the applicant.

Overall, the proposed ESD initiatives of this development will meet Council's overarching goal of promoting sustainable design and buildings.

Environmentally Sustainable Development (ESD) Approach

The project approach includes the following targets as identified in the policy requirements, statutory requirements and the project brief:

- A net zero ready development
- An average NatHERS rating of 7.5-star across the development
- 10% improvement on NCC energy efficiency requirements for non-residential areas of the development
- Best practice stormwater pollutant reduction

Change Log (20240403)

The following table highlights the key changes between Revision 10 of the SMP (previous) and Revision 11 of the SMP

Change	Causation	Section of Relevance	Date of Change
MUSIC Analysis results	Apartment Remix: Number of Expected Occupants in the building has decreased, and thus the demand for water from the rainwater tanks has also decreased. The Stormwater Management Plan has been updated to accommodate this change	Appendix A - Stormwater Management Plan	14/03/2024
NatHERS Report	Apartment Remix: Apartment layouts, and density of apartment types has changed with the release of new architectural plans. NatHERS analysis and results have been updated to reflect new apartments	Appendix D - Preliminary NatHERS	14/03/2024
Transport Calculator	Apartment Remix: The Number of apartments has increased, alongside the number of carparks and bicycle parks as well. This has changed the overall expected balance of transport utilisation in the building.	2.4 - Transport	14/03/2024
Bike Parks	Apartment Remix: The number of apartments has increased, meaning the number of bike parks under council and green star has also increased. Bike Storage and	2.4.2 - Bicycle storage	14/03/2024
Green Star	References to Green star have been removed from the SMP at the request of the ESD officer.	Entire Document	03/04/2024

1. Introduction

The following report provides an overview of the environmentally sustainable development (ESD) strategy for the proposed build-to-rent development at 50 Queens Road, Melbourne, within the municipal boundaries of the City of Melbourne.

The objective of this report is to describe how best practice ESD will be incorporated in the development, including targets and proposed design approaches, and to demonstrate that the development meets or exceeds the standards required by the Port Phillip City Council (PPCC) Planning Scheme.

1.1 Project background

The proposed development is located at 50 Queens Road in Albert Park area of Melbourne. The development includes;

- Basement 1-3: Bike parking and car parking
- Ground floor: Lobby, gym, pool, facilities management offices and apartments
- Level 01: Apartments and co-working space
- Level 02-12: Apartments
- Level 13: Apartments and rooftop tenant amenity/lounge

Figure 1 Site location of the proposed development at 50 Queens Road

1.2 Statutory context

1.2.1 Port Phillip City Council

The site is situated in South Melbourne within the municipal boundaries of the City of Port Phillip. The City of Port Phillip has objectives and strategies relating to ESD which are contained in the Planning Scheme;

- Clause 22.12 – Stormwater Management (Water Sensitive Urban Design)
- Clause 22.13 – Environmentally Sustainable Development

These policies and objectives have been taken into consideration throughout this assessment and in our advice given to the applicant.

Overall, the proposed ESD initiatives of this development will meet Council's overarching goal of promoting sustainable design and buildings.

1.2.1.1 22.13-2 Environmentally Sustainable Development

1.2.1.1.1 Objectives

Clause 22.13-2 includes the following objectives which should be applied where possible to residential and non-residential development which require a planning a permit.

- **Energy performance**
  - To improve the efficient use of energy, by ensuring development demonstrates design potential for ESD initiatives at the planning stage.
  - To reduce total operating greenhouse gas emissions.
  - To reduce energy peak demand through particular design measures (e.g., appropriate building orientation, shading to glazed surfaces, optimise glazing to exposed surfaces, space allocation for solar panels and external heating and cooling systems).
- **Water resources**
  - To improve water efficiency.
  - To reduce total operating potable water use.
  - To encourage the collection and reuse of stormwater.
  - To encourage the appropriate use of alternative water sources (e.g., greywater).
- **Indoor Environment Quality**
  - To achieve a healthy indoor environment quality for the wellbeing of building occupants, including the provision of fresh air intake, cross ventilation, and natural daylight.
  - To achieve thermal comfort levels with minimised need for mechanical heating, ventilation and cooling.
  - To reduce indoor air pollutants by encouraging use of materials with low toxic chemicals.
  - To reduce reliance on mechanical heating, ventilation, cooling and lighting systems.
  - To minimise noise levels and noise transfer within and between buildings and associated external areas.
- **Stormwater Management**
  - To reduce the impact of stormwater run-off.

- To improve the water quality of stormwater run-off.
- To achieve best practice stormwater quality outcomes.
- To incorporate the use of water sensitive urban design, including stormwater re-use.

> **Transport**
  - Minimise the production of greenhouse gas emissions and maximise energy efficiency.
  - Minimise mains potable water use and encourage the use of alternative water sources.
  - Minimise waste going to landfill, maximise the reuse and recycling of materials and lead to improved waste collection efficiency.

> **Waste Management**
  - To promote waste avoidance, reuse and recycling during the design, construction and operation stages of development.
  - To ensure durability and long-term reusability of building materials.
  - To ensure sufficient space is allocated for future change in waste management needs, including (where possible) composting and green waste facilities.

> **Urban Ecology**
  - To protect and enhance biodiversity within the municipality.
  - To provide environmentally sustainable landscapes and natural habitats and minimise the urban heat island effect.
  - To encourage the retention of significant trees.
  - To encourage the planting of indigenous vegetation.
  - To encourage the provision of space for productive gardens, particularly in larger residential developments.

1.2.1.1.2 22.13-3 Policy

It is policy that applications for the types of development listed in Table 1 be accompanied by information which demonstrates how relevant policy objectives will be achieved.

1.2.1.1.3 22.19-4 Application Requirements

An application must be accompanied by either a Sustainable Design Assessment or a Sustainability Management Plan as specified in Table 1, as appropriate.

A Sustainable Design Assessment will usually not need to be prepared by a suitably qualified professional. It should:

> provide a simple assessment of the development. It may use relevant tools from the examples listed in the table or an alternative assessment approach to the satisfaction of the responsible authority; and

> identify environmentally sustainable development measures proposed in response to policy objectives, having regard to the site's opportunities and constraints.

A Sustainability Management Plan should:

> provide a detailed assessment of the development. It may use relevant tools from the examples listed in the table or an alternative assessment approach to the satisfaction of the responsible authority; and

> identify achievable environmental performance outcomes having regard to the objectives of this policy (as appropriate); and

- demonstrate that the building has the design potential to achieve the relevant environmental performance outcomes, having regard to the site's opportunities and constraints; and
- document the means by which the performance outcomes can be achieved.

Various assessment tools have been listed in the table below which may be used to assess how the proposed development addresses the objectives of this policy, as appropriate.

Table 1 Sustainability Tools based on type of development and GFA

Type of Development	Application Requirements	Example Tools
Accommodation/Mixed Use with residential component of:		
2- 9 dwellings; or Development of a building for accommodation STORM other than dwellings with a gross floor area between 50m2 and 1000m^2.	Sustainable Design Assessment (SDA)	STORM
Development of 10 or more dwellings. Development of a building for accommodation other than dwellings with a gross floor area of more than 1000m^2.	Sustainability Management Plan (SMP)	BESS MUSIC STORM
Non-residential		
Development of a non-residential building with a gross floor area between 50m^2 and 1000m^2.	Sustainable Design Assessment (SDA)	BESS MUSIC STORM
Development of a non-residential building with a gross floor area of more than 1000m^2.	Sustainability Management Plan (SMP) Green Travel Plan (GTP)	BESS MUSIC STORM

1.2.1.2 22.12 Stormwater Management (Water Sensitive Urban Design)

Clause 22.12 Stormwater Management (Water Sensitive Urban Design) of the Port Phillip Planning Scheme is also applicable to permit applications that propose the construction of new residential buildings.

1.2.1.2.1 Objectives

Clause 22.12-2 cites the following relevant policy objectives:

- To achieve the best practice water quality performance objectives set out in the *Urban Stormwater Best Practice Environmental Management Guidelines, CSIRO 1999. Currently, these water quality performance objectives are:*
  - Suspended Solids - 80% retention of typical urban annual load
  - Total Nitrogen - 45% retention of typical urban annual load
  - Total Phosphorus - 45% retention of typical urban annual load
  - Litter - 70% reduction of typical urban annual load.
- To promote the use of water sensitive urban design, including stormwater re-use.
- To mitigate the detrimental effect of development on downstream waterways, by the application of best practice stormwater management through water sensitive urban design for new development.
- To minimise peak stormwater flows and stormwater pollutants to improve the health of water bodies, including creeks, rivers and bays.
- To reintegrate urban water into the landscape to facilitate a range of benefits including microclimate cooling, local habitat and provision of attractive spaces for community use and wellbeing.

1.2.1.2.2 Policy

Policy It is policy to:

- Require that development applications provide for the achievement of the best practice performance objectives for suspended solids, total phosphorus and total nitrogen, as set out in the Urban Stormwater Best Practice Environmental Management Guidelines, CSIRO 1999 (or as amended).
- Require the use of stormwater treatment measures that improve the quality and reduce the flow of water discharged to waterways. This can include but is not limited to:
  - collection and reuse of rainwater and stormwater on site
  - vegetated swales and buffer strips
  - rain gardens
  - installation of water recycling systems
  - multiple uses of water within a single manufacturing site
  - direction of flow from impervious ground surfaces to landscaped areas.
- Encourage the use of measures to prevent litter being carried off-site in stormwater flows, including:
  - appropriately designed waste enclosures and storage bins, and
  - the use of litter traps for developments with the potential to generate significant amounts of litter.
- Encourage the use of green roofs, walls and facades on buildings where practicable (to be irrigated with rainwater/stormwater) to enhance the role of vegetation on buildings in managing the quality and quantity of stormwater.

1.3 ESD approach

1.3.1 Project sustainability brief

The project approach includes the following targets as identified in the policy requirements, statutory requirements and the project brief:

- A climate active carbon neutral certification for the operation of common areas
- An average NatHERS rating of 7.5-star across the development
- 10% improvement on NCC energy efficiency requirements for non-residential areas of the development
- STORM assessment achieving minimum 100% score

1.3.2 Further Sustainability initiatives

In addition to the overarching sustainability targets seen above, the project has targeted a further series of holistic initiatives to uphold the project's commitments to a sustainable outcome.

In the event that it is deemed that one of the following sustainability initiatives cannot be achieved during the design and development of the building, a suitable alternative initiative will be proposed with consultation with council.

2. ESD Initiatives

2.1 Construction and Building Management

2.1.1 Environmental Performance Targets

An Owners Project Requirement (OPR) document will be produced which summarises the targets for the environmental performance of the project.

Environmental reporting goals will be set for the building, including greenhouse gas emissions, energy use and water use and shared with building users and tenants.

2.1.2 Services and Maintainability Review

The project team will undertake a comprehensive services and maintainability review that will be led by the project Independent Commissioning Agent.

The services and maintainability review will facilitate input from the design team, the facilities manager and operations staff (if known), and any relevant suppliers and subcontractors (if engaged). The review must address the following aspects for all nominated building systems:

- Commissionability;
- Controllability;
- Maintainability;
- Operability, including 'Fitness for Purpose'; and
- Safety.

The following services will be reviewed:

- Mechanical systems
- Hydraulic systems
- Electrical systems
- Fire protection systems
- Metering and monitoring systems
- Façade systems

2.1.3 Building Commissioning

2.1.3.1 Commissioning Specification

The contractual tender or construction documentation will list the commissioning requirements for each system. It is not sufficient to state that systems must be commissioned to the relevant standard.

Instead, the documentation must:

- List the design parameters for each system;
- List the required commissioning activities;
- Define how each system is intended to operate; and
- List the acceptable tolerances during commissioning.

The contractual documentation must clearly indicate divisions of responsibilities, pre-commissioning procedures, commissioning requirements, witnessing requirements, phased completion requirements (if needed), post occupancy checks, and any training requirements for the operator.

2.1.3.2 Commissioning Plan

A commissioning plan shall be developed and include at least the following, the:

- Objectives, or basis, of the design;
- Scope of the commissioning plan;
- Commissioning team list, the individual responsibilities and interface matrix;
- General sequence of commissioning;
- Proposed commissioning procedures;
- Witnessing requirements;
- Commissioning program; and
- Requirements for subcontractor commissioning manuals.

2.1.3.3 Air Permeability Testing

The project will perform an air permeability test on 20% of the building envelope area.

The project is targeting the following air permeability rate in its design:

$7.5 m^3/ (h.m^2)$

2.1.4 Building Tuning

Following practical completion, full re-commissioning will be undertaken 12 months with monthly monitoring undertaken and outcomes reported including a quarterly tuning process.

2.1.5 Building user's guide

Building operation and maintenance manuals and a CIBSE TM31 Building Logbook will be produced and made available to building owners and occupants.

Building user information will also be made available to all relevant tenants and further displayed on screens in real time to inform building users and visitors.

2.1.6 Metering

Accessible metering to all energy and water common uses and major uses within the building will be provided to meet NABERS Protocol requirements.

2.1.6.1 Energy Metering

Separate energy meters will be provided to monitor each of the following distinct uses:

- Each individual floor
- Each separate non-residential tenancy (if applicable)
- Residential common area lighting, heating, cooling and ventilation
- Vertical transport
- Photovoltaic system supply
- Any source of demand greater than 5% of the building's total energy use
- Any source of demand greater than 100kW

2.1.6.2 Water Metering

Separate water meters will be provided to monitor each of the following distinct uses:

- Each individual floor
- Irrigation
- Rainwater tank supply
- Common area amenities
- Any source of demand greater than 10% of the project's total water use

2.1.7 Monitoring

A Building Management System will be installed to monitor and control the building various systems.

The monitoring system will be capable of performing the following functions:

- Collecting data from all meters.
- Alerting to missing data due to failures.
- Recording energy use and water consumption and providing a reporting capability at user adjustable intervals.
- Raising an alarm when the energy or water use increase beyond certain parameters and automatically and instantly issue an alert the facilities manager. The process to assess, correct and validate alerts or faults must be detailed and contained in an accessible location.
- Providing a breakdown of the information by building system (mechanical, electrical, etc.), or by space (or by tenanted floor).
- Including the consumption water or energy, the load versus time (load profile), and the power factor (in the case of energy).
- Producing, as a minimum, a quarterly report that is automatically emailed to the facilities manager responsible for the building.

2.1.8 Construction environmental management plan

A project specific Construction Environmental Management Plan (EMP) will be developed and implemented by the Head Contractor. In addition to this, the builder will be required to have ISO 14001 Environmental Management System accreditation.

2.1.9 High quality staff support

Staff support programs will be implemented that promote positive mental and physical health outcomes as well as enhance worker's knowledge on sustainable practices.

2.1.9.1 Mental and Physical Health

At least three of the following must be addressed in the mental and physical health support programs:

- healthier eating and active living
- reduced harmful alcohol and drug and tobacco-free living
- increase social cohesion, community, and cultural participation
- understanding depression
- preventing violence and injury
- suicide prevention
- decrease psychological distress

2.1.9.2 Sustainable Practises

Training can be provided through one, or a combination of:

- On-site training, such as by including the items above as part of site induction practices.
- Off-site training, such as by providing sustainability training to site workers via a TAFE or similar program within the last 3 years.
- Online training, such as by a third-party service that can provide training on sustainability topics and track personnel who have taken the relevant materials within the last three years.

2.1.10 Waste Management

A specialist waste plan will be developed for the projects office and residential components and include recycling facilities as appropriate for each space type.

The current waste strategy includes:

- Triple chutes with general waste, commingled recycling and organics on each floor.
- Recycling, general waste, and glass collection bins.
- Organics process units and also soft plastics, e-waste bins collected on-call and a dedicated hard waste storage area.

2.2 Indoor Environment Quality

2.2.1 Indoor Air Quality

2.2.1.1 Ventilation System Attributes

The ventilation system will be designed to mitigate the entry of outdoor pollutants, for ease of maintenance and cleaning and will be cleaned prior to occupation and use. The design will comply with ASHRAE 62.1-2003 regarding minimum separation distances between pollution sources and outdoor air intakes.

2.2.1.2 Provision of Outdoor Air

2.2.1.2.1 Naturally Ventilated Apartments

The apartments will be naturally ventilated in accordance with AS 1668.4:2012.

2.2.1.2.2 Mechanically Ventilated Areas

Non-dwelling areas will be provided with an outdoor air rate 50% greater than the requirement of AS1668.2:2012.

2.2.2 Acoustics

2.2.2.1 Internal noise level reduction

Internal noise levels will be no more than 5dB(A) above the "satisfactory" sound levels provided in Table 1 of AS/NZS 2107:2000.

2.2.2.2 Acoustic separation

For residential projects:

- The inter-tenancy apartment construction to habitable areas results in airborne noise isolation standard of Rw+Ctr > 50; and
- All inter-tenancy walls should include Discontinuous Construction as defined by the Building Code of Australia
- Walls between apartments and public corridors results in airborne noise isolation standard of Rw > 50; and
- The floor construction above habitable rooms and wet areas of adjacent dwellings (i.e. floor cover) results in an impact isolation standard of Ln,w + CI < 50.
- Apartment entry doors include acoustic seals and achieve laboratory acoustic rating of Rw 30.

2.2.3 Artificial Lighting

2.2.3.1 Colour accuracy and flicker free

All lights on the project will be flicker free and accurately address the perception of colour in the space including products with electronic ballasts and a minimum colour rendering index (CRI) of 80.

2.2.3.2 General Illuminance and Glare Reduction

2.2.3.2.1 Dwellings

Lighting will be provided in living spaces, kitchens, bathrooms and bedrooms where:

- The lighting design includes or permits general fixed lighting that provides well maintained illuminance values for the entire room; and
- The installed fittings all have a rated colour variation not exceeding 3 MacAdam Ellipses (decorative fittings being exempt).

2.2.3.2.2 All other areas

Illuminance levels be provided as per best practice levels as per AS1680 depending on the activity performed in that space.

2.2.3.3 Occupant Lighting Control

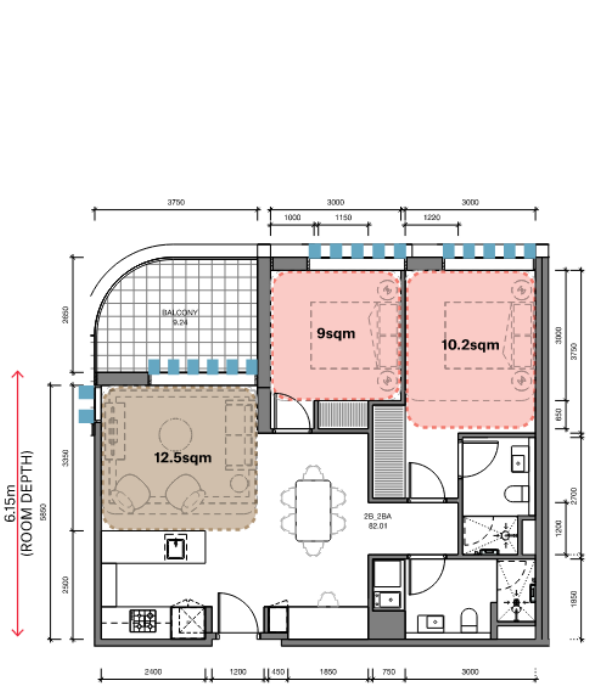
Apartments will be provided with sufficient power outlets for future task lights / lamps around the predicted furniture layouts used in the space. In addition, appropriate task lighting will be provided for kitchens, bathrooms, and service areas.

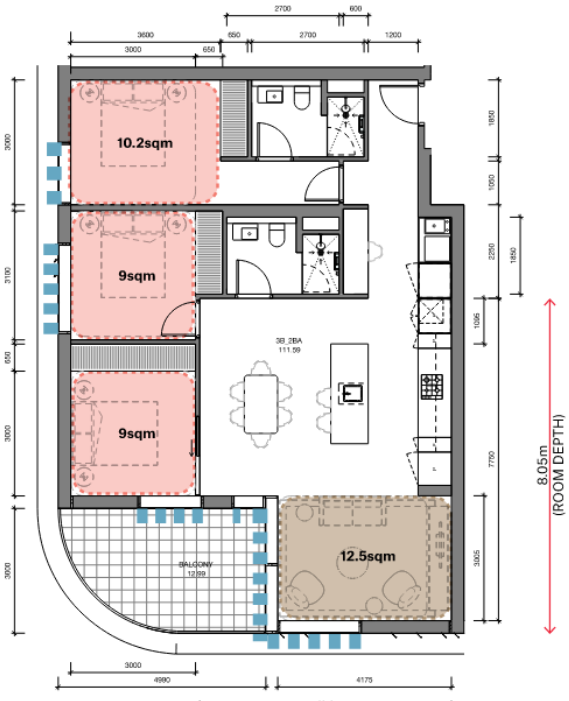
2.2.3.4 Glare Prevention

Glare reduction will be achieved to all facades through a combination of blinds, screens and fixed devices.

2.2.4 Functional Layout

The development provides residents with excellent functionality in the apartment layouts. These have been designed in line with the Better Apartment Design Standards.





2.2.5 Excellent Views

In addition to the excellent layout and communal amenity, the development has been designed to champion the excellent views of Albert Park. The façade enables privacy, view amenity and adequate shading to ensure a pleasurable living experience.

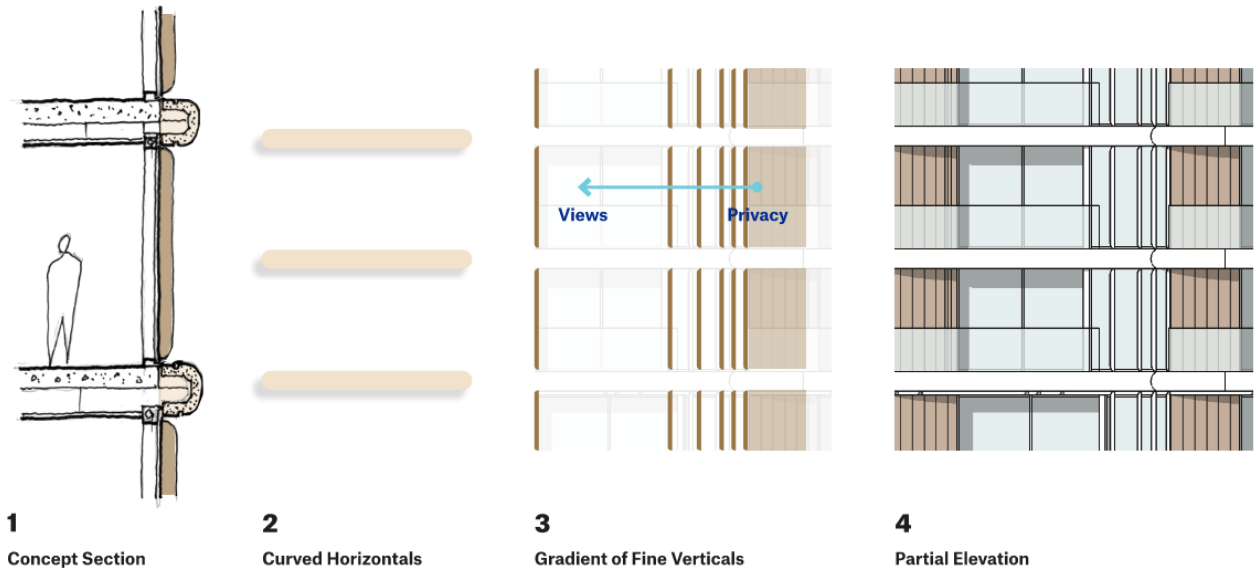


Figure 2 Façade concept

Figure 3 Rendered views of albert park || Façade Shading while still enabling views

2.2.6 Shading

In response to a warming climate the development has prioritized well shaded living rooms that are resilient to the impacts of climate change. See Figure 3 Rendered views of albert park

2.2.7 Indoor Pollutants

At least 95% of all internally applied paints, adhesives, sealants (by volume) or carpets (by area) must meet the total VOC limits specified in Table 7 as applicable.

This requirement is applicable to all internal applications of all types of paints, adhesives or sealants applied on-site, including both exposed and concealed applications.

If exterior grade products are used in an internal application, then these must also meet the requirements.

The following exclusions apply:

> Glazing film, tapes, and plumbing pipe cements;

> Products used in car parks;

> Paints, adhesives and sealants used off-site, for example applied to furniture items in a manufacturing site and later installed in the fitout; and

> Adhesives and mastics used for temporary formwork and other temporary installations.

Total VOC (TVOC) values must reflect the final ready to use product, inclusive of tints (in the case of paints) and made in grams of VOC per litre (g/L) of ready to use product.

There are two methods for demonstrating that a paint, adhesive or sealant complies with this criterion:

> Product certification in accordance with 13.1.1A; or

> Laboratory testing in accordance with 13.1.1B.

A combination of methods can be used to demonstrate compliance.

Product Certification

The product is certified under a recognised Product Certification Scheme. The current list of recognised schemes is shown on the GBCA website: http://new.gbca.org.au/product-certification-schemes/.

The certificate must be current at the time of project registration or submission and list the relevant product name and model.

Laboratory Testing

TVOC limits for paints, adhesives or sealants are detailed in the table below. Most adhesives and sealants are addressed in the 'General purpose adhesives and sealants' category of the table, unless they clearly belong in the other specialised product categories.

Table 2 Maximum TVOC Limits for Paints, Adhesives and Sealants

Product Category	**Max TVOC content of ready to use product (g/L)**
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	5*
Trim, varnishes and wood stains	75
Primers, sealers and prep coats	65
One and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

*Stricter requirement as the project is targeting an innovation level achievement for using Ultra Low VOC Paints.

2.2.7.1 Carpets

There are two methods for demonstrating that a carpet complies with this criterion. A combination of methods can be used to demonstrate compliance:

> Product certification, or;

> Laboratory testing

Product Certification

The product is certified under a recognised Product Certification Scheme (listed on the GBCA website http://new.gbca.org.au/product-certification-schemes/) or other recognised standards.

The certificate must be current at the time of project registration or submission and list the relevant product name and model.

Laboratory Testing

The product must comply with the Total VOC (TVOC) limits for a selected compliance option, specified in the table below.

Table 3 TVOC Limits – Laboratory Testing

Compliance option	Test protocol	Limit
ASTM D5116	ASTM D5116 - Total VOC limit*	0.5mg/m^2 per hour
	ASTM D5116 - 4-PC (4-Phenylcyclohexene) *	0.05mg/m^2 per hour
ISO 16000 / EN 13419	ISO 16000 / EN 13419 - TVOC at three days	0.5 mg/m^2 per hour
ISO 10580 / ISO/TC 219 (Document N238)	ISO 10580 / ISO/TC 219 (Document N238) - TVOC at 24 hours	0.5mg/m^2 per hour

*Both limits should be met when testing against ASTM D5116

2.2.7.2 Engineered Wood Products

The project must demonstrate that either no new engineered wood products are used in the building, or at least 95% (by area) of all engineered wood products meet the formaldehyde emission limits specified in Table 9.

There are two methods for demonstrating than an engineered wood product complies:

> Product certification

> Laboratory testing

A combination of methods can be used to demonstrate compliance. Engineered wood products include particleboard, plywood, Medium Density Fibreboard (MDF), Laminated Veneer Lumber (LVL), High-Pressure Laminate (HPL), Compact Laminate and decorative overlaid wood panels. Timber veneers are excluded. Where only part of a product is composed of an engineered wood product, the limits apply only to that portion of the product, not the entire item.

The following applications of engineered wood products are excluded from this initiative:

> Formwork;

> Car park applications; and

> Non-engineered wood products such as milled timber.

Product Certification

The product is certified under a recognised Product Certification Scheme. The current list of recognised schemes is shown on the GBCA website http://new.gbca.org.au/product-certification-schemes/.

The certificate must be current at the time of project registration or submission and list the relevant product name and model.

Laboratory Testing

All engineered wood products used in the building must meet the relevant limits specified in Table 4 as per the specified test protocol, or have product specific evidence that it contains no formaldehyde.

Table 4 Limits by Test Protocol

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

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

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

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

2.3 Energy Efficiency

2.3.1 Operational energy

2.3.1.1 Dwellings

The development will be committing to the following high NatHERS star ratings:

> 7.5-star average across the whole development

> No individual apartment less than 5.5-stars

By committing to a 1.5-star increase on code requirements the development is prioritising energy efficiency outcomes and affordable utility bills for its residents. It is also setting up the development to be resilient to the impacts of climate change.

In the two sections below are the results for the sample set of the apartment remix undertaken for the project. For further information, please refer to *Appendix D - Preliminary NatHERS*

2.3.1.1.1 NatHERS Preliminary Results

Table 5 Sample Results 19/02/2024

	Heating	Cooling	Star
Minimum			
Maximum		Pending Architectural Direction and Coordination	
Average			

2.3.1.1.2 NatHERS Building Fabric Assumptions

Below is a table of the assumptions used and building fabric thermal properties required to achieve a 7.5-star average rating. These details are not to be used for tendering or development of construction drawings. These are simply for information for Council to assess the feasibility of the NatHERS target.

Table 6 Building Envelope Requirements

Building Envelope Element	Assumptions
Floor Construction (Between apartments)	> Suspended concrete slab
Floor Construction (Between apartments and unconditioned spaces)	> Suspended concrete slab > R2.0 added insulation
Floor coverings	> Tiles (bathrooms) > Carpet (bedrooms) > Floating Timber (living, kitchen)
Ceiling Construction (exposed ceiling, ie ceiling below a balcony or Terrace)	> Suspended concrete slab > R3.0 added insulation
Roof Construction	> Suspended concrete slab > R5.0 added insulation + Single Sided Foil
Wall construction (External)	> Dependent on Wall Type, refer to Wall Schedule > Minimum R0.7 Added (Wall type L11)
Wall Construction (Spandrel)	> Spandrel Panel > R4.7 added insulation
Wall construction (Between apartments/risers/corridors/stairs/lifts)	> R1.5 added insulation
Wall construction (Internal within Apartments)	> Lightweight > Uninsulated
Façade Alterations	> Façade alternations need to be made to the apartments referenced in Appendix B

Table 7 Glazing Performance Recommendations

Apartments	Glazing Type	Whole of System Window Performance	
		U-Value	SHGC
All apartments	Regular Glass	≤3	0.44 ± 5%
	Bronze Glass	≤3	0.23 ± 5%

2.3.1.2 Retail and Common Areas

The project will achieve compliance with Section J of the NCC 2019 for common areas and non-residential tenancies (if applicable).

2.3.1.3 Pool Facilities

The pool will be heated by high efficiency heat pumps, and utilise a pool cover during non-operation times, to help reduce the amount of heating energy required to keep the pool at the set temperature.

2.3.2 Lighting Efficiency and Controls

2.3.2.1 Power Density

The lighting power density is reduced by at least 10% below the maximum lighting power density in Table J6.2a under Section J of the NCC. This applies to all areas of the building.

2.3.2.2 Independent Switching

Independent Light switching will be provided in each room of the SOU. In open plan, each functional area will be separately switched.

2.3.2.3 Dynamic Lighting Controls

All common areas accessible by residents will be provided with automated lighting control system(s), such as occupant detection.

2.3.3 Ventilation and Air Conditioning

For spaces provided with mechanical heating and cooling:

- The minimum cooling system energy rating for the air conditioning equipment is at least 3-star as per AS 3823.2-2013; and
- 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%.

2.3.4 Domestic Hot Water

2.3.4.1 Dwellings

Electric Heat Pumps with a COP of at least 3.5 will provide domestic hot water to the development.

2.3.5 Appliances and Equipment

All appliances installed have a minimum Energy Star rating of 1-star below the maximum Energy Star rating available for that appliance type and capacity. Appliances include but are not limited to:

- Refrigerators/freezers;
- Dishwashers;
- Clothes washers; and
- Clothes dryers.

This requirement only applies to installed appliances; it does not require their installation.

2.3.6 Renewable Energy

The project will install a 43kWp photovoltaic system on the roof of the development. The total system size accounts for 97 Solar panels at 450 Watts per panel.

2.3.7 Vertical Transport

Lifts will be specified such that the energy associated with lift machinery or other vertical transportation complies with the following features:

- Energy efficient Gearless AC Machines with regenerative VVVF drives;
- Low energy LED lighting;
- Shutdown of non-essential lighting, screens, etc. when on standby; and

2.4 Transport

2.4.1 Access to public transport & walkability

The proposed development, located at 50 Queens Road obtains a Walkscore of 91 'Walker's Paradise', meaning the access to shops and amenities is excellent and daily errands do not require the use of a car. The site also has a public transit score of 92 meaning access to word class public transport facilities.

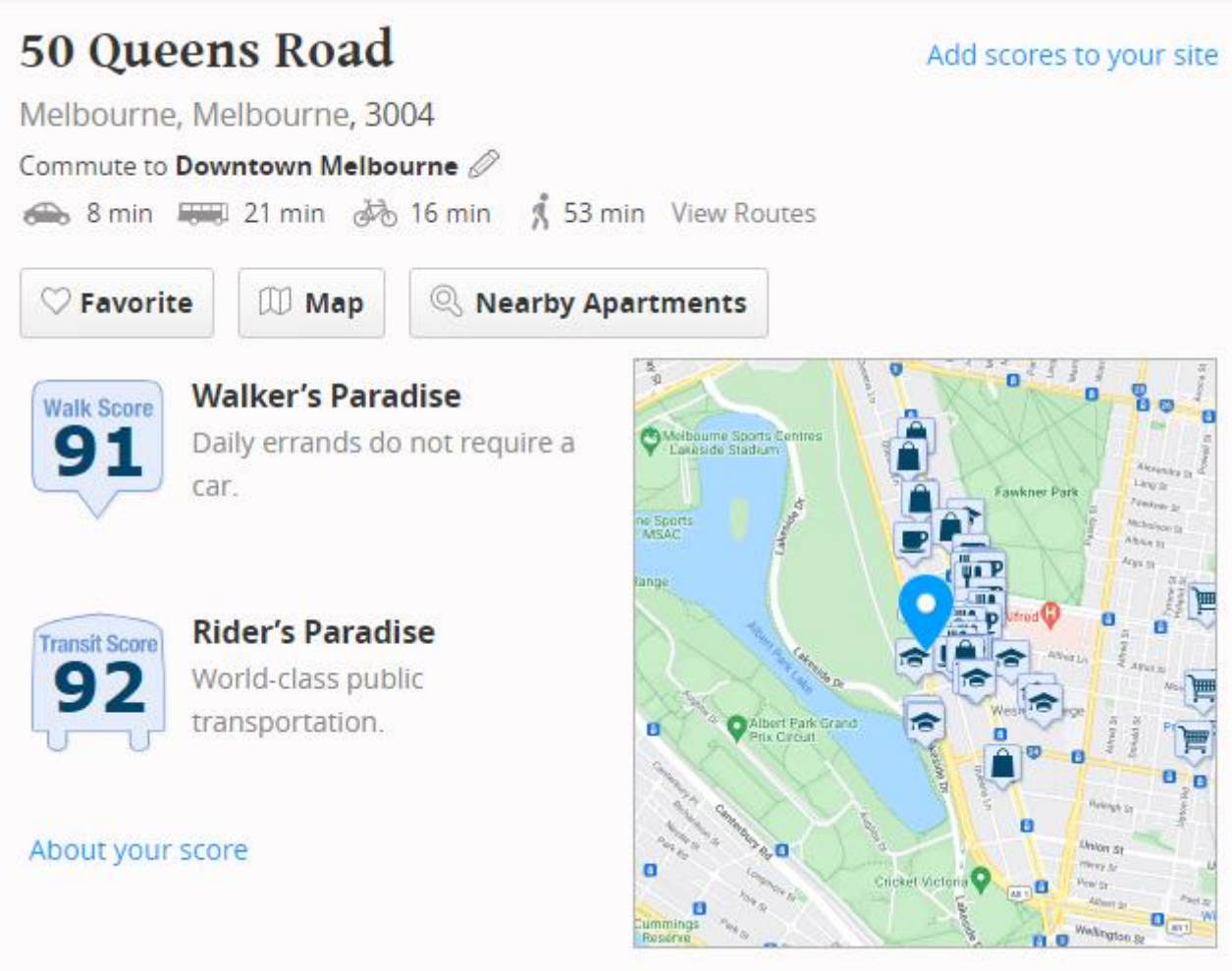


Figure 4 Project walk score and transit score

2.4.2 Bicycle storage

As of 08/03/2024, the proposed development will contain a total of 258 bicycle parking spaces for both residents, staff and visitors:

- Resident bike parks: 214
- Visitor bike parks: 44

2.5 Water Efficiency

2.5.1 Water efficient fittings and fixtures

The project will include best practice water efficient fixtures and fittings across the development including the following WELS ratings;

- Showers: 3 Stars or 4 Stars (7.5 L/min or lower)
- Toilets: 4 Stars
- Taps: 5 Stars
- Dishwashers: 5 Stars

2.5.2 Rainwater harvesting

The rainwater harvesting strategy consists of the following:

- A 40kL rainwater tank will capture rainwater from the top-most roof areas of the development and be connected to all toilets on the project.
- A second 70kL rainwater tank will capture rainwater from other roof areas and the paved surfaces on the ground level for irrigation re-use on the project.

Please refer to Appendix A - Stormwater Management Plan for more information

2.5.3 Landscape irrigation

All landscape areas on the rooftop and terraces will be irrigated using subsurface drip type irrigation systems with moisture sensor override system to prevent over watering.

2.5.4 Fire systems

The building fire testing water will be collected and recycled back into the fire protection services water tank in the Basement Level 01.

A target of 80% of fire test water will be captured during the system testing.

2.5.5 Pool Facilities

The pool will use a pool cover during non-operational times to reduce surface evaporation, and thus reduce overall water usage of the pool.

2.6 Building Materials

2.6.1 Concrete

2.6.1.1 Water Reduction

The mix water for all concrete used in the project will contain at least 50% captured or reclaimed water (measured across all concrete mixes in the project).

2.6.1.2 Aggregate Reduction

The project will seek to minimise the amount of virgin materials used for aggregates by ensuring either:

> At least 40% of coarse aggregate in the concrete will be crushed slag aggregate or another alternative materials (measured by mass across all concrete mixes in the project)

OR

> At least 25% of fine aggregate (sand) inputs in the concrete will be manufactured sand or other alternative materials (measured by mass across all concrete mixes in the project).

2.6.2 Steel

2.6.2.1 Reinforcing Steel Reduction

There will be a 5% or more reduction in mass of steel framing, when compared to a suitable reference case building. The structural engineer will provide calculations to demonstrate the reduction.

2.6.2.2 Responsible Steel Sourcing

All steel suppliers on the project must have the following:

> A currently valid and certified ISO 14001 Environmental Management System (EMS) in place, and

> a current membership with the World Steel Association's (WSA) Climate Action Programme (CAP)

2.6.3 Sustainable timber

At least 95% of the building's timber is to be certified by a forest certification scheme that meets the GBCA's 'Essential' criteria for forest certification.

2.6.4 Environmental toxicity

90% (by cost) of all cables, pipes, flooring and blinds in a project either:

> Do not contain PVC and have an Environmental Product Declaration (EPD); or

> Meet Best Practice Guidelines for PVC.

2.6.5 Environmental responsibility

3% of eligible products are required to meet the requirements of reused products, recycled content, environmental product declarations, third party certification, or stewardship programs.

2.6.6 Construction waste management plan

A construction waste management plan will be developed including a target of 90% of waste generated during construction and demolition to be diverted from landfill.

2.7 Urban Ecology

2.7.1 Reuse of developed land

The proposed development is taking place on a completely developed piece of land. No critically endangered, endangered, vulnerable species, or ecological communities were present on the site at time of purchase.

2.7.2 Enhancing ecological value

The existing site currently has little to no existing vegetation or ecologically significant value. The proposed development will include extensive landscaping on the Queens Road interface.

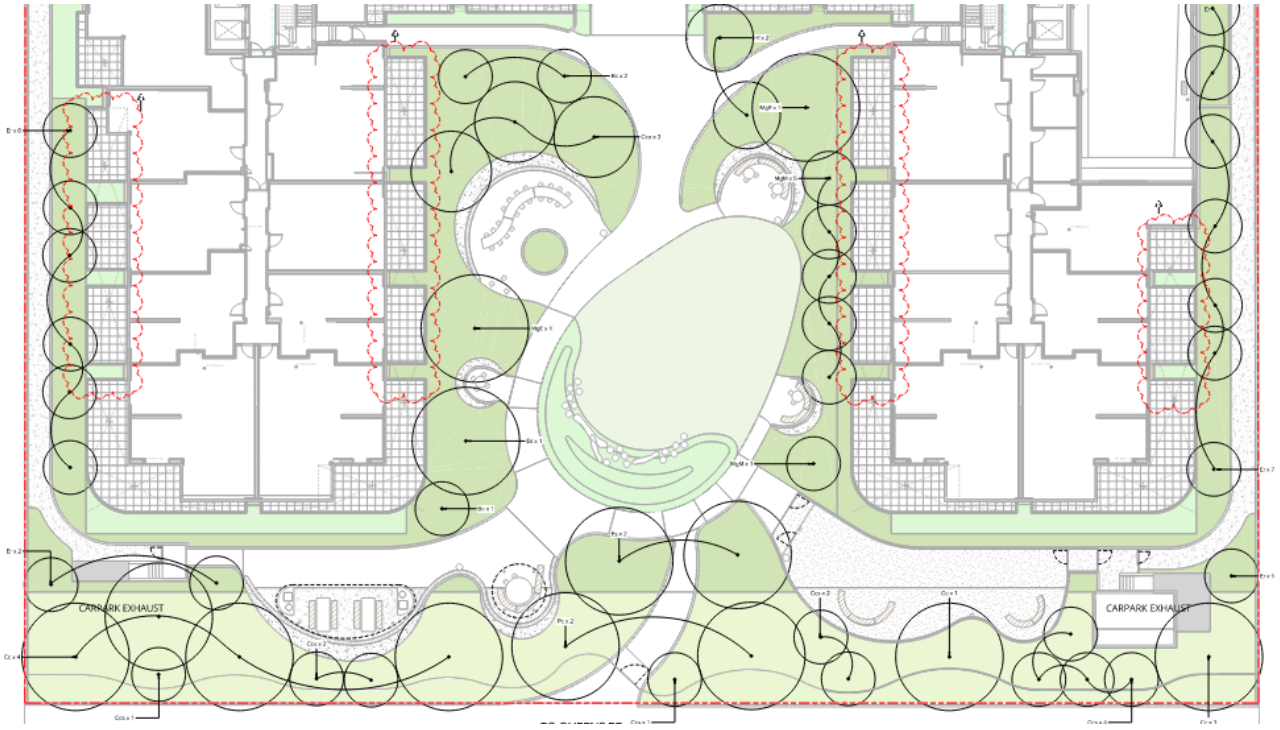


Figure 5 Green planting area on the site

2.7.3 Urban Heat Island Effect

At least 75% of the total project site area to comprises building or landscaping elements that reduce the impact of Urban Heat Island (UHI) effect.

High Solar Reflective Index (SRI) roofing and paving materials will be utilised on all roofing areas where appropriate to reduce the UHI effect:

- Roofing materials, including shading structures will have the following:
  - For roof pitched <15°– a three year SRI of minimum 64 or initial SRI of minimum 82.
  - For roof pitched >15°– a three year SRI of minimum 34 or initial SRI of minimum 39.
- Unshaded hard-scaping elements with a three year SRI of minimum 34 or an initial SRI of minimum 39;

A preliminary Urban Heat Island effect has been completed with the expected material finishes of the project. At this stage of design, material SRI's have been conservatively estimated, allowing for a margin of safety for the project. As the design and material selection of the project further develops, the UHI assessment will be updated to accommodate for new information on materials.

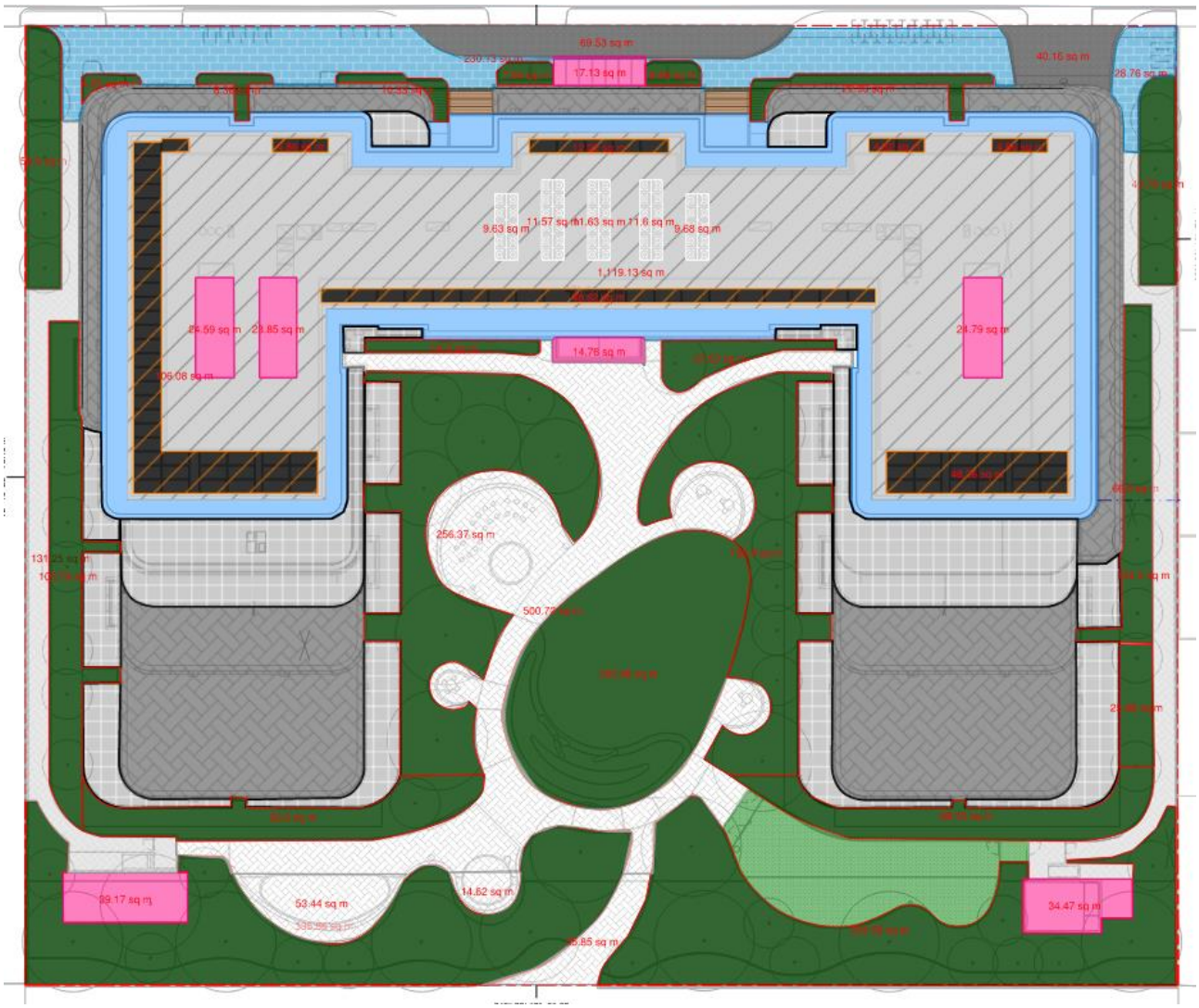
At this stage, 87.6% of the site area is anticipated to use elements that reduce the heat island effect. See Figure 7 and Figure 6 for further detail.

Figure 6 Preliminary Urban Heat Island Effect Results

MEL3110 - 50 Queens Road

North	UHI compliant	Total Areas	Assessed areas	% of area
Artificial Grass	N	149.97	149.97	2.2%
Balcony	Y	662.54	662.54	9.8%
Ballast	Y	874.81	874.81	12.9%
Bluestone	N	257.68	257.68	3.8%
EA Grey Concrete	N	255.45	255.45	3.8%
EA White Concrete	Y	604.63	604.63	8.9%
Landscape	Y	2020.56	2020.56	29.8%
Plant	N	54.12	54.12	0.8%
Road/Asphalt	N	109.69	109.69	1.6%
Roof	Y	1119.13	1119.13	16.5%
Roof Outer Radius	Y	471.31	471.31	7.0%
Small Roof	Y	178.76	178.76	2.6%
Wood Finish Rooves	N	14.21	14.21	0.2%
TOTAL		6995	6772.86	
Solar PV		229.82	-	
Sum of compliant area (ex. Solar)			5931.74	87.6%

Figure 7 Preliminary Urban Heat Island Effect Markup



2.8 Emissions

2.8.1 Water Sensitive Urban Design

The table below details the treatment measures for each of the catchment areas.

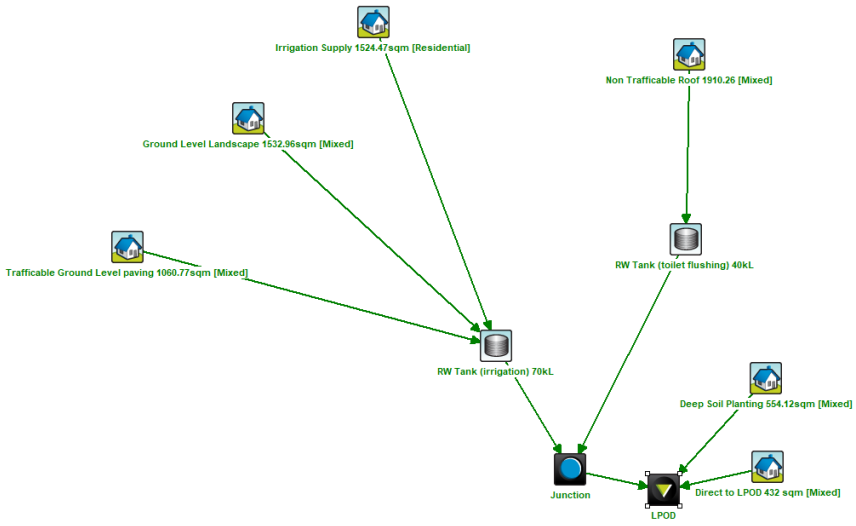
Table 8 Catchment and treatment plan

Catchment	Total Area (m^2)	Treatment
Non-trafficable, topmost roof area	1910.26	> 40kL Toilet Flushing Rainwater Tank No. 1 > 1795kL/year toilet flushing demand (from potable water calculator)
Balconies, other roof spaces, ground level landscape and paving	4118.18	> 70kL Irrigation Rainwater Tank No. 2 > 1,403kL/year irrigation demand (from potable water calculator)
Deep Soil Planting and areas draining directly to the LPOD	986.12	> No Treatment, Direct to LPOD

*Rainwater reuse calculations for irrigation, toilet and urinal flushing have been provided in Appendix B and marked up to identify where to find these figures in the Potable Water Calculator.

The plan below is the treatment train plan as modelled in MUSIC to demonstrate best practice stormwater pollutant removal.

Figure 8 WSUD Analysis Map



The full water sensitive urban design details can be found in Appendix A.

Note: *Acknowledging that this project achieves partial compliance for Total Suspended Solids, Council has been informed and is accepting of it.*

2.8.2 Light Pollution

2.8.2.1 Minimising light pollution to neighbouring bodies

All outdoor lighting on the project will comply with AS 4282:1997 Control of the obtrusive effects of outdoor lighting.

2.8.2.2 Minimise light pollution to night sky

The project will demonstrate a reduction of light pollution to the night sky through one of the following methods:

A. Control of Upward Light Output Ratio (ULOR), in accordance with 27.1A; or

B. Control of Direct Illuminance, in accordance with 27.1B.

This applies to all external lighting of a project. In addition to other types of external lighting, for the purposes of this initiative, luminaires inside glazed atria and those on the uppermost (uncovered) deck of an outdoor car park are considered to be external.

27.1A Control of Upward Light Output Ratio (ULOR)

For this option, the project team must demonstrate that no external luminaire on the project has a ULOR that exceeds 5%, relative to its actual mounted orientation.

Project teams must demonstrate that the ULOR provided or calculated in the documentation, is relevant to the as-installed orientation of the luminaire. A luminaire with a ULOR as nominated in the manufacturer's data sheet, will have a different ULOR when the mounting orientation of the luminaire is changed. In the event that any external luminaire is mounted in an orientation other than the one nominated by the manufacturer, the ULOR must be recalculated and provided by project teams.

Awnings

Awnings can be used as a means of achieving compliance with the 5% ULOR requirement where a section drawing showing the light output of the luminaire can be provided, and where the awning has the effect of blocking 95% of the output of the lamp above the horizontal. This initiative cannot be awarded where it is not clear that the awning is a permanent structure.

27.1B Control of Direct Illuminance

For this option, the project team must demonstrate that direct illuminance from external luminaires on the project produces a maximum initial point illuminance value no greater than:

- 0.5 Lux to the site boundary; and
- 0.1 Lux to 4.5 metres beyond the site into the night sky, when modelled using a calculation plane set at the highest point of the building.

Calculations shall be in accordance with AS 4282:1997.

The calculation plane must cover the area between the site boundary and building façade or vertical service to be illuminated. The horizontal calculation plane shall be set at the top of the building fabric, excluding spires. Calculation plane grid points shall have a 0.5m spacing. All illumination results shall be reported to within 2 decimal places.

2.8.3 Legionella Risk Management

There are no water-based heat rejection systems on the project.

2.9 Innovation

2.9.1 Build-to-rent

Build to rent is an emerging market trend, this development is contributing to the uptake of Build to rent properties where developers are invested in operating costs thus keeping energy and water consumption down.

2.9.2 Ultra-low VOC paints

Over 50% of paint (by cost) are to have a Total Volatile Organic Compound (TVOC) content of less than 5 grams per litre.

2.9.3 Green Cleaning

Cleaning services will be delivered in accordance with a green cleaning policy or scope of works and are applicable to all common areas (i.e. areas controlled solely by the building owner).

2.9.4 Groundskeeping

Best practice operational procedures will be used to maintain landscaped areas, hard surfaces and building exteriors are in place during the performance period in accordance with the following requirements:

A groundskeeping policy must be developed that includes the following:

a. The scope of the maintenance program
b. Frequency of maintenance
c. Sustainability requirements, including as a minimum, measures for:
    i. diversion from landfill
    ii. Minimising use of chemicals
    iii. energy and water use
    iv. plant-specific maintenance requirements (where relevant)
d. the recording and reporting mechanism of measured results
e. procedures for prompt adjustments or repairs in response to non-compliance,
f. The parties response for carrying out the maintenance program and measurements
g. A review process to assess the success of the maintenance procedures and make improvements based on lessons learned.

2.9.5 Community Investment

The project make a significant investment in the communal amenities spaces in a community. 50 Queens Road will be providing its residents with the following:

> Gym
> Swimming pool and amenities
> Communal rooftop lounge

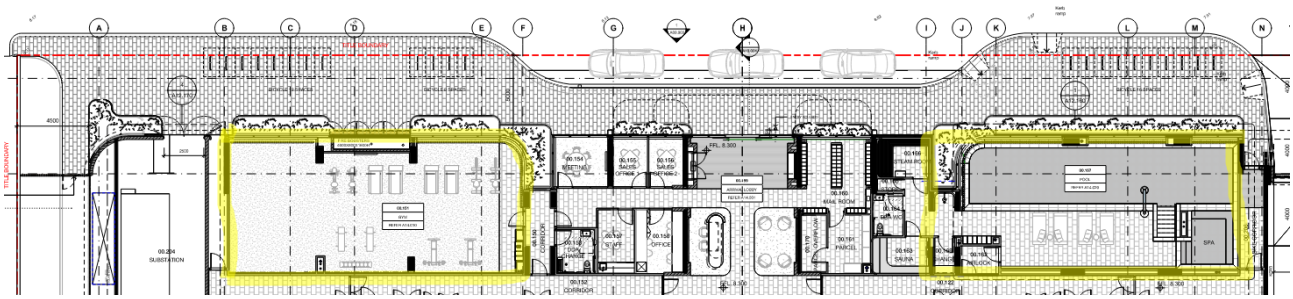


Figure 9 Ground level gym and pool amenities

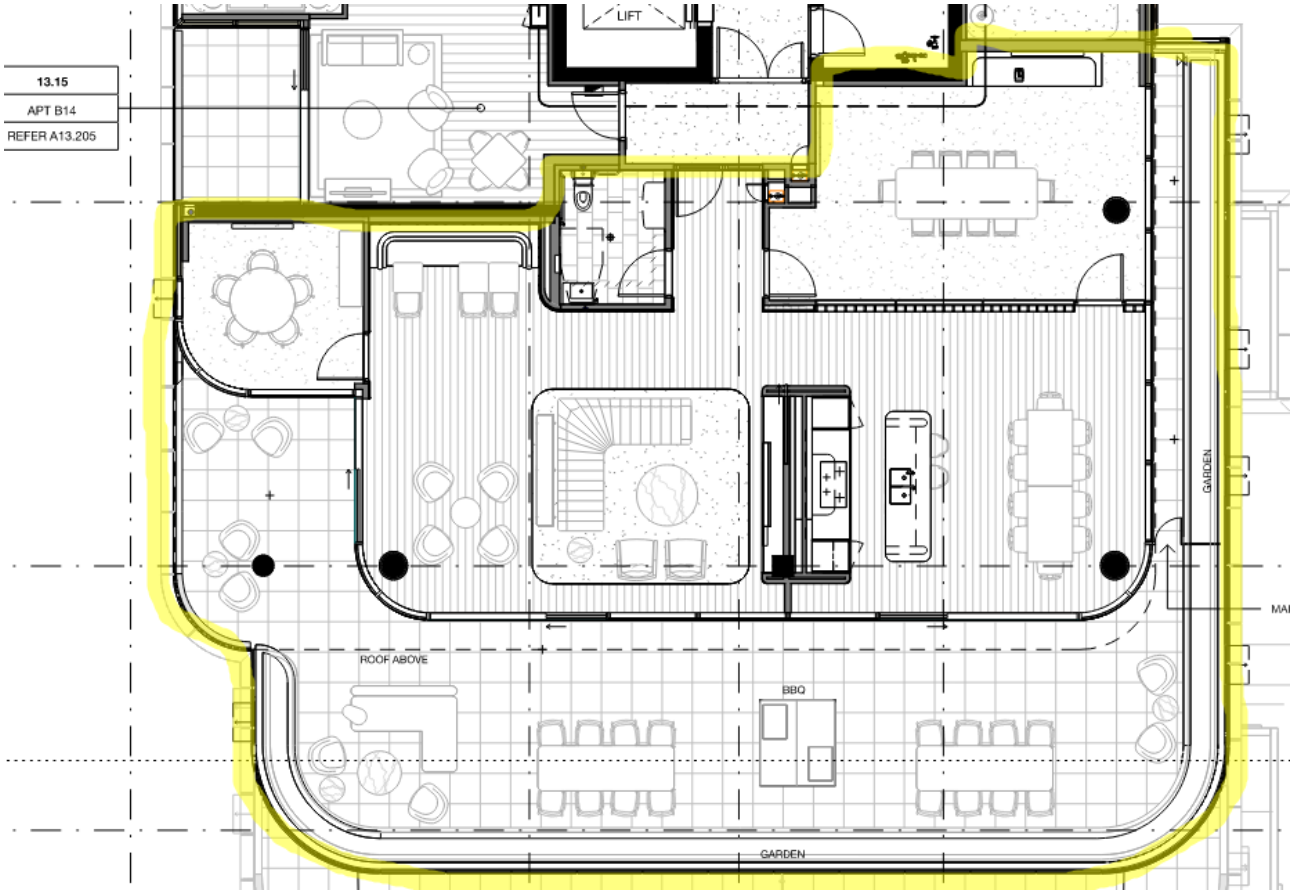


Figure 10 Rooftop communal lounge

ADP
Consulting : Engineering

Appendix A
Stormwater Management Plan

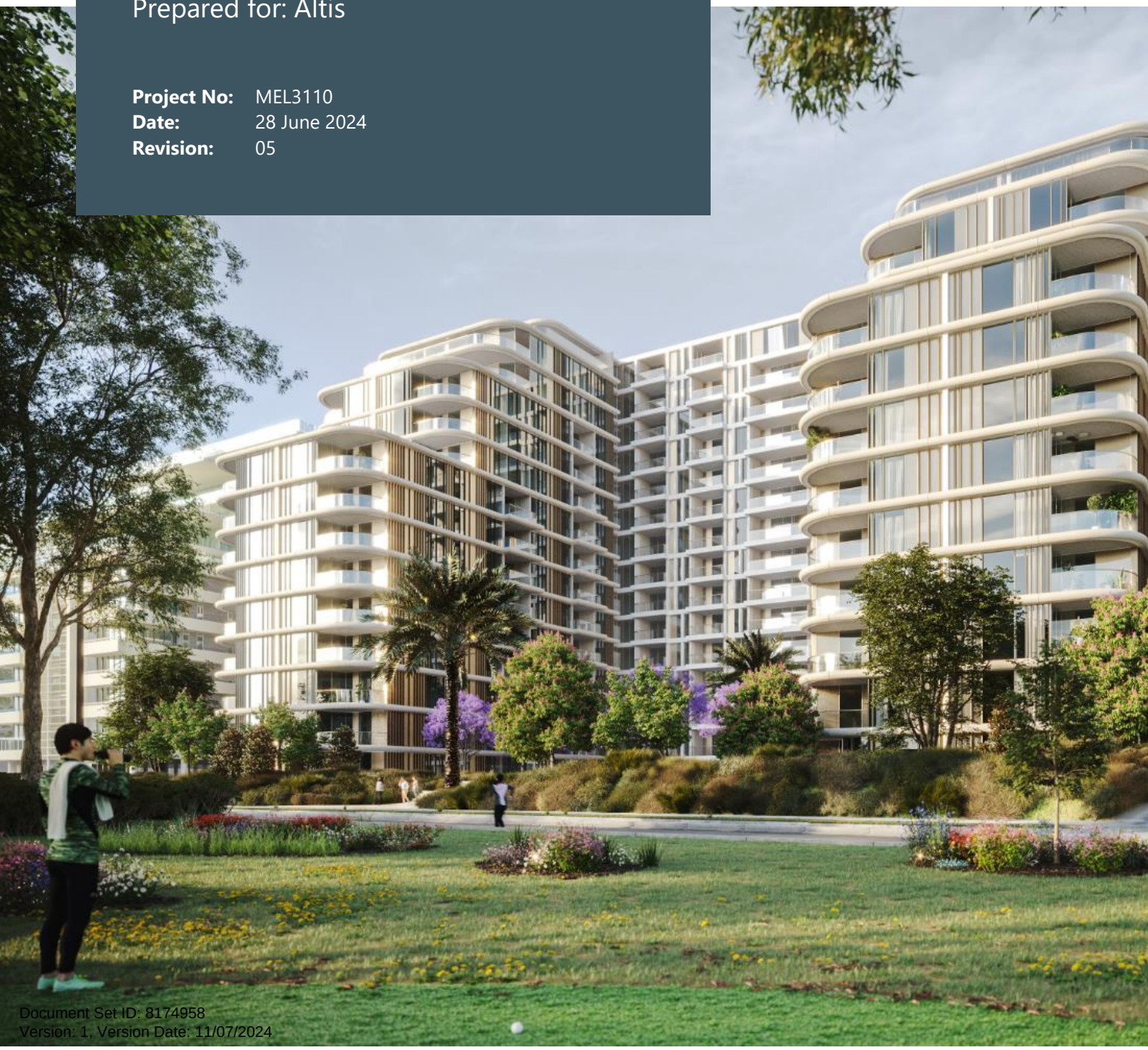
50 Queens Road

Water Sensitive Urban Design (WSUD) Report

Prepared for: Altis

Project No: MEL3110
Date: 28 June 2024
Revision: 05

ADP Consulting : Engineering



Project:	50 Queens Road
Location:	50 Queens Road South Melbourne, VIC 3004
Prepared by:	ADP Consulting Pty Ltd Level 13, 55 Collins Street Melbourne VIC 3000
Project No:	MEL3110
Revision:	05
Date:	28 June 2024

Rev	Date	Comment	Author	Signature	Technical Review	Signature	Authorisation & QA	Signature
01	29/8/22	Town Planning	Thomas Miers	TM	Alex Sear	AS	Alex Sear	AS
02	05/10/2023	Revised Design	Max Anderson	MAX	Thomas Miers	TM	Thomas Miers	TM
03	24/10/23	Revised Areas	Max Anderson	MAX	Thomas Miers	TM	Thomas Miers	TM
04	08/03/2024	Apartment Remix	Max Anderson	MAX	Thomas Miers	TM	Thomas Miers	TM
05	28/06/2024	S87a drawings	Max Anderson	MAX	Thomas Miers	TM	Thomas Miers	TM

Project Team	
Client / Principal	Altis
Architect	Bates Smart
Building Services	ADP Consulting
ESD Consultant	ADP Consulting

Contents

Appendices

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Executive Summary

To address Clause 22.12 – Stormwater Management (Water Sensitive Urban Design) in the City of Port Phillip Planning Scheme, a stormwater management strategy has been developed to treat the rainwater runoff from the site.

The design proposes that the water captured on the mix of roof will be collected in a 40kL rainwater tank that is to be reused for toilet flushing for the whole development and the terrace areas and ground level paving will be collected in a second 70kL rainwater tank that will be reused for irrigation on the project.

This scenario has been modelled in the MUSIC software to demonstrate that this would successfully meet the performance objectives for pollutant reduction from site runoff stipulated by Melbourne Water.

The results from the MUSIC model below confirm that the proposed strategy exceed all the performance except for suspended solids removal. It has been discussed with a representative of Port Phillip Council that this approach may be accepted upon review.

The Results below match the apartment remix architectural plans dated 05/03/2024, and hydraulic design specification dated 15/09/2023.

Note: Following the Apartment remix in the latest set of architectural plans, the expected total occupancy of the building will be lower, due to an increase in single and studio dwellings. This has influenced the overall performance of our rainwater catchment and treatment solution.

Note on S87a: The latest drawing set (dated 25/06/2024 from Bates Smart Architecture) has been reviewed, and at the time of updating this report, no major changes have been found that would have a noticeable effect on the stormwater treatment results seen below.

Pollutant	Reduction	Current best practice performance objective	Target Achieved
Total Suspended Solids (kg/yr)	67.6%	80%	Partial
Total Phosphorus (kg/yr)	61.9%	45%	✓
Total Nitrogen (kg/yr)	55.5%	45%	✓
Gross Pollutants (kg/yr)	93.6%	70%	✓

Acknowledging that this project achieves partial compliance for Total Suspended Solids, Council has been informed and is accepting of it.

1. Introduction

This report provides an overview of the water sensitive urban design (WSUD) strategy for the 50 Queens Road development within the municipal boundaries of the City of Port Phillip. This is in response to Clause Clause 22.12 – Stormwater Management (Water Sensitive Urban Design) in the City of Port Phillip Planning Scheme. Clause 22.12-2 sets the performance objectives for the stormwater management plan.

1.1 Clause 22.12-2 - Objectives

- To achieve the best practice water quality performance objectives set out in the Urban Stormwater Best Practice Environmental Management Guidelines, CSIRO 1999 (or as amended). Currently, these water quality performance objectives are:
  - Suspended Solids - 80% retention of typical urban annual load
  - Total Nitrogen - 45% retention of typical urban annual load
  - Total Phosphorus - 45% retention of typical urban annual load
  - Litter - 70% reduction of typical urban annual load.
- To promote the use of water sensitive urban design, including stormwater re-use.
- To mitigate the detrimental effect of development on downstream waterways, by the application of best practice stormwater management through water sensitive urban design for new development.
- To minimise peak stormwater flows and stormwater pollutants to improve the health of water bodies, including creeks, rivers, and bays.
- To reintegrate urban water into the landscape to facilitate a range of benefits including microclimate cooling, local habitat, and provision of attractive spaces for community use and wellbeing.

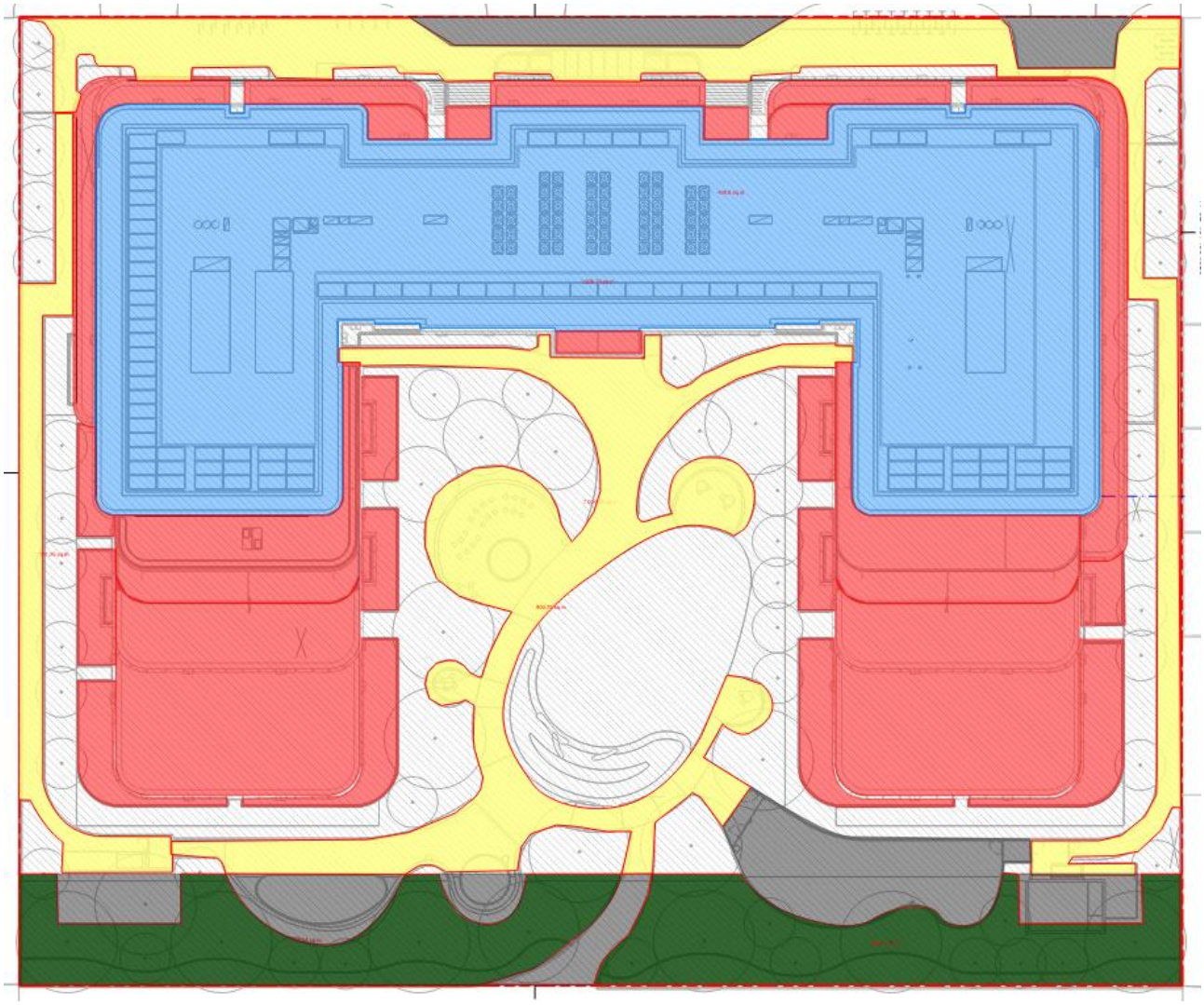
2. WSUD Strategy

2.1 Site Layout Plan

Figure 1 below demonstrates the different catchment areas and surfaces across the Stage 1 site:

- Total site area is 7,014.58 m^2
- Total catchment area to rainwater tank no. 1 (Toilet Flushing) is 1910.26m^2 of roof area.
- Total catchment area to rainwater tank no. 2 (irrigation) is 4,118m^2 of balcony, paving, landscaping, and lower floor roof areas.
- Theres an additional 554.12 m^2 of deep soil planting on the site, and another 432 m^2 of paving area or asphalt that connects directly to the LPOD.

Figure 1 Site layout and catchment areas



3. Methodology

3.1 Model Plan

A model has also been developed to assess the pollution reduction using MUSIC. Below is a screenshot of the plan view to demonstrate how the strategy has been modelled.

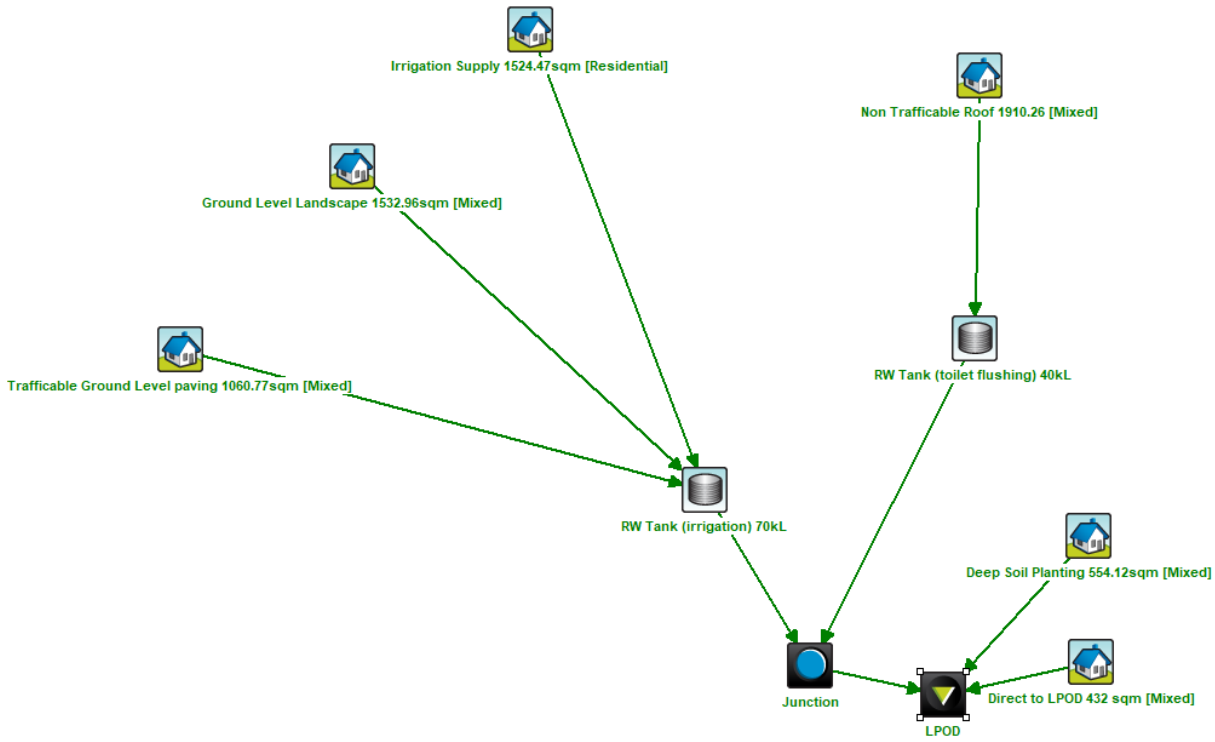
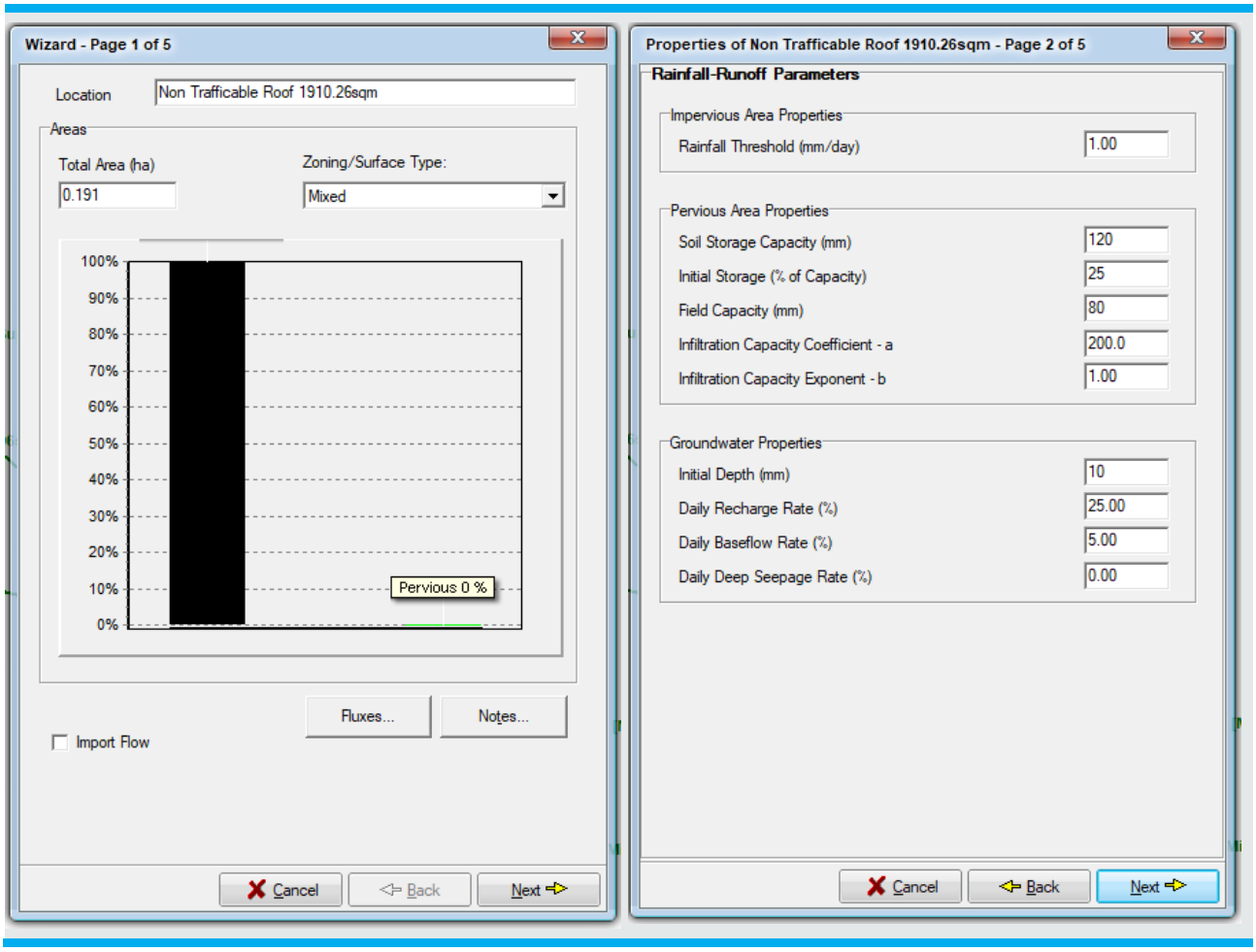


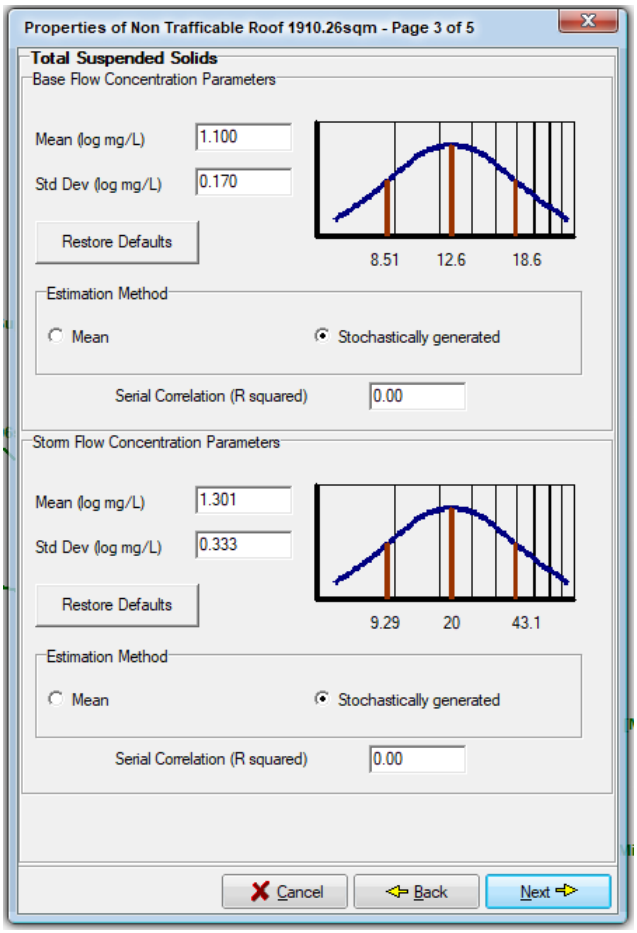
Figure 2 Music model in plan view

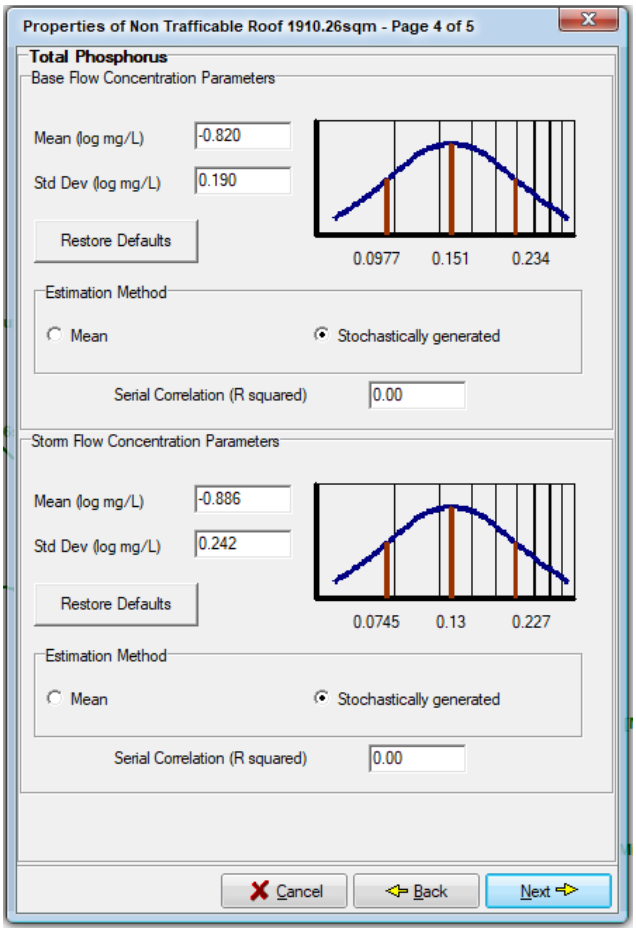
3.2 Catchment Parameters

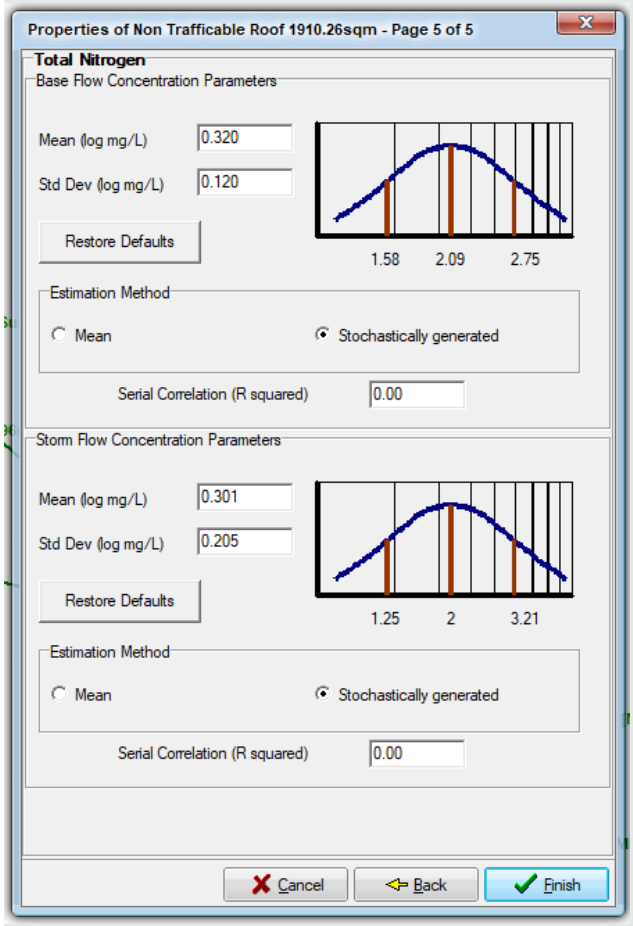
This section outlines the modelling parameters used for each of the catchment areas. These are the default parameters preloaded into the MUSIC software. Melbourne Water guidelines dictate that the default parameters should be used for Rainfall-runoff, Total Suspended Solids, Total Phosphorous and Total Nitrogen for roof and mixed catchment areas.

3.2.1 Non-Trafficable Roof 1910.26sqm

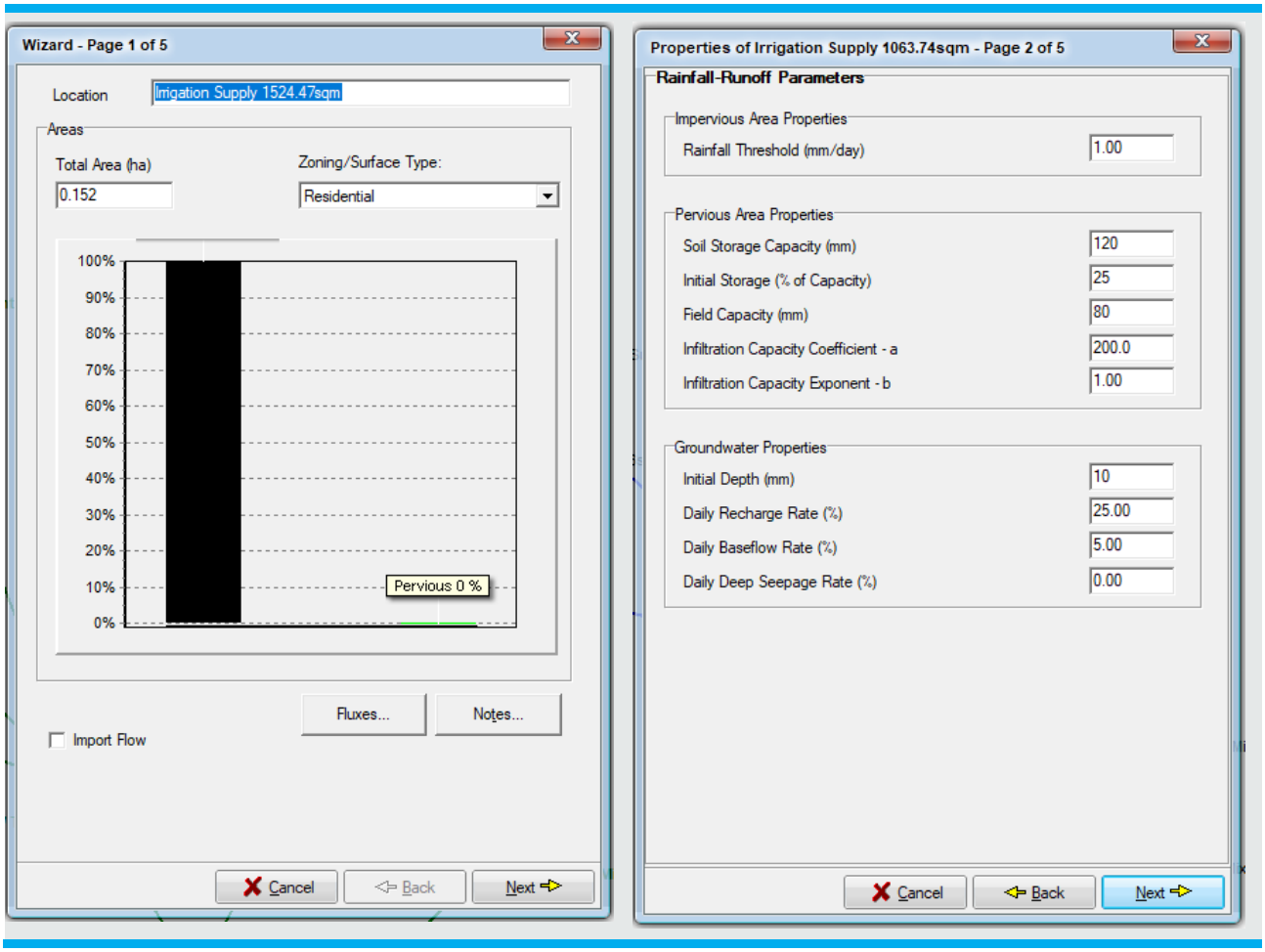


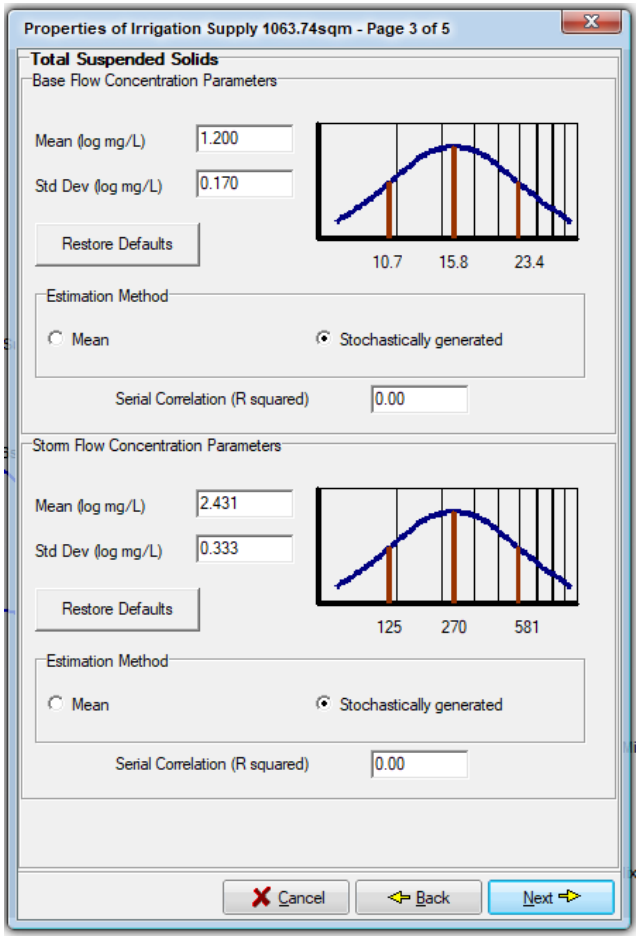


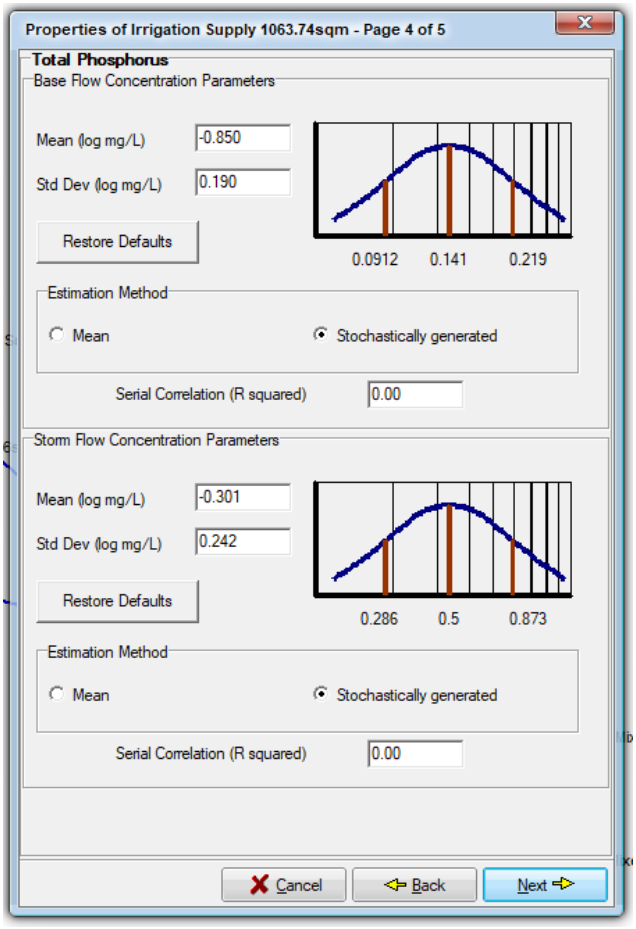


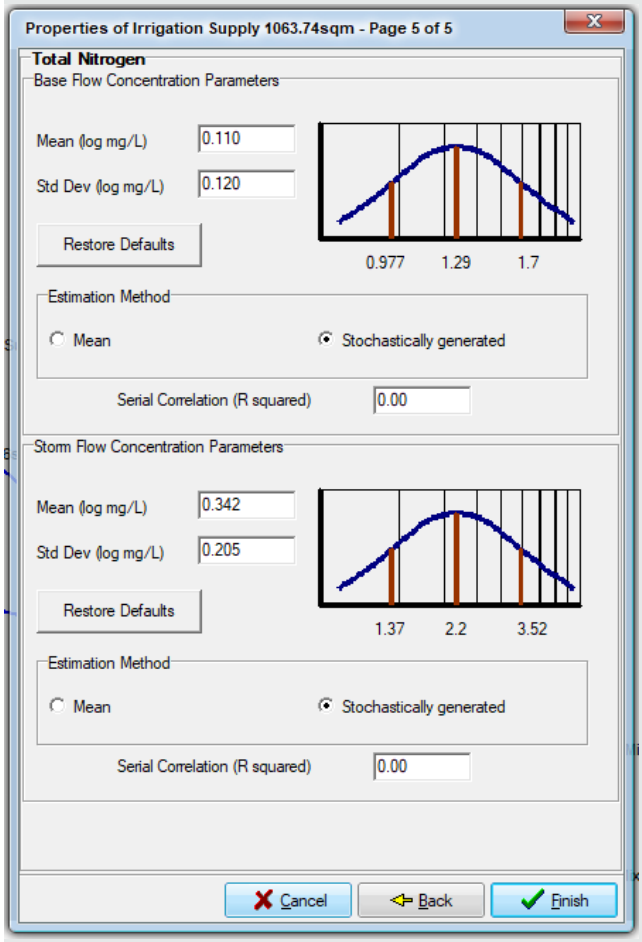


3.2.2 Irrigation Supply Areas (Trafficable Balcony and Additional Roof Areas) 1063.74sqm

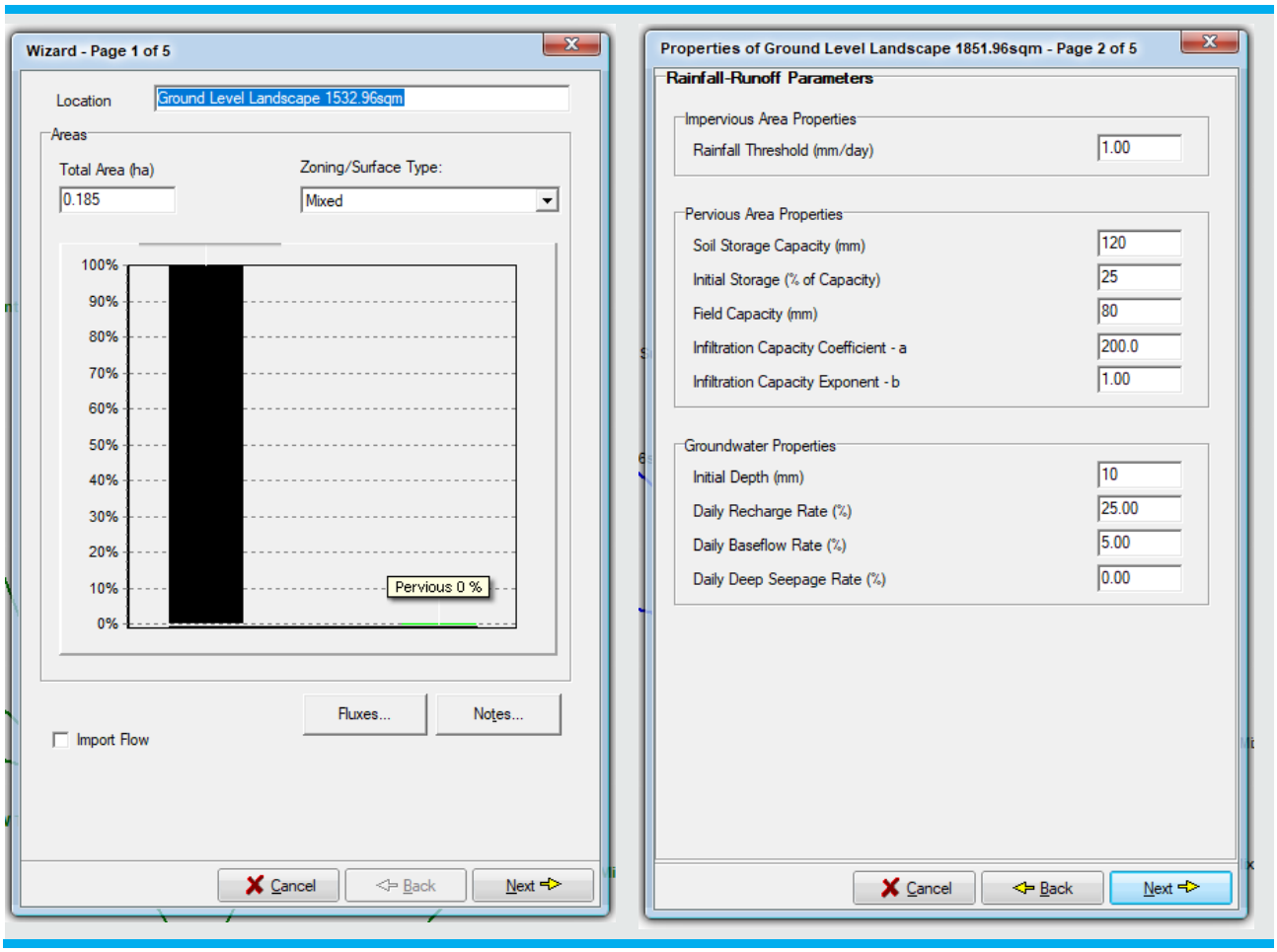


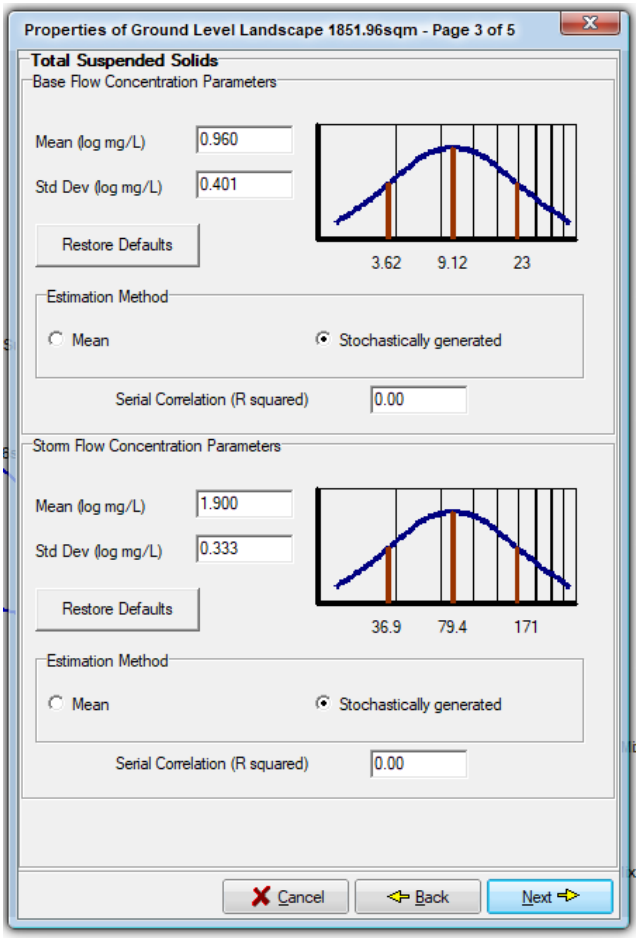


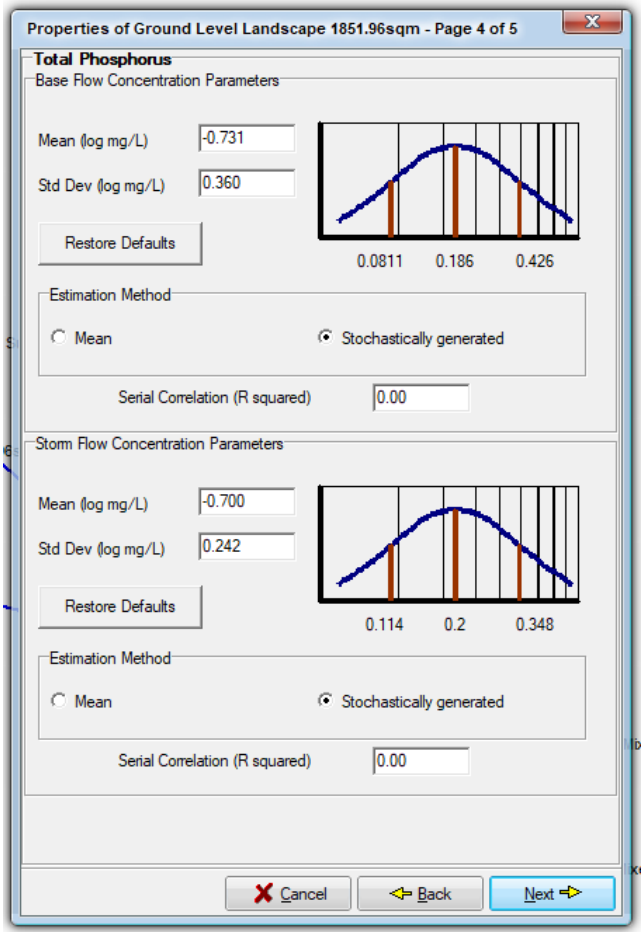


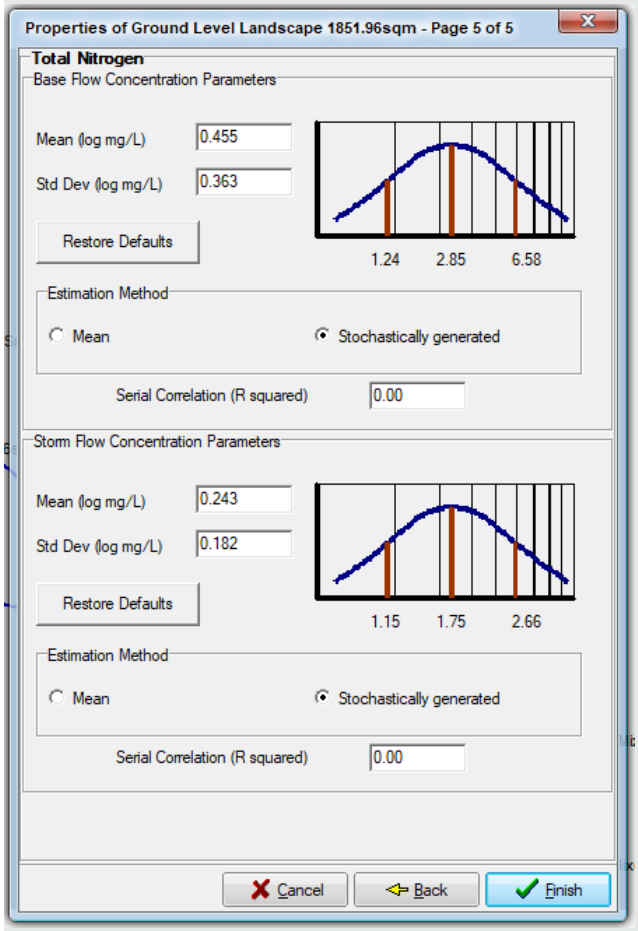


3.2.3 Ground Level Landscape 1851.96sqm

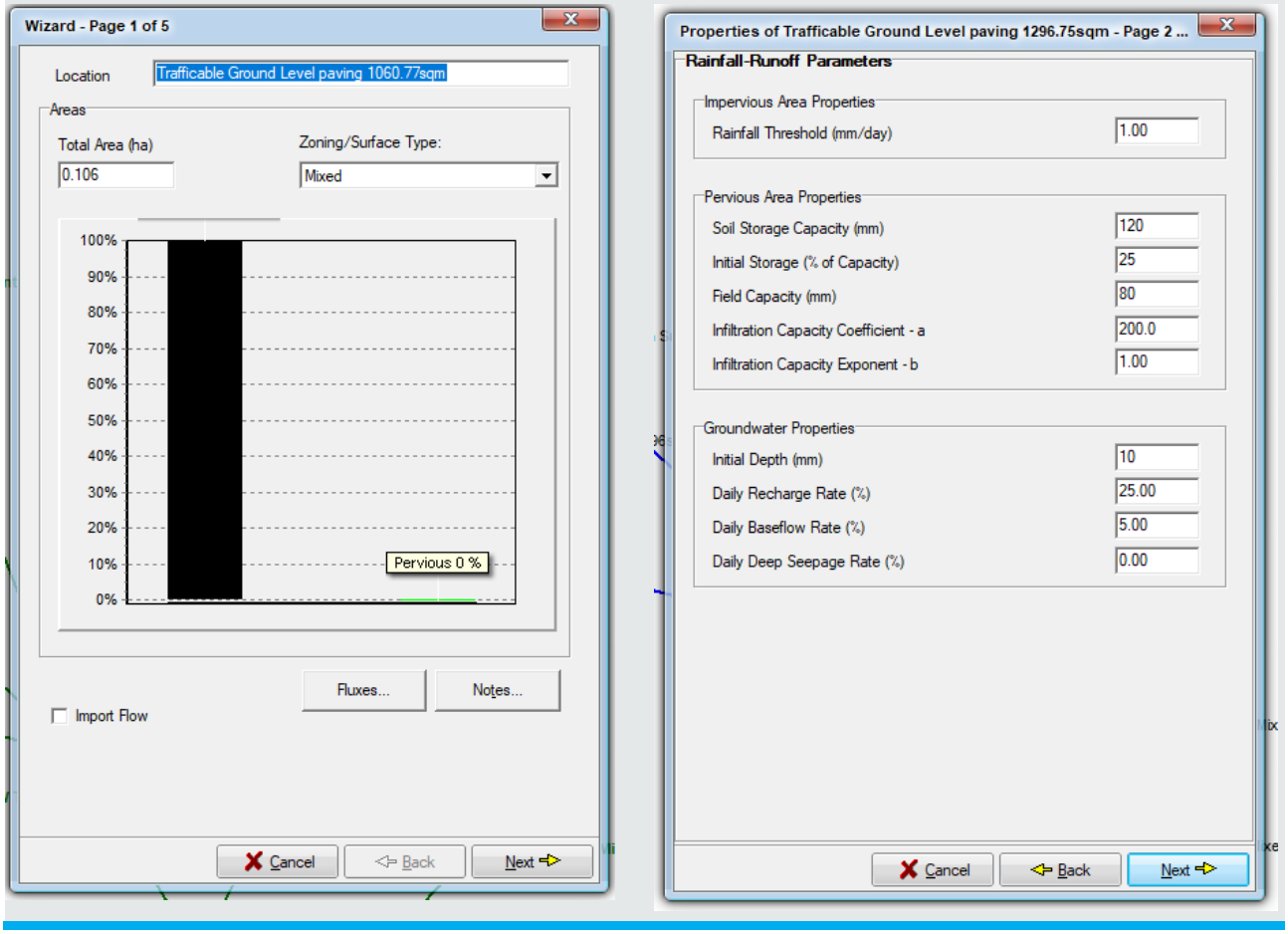


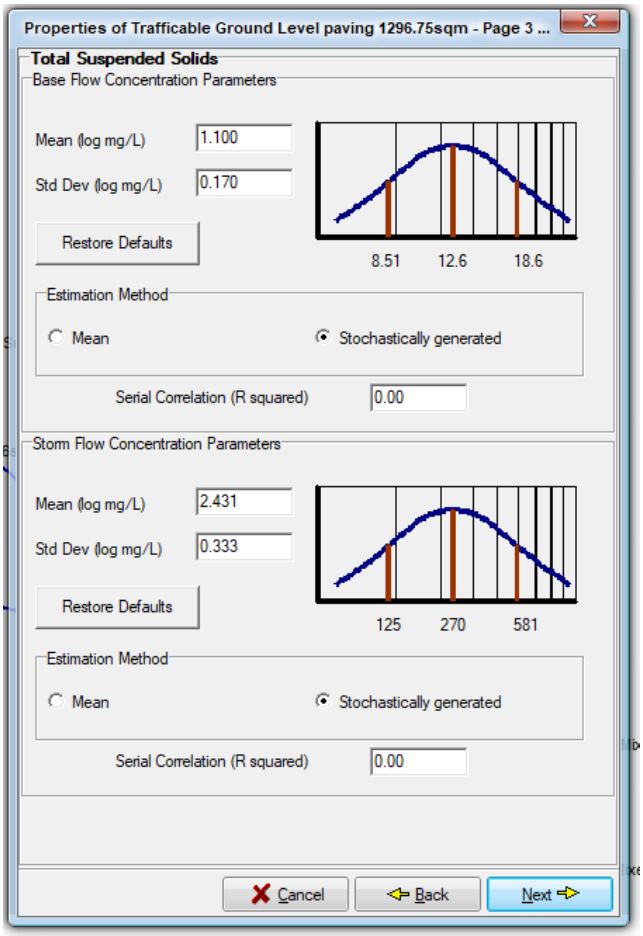


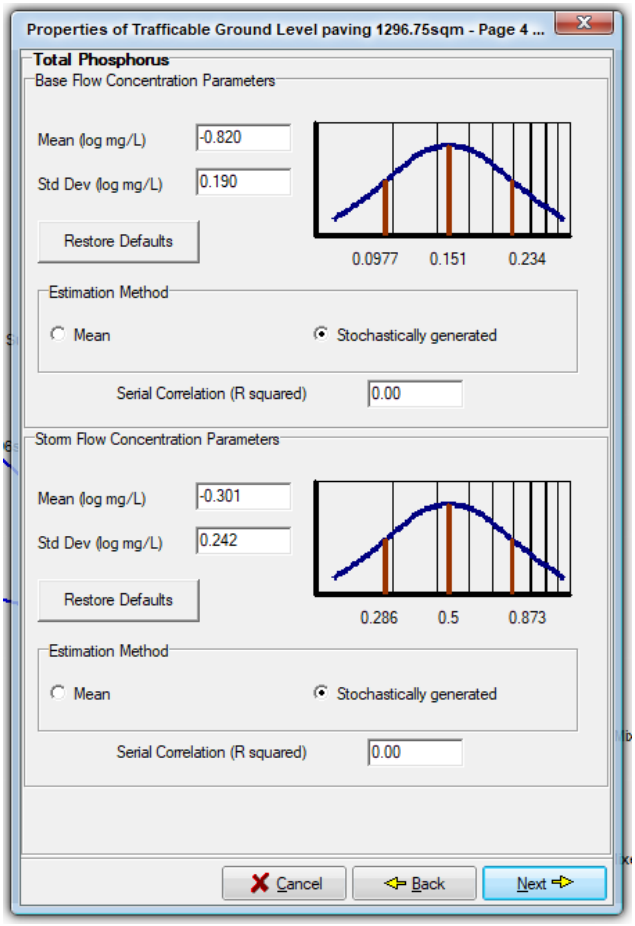


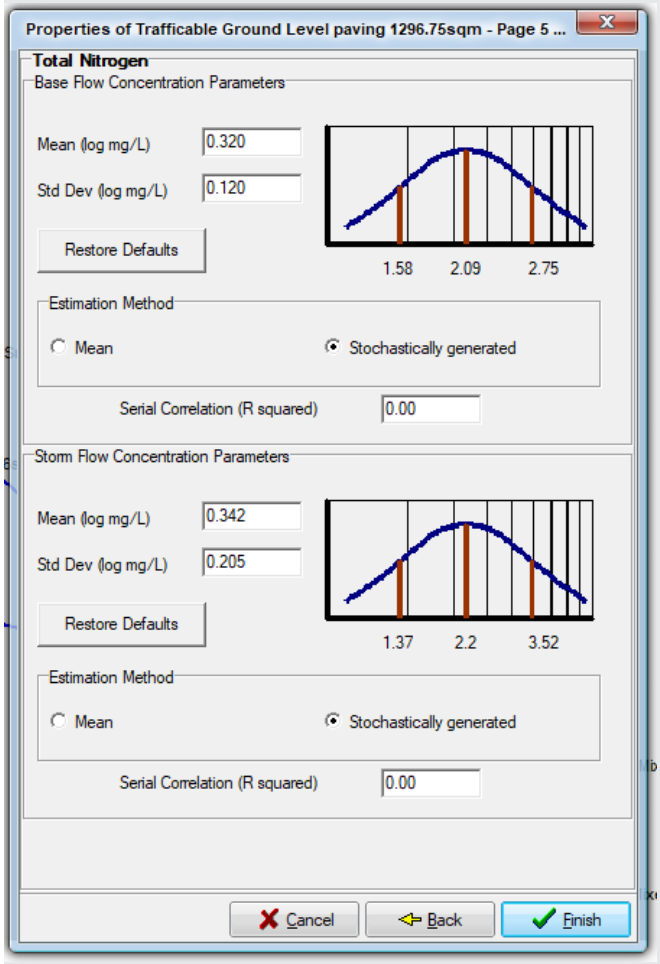


3.2.4 Trafficable Ground Level Paving 1296.75sqm

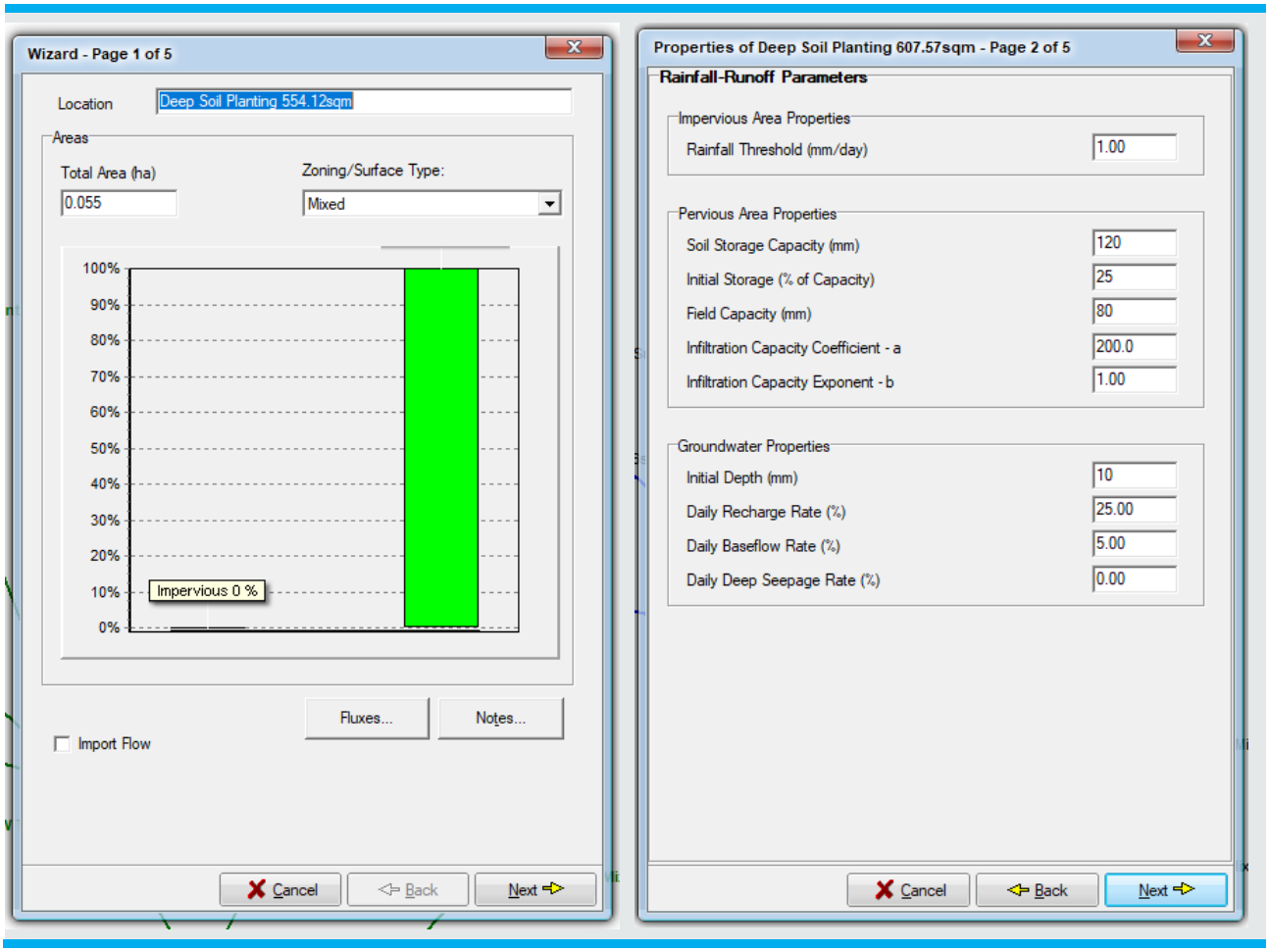


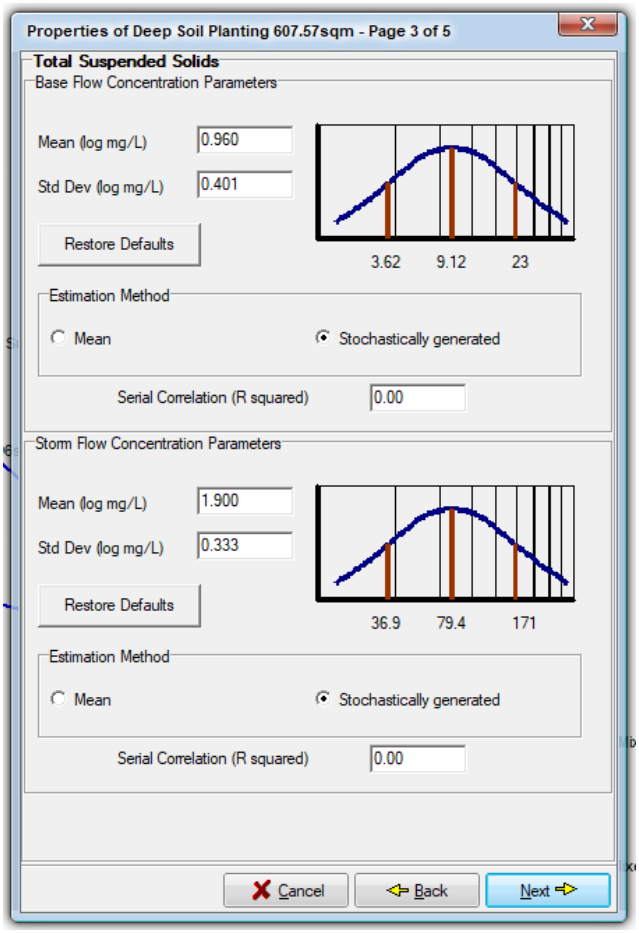


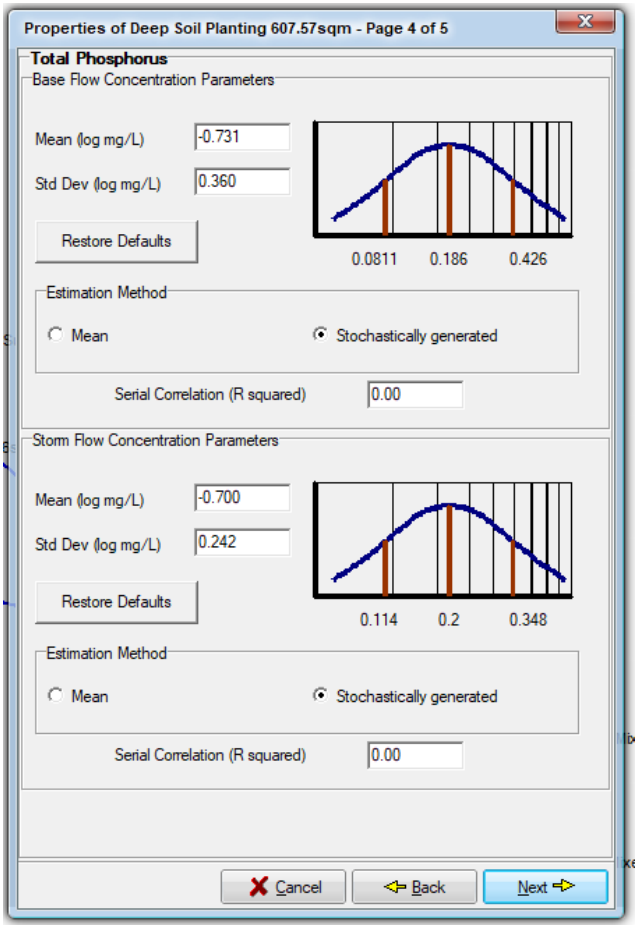


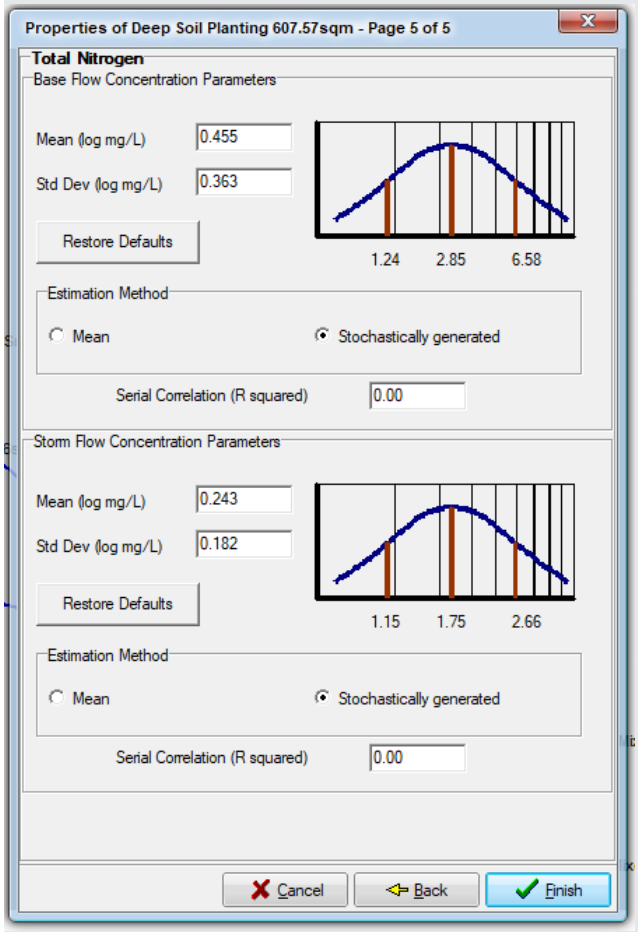


3.2.5 Deep Soil Planting 607.57sqm

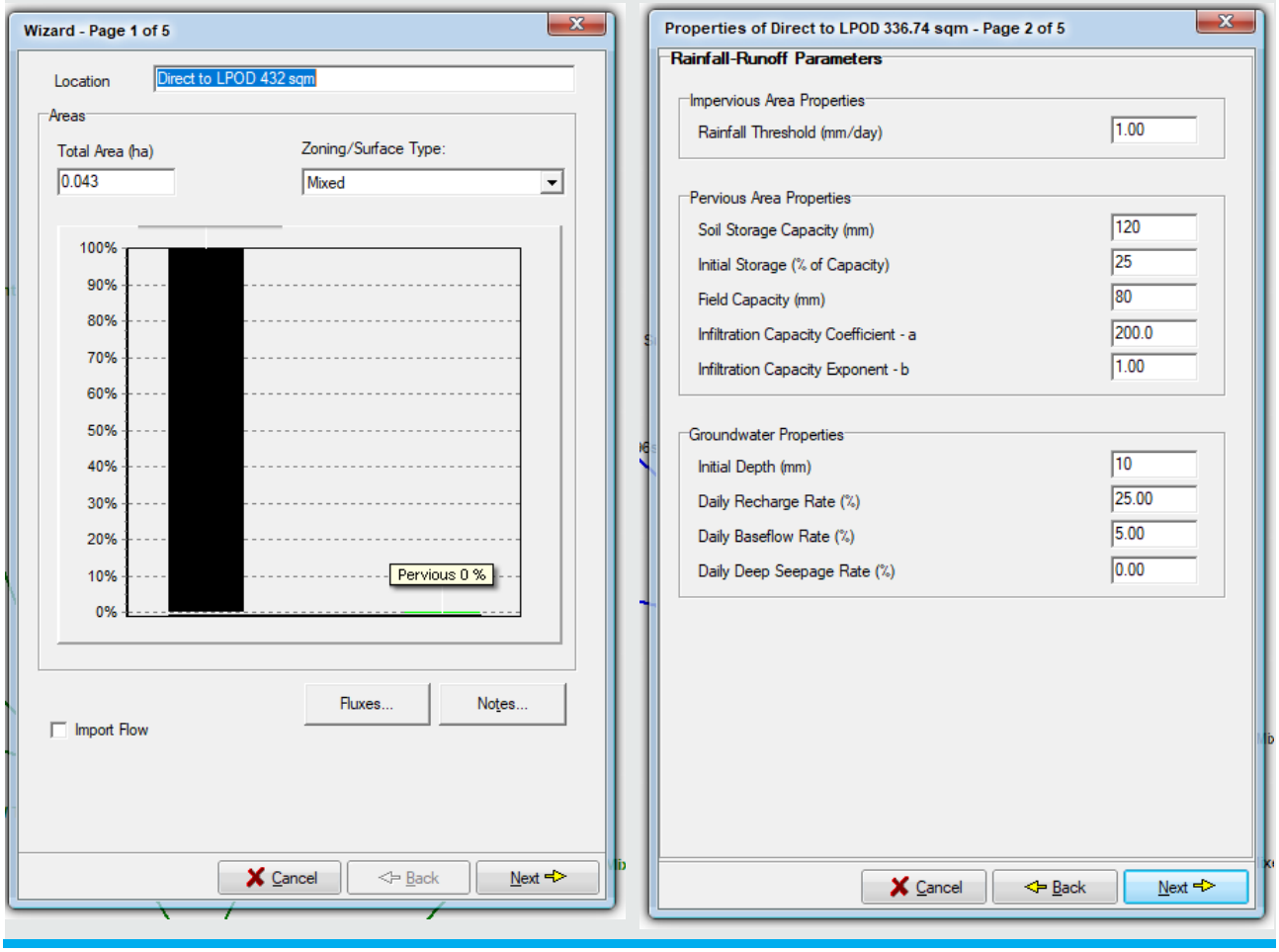


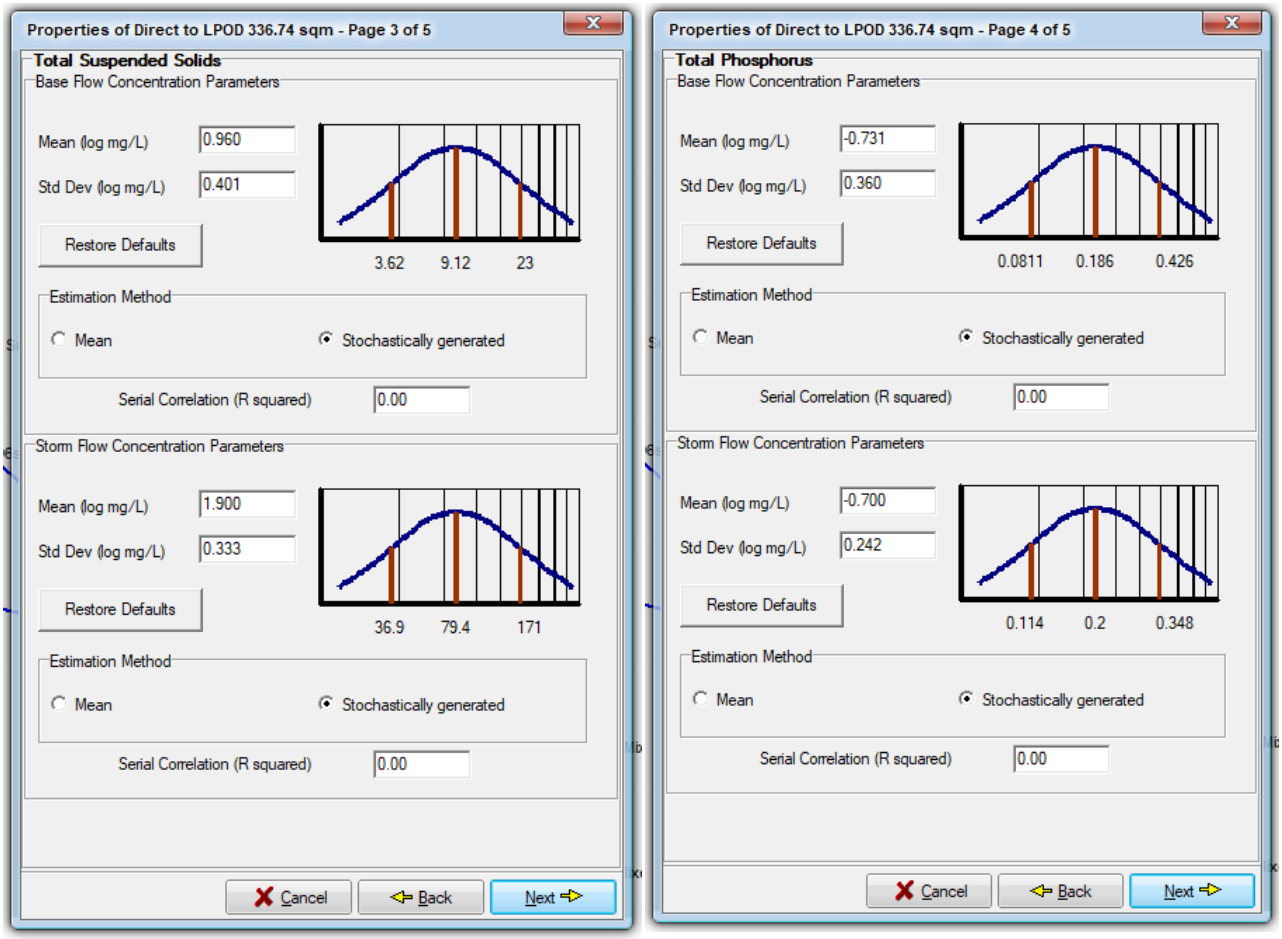


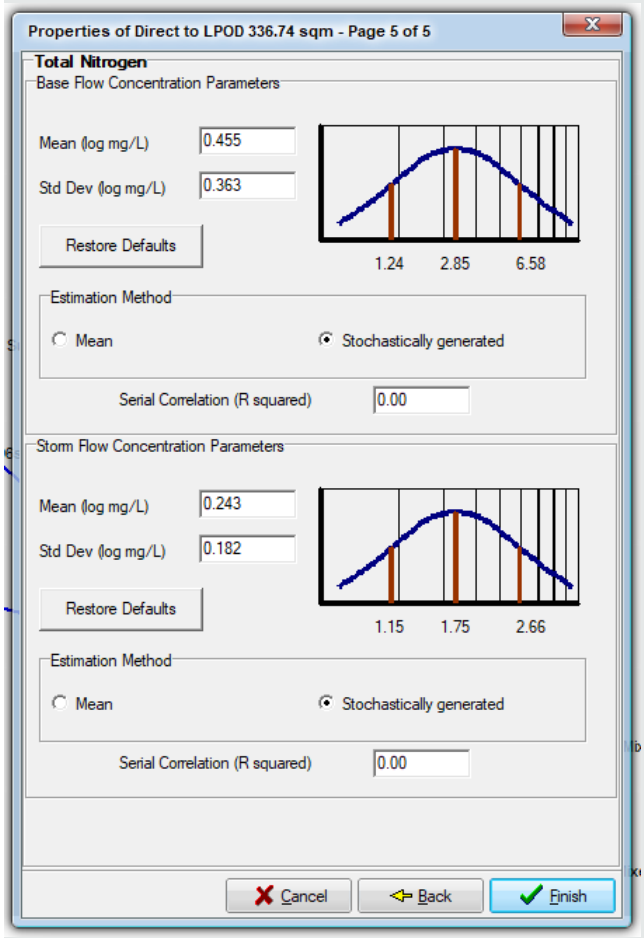




3.2.6 Direct to LPOD 336.74sqm







3.3 Weather Data

The weather station that has been chosen to model this site with is Melbourne City as per the Melbourne Water Guidelines for the use of MUSIC.

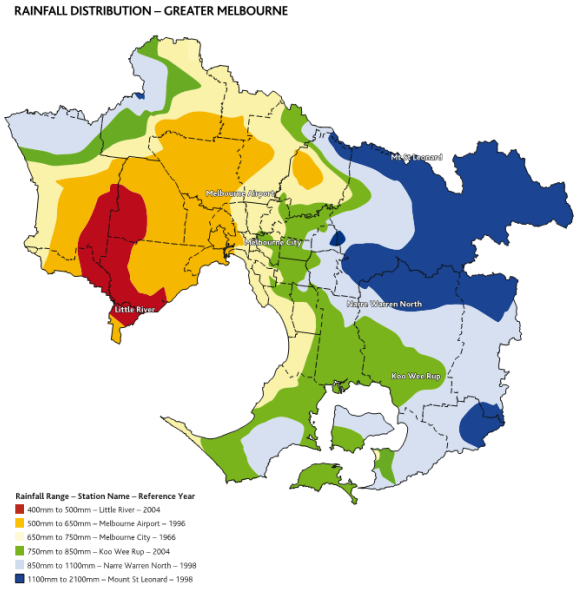


Figure 3 Rainfall Distribution for Great Melbourne, Melbourne Water Guidelines for the use of MUSIC

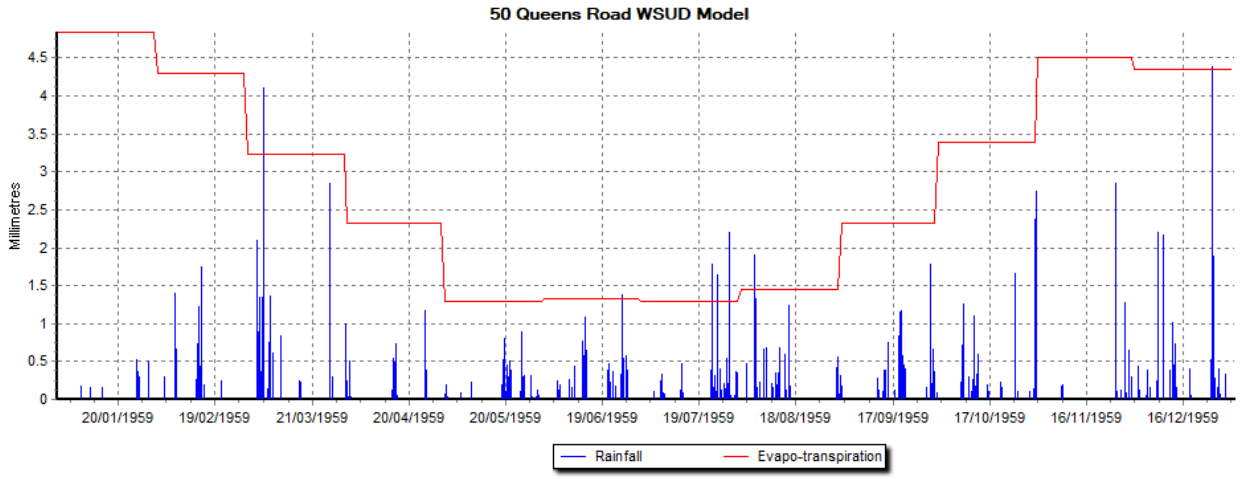


Figure 4 Annual rainfall for Melbourne

4. Treatment Train

As demonstrated in Figure 2 the treatment train proposed for the site stormwater run-off consists of the following measures

Catchment	Total Area (m^2)	Treatment
Non-trafficable, topmost roof area	1910.26	> 40kL Toilet Flushing Rainwater Tank No. 1 > 1795kL/year toilet flushing demand (from potable water calculator)
Balconies, other roof spaces, ground level landscape and paving	4118.18	> 70kL Irrigation Rainwater Tank No. 2 > 1,403kL/year irrigation demand (from potable water calculator)
Deep Soil Planting and areas draining directly to the LPOD	986.12	> No Treatment, Direct to LPOD

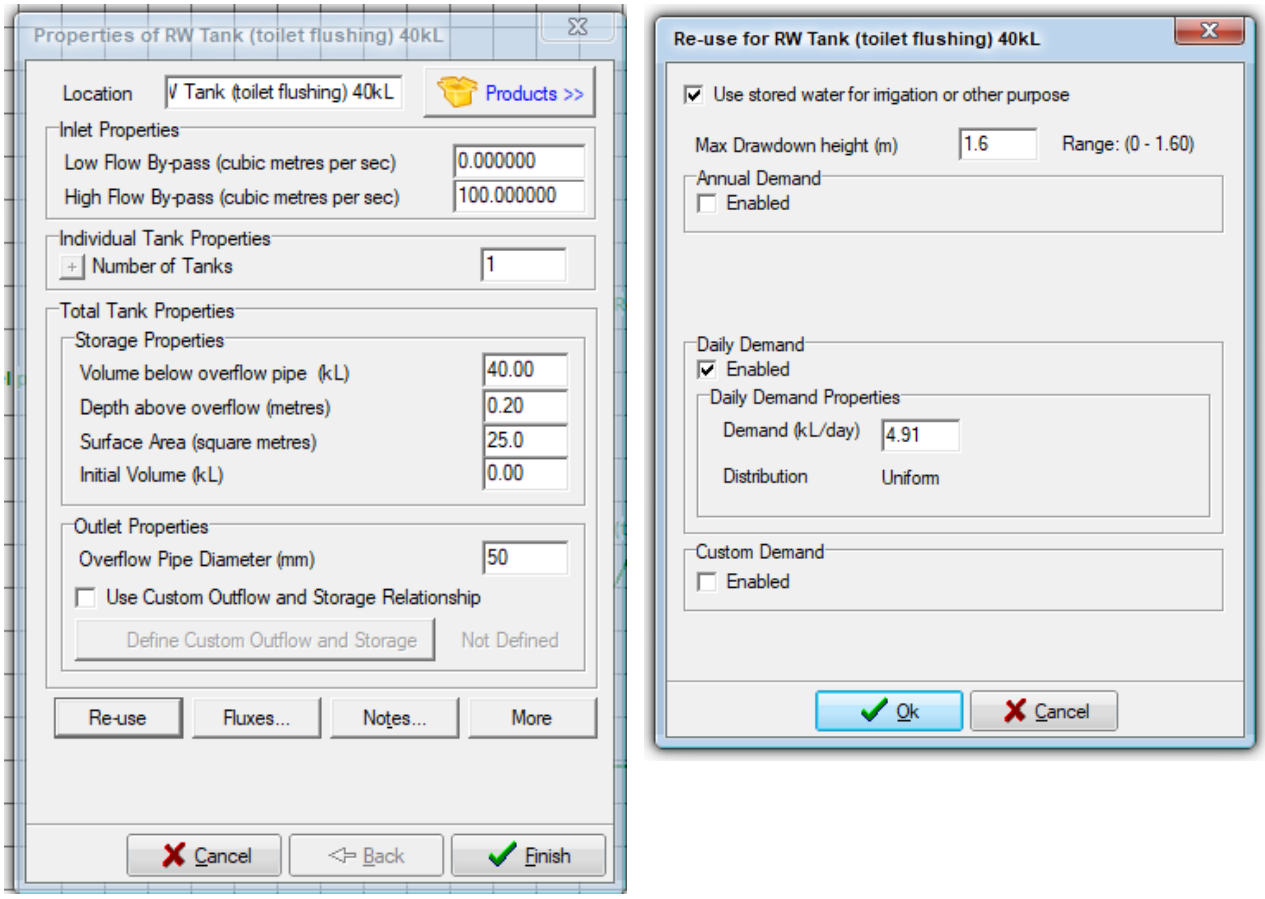
4.1 Rainwater Tank Parameters

4.1.1 Rainwater Tank no. 1

Rainwater tank no. 1 has been modelled with the following parameters:

- 40kL storage capacity.
- Re-use demand of 1,795kL/year calculated for toilet and urinal flushing has been determined using the Green Star Potable Water Calculator based on 4-star toilets.

Rainwater Tank Properties



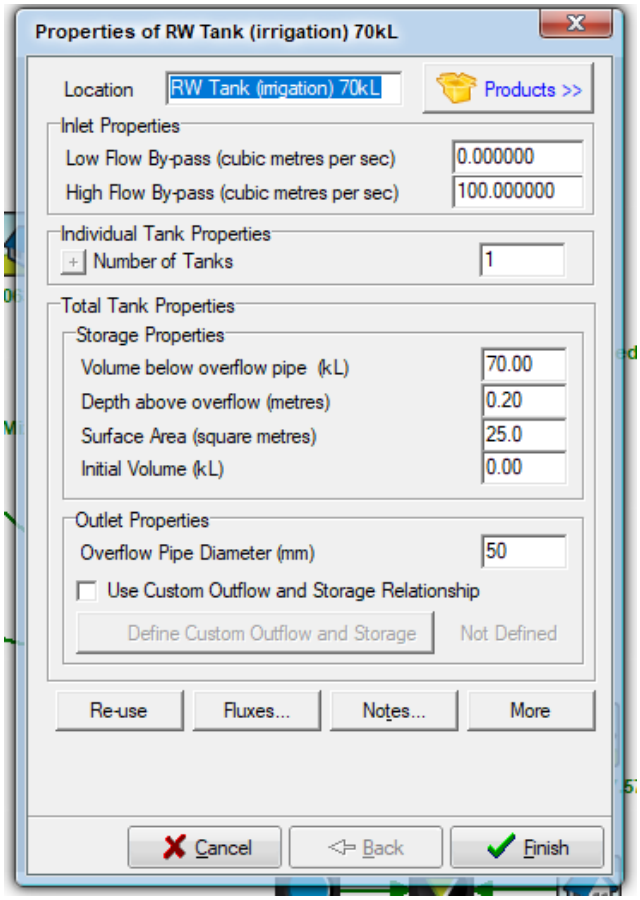
4.1.2 Rainwater Tank no. 2

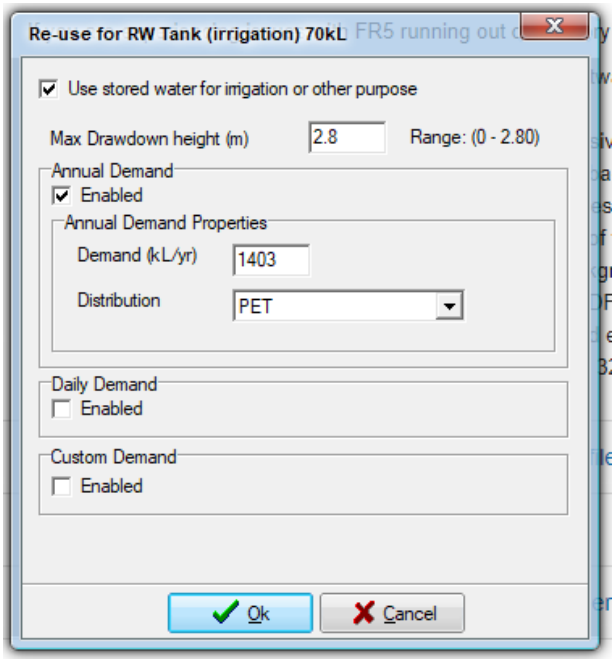
Rainwater tank no. 2 has been modelled with the following parameters:

> 70kL storage capacity.

> Re-use demand of 1403kL/year calculated for irrigation has been determined using the Green Star Potable Water calculator. This demand is distributed throughout the year based on the Potential Evapotranspiration annual profile for Melbourne.

Rainwater Tank Properties





5. Results

The results generated from the model are shown in the screen capture taken from the MUSIC software, in Figure 5 below.

Figure 5 Treatment train effectiveness

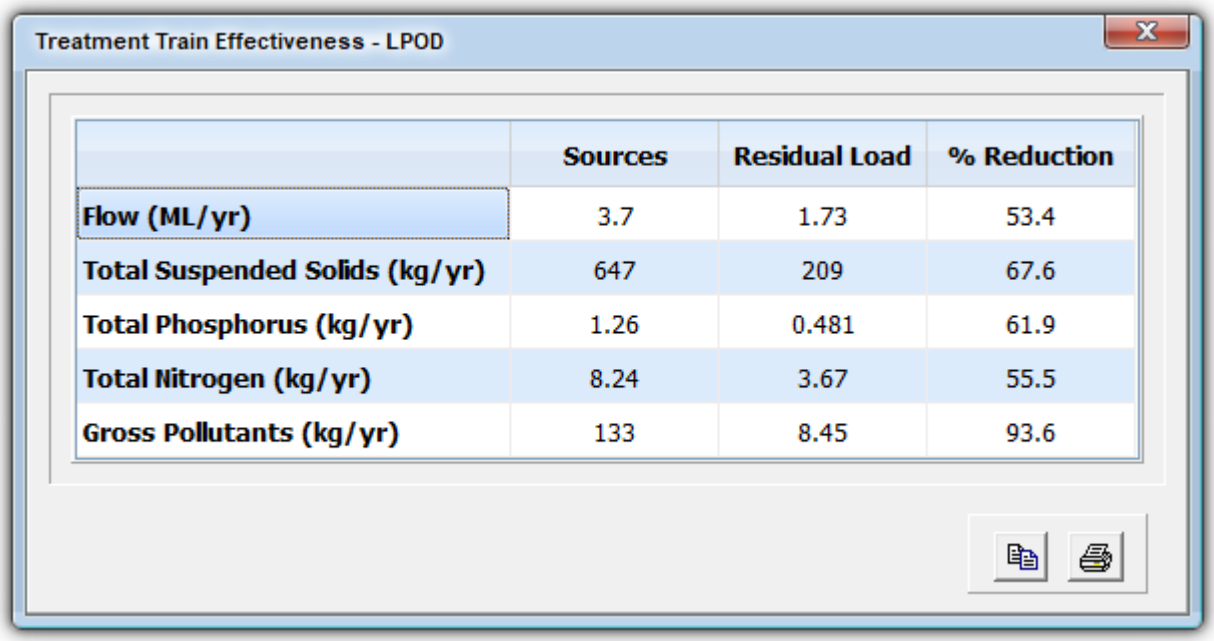


Table 1 compares the results obtained from the MUSIC simulation with the best practice performance objectives. This demonstrates that the proposed strategy exceeds all the performance except for suspended solids removal. It has been discussed with a representative of Port Phillip Council that this approach may be accepted upon review.

Table 1 MUSIC model pollution reduction results

Pollutant	Reduction	Current best practice performance objective	Target Achieved
Total Suspended Solids (kg/yr)	67.6%	80%	Partial
Total Phosphorus (kg/yr)	61.9%	45%	✓
Total Nitrogen (kg/yr)	55.5%	45%	✓
Gross Pollutants (kg/yr)	93.6%	70%	✓

Acknowledging that this project achieves partial compliance for Total Suspended Solids, Council has been informed and is accepting of it.

6. Construction Site Management Plan

A stormwater pollution reduction strategy will be contractually required to be adopted by the Main Contractor as part of its overall Environmental Management Plan (EMP). The strategy should prevent construction debris and littering entering the stormwater systems. The EMP will be required to specifically address the following in respect to stormwater:

1. Objectives
    a. No impact on offsite surface or ground water due to construction activities
    b. Site stormwater to be managed such that no contaminated water is discharged from site
2. General
    a. Materials and waste to be stored at least 2m away from drainage lines
    b. All inadvertent chemical spills to be cleaned up immediately
    c. Application and inclusion of a range of mitigation measures for soil depositing on roads, stormwater, dust, and noise
3. Stormwater
    a. Installation of hay bales around stormwater drains to minimise sediment entering stormwater
    b. Installation of crushed rock to frequently used tracks / haul roads that may produce sediment

7. Maintenance Program

7.1 Rainwater Tank

The proposed system will be routinely maintained as part of the maintenance programme and will be included in the service requirements of the project.

The following will be followed:

- First flush devices will be cleaned every 6 months
- Roof and other collection areas will be inspected regularly, at a minimum every 3 months to ensure they are maintained free of pollutants
- The type of tanks and pump will be maintained in accordance with manufacturers' requirements – typically annually but quarterly in the first year as part of building tuning phase

A sample maintenance manual is attached for reference.

ADP
Consulting : Engineering

Appendix 1
Rainwater Tank Maintenance Schedule

Tips for undertaking maintenance

Things to look for and how to fix them.

Leaf litter / debris in gutters	**Pump not working**
Regularly clear your gutters. Make sure you cover the tank inlet if you're rinsing down the gutters to avoid debris entering the tank.	Check operating instructions for your pump. Check that pumps are kept clear of surface water (flooding), vegetation, and have adequate ventilation. Pumps should be serviced every few years to prolong the pump life.
Blocked downpipe	**Mains backup or pump not working**
If you see water spilling from the edge of the gutters check that the downpipe is not blocked, removing any debris.	Have you heard the pump operating? If the mains backup switching device fails many people do not notice for a long time. Consider a manual system if the switching device is problematic and you don't mind operating it manually.
First flush diverter clogging	**Overflow**
To clean out, unscrew the cap at the base of the diverter and remove the filter. Wash the filter with clean water and the flow restrictor inside the cap.	Check that the overflow is not blocked and that there is a clear path for water to safely spill from the tank through the overflow pipe when full. Check that a clean mesh screen is safely in place to prevent mosquitoes entering the tank.
Debris on the mesh cover over inlets / outlets	**Sediment / debris build-up in tank (more than 20mm thick)**
The fine stainless steel mesh is similar to fly screen mesh. It should be cleaned regularly to ensure it does not become blocked with leaves and other material.	Over time a small amount of fine sediment will collect in the bottom of your tank and this is harmless and natural. It should not be disturbed until it is approx 20 mm thick which may take many years. To clean your tank out simply empty your tank and wash out with a high-pressure washer or hose.
Dirt and debris around the tank base or side.	**Base area**
Keep leaf build-up, sticks, pot plants and other items off the lid of your tank. Use a hose to remove dust and dirt from the outside of the rainwater tank and ensure there is no debris on the base, bottom lip and walls of your tank.	Tanks must be fully supported by a flat and level base. Check for any movement, cracks or damage to the slab or pavers. If damage is observed, empty the tank to remove the weight and have the fault corrected to prevent damage to the tank. There is no warranty from suppliers for damage to a rainwater tank if the base has failed.
Smelly water or mosquitos	**Monitoring the water level**
Rainwater tanks can smell if there is debris in the gutters. Check the gutters and leaf strainers are clean. Mosquitos or wrigglers can make their way into your tank if they are small enough to pass through the inlet strainer. A very small amount of chlorine (approx 4 parts per million) can be put in the tank to kill off mosquitos or the bacteria causing odours. The chlorine will disinfect the water and then evaporate. Chlorine tablets from a pool supplier can be used (but check the recommended dose based on your tank capacity).	A range of devices are available to monitor water level. Some simple float systems can be used effectively.

Acknowledgement: Information from PJT Green Plumbing's 'Maintenance Guide for Your Rainwater Tank' was used to develop this fact sheet.

For more information please visit **www.portphillip.vic.gov.au**
or contact the Sustainability team via:

Phone: 03 9209 6777
email: sustainabledesign@portphillip.vic.gov.au

Maintenance manual

Rainwater tanks

Site address: 50 Queens Road, South Melbourne

Planning permit number: _____

Rainwater tank maintenance

This manual lists the key tasks required to maintain a domestic rainwater tank and the recommended frequency of each task. This manual can be submitted with planning permit applications for developments that include the installation of a domestic rainwater tank. Once endorsed, the property owner is responsible for continuous implementation of rainwater tank maintenance, in accordance with the guidance in this manual.

Rainwater tanks are an exceptional tool for environmental protection. They collect and store roofwater for use inside and outside the home. This simultaneously reduces the demand on our precious potable mains water and limits the amount of stormwater pollutants that enter our sensitive Bay.

Maintenance of rainwater tanks is relatively easy however it is important to do the following key tasks to ensure the quality of water is high:

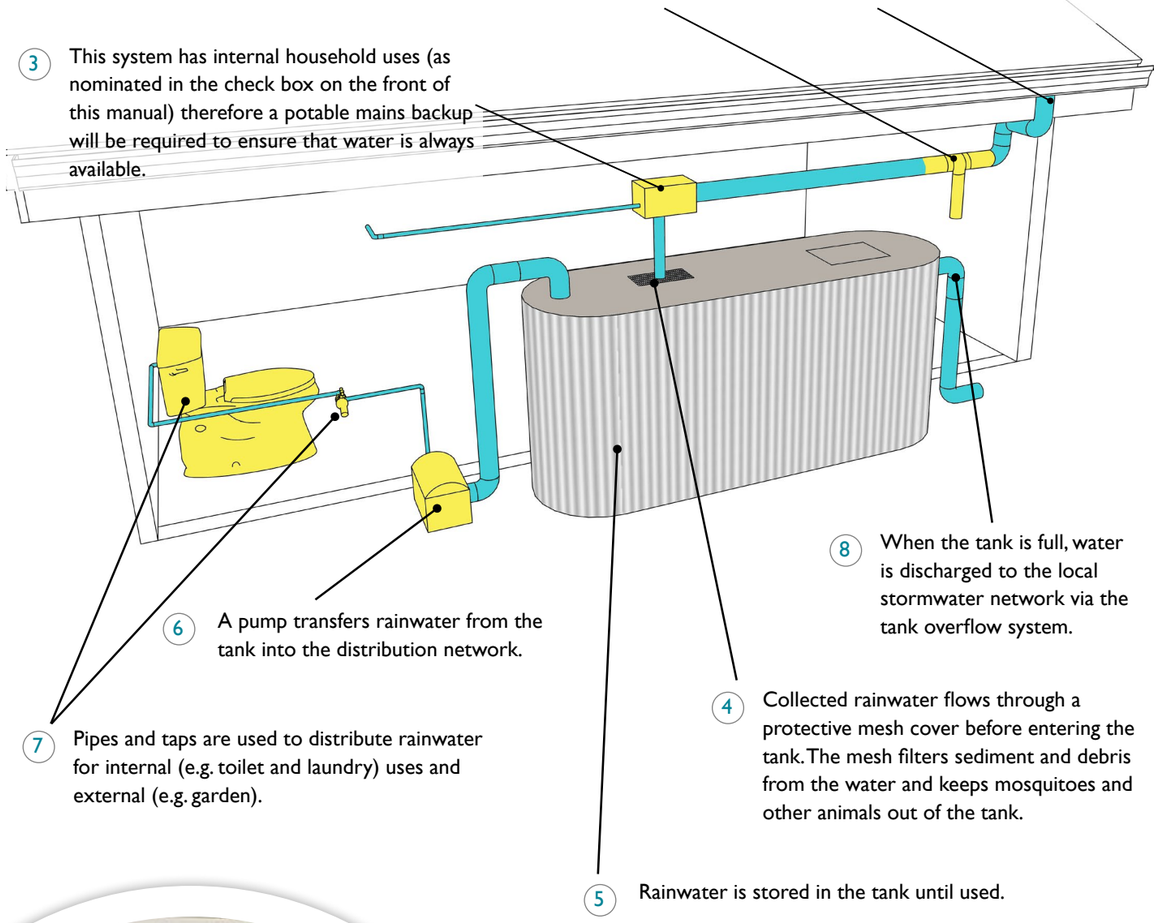
- stop leaf litter and debris entering the tank.
- prevent bird droppings and dust building up in the gutters.
- prevent mosquitos and other animals entering the tank.

Tank connected to	toilet only ☐ toilet & irrigation ☐ toilet & laundry & irrigation ☐ toilet & laundry & hot water & irrigation ☐
Rainwater tank location	Basement 1 & 3
Planning drawing number showing rainwater tank location	TP03.B01 & TP03.B03
Rainwater tank construction date	TBC
Date of final building inspection	TBC
Tank volume (litres)	2 no. 40kL
Area or percentage of the roof that is connected to the tank via gutters and downpipes	100% of roof and 100% of ground level paved area and terraces.

Maintenance Overview

Rainwater Tank Maintenance

The following diagram identifies the key items which are important for rainwater tanks and their maintenance.



Maintenance Checklist

The property owner is responsible for checking the maintenance items in this checklist at the recommended frequency at the bottom of the table. The maintenance log at the bottom of the page should be filled in once each maintenance check is complete. Upkeep of this maintenance log should continue throughout the life of the rainwater tank.

Item	Rainwater tank element	Inspection item	Y/N	Likely maintenance task
1	Roof gutters and downpipes	Is there leaf litter or debris in the gutters?		Remove by hand and dispose responsibly.
2	First flush diverter	Is there anything blocking the first flush diverter (leaves etc)?		Remove by hand and dispose responsibly.
3	Potable mains back up device	Is the potable mains back up switch operating correctly?		Repair or replace device. Consider a manual switching device.
4	Mesh cover	Has the mesh cover deteroriated or have any holes in it?		Replace mesh cover.
5	Tank volume	Is there large amounts of sediment or debris sitting in the bottom of the tank, reducing the volume available in the tank to store water?		Remove sediment and dispose responsibly.
6	Pump	Is the pump working effectively? Have you heard it on a regular basis?		Check the potable mains back up is not permanently on. Repair or replace pump.
7	Pipes and taps	Are pipes and taps leaking?		Repair as needed.
8	Overflow	Is the overflow clear and connected to the stormwater network?		Remove blockages and/or restore connections to stormwater network.
9	Supporting base	Are there any cracks or movement of pavers?		Empty the tank to reduce weight then repair any damage to the base.

Maintenance frequency

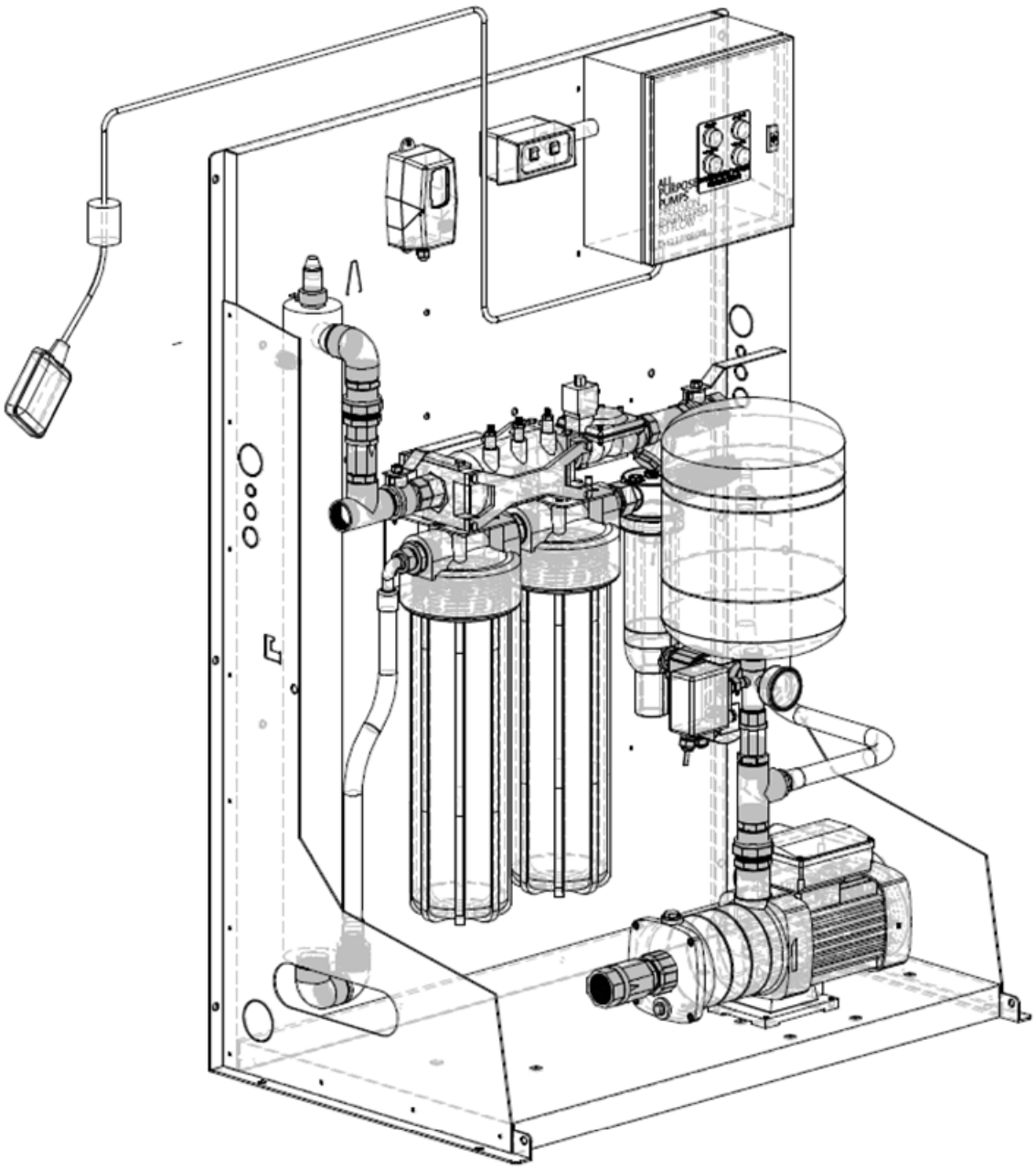
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
All tasks	x			x			x			x		

Regular maintenance will improve the water quality and extend the life of your system. A well maintained tank isn't likely to need to be cleaned out for up to ten years (when there is more than 20mm of accumulated sediment).

Maintenance Log

Maintenance date	Maintenance undertaken

INSTALLATION & OPERATING INSTRUCTIONS
RAINWATER REUSE SYSTEM - COMMERCIAL



Instructions must be read and retained for future reference.

Contents

1 PRODUCT DESCRIPTION

1.1 Introduction

The All Purpose Pumps' range of Rainwater Reuse Systems allow commercial and residential properties to be greener and more efficient. These compact and efficient systems can filter rainwater to variable micron levels and provide ultra-violet disinfection while delivering flows of up to 6.0 l/s. They incorporate a back-up mains water by-pass and can be neatly stored inside a weatherproof security enclosure. The Rainwater Reuse Systems should be installed and maintained in accordance with this manual.

Typical Applications:

- Industry
- Hospitals
- Warehouses
- Schools
- Irrigation
- Public Toilets
- Multi-storey buildings
- Wash bays
- Domestic dwellings

NOTE: The Rainwater Reuse System is an engineered pumping system. All performance, operating conditions and installations details need be clarified with All Purpose Pumps prior to manufacture.

1.2 Typical Arrangement

The scope of supply of a typical Rainwater Reuse System is:

1. Pump – typically horizontal multi-stage or submersible
2. Controller – 240 V or 415 V – Pressure controlled or pressure switch control. VSD controlled is available as an option.
3. Pressure accumulator (where fitted)
4. Primary coarse filtration – either manual or automatic screen filter
5. Secondary fine filtration (where fitted) – cartridge filters with option of carbon impregnation to remove taste and odour.
6. UV Sterilisation (where fitted) – disinfection unit
7. Mains water by-pass complete with solenoid control valve and backflow prevention device.
8. Low level float switch for installation in a rainwater storage tank
9. Valves and manifold pipework.
10. Equipment mounted on a common galvanised base with lockable enclosure for security and protection (where fitted). *See Appendix 9.2*

2 INTRODUCTION TO INSTALLATION

2.1 Warnings

1. Prior to installation, read and understand all instructions in this manual, including any related manufacturer's instructions that apply to the complete system.
2. Failures that have been caused by incorrect installation are not covered by the manufacturer's warranty. See Section 8
3. Installation must comply with local codes, regulations, and authority requirements.
4. Only trade qualified or All Purpose Pumps personnel should install the Rainwater Reuse System.

2.2 Safety Precautions

Prior to commencing any installation work or service work, ensure that all Workplace Health and Safety directives are adhered to, including but not limited to;

1. Use protective clothing including gloves, safety glasses, helmets and safety footwear.
2. Isolate the electrical power before working on any live equipment.
3. Isolate any live services or pressure sources.
4. Isolate equipment that may automatically start up during maintenance.
5. Ensure lifting equipment conforms to AS 4991.

Warning: Once the system has been operated, it has the potential to store water under pressure even when turned off. Use extreme care when uncoupling pipe work. Be prepared to crack open joints and bleed off water to relief pressure.

3 PRODUCT CARE

3.1 Handling

The contractor is responsible for off-loading. All handling and lifting are to be undertaken by suitability qualified personal.

1. Heavy units must be lifted with care to prevent any accidental damage.
2. Gently place unit on the ground. Avoid jarring or bumps. Never drop the unit.
3. Do not drag the unit along the ground for any distance.
4. Do not lift with any liquid in the unit.

3.2 Storage

If the Rainwater Reuse System must be stored temporarily prior to installation, is should be located:

1. In a weatherproof, indoor area protected from UV.
2. In a secure location where accidental damage or vandalism will be prevented.

4 INSTALLATION

4.1 Installation - Preliminary

P&ID and Installation drawings for typical Rainwater Reuse System installations are in Appendix 9.2.

There are four common types of Rain Water Pressure Systems:

Item	System	Type	Applicable P&ID Drawing	Applicable Installation Drawing
1	Above Ground Pump	Pressure Controller	850-SK001	850-SK005
2	Above Ground Pump	Pressure Switch	850-SK003	850-SK005
3	Submersible Pump	Pressure Controller	850-SK002	850-SK006
4	Submersible Pump	Pressure Switch	850-SK004	850-SK006

Note: Contact All Purpose Pumps for details of any customised systems.

There are two to three items to install depending on the system:

1. Base mounted Rain Water Reuse System
2. Remotely mounted Low level Float Switch in a rainwater storage tank
3. Remotely mounted Submersible pump(s) in a rainwater storage tank (if applicable)

Other pre-installation work:

1. The Rain Water Reuse System is intended for installation with a rainwater storage tank and a backup source of mains water.
2. Determine which P&ID and Installation drawings are applicable for the system.
3. Ensure that a screen filter is installed on the inlet to the rainwater storage tank.
4. Thoroughly clean the rainwater storage tank and pipework of all sludge, sediment, or debris prior to connecting to the Rainwater Reuse System. Damage to the system or faulty operation caused by contaminants drawn in from the rainwater storage tank are not covered by warranty.
5. Inspect all equipment when delivered. Report any missing or damaged goods immediately.
6. Never install damaged equipment.
7. The base mounted unit is intended for installation where it is protected from the weather and UV.
8. Check the overall dimension of the unit (length, width, and height) prior to installation. Confirm the unit can be installed in the desired location. Confirm that there is clearance above the unit for maintenance of the UV sterilisation equipment (if fitted).
9. After installation, 600 mm clear access is required on three sides of the unit for maintenance.
10. Check that all the remote mounted items can be installed with the cabling provided.
11. Ensure that appropriate 240 v or 415 V power is available for the unit.
12. Ensure that mains water supply is available for connection into the unit.
13. This manual sets out the minimum conditions required for the correct installation of the Rainwater Reuse System. The overall design and installation of the facility that the unit is integrated into is the responsibility of the owner/contactor.
14. Refer the Appendix 9.1 for the Installation and Operation Manuals of the major ancillary equipment of the Diversion System.

4.2 Installation - Base Mounted Rainwater Reuse System

1. The Rainwater Reuse System should be installed as per the applicable P&ID and Installation drawing.
2. Install with additional isolation valves and barrel unions to allow the unit to be removed from service.
3. Install additional drain lines and tundishes for the automatic screen filters and backflow prevention devices where fitted.

4.3 Installation - Low Level Float Switch

1. The low-level float switch is supplied with counterweight and 10 m of cable.
2. Install the float switch in the rainwater storage tank and ensure it is securely fastened. Set the float switch at the appropriate height as per the relevant installation drawing. Adjust the counterweight to ensure the float switch can operate when in the up and down position. Ensure that the switch is set higher than the pump.
3. Ensure that the float can move to the up and down position without interference or entanglement.

4.4 Installation - Submersible Pump(s) (where applicable)

1. The submersible pump(s) are supplied with lifting chain and 10 m of cable per pump.
2. Lift the pump(s) with the chain. Never lift or suspend the pump by the cable.
3. Install the submersible pump in the rainwater storage tank.
4. If the pump is fitted with a float switch, ensure that the float switch is secured in the upright (on) position.
5. Connect the pump to the Base Mounted Rainwater reuse system using rigid pipework. Install with additional isolation valves and barrel unions to allow the pump to be removed from service.
6. The pump is to be wired into the pump starter mounted on the base next to the controller. A wiring diagram for connecting the pump is locate inside the starter.

4.5 Installation - Electrical

1. Refer Controller Installation and Operation Manual for details of electrical installation.

5 COMMISSIONING & START UP PROCEDURES

The Rainwater Reuse System is design to operate automatically.

The system is factory set and tested. There no settings to adjust once installed. Start the unit and perform functional checks of the system as outlined below in Section 5.2.

WARNING: The start-up procedure is for pressure controlled or pressure switch-controlled pumps.

5.1 Normal Operation

1. When the main isolator on the controller is turned on, the operation of the pump(s) is controlled by the low-level float switch. When there is sufficient water in the rainwater storage tank and the float is in the raised position, the pump will start and bring the system up to operating pressure. Once the system high pressure set point is reached, the pump will turn off.
2. When a tap downstream of the system is opened, the system will supply pressurised rainwater. The system pressure will initially be maintained by the pressure accumulator. When the pressure drops below the system low pressure set point the pump will start and run until the high pressure set point is reached.
3. Pressurised rainwater will be filtered through primary screen filters, secondary cartridge filters (where fitted) and disinfected by UV sterilisation (where fitted) prior to being discharged.
4. When water level drops in the rainwater storage tank the float switch will move to the down position. This will turn the pump off and open the mains water control solenoid switching the water supply over to the mains water by-pass.
5. When the water level again rises in the storage tank, and the low-level float switch moves to the up position, the mains water control solenoid will close and the pump will be enabled. Rainwater will be supplied.
6. If there is a power failure or pump failure, the system will default to the mains water supply. Once power is restored, the system will revert to rainwater supply.
7. The controller controls the pumps, level sensing, mains water back up and filters (if applicable).

5.2 Start Up

1. Ensure that the rainwater storage tank and supply pipework have been flushed and are clean of all sludge, sediment, and debris.
2. Ensure that there is sufficient water in the storage tank for start-up and initial checks.
3. Ensure that the pump and suction pipework leading to the pump are fully primed and there are no leaks.
4. Ensure all valves (rainwater and mains water supply) are open.
5. Ensure that all taps downstream of the system are turn off.
6. With 415V systems, ensure direction of pump rotation is correct as per direction of rotation arrow / label attached to pump.
7. Switch on the power supply and close the discharge isolation valve.
8. Switch the pump on and allow the system to come up to working pressure (high pressure set point).
9. Gradually open the discharge isolation valve and let the downstream pipe work charge up.
10. Open a tap down-stream of the system and leave it open while performing checks.
11. Remove the float switch from the rainwater tank. Hold the float switch in the down position. Check that the pump does not start and that the system switches over to mains water supply.
12. Hold the float switch in the up position. Check that the system switches back to rainwater supply.
13. Return the float switch to the rainwater tank and ensure it is correctly set.
14. Turn off the power and see that the system switches over to mains water supply.
15. Turn on the power and check that the system reverts to rainwater supply.

16. Close the tap downstream of the system. Check that the system pressure returns to the high pressure set point.
17. The system is now ready for operation.

6 MAINTENANCE

In normal operation, the maintenance schedule for the Rainwater Reuse System is:

Filters, pressure accumulator	3 – 6 months
Other equipment	6 – 12 months

The maintenance of your Rainwater Reuse System will vary with every installation and the actual service intervals will need to be determined once the unit is in operation. Under severe conditions the System may need to be checked as often as weekly.

When performing a service, the following should be checked:

6.1 Manual Filters

1. Remove and clean filter screen
2. Check screen for damage or deterioration. Replace if necessary

6.2 Automatic Filters

1. Press manual backwash button if provided.
2. Remove and clean cartridges.
3. Check cartridges for damage or deterioration. Replace if necessary

6.3 Pressure Accumulator

1. Check pre-charge air pressure and adjust accordingly.
2. For pressure controlled or pressure switch-controlled systems, the air pressure is to be 10% below cut in pressure.
3. For variable speed systems, the air pressure is to be 30% below pump cut in pressure.

6.4 Pumps

1. Check the motor insulation resistance
2. Check the motor current draw
3. Check operation by opening and closing a tap up stream of the unit.
4. Check for excessive bearing noise
5. Inspect submersible cable for damage or wear. (submersible pumps only)

6.5 Controller

1. The controller should be cleaned externally to remove build-up of dust.
2. The controller should be kept dry at all times. Inspect for any moisture ingress.
3. Check for correct operation of any visual/audible alarms.
4. Check pressure settings on Pressure Pump Controller (pressure controlled systems only).

6.6 UV Sterilisation

1. Check site glass to ensure lamp is operating.
2. Clean quartz sleeve.
3. Check run timer for remaining hours. Replace when hours fall to zero.

6.7 Valves & pipe-work

1. Check for satisfactory operation of check valves and isolation valves.
2. Check pipe work for damage or leaks.

6.8 Level Float Switch

1. Clean level float switch.
2. Inspect cable for damage or deterioration.
3. Check level set points and adjust if necessary.

6.9 Ancillary Equipment

1. Consult ancillary equipment manuals for any additional maintenance procedures.

7 FAULT FINDING

Read and understand the safety and operating instructions in this manual before undertaking any work on a pump.

WARNING: Before removing equipment for service, always isolate the electrical power, live services and pressure sources. The system has the potential to store water pressure even when turned off.

Only qualified trade personnel should electrically test the pump motors and controller.

Symptom	Possible Cause	Corrective Action
System does not run	No power supply to unit	Turn on or reconnect supply
	Pump power lead or float switch not plugged into controller	Ensure power and float cables are plugged into power outlets on the underside of the controller
	Loose electrical connections	Check & tighten connections
	Water level below low level float switch	Add water to storage tank Check level of float switch
System trips circuit breaker or thermal overload after short period of operation	Blockage in pump	Remove blockage and clean tanks if necessary
	Overload setting is incorrect	Adjust setting
	Electrical supply is not sufficient	Investigate and rectify supply
System runs but does not deliver water	Isolation valve shut	Check that all valves up and down stream of unit are open
	Air in suction line or pump	Remove high points in suction line. Re-prime suction line and pump
	Leak in suction line	Inspect and repair leaks
	Suction line is not installed correctly	Check suction conditions
	Filters are blocked	Clean filters. Replace filter element if necessary
	Leak in discharge pipe-work	Inspect and repair leak.
System runs but capacity is not constant	Suction pipe is too small for capacity of system	Replace suction line or restrict pump discharge flow
	Insufficient water is available at the pump inlet	Check suction conditions
	Water level is too low	Check suction conditions
	Suction side is partially blocked	Remove blockage and clean tanks if necessary
Pump starts and stops too frequently	Pressure switch setting is incorrect	Check setting and adjust if necessary
	Tank pre-charge pressure is incorrect	Ensure pressure is correct
	Check valve in suction line is not seating correctly	Clean or replace valve
Pump run continuously	Pump not achieving pre-set stop pressure setting	Remove high points in suction line. Re-prime suction line and pump
		Pressure test suction line and pump
		Check suction conditions
		Clean filters, Replace filter element if necessary
		Repair leak in discharge line

8 WARRANTY

All Purpose Pumps (APP) products come with a 12 month warranty that complies with all legal requirements, and is in addition to other rights and remedies you may have under law in relation to the products to which this warranty applies. This warranty is given in place of all excludable warranties, conditions, terms, undertakings and obligations implied by statute, common law, trade usage, course of dealing or otherwise including warranties or conditions of merchantability, fitness for purpose, satisfactory quality and/or compliance with description, all of which are excluded to the fullest extent permitted by law.

Sales to Australian customers may be subject to certain product guarantees and warranties that cannot be excluded under the Australian Consumer Law contained in Schedule 2 of the Competition and Consumer Act 2010 (Cth) ("the Australian Consumer Law") (see www.consumerlaw.gov.au) and nothing in this warranty purports to modify or exclude the conditions, warranties and undertakings, and other legal rights, under the Australian Consumer Law.

Any rights the Customer may have under the Australian Consumer Law will apply regardless of any inconsistent provisions in this warranty which will be read down to the extent necessary to comply with the Australian Consumer Law and which will otherwise apply to the fullest extent legally permissible. APP's liability under this warranty is limited at APP's option, to: (a) in the case of products, the replacement of the products or the supply of equivalent products; the repair of such products; the payment of the cost of replacing the products or of acquiring equivalent products; or the payment of the cost of having the products repaired; OR (b) in the case of services, the supplying of the services again; or the payment of the cost of having the services supplied again.

This warranty covers product and material defects which are not the results of normal wear and tear for a period of 12 months from the date of delivery. The warranty does not cover damage, fault, failure or malfunction caused by external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorised by APP, failure to perform required preventive maintenance, act of God, fire, flood, war, act of violence or any similar occurrence; products with missing or altered serial numbers; any attempt by any person other than APP personnel or any person authorised by APP, to adjust, repair or support the products and problems caused by use of parts and components not supplied by APP, or misapplication, i.e. outside the guidelines that are specified in our operating and installation manual provided with the product. At the discretion of APP a product will be inspected for signs of, but not limited to, misuse, misapplication and neglect before any repair or replacement will be considered.

All products must be installed by a licensed trades person and where specified require commissioning by APP before initiating general use, failure to do so will void the warranty. APP will not be liable for the transportation / replacement / removal / installation costs associated with the warranty claim. Subject to the above paragraphs, APP excludes all liability which can be lawfully excluded (including liability in negligence) and will not be liable for any loss, cost or damage of any kind arising from the product or defect (including personal injury or death) whether incidental, special, consequential, indirect or otherwise (including without limitation loss of profits, revenues, anticipated sales, business opportunities, goodwill, or interruption of business), suffered or incurred by any person and arising directly or indirectly from the sale handling or use of the products or from any other cause with respect to the products. Any product that has been repaired or altered without prior authorisation and communication with APP will void the warranty.

This warranty is governed by and construed in accordance with the laws of Victoria and are subject to the non-exclusive jurisdiction of the courts of Victoria, in the Commonwealth of Australia.

9 APPENDIX

9.1 Ancillary Equipment – Installation & Operation Manuals

If required, contact All Purpose Pumps for the Installation & Operations manuals of ancillary equipment.

T +61 3 8368 000

Please quote

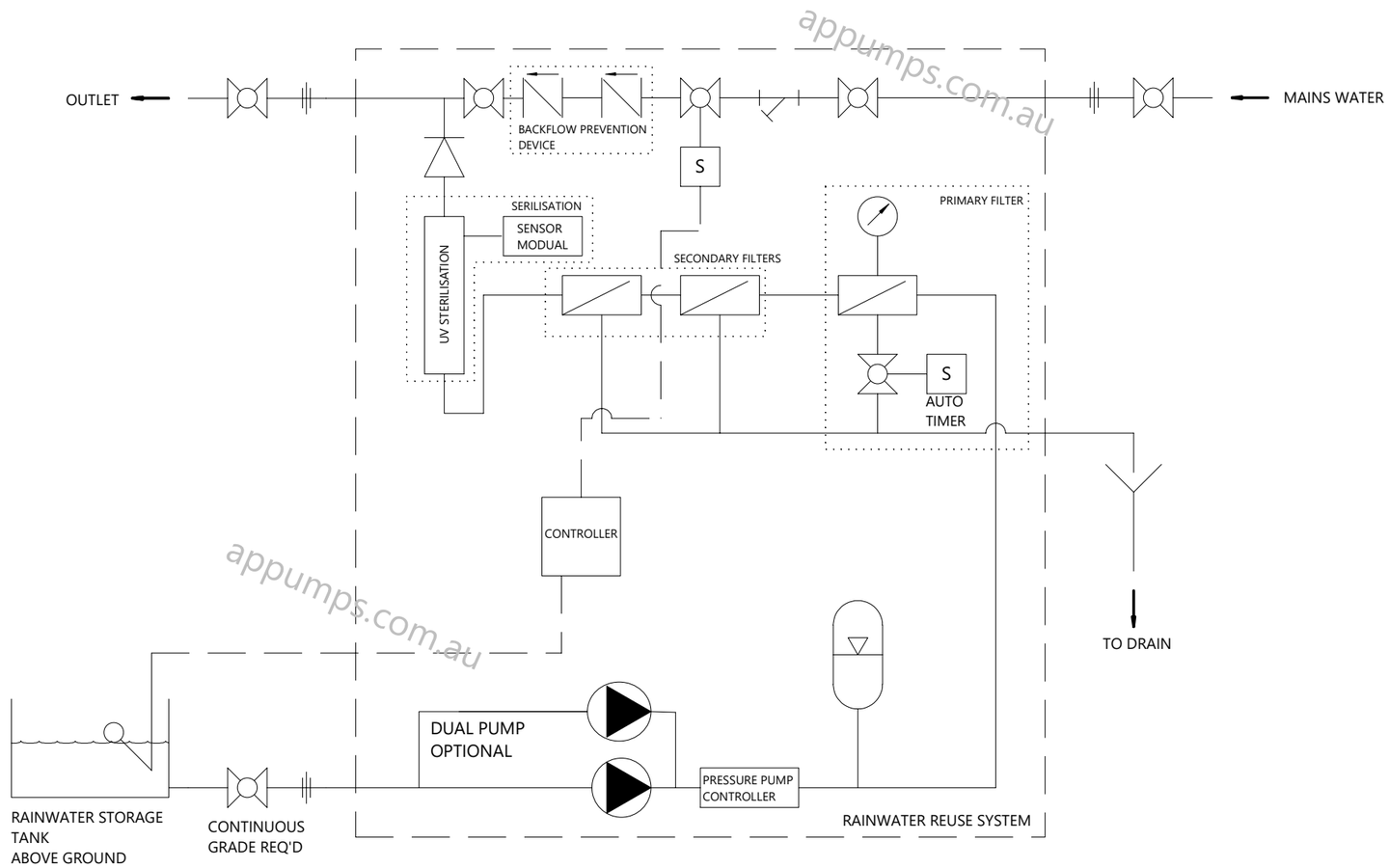
- Serial number – located on pump controller

Ancillary Equipment with applicable manuals are:

1. Pump
2. Controller
3. Pressure Accumulator
4. Filter – Primary
5. Filter – Secondary (where fitted)
6. UV Sterilisation (where fitted)

9.2 Drawings

Drawing No.	Title
850-SK001	Rainwater Reuse System Above Ground Pump Pressure Control Typical P&ID
850-SK002	Rainwater Reuse System Submersible Pump Pressure Control Typical P&ID
850-SK003	Rainwater Reuse System Above Ground Pump Pressure Switch Control Typical P&ID
850-SK004	Rainwater Reuse System Submersible Pump Pressure Switch Control Typical P&ID
850-SK005	Rainwater Reuse System Above Ground Pump Typical Installation - Above Ground Tank
850-SK006	Rainwater Reuse System Submersible Pump Typical Installation - Above or Below Ground Tank



SYMBOLS

PUMP

ISOLATION VALVE

CHECK VALVE

BACKFLOW PREVENTION DEVICE

Y-STRAINER

ORIFICE

PRESSURE GAUGE

PS — PRESSURE SWITCH

PRESSURE ACCUMULATOR

COUPLING

CONTROLLER — CONTROLLER

CONTROLLER AUTO PUMP — INLINE PRESSURE CONTROLLER

S — SOLENIOD

FLOAT SWITCH

FILTER

UV STERILISATION — UV STERILISATION

SENSOR MODUAL — UV SENSOR MODULE

ALL DIMENSIONS ARE IN MM
ALL DIMENSIONS ARE APPROXIMATE

ALL PURPOSE PUMPS
PRECISION ENGINEERED TO FLOW...
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F: +61 3 8368 0099
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W: allpurposepumps.com.au

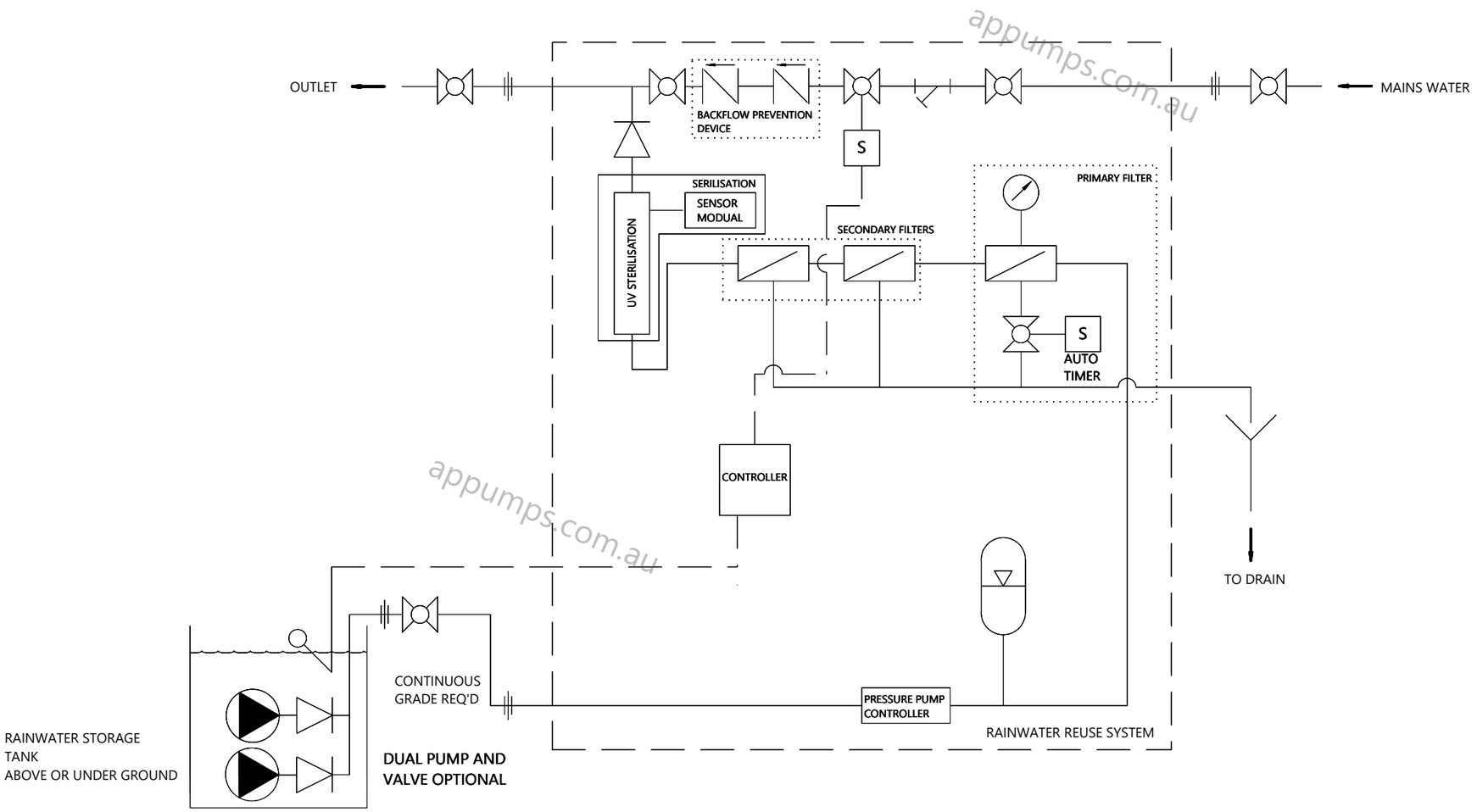
PROJECT
RAINWATER REUSE SYSTEMS

DRAWING TITLE
ABOVE GROUND PUMP
PRESSURE CONTROL
TYPICAL P&ID

DRAWN	CHECKED	APPROVED
J FOLEY		

SCALE	DATE
NTS	16/1/17

DRAWING NO.	REVISION NO
850-SK001	0



SYMBOLS

PUMP

ISOLATION VALVE

CHECK VALVE

BACKFLOW PREVENTION DEVICE

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PROJECT: RAINWATER REUSE SYSTEMS

DRAWING TITLE: SUBMERSIBLE PUMP PRESSURE CONTROL TYPICAL P&ID

DRAWN	CHECKED	APPROVED
J FOLEY		

SCALE	DATE
NTS	16/1/17

DRAWING NO.	REVISION NO
850-SK002	0

ALL DIMENSIONS ARE IN MM
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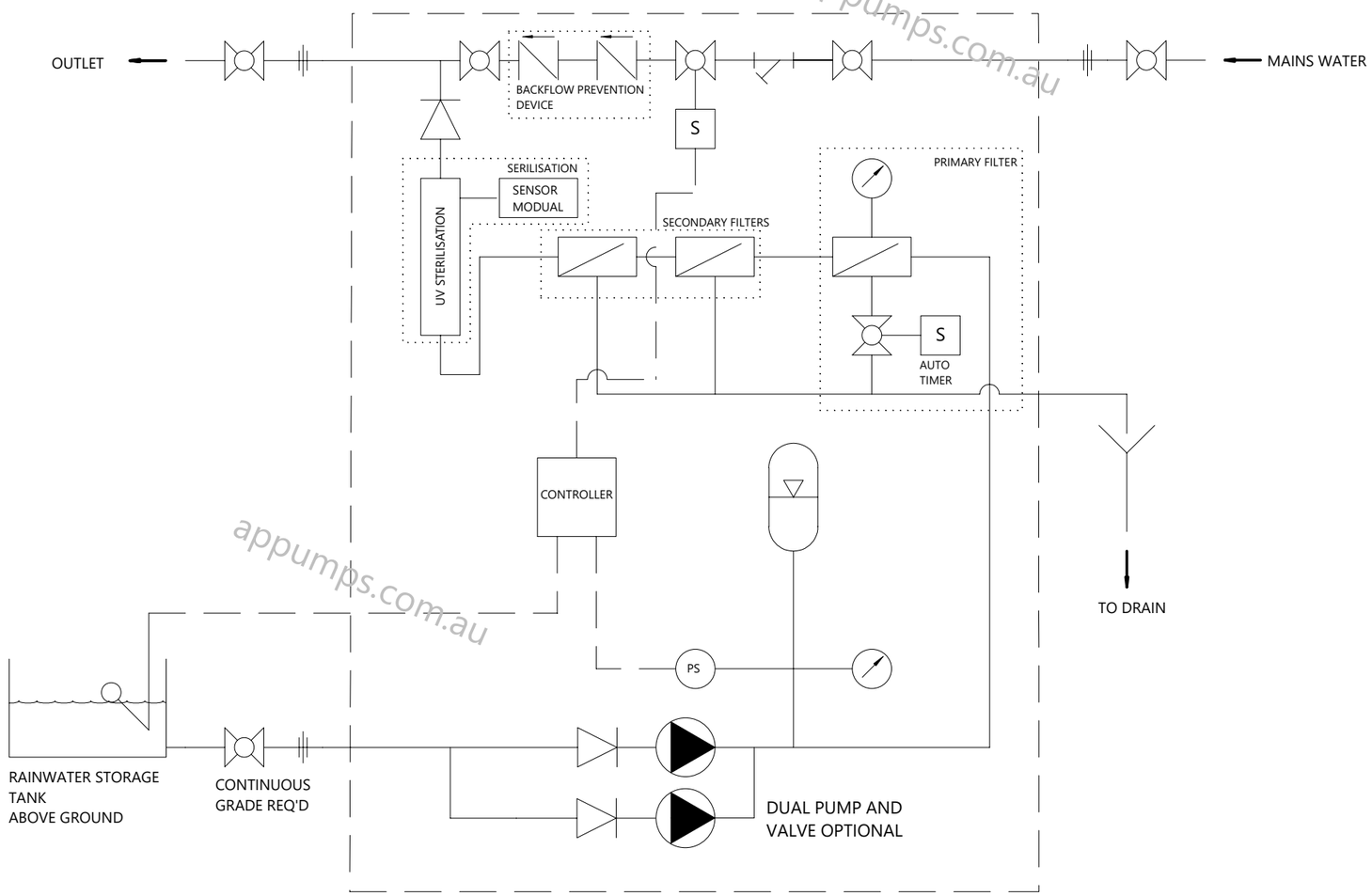

RAINWATER REUSE SYSTEM

SYMBOLS

PUMP

ISOLATION VALVE

CHECK VALVE

BACKFLOW PREVENTION DEVICE

Y-STRAINER

PRESSURE GAUGE

PS — PRESSURE SWITCH

PRESSURE ACCUMULATOR

COUPLING

CONTROLLER — CONTROLLER

CONTROLLER AUTO PUMP — INLINE PRESSURE CONTROLLER

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FLOAT SWITCH

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SENSOR MODUAL — UV SENSOR MODULE

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W: allpurposepumps.com.au

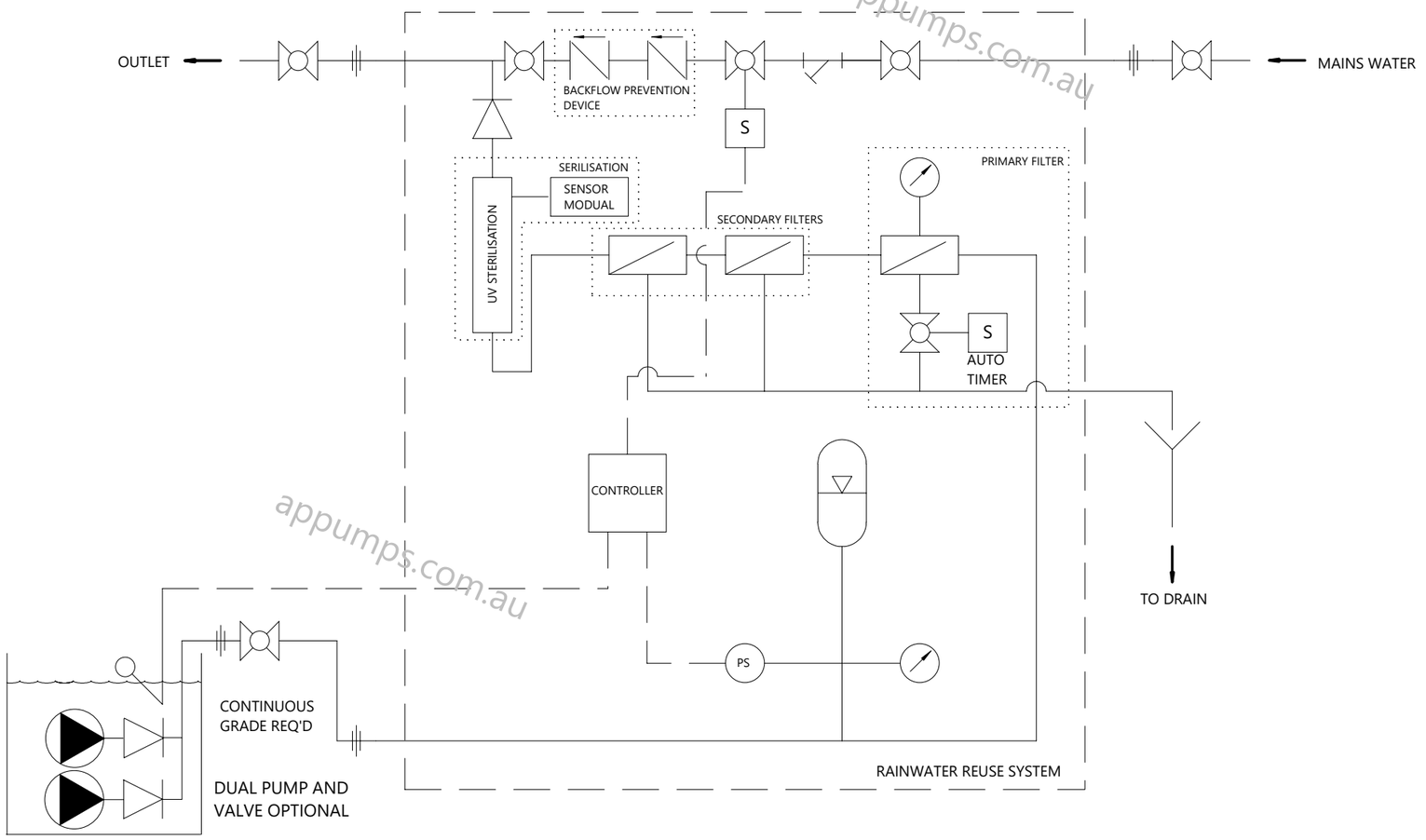
PROJECT: RAINWATER REUSE SYSTEMS

DRAWING TITLE: ABOVE GROUND PUMP PRESSURE SWITCH CONTROL TYPICAL P&ID

DRAWN	CHECKED	APPROVED
J FOLEY		

SCALE	DATE
NTS	16/1/17

DRAWING NO.	REVISION NO
850-SK003	0



SYMBOLS

PUMP

ISOLATION VALVE

CHECK VALVE

BACKFLOW PREVENTION DEVICE

Y-STRAINER

PRESSURE GAUGE

PS — PRESSURE SWITCH

PRESSURE ACCUMULATOR

COUPLING

CONTROLLER — CONTROLLER

CONTROLLER AUTO PUMP — INLINE PRESSURE CONTROLLER

S — SOLENIOD

FLOAT SWITCH

FILTER

UV STERILISATION — UV STERILISATION

SENSOR MODUAL — UV SENSOR MODULE

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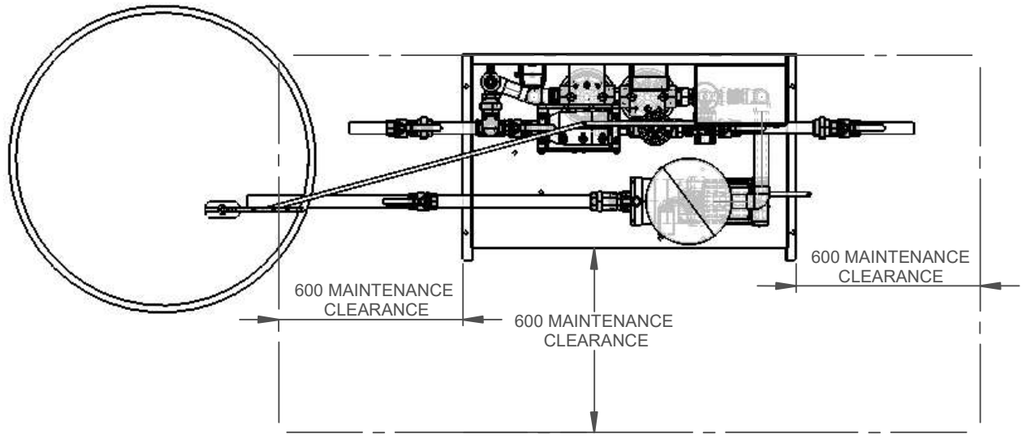
PROJECT
RAINWATER REUSE SYSTEMS

DRAWING TITLE
SUBMERSIBLE PUMP
PRESSURE SWITCH CONTROL
TYPICAL P&ID

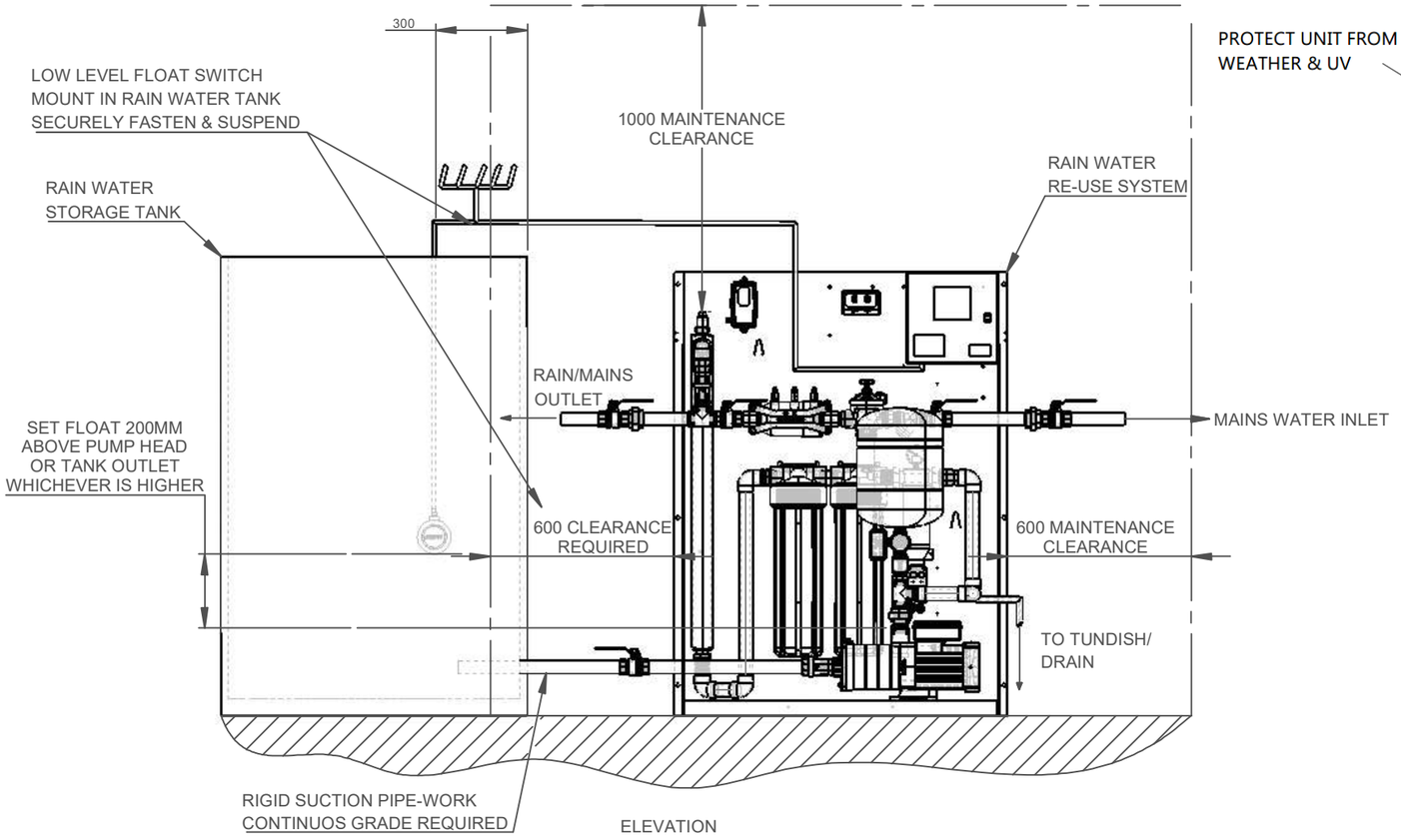
DRAWN	CHECKED	APPROVED
J FOLEY		

SCALE	DATE
NTS	16/1/17

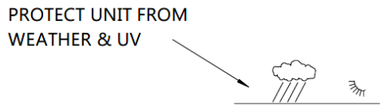
DRAWING NO.	REVISION NO
850-SK004	1



PLAN



ELEVATION



GENERAL INSTALLATION INSTRUCTIONS

1. CHECK OVERALL UNIT DIMENSIONS PRIOR TO INSTALLATION.
2. THE UNIT IS TO BE PROTECTED FROM WEATHER & UV.
   INSTALL ANTI-TAMPER WEATHER COVER IF REQUIRED(OPTIONAL).
3. UNIT TO BE INSTALLED ON A FLAT LEVEL SURFACE.
4. DO NOT TWIST BASE WHEN INSTALLING UNIT.
5. UNIT CAN BE MOUNTED AGAINST WALL.
6. ALLOW CLEARANCE AROUND THREE SIDES AND ABOVE AS SHOWN.
7. MOUNT ANCILLARY EQUIPMENT AS SHOWN.
8. INSTALL TUNDISH & DRAIN LINE FOR AUTO SCREEN FILTERS AND
   BACKFLOW PREVENTION DEVICES WHERE FITTED.
9. RAINWATER STORAGE TANK AND SUPPLY PIPE-WORK ARE TO BE
   CLEANED OF ALL SLUDGE,SEDIMENTS AND DEBRIS PRIOR TO UNIT
   BEING OPERATED.
10. FIT SCREEN TO INLET OF STORAGE TANK.
11. IF UV STERLISATION FITTED, ALLOW CLEARANCE ABOVE UNIT FOR
    MAINTENANCE AS SHOWN.
12. REFER TO APPLICABLE P&ID DRAWING.

#	COMMENT	BY	DATE

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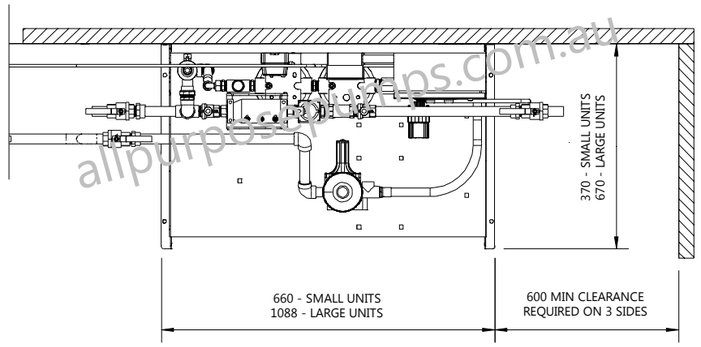
PROJECT
HORIZONTAL MULTISTAGE RAINWATER REUSE SYSTEM

REFERENCE
580-SK005 -

DRAWN	PS	30/04/2019	
CHECKED	PA	30/04/2019	
APPROVED	AW	30/04/2019	

REV	SCALE	SIZE	SHEET
01	NTS	A3	1



PLAN

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5. UNIT CAN BE MOUNTED AGAINST WALL.
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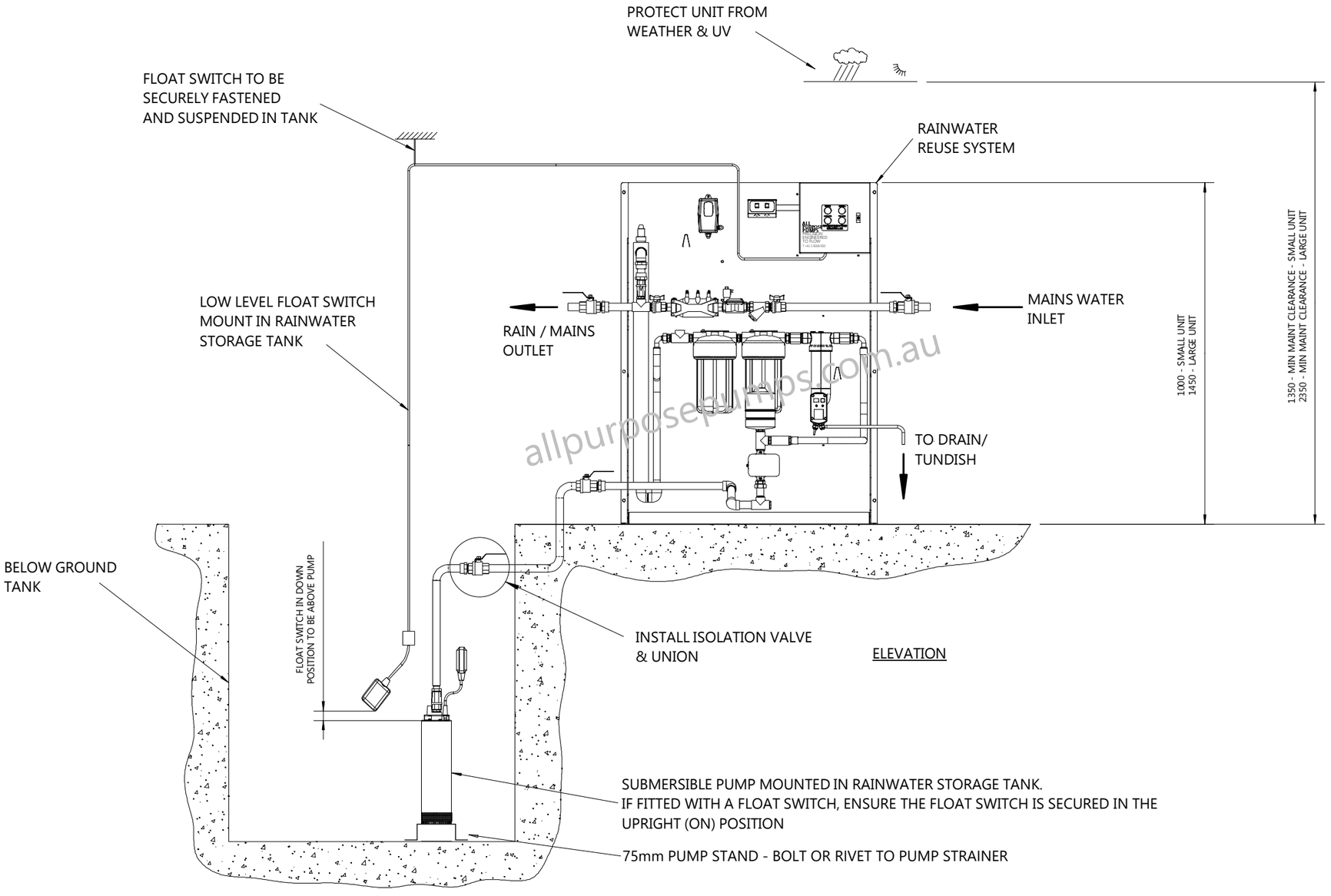
7. MOUNT ANCILLARY EQUIPMENT AS SHOWN.
8. INSTALL TUNDISH & DRAIN LINE FOR AUTO SCREEN FILTERS AND BACKFLOW PREVENTION DEVICES WHERE FITTED.
9. RAINWATER STORAGE TANK AND SUPPLY PIPE-WORK ARE TO BE CLEANED OF ALL SLUDGE, SEDIMENT OR DEBRIS PRIOR TO UNIT BEING OPERATED.
10. FIT SCREEN TO INLET OF STORAGE TANK.
11. IF UV STERILISATION FITTED, ALLOW CLEARANCE ABOVE UNIT FOR MAINTENANCE AS SHOWN.
12. REFER TO APPLICABLE P&ID DRAWING.



ELEVATION

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PROJECT
RAINWATER REUSE SYSTEM

DRAWING TITLE
SUBMERSIBLE PUMP
TYPICAL INSTALLATION
ABOVE OR BELOW GROUND TANK

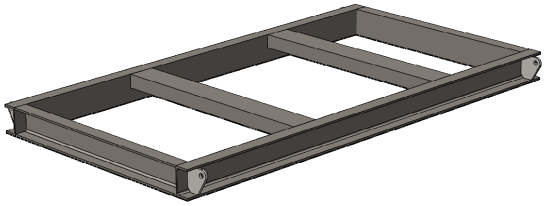
DRAWN	CHECKED	APPROVED
J FOLEY		

SCALE	DATE
NTS	29/6/17

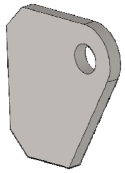
DRAWING NO.	REVISION NO
850-SK006	1

LIFTING LUG CERTIFICATES

TYPE: WELDABLE BASE



Base 125&150 PFC



Lifting Lug to suit:
125PFC & 150PFC

Building Act 1993
Section 238(1)(a)
Building Regulations 2018
Regulation 126
CERTIFICATE OF COMPLIANCE FOR PROPOSED BUILDING WORK

This certificate is issued to

This certificate is issued in relation to the proposed building work at:

Lifting Lugs for All purpose Pumps

Nature of proposed building work: Lifting Lugs

Version of BCA applicable to certificate: NCC Volume 1, 2019

Building classification: Class 1a
Prescribed class of building work for which this certificate is issued: Structural design

Documents setting out the design that is certified by this certificate

Document no.	Document date	Pages and Revision	Type of document	Prepared by
5000703	23.6.2016	-	Structural Drawing	All Purpose Pumps
5000704	23.6.2016	-	Structural Drawing	All Purpose Pumps
15459	Nov 21	1-4	Structural comps	Faran Rahmanian

The design certified by this certificate complies with the following provisions of Building Act 1993, Building Regulations 2018 or National Construction Code

Act, Regulation or NCC	Section, Regulation, Part, Performance Requirement or other provision
NCC 2019 - VOLUME 2 **Part B**	AS1170.1—2002 AS4100-1998 AS1170.2—2011

I prepared the design, or part of the design, set out in the documents listed above.

I certify that the design set out in the documents listed above complies with the provisions set out above.

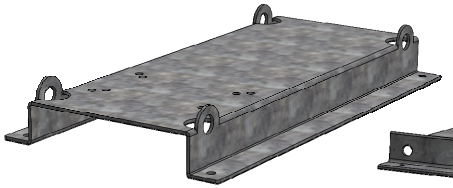
I believe that I hold the required skills, experience and knowledge to issue this certificate and can demonstrate this if requested to do so.

Endorsed Building Engineer Faran Rahmanian **Category/Class** Civil Engineering
Registration No. PE0001272
Postal Address 5 Villamanta St, Geelong West, VIC 3218
Signature

Date 08 November 2021

Approved by the Victorian Building Authority Page 1 of 1

TYPE: WATER PRESSURE SYSTEM BASE



Base Thickness: 5mm

Base: 300 PFC
90x90x8mm Angle

Building Act 1993
Building Regulations 2006

REGULATION 1507: CERTIFICATE OF COMPLIANCE—DESIGN

To :

Relevant Building Surveyor:

From
Building Practitioner Faran Rahmanian **Category/Class** Civil Engineering
Postal Address 5 Villamanta St , Geelong West Post Code 3218
Property Details

Number **Street/Road** **City/Suburb/Town**
Lot/s **LP/PS** **Volume** **Folio**
Crown Allotment **Section** **Parish** **County**
Municipal District
Compliance Statement
I did prepare the design and I certify that the part of the design described as: Pump Base Plate and Lifting Points Complies with the following provisions of the Regulations* Part B of the NCC Volume 1- 2014
Relevant Standards
1170.1—2002 AS4100-1998

Design Documents

Drawing Nos. 14411-1-2A,3A,4A,5A,6A,7A
Prepared by Page-Green & Assoc P/L **Date** May 2015
Computations 14411-1-8 **Prepared by Faran Rahmanian** **Date** April 2015

Signature

Building Practitioner **Faran Rahmanian** **Registration No.** EC 24658
Date 20 May 2015

CONTACT

ALL PURPOSE PUMPS PRECISION ENGINEERED TO FLOW...

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ADP
Consulting : Engineering

Appendix B
Potable Water Calculator

Note: The Green Star Potable Water Calculator has been used for this project as it is a industry wide accepted water balance model.

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	#VALUE!

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.

INSTRUCTIONS ON HOW TO ENTER PROFILES

1) Add a name for the profile (this will appear in the drop down box under 'Occupancy Profiles'

2) Add a description. This is for your own reference but also to help the Assessors keep track of what has been entered and why.

3) Enter the percentage of design occupancy that is typically present on a typical peak and off-peak day.

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)	
Apartments	34,914	7 days a week	Class 1 or 2 Residential	40	Please select	100%
Gym		2 days a week	Class 1 or 2 Residential	3	Please select	5%
Pool		2 days a week	Class 1 or 2 Residential	2	Please select	5%
Lobby and Remaining Areas		7 days a week	Please Select	10	Please select	5%
		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	34,914					

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?	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	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%	1,795	2,052

(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

(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				
Indoor Tap		5 Star	6.0	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%	502	627

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

SHOWERS - OCCUPANTS

Shower demand by occupants (reference)	100%
Shower demand by occupants (current)	100%

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	7.5	3 Star	7.5	100%		
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
			Total	100%	10,155	12,186

(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	

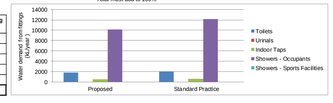
Description	Water efficiency (Enter manually OR nominate WELS Star Rating)		Water efficiency used in calculations (L/min)	Percentage of each type	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
	Manufacturer's data (L/min)	WELS Star Rating selection				
			Total	0%	0	0

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

Total must add to 100%

RESULTS: WATER DEMAND FROM FITTINGS

	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
Toilets	1,795	2,052
Urinals	0	0
Indoor Taps	502	627
Showers - Occupants	10,155	12,186
Showers - Sports Facilities	0	0
TOTAL	12,452	14,865



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							
Washing Machines		4 Star	8.0	10.3	369			11,087	15,839
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
				Total	369			11,087	15,839

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							
Dish Washers		4 Star	15	14.9	369			2,004	2,206
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
<enter description>		Select star rating						0	0
				Total	369			2,004	2,206

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?ref=ftr

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	0	0	0	0
February				0	0	0	0	0
March				0	0	0	0	0
April				0	0	0	0	0
May				0	0	0	0	0
June				0	0	0	0	0
July				0	0	0	0	0
August				0	0	0	0	0
September				0	0	0	0	0
October				0	0	0	0	0
November				0	0	0	0	0
December				0	0	0	0	0
Total (kL/year)	0	0	0	0	0	0	0	0

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	

STANDARD OCCUPANCY PROFILES BASED ON PROFILES GIVEN IN SPECIFICATION J of THE NCC 2019

Profile name	Class 5, Class 7 Class 8 or Class 9a	Class 6 shop or shopping centre	Class 6 restaurant or cafe	Class 9b theatre or cinema	Class 9c aged care	Class 9a ward area	Class 9b Conference facility	Class 9b School	Class 3 Hotel	Class 1 or 2 Residential	
Description	NCC Table 2c & 2d	NCC Table 2e	NCC Table 2f	NCC Table 2h	NCC Table 2k	NCC Table 2g	NCC table 2i	NCC table 2j	NCC table 2b		
Time period (local standard time)	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak	Off-peak
12:00am to 1:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	90%	90%
1:00am to 2:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	90%	90%
2:00am to 3:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	90%	90%
3:00am to 4:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	90%	90%
4:00am to 5:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	90%	90%
5:00am to 6:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	80%	80%
6:00am to 7:00am	0%	0%	5%	0%	85%	85%	70%	5%	0%	70%	70%
7:00am to 8:00am	10%	0%	5%	0%	85%	80%	70%	10%	5%	60%	60%
8:00am to 9:00am	20%	5%	20%	0%	50%	50%	70%	20%	20%	75%	60%
9:00am to 10:00am	70%	5%	20%	0%	50%	50%	70%	20%	20%	90%	0%
10:00am to 11:00am	70%	5%	15%	0%	20%	0%	70%	10%	20%	90%	0%
11:00am to 12:00pm	70%	5%	25%	0%	50%	0%	70%	10%	20%	90%	0%
12:00pm to 1:00pm	70%	5%	25%	0%	80%	0%	70%	10%	20%	90%	0%
1:00pm to 2:00pm	70%	5%	15%	0%	70%	0%	70%	10%	20%	90%	0%
2:00pm to 3:00pm	70%	5%	15%	0%	40%	0%	70%	10%	20%	90%	0%
3:00pm to 4:00pm	70%	5%	15%	0%	20%	0%	70%	10%	30%	70%	0%
4:00pm to 5:00pm	70%	5%	15%	0%	25%	0%	70%	50%	50%	50%	0%
5:00pm to 6:00pm	35%	0%	5%	0%	50%	0%	20%	50%	50%	20%	0%
6:00pm to 7:00pm	10%	0%	5%	0%	80%	0%	20%	70%	70%	20%	0%
7:00pm to 8:00pm	5%	0%	0%	0%	80%	0%	70%	70%	70%	15%	15%
8:00pm to 9:00pm	5%	0%	0%	0%	80%	0%	70%	70%	80%	80%	70%
9:00pm to 10:00pm	0%	0%	0%	0%	50%	0%	70%	70%	85%	80%	70%
10:00pm to 11:00pm	0%	0%	0%	0%	35%	0%	70%	70%	85%	85%	70%
11:00pm to 12:00am	0%	0%	0%	0%	20%	0%	10%	10%	85%	85%	70%
Hours per day at peak occupancy	**6.45**	**0.45**	**1.85**	**0**	**7.2**	**0**	**6.3**	**8.6**	**13.75**	**14.75**	**16.8**
Maximum occupancy during the day	70%	5%	25%	0%	80%	0%	70%	70%	85%	85%	70%

Profile name	Class 5, Class 7 Class 8 or Class 9a	Class 6 shop or shopping centre	Class 6 restaurant or cafe	Class 9b theatre or cinema	Class 9c aged care	Class 9a ward area	Class 9b Conference facility	Class 9b School	Class 3 Hotel	Class 1 or 2 Residential	
Description	NCC Table 2c & 2d	NCC Table 2e	NCC Table 2f	NCC Table 2h	NCC Table 2k	NCC Table 2g	NCC table 2i	NCC table 2j	NCC table 2b		
Time period (local standard time)	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak / Off-peak	Peak	Off-peak
12:00am to 1:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	90%	90%
1:00am to 2:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	90%	90%
2:00am to 3:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	90%	90%
3:00am to 4:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	90%	90%
4:00am to 5:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	90%	90%
5:00am to 6:00am	0%	0%	0%	0%	85%	85%	70%	0%	0%	80%	80%
6:00am to 7:00am	0%	0%	5%	0%	85%	85%	70%	5%	0%	70%	70%
7:00am to 8:00am	10%	0%	5%	0%	85%	80%	70%	10%	5%	60%	60%
8:00am to 9:00am	20%	5%	20%	0%	50%	50%	70%	20%	20%	75%	60%
9:00am to 10:00am	70%	5%	20%	0%	50%	50%	70%	20%	20%	90%	0%
10:00am to 11:00am	70%	5%	15%	0%	20%	0%	70%	10%	20%	90%	0%
11:00am to 12:00pm	70%	5%	25%	0%	50%	0%	70%	10%	20%	90%	0%
12:00pm to 1:00pm	70%	5%	25%	0%	80%	0%	70%	10%	20%	90%	0%
1:00pm to 2:00pm	70%	5%	15%	0%	70%	0%	70%	10%	20%	90%	0%
2:00pm to 3:00pm	70%	5%	15%	0%	40%	0%	70%	10%	20%	90%	0%
3:00pm to 4:00pm	70%	5%	15%	0%	20%	0%	70%	10%	30%	70%	0%
4:00pm to 5:00pm	70%	5%	15%	0%	25%	0%	70%	50%	50%	50%	0%
5:00pm to 6:00pm	35%	0%	5%	0%	50%	0%	20%	50%	50%	20%	0%
6:00pm to 7:00pm	10%	0%	5%	0%	80%	0%	20%	70%	70%	20%	0%
7:00pm to 8:00pm	5%	0%	0%	0%	80%	0%	70%	70%	70%	15%	15%
8:00pm to 9:00pm	5%	0%	0%	0%	80%	0%	70%	70%	80%	80%	70%
9:00pm to 10:00pm	0%	0%	0%	0%	50%	0%	70%	70%	85%	80%	70%
10:00pm to 11:00pm	0%	0%	0%	0%	35%	0%	70%	70%	85%	85%	70%
11:00pm to 12:00am	0%	0%	0%	0%	20%	0%	10%	10%	85%	85%	70%
Hours per day at peak occupancy	**6.45**	**0.45**	**1.85**	**0**	**7.2**	**0**	**6.3**	**8.6**	**13.75**	**14.75**	**16.8**
Maximum occupancy during the day	70%	5%	25%	0%	80%	0%	70%	70%	85%	85%	70%

USER ENTERED OCCUPANCY PROFILES

Profile name	<User entered occupancy profile 1>		<User entered occupancy profile 2>		<User entered occupancy profile 3>		<User entered occupancy profile 4>		<User entered occupancy profile 5>		<User entered occupancy profile 6>		<User entered occupancy profile 7>		<User entered occupancy profile 8>	
Description	<Description>		<Description>		<Description>		<Description>		<Description>		<Description>		<Description>		<Description>	
Time period (local standard time)	Peak	Off-peak	Peak	Off-peak	Peak	Off-peak	Peak	Off-peak	Peak	Off-peak	Peak	Off-peak	Peak	Off-peak	Peak	Off-peak
12:00am to 1:00am																
1:00am to 2:00am																
2:00am to 3:00am																
3:00am to 4:00am																
4:00am to 5:00am																
5:00am to 6:00am																
6:00am to 7:00am																
7:00am to 8:00am																
8:00am to 9:00am																
9:00am to 10:00am																
10:00am to 11:00am																
11:00am to 12:00pm																
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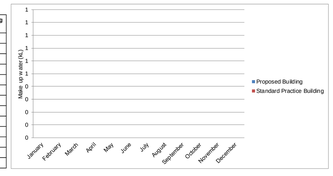
3:00pm to 4:00pm																
4:00pm to 5:00pm																
5:00pm to 6:00pm																
6:00pm to 7:00pm																
7:00pm to 8:00pm																
8:00pm to 9:00pm																
9:00pm to 10:00pm																
10:00pm to 11:00pm																
11:00pm to 12:00am																
Hours per day at peak occupancy	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Maximum occupancy during the day	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

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
February	0	0
March	0	0
April	0	0
May	0	0
June	0	0
July	0	0
August	0	0
September	0	0
October	0	0
November	0	0
December	0	0
Total make up water (kL/year)	0	0



4. WASHDOWN

Washdown hoses

Description	Hose Flowrate (L/min)	Number of Hoses	Average daily use (minutes)	Proposed consumption (kL/day)	Standard Practice consumption (kL/day)
			Total	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	210
February	50.2	180
March	26.3	150
April	50.0	90
May	39.3	60
June	40.9	60
July	36.3	60
August	45.1	90
September	41.6	90
October	55.2	150
November	50.2	180
December	53.0	210

Landscape zones

Name and description	Area of zone (m²)	Percentage of zone undercover (%)	Weighted average crop coefficient in zone	Common irrigation systems water application efficiency	User determined application efficiency
Landscaping	2,087	0%	0.600	Subsurface drip (SDI) (90%)	
				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

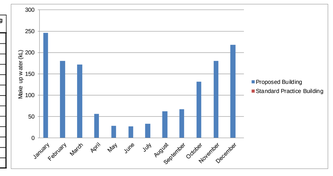
Landscape irrigation requirements per zone

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)
Landscaping	1,403	1,683
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	1,403	1,683

Landscape irrigation requirements per month

Month	Proposed Building (kL)	Standard Practice Building (kL)
January	245	#VALUE!
February	181	#VALUE!
March	172	#VALUE!
April	56	#VALUE!
May	29	#VALUE!
June	27	#VALUE!
July	33	#VALUE!
August	63	#VALUE!
September	67	#VALUE!
October	132	#VALUE!
November	181	#VALUE!
December	218	#VALUE!
Total	1,403	1,683



6. SWIMMING POOLS

GENERAL INFORMATION

Is the swimming pool outdoor or indoor	
Enter the project height above sea level (m)	
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)	
Proposed swimming pool water consumption (L/day)	

CLIMATE DATA

Enter climate data relevant to the project location

Month	Rainfall (mm)	Evapotranspiration (point potential) (mm)
January	33.6	
February	50.2	
March	26.3	
April	50.0	
May	39.3	
June	40.9	
July	36.3	
August	45.1	
September	41.6	
October	55.2	
November	50.2	
December	53.0	
TOTAL	521.7	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)	1
Volume discharged per test (L)	12,000
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%				
Urinals	100%				
Indoor taps					
Showers - occupants					
Showers - sports					
Laundries					
Dishwashers					
Heat rejection					
Washdown					
Landscape irrigation					
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.

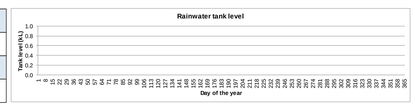
When reclaimed water is used, enter the total demand for each month regardless of whether it is fully or partially met by the reclaimed water supply. In the table below, the percentage of the demand met by reclaimed water/connected to the reclaimed water supply is entered.

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)		3,380
Run-off co-efficient	Pitched roof with profiled metal sheeting	0.9
Storage capacity (kL)		40
Rainwater tank reliability %		#VALUE!



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

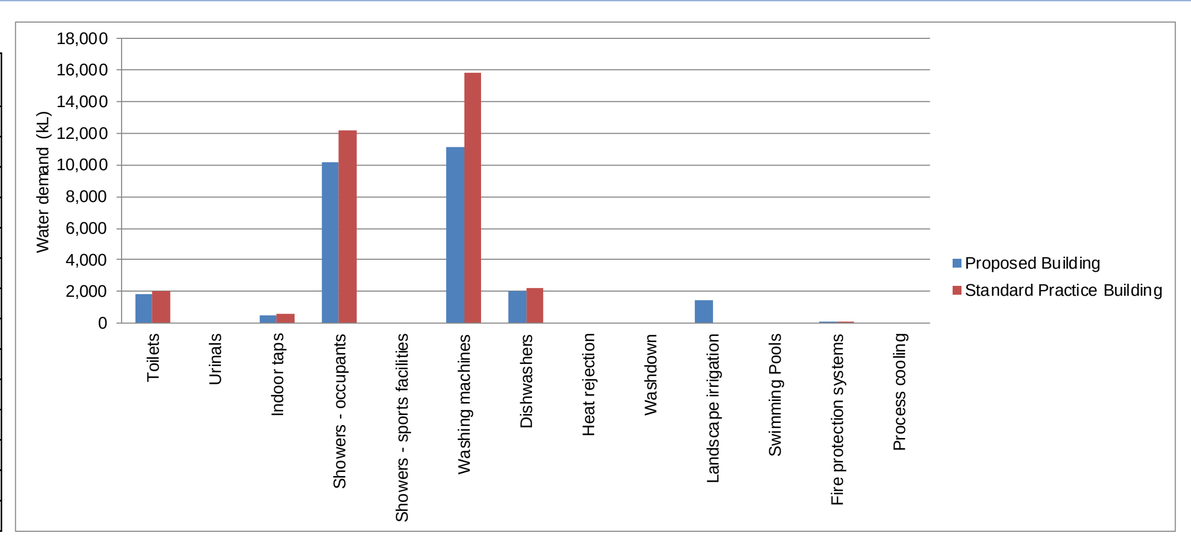
Month	Stormwater collected for re-use (kL)	Off-site reclaimed water supplied to site (kL)
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		

WATER DEMAND SUMMARY

Total water demand summary for each system and per month

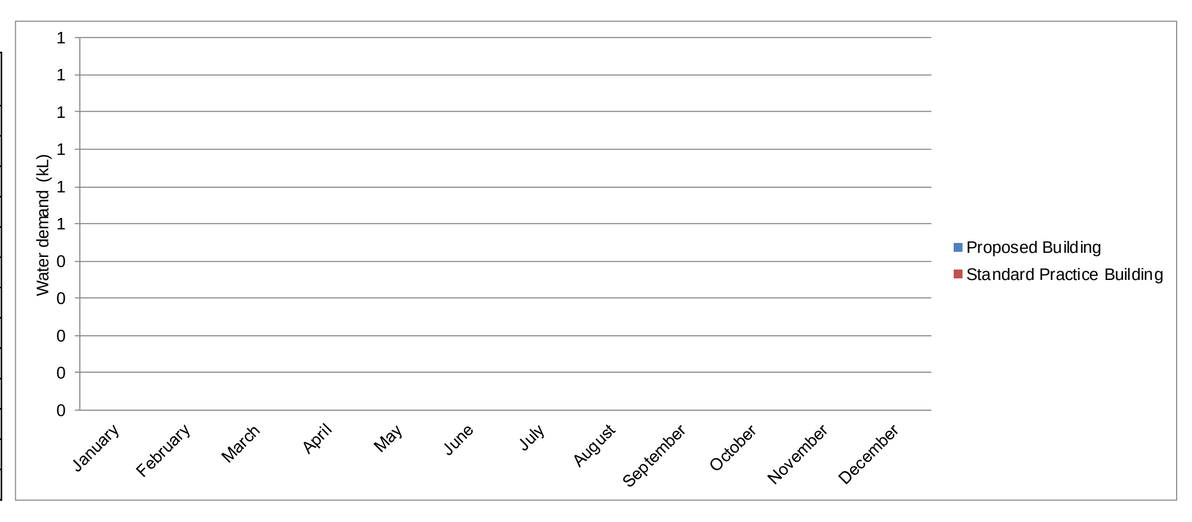
TOTAL WATER DEMAND FOR EACH SYSTEM

Water system	Proposed Building (kL)	Standard Practice Building (kL)
Toilets	1,795	2,052
Urinals	0	0
Indoor taps	502	627
Showers - occupants	10,155	12,186
Showers - sports facilities	0	0
Washing machines	11,087	15,839
Dishwashers	2,004	2,206
Heat rejection	0	0
Washdown	0	0
Landscape irrigation	1,403	#VALUE!
Swimming Pools	#VALUE!	#VALUE!
Fire protection systems	2	2
Process cooling	0	0
Total	#VALUE!	#VALUE!



TOTAL WATER DEMAND PER MONTH

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



POTABLE WATER RESULTS

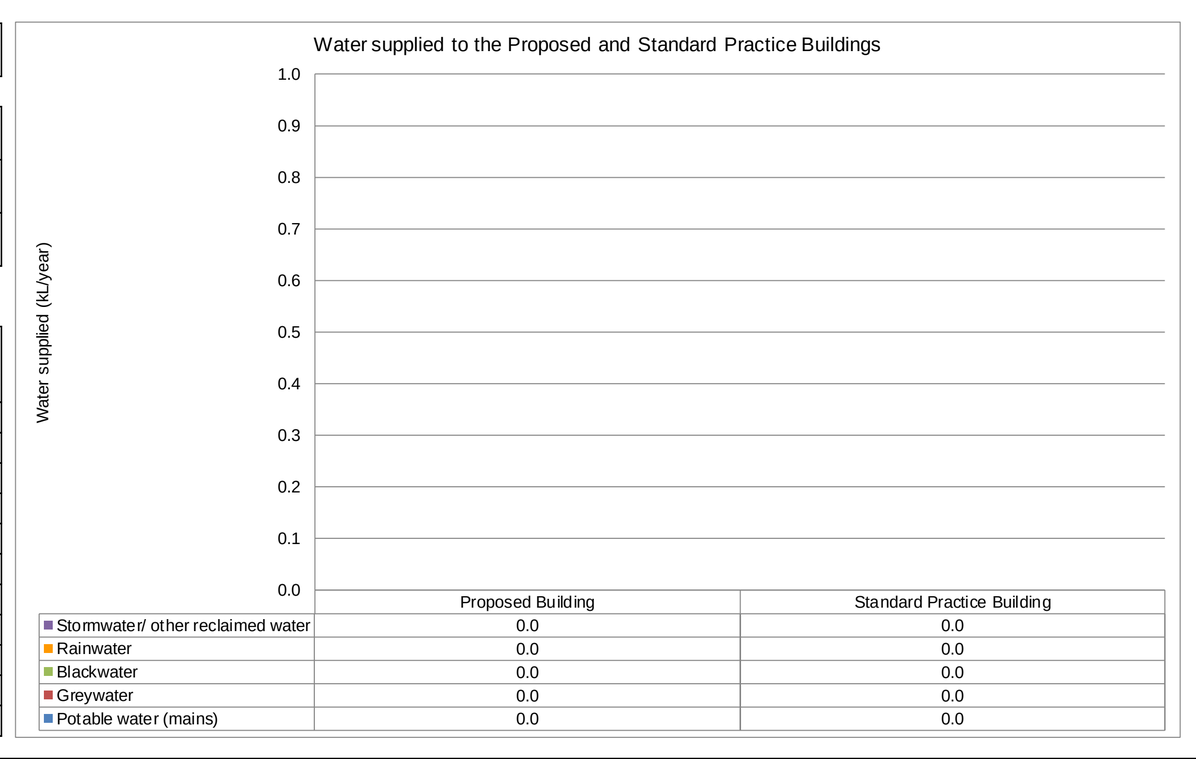
	Proposed Building						Standard Practice Building
Month	Total water demand	Rainwater used to meet demand	Greywater used to meet demand	Blackwater used to meet demand	Stormwater and off-site reclaimed water used	Potable water demand	Potable water demand
January	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
February	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
March	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
April	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
May	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
June	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
July	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
August	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
September	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
October	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
November	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
December	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
Total	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
		#VALUE!					

Percentage reduction in Potable Water Consumption compared to the Standard Practice Building	**#VALUE!**

Points Achieved - General	**#VALUE!**
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%	#VALUE!	0.0
8%	#VALUE!	1.1
15%	#VALUE!	2.2
23%	#VALUE!	3.3
30%	#VALUE!	4.4
38%	#VALUE!	5.5
45%	#VALUE!	6.6
53%	#VALUE!	7.7
60%	#VALUE!	8.8
68%	#VALUE!	9.9
75%	#VALUE!	11.0



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)	5,328	6,407

DISCHARGE TO SEWER

SEWERAGE REDUCTION DUE TO WATER RECYCLING

Percentage reduction in discharge to sewer compared to Standard Practice Building	**#VALUE!**

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

Innovation Point Achieved	**#VALUE!**

RAINFALL DATA

The average rainfall data for the location selected in the General section is shown below (white shaded cells). The project team may supply their own data (see Potable Water calculator guide) by selecting 'User defined' as the location and entering the data in the blue column of the table.

10 YEAR AVERAGE RAINFALL DATA

Day	User defined (mm)	Melbourne (1998 - 2007) (mm)	Sydney (1996 - 2005) (mm)	Brisbane (1997 - 2006) (mm)	Adelaide (1996 - 2005) (mm)	Hobart (1996 - 2005) (mm)	Perth (1997 - 2006) (mm)	Darwin (1996 - 2005) (mm)	Canberra (1997 - 2006) (mm)	Mackay (1991 - 2000) (mm)	Townsville (1994 - 2003) (mm)
1 Jan		0.8	0.0	1.0	0.0	1.7	0.0	22.4	0.6	11.3	4.2
2 Jan		2.2	0.8	1.1	8.7	1.7	0.0	27.9	1.8	10.9	2.0
3 Jan		0.0	5.5	3.2	0.0	1.0	0.0	34.4	0.0	26.8	4.7
4 Jan		1.1	0.9	2.0	0.8	1.0	0.0	20.9	1.4	20.8	1.6
5 Jan		1.1	1.4	3.7	0.0	4.2	1.2	6.8	2.1	37.4	3.8
6 Jan		0.0	4.1	1.7	0.0	0.7	0.0	13.1	0.5	6.0	12.0
7 Jan		0.7	5.2	4.2	0.9	2.0	0.0	4.8	4.4	5.6	11.7
8 Jan		1.6	2.0	0.6	1.1	3.0	0.0	6.8	1.2	4.6	4.4
9 Jan		0.0	1.0	1.0	0.0	0.0	0.0	6.5	1.9	16.4	0.6
10 Jan		0.0	0.5	7.7	0.0	0.0	0.0	22.6	0.0	4.2	10.3
11 Jan		1.1	0.0	1.1	0.0	0.0	0.0	11.4	0.0	33.2	56.5
12 Jan		0.7	1.0	1.4	0.0	1.6	0.5	10.1	0.7	18.4	15.6
13 Jan		0.0	0.0	1.4	1.2	0.0	1.3	25.4	0.0	7.8	18.5
14 Jan		0.0	1.0	2.2	2.4	0.0	0.0	6.6	0.0	0.6	7.6
15 Jan		0.0	0.7	1.4	0.0	0.0	1.6	10.2	0.0	0.6	1.6
16 Jan		0.0	3.1	11.7	0.0	0.7	0.6	14.1	1.3	6.8	1.9
17 Jan		0.0	4.7	1.9	0.0	0.0	1.1	12.1	4.1	7.3	2.4
18 Jan		0.0	1.2	5.7	0.0	0.8	0.0	15.3	2.4	5.4	2.4
19 Jan		0.7	4.7	0.0	0.0	0.0	0.0	8.6	0.9	1.3	4.5
20 Jan		0.0	2.3	1.0	2.6	0.0	0.0	12.5	0.0	6.6	4.9
21 Jan		2.0	4.6	3.0	1.4	1.1	0.0	23.8	3.2	3.5	1.6
22 Jan		1.4	9.0	0.0	2.4	6.1	6.1	14.6	1.6	0.0	0.6
23 Jan		1.9	4.7	0.0	0.0	2.6	4.7	15.4	1.7	0.0	1.1
24 Jan		0.0	4.8	0.0	0.0	0.0	0.0	7.5	2.7	0.0	6.8
25 Jan		4.6	7.9	7.3	0.8	4.8	0.9	11.7	2.4	0.0	0.9
26 Jan		1.5	3.1	5.1	0.0	1.0	0.0	14.3	3.5	4.4	6.9
27 Jan		2.5	2.6	0.7	0.0	0.8	0.0	10.4	4.1	9.2	5.3
28 Jan		1.0	2.3	9.2	0.0	3.2	0.0	8.3	0.0	7.1	1.9
29 Jan		2.6	5.5	15.7	0.8	1.7	0.0	12.7	2.3	9.5	0.0
30 Jan		5.5	9.4	4.1	0.7	5.6	0.0	9.2	0.0	1.1	4.5
31 Jan		0.7	13.7	3.2	0.0	1.1	0.0	9.4	0.0	3.9	8.9
1 Feb		0.0	7.5	10.9	0.0	0.7	0.0	7.0	0.0	3.5	9.2
2 Feb		5.1	7.6	18.7	0.0	1.1	1.7	9.6	0.6	34.5	4.1
3 Feb		11.5	2.6	12.7	0.0	1.6	0.0	14.7	3.2	11.9	6.9
4 Feb		0.0	6.5	5.6	0.7	5.4	0.0	5.4	2.4	9.5	11.8
5 Feb		0.0	13.3	5.1	0.0	1.2	0.0	6.7	13.5	23.3	21.5
6 Feb		0.0	6.6	1.1	0.0	1.4	0.0	21.3	2.1	6.2	12.0
7 Feb		1.5	2.1	0.5	4.0	4.4	1.3	15.2	1.6	2.2	4.0
8 Feb		4.5	1.3	8.4	2.2	5.7	0.0	11.7	4.2	3.4	10.8
9 Feb		2.0	7.5	14.1	0.7	7.8	0.0	22.7	0.0	18.9	8.1
10 Feb		2.2	0.9	2.1	0.8	6.0	0.0	17.5	0.0	11.2	13.7
11 Feb		1.3	3.1	1.4	0.0	0.9	0.0	17.3	0.5	9.7	8.9
12 Feb		0.8	9.9	1.4	0.0	3.0	0.0	21.8	2.1	18.6	1.6
13 Feb		2.1	6.3	1.3	0.7	1.5	0.0	22.3	4.1	3.2	3.9
14 Feb		0.0	1.5	0.0	0.0	0.0	0.0	24.1	1.2	7.1	22.2
15 Feb		0.9	0.8	4.7	0.0	1.4	0.0	12.6	0.9	10.8	24.0
16 Feb		4.1	1.7	0.0	0.0	2.5	0.0	8.4	3.8	20.5	15.5
17 Feb		0.7	2.4	0.6	0.5	0.0	0.0	24.7	3.2	6.9	17.1
18 Feb		0.0	0.7	3.7	0.0	0.0	0.9	21.3	1.8	19.1	21.0
19 Feb		0.5	0.6	1.1	0.0	0.0	0.0	11.0	0.0	20.9	12.3
20 Feb		0.0	3.6	1.4	5.1	1.7	0.0	26.5	0.0	2.1	4.2
21 Feb		2.0	6.2	0.0	2.2	0.5	0.0	9.0	3.3	6.1	1.8
22 Feb		1.1	2.4	1.3	1.9	0.0	1.1	14.3	4.4	9.9	2.8
23 Feb		0.0	1.5	0.0	0.0	0.0	0.6	17.4	1.3	18.4	4.1
24 Feb		1.8	0.9	11.4	0.0	1.8	0.0	17.1	0.0	13.1	13.2
25 Feb		0.0	11.0	3.9	0.0	0.0	0.0	10.2	0.9	22.7	24.7
26 Feb		7.1	3.6	2.3	0.0	0.7	0.0	21.9	0.0	13.4	13.5
27 Feb		1.2	0.5	0.0	0.0	0.0	0.0	9.2	0.0	12.4	15.2
28 Feb		0.0	1.6	4.1	0.0	0.9	0.0	19.0	1.1	8.5	12.3
1 Mar		0.0	5.3	3.4	0.0	1.4	0.0	12.2	0.0	17.4	11.4
2 Mar		0.5	1.9	7.3	0.0	0.8	0.0	43.9	0.7	4.9	8.6
3 Mar		1.2	1.4	6.5	0.0	1.6	0.0	25.3	2.7	15.0	6.3
4 Mar		0.0	1.0	4.3	0.0	0.0	0.0	28.1	0.0	10.9	7.7
5 Mar		1.1	1.8	3.0	0.9	0.9	0.0	26.0	0.0	15.5	4.4
6 Mar		0.0	3.1	0.0	0.0	0.5	0.0	6.9	0.0	11.7	8.0
7 Mar		0.0	0.9	13.6	1.0	0.0	0.0	7.5	0.0	2.8	0.0
8 Mar		0.0	7.6	1.7	0.0	3.1	0.5	9.8	0.9	5.4	0.0
9 Mar		0.0	7.9	1.1	0.0	1.2	0.0	11.7	0.0	16.4	3.7
10 Mar		0.7	6.7	3.2	0.7	0.6	1.5	7.0	1.0	8.7	0.0
11 Mar		0.0	8.0	3.1	0.0	0.0	1.5	5.5	1.7	4.3	1.8
12 Mar		0.0	5.3	1.1	0.0	0.0	0.0	15.2	0.8	4.5	1.9
13 Mar		1.6	2.2	1.4	0.0	1.2	0.0	6.1	1.6	3.4	4.0
14 Mar		0.0	0.0	2.4	0.0	0.5	0.0	7.3	0.0	2.1	0.0
15 Mar		0.0	1.1	0.0	0.0	0.7	0.0	7.1	4.1	0.7	0.0
16 Mar		0.6	1.2	0.6	0.0	0.6	0.0	10.5	2.0	0.0	0.0
17 Mar		1.3	0.9	0.0	1.6	3.3	0.0	10.0	4.8	0.0	0.0
18 Mar		0.0	2.3	0.0	1.4	2.1	0.0	8.4	0.0	0.5	13.7
19 Mar		0.0	0.0	2.2	2.8	0.8	2.5	13.8	0.0	1.7	2.1
20 Mar		0.6	0.0	1.1	0.0	2.9	0.0	9.5	0.8	27.0	0.0
21 Mar		1.9	0.6	0.0	2.3	7.1	1.1	11.5	3.4	1.9	0.0
22 Mar		2.4	8.8	2.9	0.6	2.8	0.0	5.3	2.5	3.3	2.6
23 Mar		4.7	11.0	3.2	0.6	2.0	2.8	10.0	0.9	2.7	0.6
24 Mar		4.6	8.4	3.1	1.8	0.0	0.0	8.2	0.0	3.4	30.5
25 Mar		0.5	0.6	0.5	0.7	1.0	0.0	3.5	0.0	4.7	0.7
26 Mar		0.0	0.0	0.0	1.0	0.0	0.0	5.1	0.0	0.8	0.0
27 Mar		0.8	1.2	0.5	0.0	0.0	0.0	10.9	1.0	1.1	0.0
28 Mar		0.9	0.0	1.1	0.0	3.2	3.4	2.2	1.5	0.8	0.7
29 Mar		1.2	0.0	2.5	0.8	2.4	0.0	2.5	0.7	0.0	1.0
30 Mar		1.0	0.9	1.1	1.3	0.0	4.6	3.3	3.3	1.1	0.8
31 Mar		0.6	2.4	1.7	0.0	0.9	4.0	9.4	1.2	0.9	0.0
1 Apr		1.3	1.8	2.7	0.0	1.2	2.4	2.2	0.0	3.0	0.6
2 Apr		0.0	7.0	0.0	0.0	1.3	0.0	1.3	0.0	9.0	2.5
3 Apr		0.0	2.7	3.2	0.0	2.2	0.0	9.0	0.0	6.0	4.1
4 Apr		0.5	2.0	1.1	0.0	1.7	0.0	6.1	0.5	7.0	19.7
5 Apr		1.7	3.8	1.6	0.0	0.0	0.6	2.4	5.1	6.5	27.3
6 Apr		3.8	3.3	6.5	0.0	1.9	0.5	3.9	3.4	2.6	0.0
7 Apr		0.0	2.2	0.0	0.0	1.1	0.0	2.0	0.0	10.9	3.4
8 Apr		0.0	0.5	0.0	3.0	0.0	0.0	8.3	0.0	3.1	1.6
9 Apr		0.5	0.0	0.0	0.0	1.9	0.6	1.3	0.0	4.4	0.6
10 Apr		0.5	15.5	1.6	0.0	0.9	0.6	9.5	1.3	12.2	0.0
11 Apr		2.1	19.4	1.9	1.3	1.8	1.3	7.0	0.0	7.3	0.0
12 Apr		2.2	1.0	2.4	2.8	3.1	3.4	15.5	0.0	4.4	0.6
13 Apr		2.7	1.0	0.7	1.7	3.6	0.5	2.6	0.6	3.1	0.0
14 Apr		2.7	3.5	1.8	1.3	1.8	0.0	2.3	0.8	5.0	1.3
15 Apr		3.2	2.1	2.0	1.4	0.0	0.0	0.6	2.1	3.1	0.0
16 Apr		1.9	1.2	0.6	0.0	0.0	1.0	0.0	1.4	10.3	0.0
17 Apr		0.0	1.5	1.8	0.0	0.0	6.3	1.1	0.0	2.5	0.0
18 Apr		0.0	11.4	0.8	0.0	3.0	1.2	3.3	1.0	4.4	1.3
19 Apr		0.0	1.2	0.0	0.0	6.1	0.0	2.8	0.0	4.3	0.0
20 Apr		1.7	2.7	0.0	2.5	3.7	0.0	2.1	0.0	4.7	0.0
21 Apr		1.7	4.7	1.6	0.0	2.3	0.0	0.6	2.0	2.6	1.3
22 Apr		4.8	3.9	0.0	0.0	0.8	1.5	0.6	2.1	2.1	0.0
23 Apr		3.0	7.3	3.7	0.0	0.6	0.6	3.2	0.0	3.1	1.2
24 Apr		6.2	3.2	2.9	0.7	3.9	0.0	1.1	0.0	4.4	1.5
25 Apr		4.2	0.0	0.0	2.1	2.3	0.5	0.0	0.0	8.5	1.0
26 Apr		1.8	0.0	1.1	0.0	1.3	2.1	4.8	0.0	5.2	1.8
27 Apr		0.0	1.5	5.6	0.5	0.6	0.8	1.0	0.0	9.8	1.9
28 Apr		2.4	8.0	6.1	0.0	0.0	0.6	0.0	0.9	5.3	1.7
29 Apr		0.5	1.0	1.4	0.0	0.5	0.0	0.0	0.0	2.8	0.7
30 Apr		0.6	3.5	2.3	0.0	0.0	1.2	0.0	0.6	8.9	0.7
1 May		2.5	4.4	2.0	2.4	0.9	1.2	1.1	0.0	7.5	1.2
2 May		1.1	6.1	1.8	0.0	0.0	3.9	0.0	0.0	9.7	0.0
3 May		1.4	4.5	3.6	1.0	0.8	1.3	0.5	0.0	2.3	0.0
4 May		0.0	2.5	3.7	1.4	1.3	0.0	0.0	0.0	1.9	0.0
5 May		1.3	5.9	6.6	0.0	1.0	0.0	2.8	2.5	7.1	6.9
6 May		1.7	17.9	2.1	0.0	1.1	5.3	0.0	3.7	5.4	0.0
7 May		1.9	5.1	1.2	0.0	1.9	0.9	1.1	0.0	0.9	1.0
8 May		0.6	3.7	0.9	0.0	0.0	1.4	0.0	0.7	6.7	1.2
9 May		0.0	5.9	0.8	1.4	0.0	5.1	0.0	0.0	4.8	0.0
10 May		1.1	1.9	1.9	0.0	0.9	0.8	0.0	0.0	4.9	0.0
11 May		0.0	8.6	0.9	0.0	0.0	4.7	0.0	0.0	2.0	0.0
12 May		0.0	3.6	0.9	2.3	0.0	5.1	0.0	0.0	2.3	0.0
13 May		0.0	3.9	0.9	1.0	0.0	4.1	0.0	0.0	3.6	0.0
14 May		0.0	7.2	1.9	0.9	1.0	1.4	0.0	1.2	4.3	0.6
15 May		1.8	9.0	2.1	0.7	0.0	2.1	1.0	0.8	1.3	5.0
16 May		1.6	6.8	6.1	1.4	0.8	5.1	0.0	1.3	7.7	4.0
17 May		0.0	8.7	4.1	1.9	2.6	2.9	2.1	1.2	2.8	0.7
18 May		1.8	6.2	0.7	4.2	0.8	1.5	0.0	0.7	2.0	0.0
19 May		1.0	15.5	0.0	2.2	0.0	8.7	0.0	1.7	5.2	0.0
20 May		3.8	4.4	0.0	2.4	0.7	1.0	0.0	0.0	3.1	0.0
21 May		2.8	1.1	1.7	1.0	3.6	3.4	1.1	0.6	3.3	0.0
22 May		1.9	0.7	1.2	0.0	4.2	1.9	0.7	0.0	0.0	0.0
23 May		0.8	0.8	1.3	0.0	1.4	5.0	9.0	0.0	0.0	0.0
24 May		0.7	1.6	0.0	4.2	0.0	2.1	1.6	0.0	0.5	0.0
25 May		2.4	4.2	0.0	0.9	3.0	0.7	0.0	0.5	0.8	0.0
26 May		0.0	7.1	0.9	1.7	0.0	3.0	0.0	0.5	0.5	0.0
27 May		0.7	1.5	0.0	1.5	1.0	1.9	1.6	0.0	0.0	1.9
28 May		1.7	0.0	0.0	1.7	1.1	4.0	0.0	0.0	0.8	0.0
29 May		1.6	10.4	2.4	1.8	0.0	0.7	0.0	0.0	1.4	0.0
30 May		2.3	2.1	1.1	0.8	0.8	1.5	0.9	0.0	4.2	0.0
31 May		2.9	0.0	1.4	0.9	1.9	3.4	0.0	2.1	2.1	0.0
1 Jun		3.2	0.6	0.0	0.0	0.0	4.4	0.0	0.0	6.9	0.0
2 Jun		0.6	3.1	0.0	0.0	0.6	3.3	0.0	2.9	3.7	0.0
3 Jun		0.6	4.4	2.8	1.2	0.6	2.9	5.3	1.4	1.9	0.0
4 Jun		0.0	2.2	5.3	1.0	0.0	7.2	0.0	1.1	5.0	0.0
5 Jun		0.0	0.9	1.2	2.5	1.5	4.3	0.0	0.0	0.0	0.0
6 Jun		1.1	0.0	2.0	5.7	0.7	3.3	0.0	0.6	2.1	0.0
7 Jun		3.9	0.0	0.0	3.9	3.0	5.5	0.0	2.3	0.9	0.7
8 Jun		0.0	0.9	0.7	2.0	1.1	6.8	0.0	6.3	1.2	2.2
9 Jun		1.8	0.0	1.5	0.0	2.8	5.0	0.0	0.0	0.6	0.0
10 Jun		0.0	3.3	0.6	2.3	2.7	9.1	0.0	1.6	2.4	1.0
11 Jun		6.8	1.3	0.6	3.0	1.4	7.3	0.0	3.3	6.5	2.3
12 Jun		0.5	8.1	2.3	1.4	0.9	4.7	0.0	4.2	2.7	0.0
13 Jun		0.8	3.4	0.0	2.3	0.0	3.9	0.0	2.6	0.0	0.0
14 Jun		1.5	2.8	0.0	1.6	1.8	2.6	0.0	2.8	0.0	0.0
15 Jun		1.5	3.6	1.2	4.4	1.0	3.9	0.0	0.6	1.8	1.0
16 Jun		2.1	1.3	0.0	1.8	0.6	2.2	0.0	1.3	2.3	0.0
17 Jun		0.0	0.0	2.3	0.0	1.4	2.0	0.0	0.0	0.0	0.0
18 Jun		0.0	4.7	0.0	1.1	0.0	4.1	0.0	0.0	0.0	0.0
19 Jun		1.6	2.9	0.0	2.9	0.7	2.6	0.0	0.9	1.0	0.0
20 Jun		0.6	0.7	1.0	3.2	0.0	2.0	0.0	0.7	1.0	0.0
21 Jun		2.8	0.6	1.7	7.0	0.0	0.6	0.0	1.0	0.7	0.0
22 Jun		2.5	0.7	2.0	2.8	7.1	1.3	0.0	1.2	1.7	0.0
23 Jun		0.7	5.3	0.0	1.4	0.7	6.5	0.0	4.5	0.0	0.0
24 Jun		0.7	2.1	2.1	1.3	1.9	4.1	0.0	4.9	0.8	0.0
25 Jun		0.9	4.4	0.0	1.0	5.7	3.8	0.0	0.0	0.8	0.5
26 Jun		0.8	5.9	1.0	0.6	2.4	3.3	0.0	0.0	0.5	0.0
27 Jun		0.9	5.1	0.9	4.1	0.0	3.3	0.0	2.4	0.0	0.0
28 Jun		2.3	0.0	2.7	2.3	1.4	3.8	0.0	5.6	0.0	0.0
29 Jun		1.4	1.9	4.6	2.2	1.8	5.2	0.0	1.7	1.6	0.0
30 Jun		1.2	3.9	7.8	2.9	4.4	3.3	0.0	1.2	4.0	0.0
1 Jul		1.2	10.5	0.6	0.0	0.9	2.6	0.0	3.1	0.6	0.0
2 Jul		1.0	6.6	4.5	1.5	3.6	3.9	0.0	0.0	0.0	0.0
3 Jul		1.7	4.3	0.0	1.1	1.4	9.0	0.0	0.0	2.9	0.0
4 Jul		0.8	0.0	0.0	0.5	0.0	5.3	0.0	0.0	1.7	0.0
5 Jul		0.5	3.4	0.7	2.3	0.0	9.6	0.0	0.0	0.0	0.6
6 Jul		0.8	4.2	0.0	3.2	2.7	5.5	0.0	3.0	1.0	0.6
7 Jul		1.3	1.4	0.0	0.9	1.1	5.3	0.0	0.0	0.0	0.0
8 Jul		1.2	0.0	0.0	1.0	0.9	3.0	0.0	2.2	0.0	0.0
9 Jul		0.7	0.0	0.0	3.4	2.5	5.3	0.0	5.3	1.2	0.0
10 Jul		1.5	1.7	0.7	1.0	3.1	3.8	0.0	0.5	2.7	0.0
11 Jul		0.9	3.2	0.0	0.0	1.3	2.3	0.0	0.0	1.4	0.0
12 Jul		0.7	7.2	1.0	1.8	1.4	5.3	0.0	1.6	2.3	0.7
13 Jul		1.3	1.4	2.0	1.4	0.0	3.0	0.0	0.5	0.0	0.0
14 Jul		0.9	9.3	0.0	1.8	0.0	7.7	0.0	0.0	0.0	0.0
15 Jul		1.0	0.9	0.0	1.1	1.2	2.3	0.0	1.1	0.0	0.0
16 Jul		1.9	1.3	0.0	0.8	0.9	2.3	0.0	0.7	0.0	0.0
17 Jul		0.0	0.0	0.0	1.2	1.0	1.4	1.9	0.0	0.0	0.0
18 Jul		2.2	0.0	0.0	1.0	1.0	3.1	0.7	0.0	0.0	0.0
19 Jul		0.6	1.9	1.3	2.0	0.0	3.7	0.0	1.5	0.7	0.0
20 Jul		1.2	0.0	0.0	2.1	0.0	0.8	0.0	0.0	0.0	0.0
21 Jul		0.9	2.4	0.0	2.2	0.0	3.8	0.0	3.4	0.0	0.0
22 Jul		0.0	0.5	0.6	0.7	1.7	1.8	0.0	1.4	0.0	0.0
23 Jul		0.0	1.5	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0
24 Jul		3.9	0.9	0.0	1.2	1.7	2.2	0.0	1.9	0.8	0.6
25 Jul		1.2	3.5	2.8	3.2	2.0	4.4	0.0	0.6	1.6	0.0

26 Jul		0.9	4.7	0.9	0.0	1.4	8.6	0.0	1.8	0.0	0.8
27 Jul		1.7	2.9	2.5	2.3	0.8	3.0	0.0	2.1	0.0	0.0
28 Jul		1.3	1.9	2.2	4.6	2.5	2.9	0.0	1.1	3.3	0.0
29 Jul		1.7	6.1	3.1	2.1	1.5	0.0	0.0	1.2	0.0	0.0
30 Jul		2.0	3.4	0.0	1.3	1.3	12.5	0.0	0.0	0.0	0.0
31 Jul		1.3	0.0	0.0	0.0	1.1	3.6	0.0	0.0	0.0	0.0
1 Aug		1.8	1.3	0.0	1.0	0.0	2.7	0.0	0.0	0.0	0.0
2 Aug		0.6	0.0	0.0	2.4	1.6	2.7	0.0	5.5	0.0	1.0
3 Aug		0.7	0.0	0.0	1.9	0.0	4.5	0.0	2.1	0.0	0.7
4 Aug		2.3	1.7	0.9	3.4	1.5	4.7	0.0	3.6	2.5	0.0
5 Aug		1.1	0.5	2.0	2.6	1.5	3.2	0.0	2.3	1.9	0.0
6 Aug		0.0	6.1	2.5	1.6	0.7	4.4	0.0	1.1	0.0	2.3
7 Aug		0.6	13.9	0.0	2.4	1.3	5.7	0.0	2.1	8.6	4.0
8 Aug		1.2	13.7	0.0	2.0	1.6	1.7	0.0	0.0	1.6	0.0
9 Aug		2.1	0.8	2.5	2.4	1.3	5.5	0.0	2.3	0.8	0.0
10 Aug		2.4	0.0	0.0	0.7	1.7	7.6	0.0	0.8	0.0	0.0
11 Aug		0.8	0.0	0.0	3.8	3.5	8.0	0.0	0.0	0.0	0.0
12 Aug		1.6	0.0	0.0	1.3	0.8	1.4	0.0	1.9	0.0	0.0
13 Aug		1.8	0.5	0.0	1.3	4.8	4.7	0.0	1.6	0.5	0.0
14 Aug		3.8	1.1	0.0	2.2	1.7	3.7	0.0	2.1	0.0	0.0
15 Aug		1.5	6.1	0.0	2.4	4.1	6.4	0.0	1.8	0.0	0.0
16 Aug		1.6	5.5	0.0	1.5	0.0	2.2	0.0	0.0	3.0	2.4
17 Aug		1.7	3.5	0.7	0.8	2.4	5.3	0.0	1.3	0.0	0.0
18 Aug		1.5	0.0	0.0	0.0	2.8	6.4	0.0	0.0	0.0	0.0
19 Aug		0.0	10.7	1.2	1.1	1.4	2.8	0.2	0.8	0.0	0.0
20 Aug		1.8	8.8	0.0	1.5	1.5	1.3	0.0	0.0	0.7	0.0
21 Aug		0.0	2.5	1.0	3.4	2.0	0.9	0.0	5.7	0.0	0.0
22 Aug		1.8	0.0	1.6	0.7	1.4	5.7	0.0	2.4	0.0	0.9
23 Aug		0.6	0.7	0.8	1.4	2.4	0.8	0.2	1.1	0.0	0.0
24 Aug		3.2	1.5	1.1	3.5	3.0	5.2	0.0	4.1	2.0	0.0
25 Aug		1.2	0.0	0.0	1.2	5.6	3.5	0.0	1.3	0.0	0.0
26 Aug		1.2	1.2	1.7	2.1	1.4	1.7	0.0	2.1	0.0	0.0
27 Aug		3.7	3.5	3.3	0.9	0.8	4.8	0.0	4.2	0.0	0.0
28 Aug		1.3	2.7	2.4	2.2	0.0	6.4	0.0	0.8	3.9	0.0
29 Aug		0.0	1.8	3.3	0.8	0.0	7.0	0.0	1.0	2.2	2.1
30 Aug		0.5	3.0	0.8	2.5	1.0	5.0	0.0	0.0	13.2	13.8
31 Aug		2.7	1.7	1.3	1.4	1.5	3.0	0.0	2.5	3.1	12.2
1 Sep		1.5	13.3	4.5	1.8	0.7	7.5	0.0	3.6	2.7	3.2
2 Sep		0.0	3.6	1.5	3.8	0.0	5.6	0.0	3.8	0.0	1.0
3 Sep		0.6	2.5	0.6	2.5	1.5	3.1	0.0	2.0	2.0	0.0
4 Sep		2.0	0.0	0.0	0.9	0.5	2.2	0.0	1.2	0.5	0.0
5 Sep		2.0	1.8	0.0	0.9	1.9	0.0	0.0	4.3	0.0	0.0
6 Sep		1.2	1.5	0.7	2.1	0.8	7.3	0.0	0.8	0.0	0.0
7 Sep		1.0	2.2	0.8	1.7	1.8	4.0	0.0	2.6	0.5	0.0
8 Sep		0.6	0.0	0.6	6.3	0.5	3.4	0.0	1.4	0.5	0.0
9 Sep		3.7	1.2	0.6	2.5	1.3	4.0	0.0	3.1	0.0	0.0
10 Sep		1.9	0.0	0.7	2.7	2.6	1.2	0.0	2.4	3.0	0.0
11 Sep		0.8	0.5	5.1	0.0	1.5	4.8	0.6	2.4	0.5	0.0
12 Sep		3.5	1.7	2.1	5.7	8.5	1.8	0.0	3.8	0.0	0.0
13 Sep		1.2	1.3	0.0	3.0	0.8	1.8	0.0	3.1	0.0	0.0
14 Sep		0.6	0.0	0.0	2.2	1.5	1.9	2.4	0.0	0.0	0.0
15 Sep		0.6	0.0	3.0	4.3	2.7	4.0	0.0	2.4	1.1	0.0
16 Sep		1.2	0.0	0.0	2.5	3.4	0.0	0.0	0.5	0.0	0.0
17 Sep		1.8	2.5	1.0	2.0	1.6	2.1	0.0	6.8	0.7	0.0
18 Sep		0.8	1.2	0.0	0.0	3.5	0.7	0.0	1.7	0.0	0.0
19 Sep		0.6	0.0	0.0	1.5	2.4	0.0	0.7	0.0	0.0	0.0
20 Sep		1.0	0.8	0.0	1.2	4.4	1.9	0.0	2.3	0.0	0.0
21 Sep		0.0	1.9	2.6	6.7	2.6	2.4	0.0	2.1	0.0	0.0
22 Sep		0.0	1.7	0.0	0.5	1.9	5.7	0.0	2.7	2.1	0.0
23 Sep		0.5	0.0	0.0	2.8	2.5	2.4	0.0	0.0	0.0	0.0
24 Sep		1.8	1.7	0.0	5.4	3.9	1.2	0.7	2.7	0.0	0.0
25 Sep		1.9	4.8	5.3	2.0	2.5	1.4	0.0	1.2	0.0	0.0
26 Sep		1.1	2.0	0.0	1.8	3.0	0.9	0.0	2.2	0.0	0.0
27 Sep		3.0	2.0	2.4	0.0	0.0	2.2	0.0	3.0	0.0	0.0
28 Sep		1.7	1.4	2.7	5.1	1.2	0.8	0.0	3.3	0.7	0.0
29 Sep		2.1	1.6	0.0	1.2	1.6	4.7	0.0	4.2	0.0	0.0
30 Sep		2.7	7.3	0.0	2.0	0.5	3.2	0.0	2.5	0.7	0.0
1 Oct		1.3	2.7	0.7	2.5	1.5	2.6	1.7	0.9	2.4	0.0
2 Oct		1.2	3.9	0.8	1.2	1.7	0.6	0.0	4.3	2.4	1.0
3 Oct		2.2	10.0	0.3	2.1	2.2	0.0	0.0	2.8	0.0	0.0
4 Oct		1.1	0.7	0.0	0.0	1.5	1.3	0.0	2.5	1.5	0.0
5 Oct		0.6	0.6	0.0	0.0	0.7	0.7	0.8	1.8	0.0	0.0
6 Oct		1.9	4.1	0.0	3.9	1.9	3.2	1.0	2.9	0.0	0.0
7 Oct		1.3	1.2	2.4	2.3	3.2	2.4	0.0	1.4	0.0	0.0
8 Oct		2.6	4.0	4.6	1.9	2.2	3.6	0.7	2.0	0.0	2.6
9 Oct		0.9	0.0	0.0	1.7	1.5	2.9	0.0	0.0	1.2	0.0
10 Oct		3.3	2.4	0.0	1.3	0.5	1.2	0.5	0.0	1.4	4.5
11 Oct		1.6	7.9	0.0	2.7	2.0	0.2	0.0	2.7	0.0	1.4
12 Oct		1.6	1.0	0.5	0.6	6.5	1.2	0.0	0.8	0.0	4.1
7 Oct		1.3	1.2	2.4	2.3	3.3	2.4	0.0	1.4	0.0	0.0
8 Oct		2.6	4.5	4.6	1.9	2.2	3.6	0.7	2.0	0.0	0.0
9 Oct		0.9	0.0	0.0	1.7	1.5	2.9	0.0	0.0	1.2	0.0
10 Oct		3.3	2.4	0.0	1.3	0.5	1.2	0.5	0.0	1.4	4.5
11 Oct		1.6	2.9	0.0	1.7	2.0	0.2	0.0	2.7	0.0	1.4
12 Oct		1.6	1.0	0.5	0.6	6.2	1.2	0.0	0.9	0.0	4.1
13 Oct		0.6	6.4	0.0	2.0	4.6	3.1	0.0	0.8	4.2	0.0
14 Oct		1.3	0.7	4.5	1.9	2.2	3.6	0.7	2.0	0.0	0.0
15 Oct		1.5	1.9	4.8	0.0	1.5	0.0	4.8	0.0	0.0	0.6
16 Oct		2.1	0.0	2.2	0.0	0.9	1.2	3.6	0.0	6.7	1.3
17 Oct		0.0	0.8	1.3	0.6	0.7	0.4	0.3	0.0	1.2	1.0
18 Oct		0.5	0.8	0.7	0.0	0.6	1.1	9.2	0.0	0.6	0.7
19 Oct		0.6	6.9	5.4	4.0	1.3	0.0	6.1	4.6	0.6	0.0
20 Oct		2.9	7.2	5.2	3.2	2.3	0.0	3.0	4.6	0.0	0.0
21 Oct		1.9	1.4	2.1	2.0	0.0	1.2	14.9	2.0	2.0	0.0
22 Oct		2.7	6.3	2.1	0.0	1.6	2.8	2.6	0.5	0.0	0.8
23 Oct		1.1	0.9	0.0	0.8	2.1	0.0	1.0	0.6	0.0	0.8
24 Oct		1.8	5.3	0.0	0.7	0.0	0.0	2.9	1.8	1.8	0.0
25 Oct		3.6	1.0	5.0	0.7	0.0	0.5	2.6	1.4	3.4	0.8
26 Oct		4.5	2.5	5.2	0.0	3.5	0.0	1.1	2.9	1.5	7.8
27 Oct		1.3	1.3	1.7	0.0	3.0	0.5	0.8	0.0	0.8	3.2
28 Oct		3.7	1.0	4.6	0.8	2.0	0.8	0.8	5.0	0.6	1.0
29 Oct		3.1	0.0	0.0	0.7	2.4	0.0	1.5	0.7	1.8	4.6
30 Oct		0.5	0.0	1.0	0.4	0.0	0.0	0.9	0.4	0.0	0.0
31 Oct		1.8	3.9	0.0	0.7	1.1	0.5	4.1	0.0	10.4	4.8
1 Nov		0.0	1.8	2.3	2.0	3.4	2.2	1.3	1.8	3.5	0.0
2 Nov		1.6	0.9	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.8
3 Nov		2.9	0.0	0.0	0.7	2.4	0.0	2.1	2.1	1.0	0.0
4 Nov		5.0	0.0	0.6	0.0	3.6	0.0	0.0	3.9	0.0	0.0
5 Nov		0.0	1.5	7.3	2.4	1.2	0.9	5.2	0.0	0.0	0.5
6 Nov		4.4	4.4	2.3	1.5	1.6	0.0	1.7	2.4	0.0	1.3
7 Nov		1.5	3.3	4.6	3.4	4.9	0.0	2.6	5.7	3.7	0.8
8 Nov		3.3	2.9	3.7	2.4	0.8	0.0	4.1	7.4	1.5	3.9
9 Nov		1.8	7.2	3.7	0.9	1.2	0.0	9.1	5.2	0.8	3.0
10 Nov		0.0	0.0	0.0	1.6	0.0	1.1	13.1	0.0	0.8	1.0
11 Nov		1.1	0.6	1.3	2.5	0.7	1.4	1.9	0.0	2.1	1.6
12 Nov		5.5	0.0	2.1	0.7	2.7	0.0	4.9	2.4	0.8	8.1
13 Nov		3.7	4.0	0.5	3.8	3.7	0.0	0.5	3.9	0.5	1.7
14 Nov		3.1	0.0	5.2	0.8	2.3	0.0	1.8	2.1	2.2	2.1
15 Nov		3.9	0.0	2.9	0.0	0.5	0.0	7.2	0.6	0.0	0.0
16 Nov		0.9	7.1	3.8	0.0	1.4	0.0	8.1	0.7	15.0	3.2
17 Nov		0.0	5.3	3.3	0.0	0.0	2.8	8.4	0.3	8.2	1.4
18 Nov		1.0	4.4	4.1	0.0	2.5	1.8	9.0	1.0	37.9	4.1
19 Nov		0.9	3.1	6.0	0.0	1.5	2.5	0.5	0.0	14.6	4.9
20 Nov		0.0	3.0	1.8	0.0	0.0	0.0	1.7	0.0	1.0	3.8
21 Nov		1.7	0.7	4.8	0.0	0.0	0.0	7.1	0.0	2.6	8.8
22 Nov		1.8	2.3	0.5	0.7	2.5	0.8	2.8	0.5	4.4	1.9
23 Nov		1.8	2.2	9.8	1.6	1.9	0.0	7.3	2.4	4.0	3.0
24 Nov		0.5	5.8	2.2	0.0	1.3	0.0	9.4	0.0	12.4	5.1
25 Nov		0.0	2.0	2.3	0.0	1.0	0.0	2.9	0.0	3.2	0.0
26 Nov		0.9	3.8	2.0	1.7	2.4	1.0	2.2	0.0	8.6	7.6
27 Nov		1.4	1.9	1.2	0.5	1.2	0.8	10.0	1.3	0.7	6.7
28 Nov		1.5	3.5	2.6	0.0	1.9	1.4	5.8	0.0	2.3	4.1
29 Nov		0.0	1.2	1.7	0.0	0.7	0.8	5.5	0.0	0.0	8.1
30 Nov		0.0	1.4	1.4	0.0	1.3	0.0	4.6	1.1	0.0	1.0
1 Dec		0.0	1.7	2.7	0.0	0.7	0.0	2.7	0.5	1.4	0.0
2 Dec		0.7	2.5	0.0	0.7	1.0	0.0	1.5	1.4	7.4	0.8
3 Dec		8.9	1.9	1.4	1.2	0.7	0.0	1.9	0.0	4.0	0.9
4 Dec		0.9	0.8	5.5	0.0	3.0	0.0	9.7	2.4	4.2	0.6
5 Dec		0.7	2.4	3.2	0.0	1.0	0.0	3.7	1.4	9.5	5.2
6 Dec		0.0	1.3	3.7	0.0	0.5	0.0	11.7	0.8	6.4	2.1
7 Dec		4.7	0.0	0.0	1.3	0.0	0.0	0.8	1.5	1.5	0.6
8 Dec		1.7	3.4	1.5	0.0	0.5	0.0	7.1	2.0	1.1	0.0
9 Dec		0.0	1.6	5.3	1.3	1.5	0.0	27.1	2.8	0.0	1.5
10 Dec		0.0	5.7	12.1	0.0	1.4	0.0	25.2	4.1	4.0	1.2
11 Dec		0.0	0.0	6.3	1.2	0.5	0.0	8.7	0.0	11.2	3.3
12 Dec		1.4	3.1	5.2	0.0	0.0	0.0	4.8	2.3	8.3	0.9
13 Dec		2.8	1.3	2.0	0.0	2.8	0.0	2.6	0.6	1.1	4.9
14 Dec		1.2	1.6	1.3	0.0	0.0	0.0	6.2	0.0	1.5	0.0
15 Dec		0.7	4.3	4.1	0.0	0.5	0.0	2.4	2.9	0.0	3.3
16 Dec		1.7	0.0	4.6	0.9	0.5	0.0	0.0	0.7	4.2	3.3
17 Dec		0.7	0.7	4.1	0.0	0.6	0.0	3.7	0.0	1.8	0.7
18 Dec		0.0	1.3	3.2	2.4	1.2	0.0	6.1	0.0	7.2	5.2
19 Dec		1.5	3.2	2.7	0.0	0.5	0.0	9.9	0.0	4.6	1.7
20 Dec		0.0	1.8	0.0	0.9	0.7	0.0	6.6	0.8	11.1	0.7
21 Dec		2.9	0.6	0.0	0.7	2.5	0.0	9.8	0.9	7.0	1.7
22 Dec		3.1	0.0	0.0	2.0	2.7	0.0	9.0	2.0	4.7	11.4
23 Dec		2.4	0.0	0.0	0.0	0.9	0.0	12.8	0.0	5.7	18.3
24 Dec		2.6	0.0	5.2	0.0	0.0	0.0	26.1	1.9	7.0	3.0
25 Dec		0.0	1.5	4.4	0.0	4.0	0.0	16.5	0.0	1.8	2.1
26 Dec		1.6	0.6	1.6	0.0	1.2	0.0	17.9	0.0	5.6	9.3
27 Dec		6.9	0.8	15.4	0.0	5.3	0.0	11.8	0.6	11.3	12.9
28 Dec		3.4	0.5	5.5	0.0	1.2	0.0	9.8	1.2	2.4	8.5
29 Dec		1.8	1.0	11.7	0.0	0.6	0.0	38.8	1.6	11.7	4.7
30 Dec		0.8	0.0	2.7	0.0	0.0	0.0	13.0	2.1	7.0	0.6
31 Dec		0.0	0.8	15.7	0.8	0.6	0.0	11.8	0.0	8.9	3.0

ADP
Consulting : Engineering

Appendix C
Climate Change Adaptation Plan (CCAP)

ADP
Consulting : Engineering

50 Queens Road

Climate Adaptation & Resilience Plan

Prepared for: Altis

Project No: MEL3110
Date: 20 March 2024
Revision: 01

Project:	50 Queens Road
Location:	50 Queens Road South Melbourne VIC 3205
Prepared by:	ADP Consulting Pty Ltd Level 13, 55 Collins Street Melbourne VIC 3000
Project No:	MEL3110
Revision:	01
Date:	20 March 2024

Rev	Date	Comment	Author	Signature	Technical Review	Signature	Authorisation & QA	Signature
01	1/10/23	Town Planning	Thomas Miers	TM	Alex Sear	AS	Alex Sear	AS
02	20/03/24	Apartment Remix	Max Anderson	MAX	Thomas Miers	TM	Thomas Miers	TM

Project Team	
Client / Principal	Altis
Architect	Bates Smart
Project Manager	Essence
EIC Contractor	Hickory
Building Services	ADP Consulting
Sustainability Consultant	ADP Consulting
Structural Engineer	Rincovitch
Landscape Architect	Arcadia

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Executive Summary

This report assesses risks associated with the projected climate changes in the region of Alfasi's proposed 50 Queens Road built to rent residential development in South Melbourne.

Climate Adaptation Plan

Climate change impacts are expected to present increasingly significant risks over time. Incorporating climate risk considerations into the design and development of the 50 Queens Road development is the lowest cost option to reduce future impacts and losses.

Climate change variables were explored covering the primary effects of changes in air temperature, precipitation, and wind. Secondary effects relating to changes in relative humidity, drought, floods, storm events, and fire danger were also considered.

An initial screening of the project's infrastructure and physical and social assets was undertaken, consistent with the approach used in standard climate risk assessments and adaptation plans. The screening is to highlight the sensitivity to exposure to these climate changes and to identify vulnerabilities to the changing climatic conditions. The risk assessment conducted was based on AS/NZS ISO 31000 'Risk management – principles and guidelines.

Two emissions scenarios were used for this study to represent a range of likely future global GHG emission pathways. The scenarios reflect current levels of emissions (RCP 8.5) and the level of emissions necessary to limit global warming in line with the Paris Agreement (RCP 4.5).

The climate projections for the 50 Queens Road Development project are detailed in Section 3.2 and summarised as:

Annual average temperature (days over 35°C).

- **2016:** 11 days were over 35°C.
- **2030: + 0.6°C** (13 days)
- **2070: + 3.1°C** (24 days)

UHI - CBD temperatures can be up to 7°C higher than less urbanised areas

Average sea level rise

- **2030:** +7 – 19 cm
- **2070:** +27 – 89 cm

Annual average rainfall

- **2030:** - 2%
- **2070:** - 9%

Heavy rainfall intensity

- **2030**: -7.7 to +15%
- **2070**: -24.8 to +48.9%

Findings

A total of 29 climate change risks were identified, with the majority rated as low to medium. Only 8 risks were identified as being of high risk with no risks identified as extreme. The project's most significant risks relate to:

- An increase in the number of extreme heat days could lead to power supply disruptions from programmed load shedding and heat damage to network infrastructure (increases in black outs and brown outs) causing inconvenience and interruption.
- An increase in the number of extreme heat days could lead to heat stress and UV exposure of occupants resulting in decreased use of open space and recreational facilities.
- An increase in extreme heat days would reduce thermal comfort in buildings where HVAC systems are not able to ensure thermal comfort.
- An increase in intense rainfall, runoff, wind and hail events (in combination or in isolation) could result in higher costs of property maintenance and clean up.
- An increase in the number of extreme heat days could lead to more bushfires resulting in an increase in smoke and air-borne pollutants causing respiratory issues for residents
- An increase in extreme winds could lead to a higher exposure of built assets and property to strong winds resulting in a higher frequency of falling trees and branches impacting assets, building users and local community members.
- An increase in frequency and severity of storms could lead to a higher exposure of electricity and communications infrastructure to rain/wind/lightning, resulting in increased stresses and damage to power infrastructure (gas and electricity), telecommunications and vital equipment resulting in power interruptions.
- An increase in high wind events, coupled with high humidity and storms generating extreme pollen conditions impacting on health and amenity (i.e. thunderstorm asthma)

The following table details the actions and responsibility for the significant risks and forms the basis of the Climate Adaptation Plan.

Action	Reason	Implementation Responsibility
Targeting 7.5-star NatHERS average rating and the minimum rating is 6.2-stars.	A high standard of building fabric and good passive design, demonstrated by a higher NatHERS rating ensures that energy used to keep the building comfortable is kept to a minimum. This ensures more affordability for residences and ensures a greater level of thermal comfort and greater resilience to heat based shocks and stresses	> Architect > ESD Consultant > Head Contractor

Action	Reason	Implementation Responsibility
Light coloured finishes on roofing and façade	The light-coloured finishes mitigate the effects of the urban heat island.	> Architect > Head Contractor
BMS set up to raise alarm when AHU filters are dirty	To ensure filters are functioning correctly in the even of dusty conditions or bushfire smoke.	> Mechanical Contractor
Facility management team to have strategy for heatwave e.g. vulnerable resident register, can check in on them during extreme heat conditions.	To ensure risk of serious illness of fatality is mitigated in the event of extreme heat.	> Altis Facilities Management
Project has implemented a highly vegetated courtyard area with substantial tree planting providing shade to sitting areas.	To ensure outdoor spaces are still usable in warmer months in the future when hotter days will be more intense and frequent.	> Landscape Architect > Head Contractor
Central lawn area uses real lawn mitigating the heat island effect.	Use of natural lawns reduces the heat island effect with its ability to absorb solar radiation without significantly heating up and adding to heat island effect.	> Landscape Architect > Head Contractor
Rooftop communal area has included shade canopy.	Additional shading ensures that common areas are still used on hotter days	> Architect > Head Contractor
Two Rainwater tanks collect rainwater and reuse. One tahk (40kL) for toilet flushing and the other (70kL) for irrigation, significantly reducing the reliance on mains water supply for non-potable water uses.	Rainwater capture and reuse systems ensure that on site water retention is maximised and reliance on mains water is minimised.	> Hydraulic Engineer > Head Contractor

Action	Reason	Implementation Responsibility
Irrigation type is sub-surface drip irrigation, which is the most efficient, with moisture sensors to prevent overwatering and water wastage.	Subsurface drip irrigation reduces the amount of evaporation and is the most efficient irrigation systems. The moisture sensor will monitor how moist the soils are and ensure watering only occurs when needed.	> Landscape Architect > Head Contractor
High efficiency fixtures and fittings: > Showers: 3 Stars or 4 Stars (7.5 L/min or lower) > Toilets: 4 Stars > Taps: 5 Stars > Dishwashers: 5 Stars	High efficiency fixtures and fittings reduces the projects reliance on mains potable water and contributes to greater drought resilience.	> Architect > Head Contractor

1. Introduction

The following Climate Adaptation and Resilience Plan (CAP) has been developed for the proposed build-to-rent residential development project located at 50 Queens Road, South Melbourne. The project is being developed by Altis.

The CAP outlines the climate and operational risks likely to impact the community and the development, how these risks are prioritised, and how Investa seek to manage these risks.

1.1 Project Overview

1.1.1 Development

The project is a build to rent development targeted at providing affordable housing for key workers in South Melbourne. The project has 434 apartments consisting of a mix of studio, 1-bed, 2-bed and 3-bed apartments. In addition to these apartments are communal amenities such as a co-working centre, swimming pool and a gym. Outdoor amenities include a rooftop lounge area and central courtyard with outdoor seating and extensive tree canopy.

Figure 1: render of the proposed development

1.1.2 Location

The project is located at 50 Queens Road, South Melbourne, Victoria. The development is directly opposite Albert Park Golf Course and just south of Albert Cricket Ground.

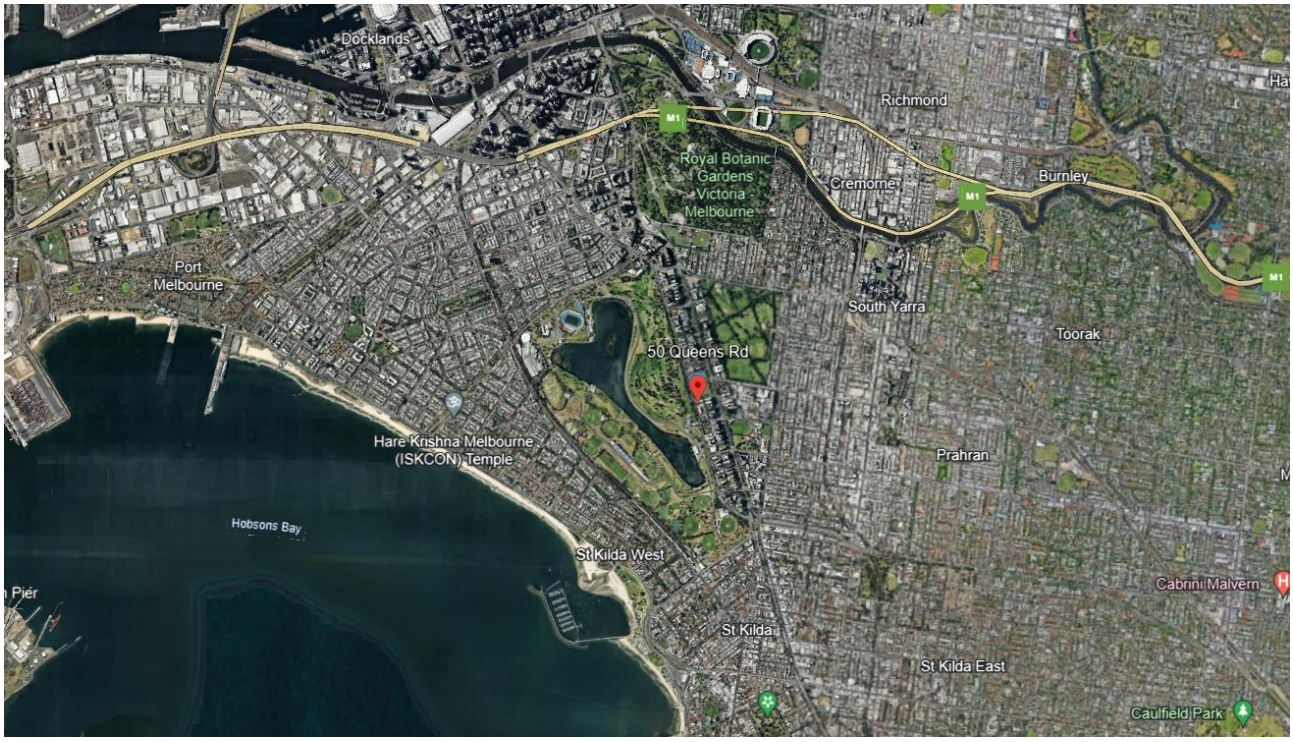


Figure 2: Location of the proposed development within the greater Melbourne area.

This particular part of South Melbourne has in its proximity a large park and lake. This means it is not susceptible to flooding given the increased permeability of the area. This is supported by the SES Local Flood Guide for South Melbourne. Whilst the park is vegetated with trees and shrubs it is isolated from parklands that are at fire risk, the risk of a bushfire starting in Albert Park is negligible.

1.1.3 Asset Life

The expected life of the asset is at least 50 years. This report will assess risk over a 70 year life span regardless to be conservative.

1.1.4 Stakeholders

In developing the Climate Adaptation Plan, key stakeholders have been engaged, summarised in the table below. Stakeholders were consulted throughout the development of this Plan and in a climate change workshop specific for the project.

Table 1: Key stakeholders for the project and relevant for the Climate Adaptation Plan

Project Role	Company	Project Contacts
Client / Principal	Altis	David Simpson
Owner Operator	Altis	David Simpson
Architect	Bates Smart	Damian Rough
Project Manager	Essence	Francesca Tang
ECI Contractor	Hickory	Blair Whelan
Building Services	ADP Consulting	Hamed Golshan
Sustainability Consultant	ADP Consulting	Thomas Miers

2. Context

Australia's climate is changing. More intense and frequent storms, heatwaves, droughts, sea level rise, bushfires and other extreme weather events are impacting our natural and built environments. Climate impacts are already observable and there is broad scientific consensus that further changes will occur and that impacts are likely to increase.

The developments we build today must adapt to a future climate and be designed to support the resilience of their surrounding communities.

Climate change adaptation is therefore necessary. It is the principal way to deal with the unavoidable impacts of climate change and can help manage risks, adjust economic activity and reduce vulnerability.

Recent extreme climate events across Australia such as flooding, heat waves and bushfires have demonstrated the vulnerability of property, infrastructure and assets to climate extremes. It is critical that steps are taken to minimise the potential impacts of a changing climate and that these steps are specific to each developments' conditions.

8500 people were hospitalised, with nine deaths, on November 20, 2016 in Melbourne due to a severe thunderstorm asthma event

Figure 3: Thunderstorm asthma event in Melbourne, November 2016 (Photo: Herald Sun)[1]

[1] "The Melbourne epidemic thunderstorm asthma event 2016: an investigation of environmental triggers, effect on health services, and patient risk factors", The Lancet Planetary Health, June 2018

2.1 National context

As part of the international agreement reached at the 2015 United Nations climate negotiations in Paris, Australia has committed to emission reductions intended to keep a global temperature rise to well below 2 degrees Celsius. This commitment was ratified in November 2016, formalising Australia's commitment to the Paris Agreement.

2.2 State context

The Victorian Government is leading in efforts towards effective and long-lasting climate change action. The Climate Change Act 2017, updated in February 2018, provides a foundation to manage climate change risks. The Act embeds a long-term emissions reduction target (net zero by 2050) and requires adaptation action plans for key systems that are either vulnerable to the impacts of climate change or essential to Victoria's preparation.

3. Climate Hazards

Observational data from the past century reveals significant changes in climate within and surrounding Australia, with the climate system changing faster than expected. The frequency and intensity of storms, heatwaves and bushfires already pose material financial risks, and these risks are projected to continue to increase.

Property, infrastructure and natural resources will be directly impacted by the physical impacts of a changing climate. Reported by CSIRO (2013), the "most likely climate future" for central Melbourne includes increasingly drier and hotter climatic conditions with increasing intensity of rainfall events likely in summer and autumn seasons.

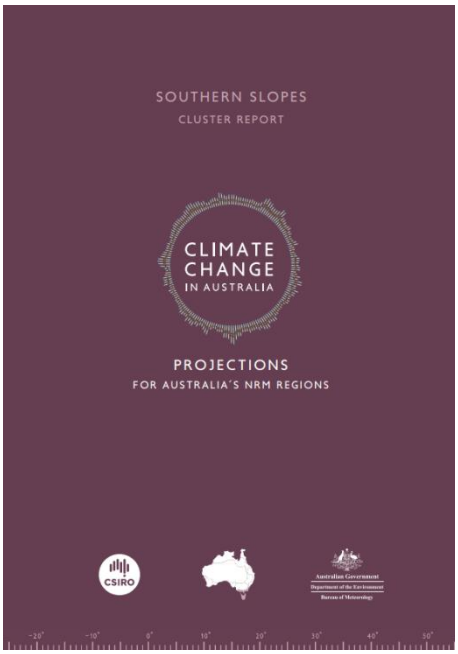
3.1 Climate variables

The risk assessment considers projected changes to both primary and secondary climate variables impacting on the proposed development. These include:

Global warming causes changes to essential climate variables:		
Primary Effects	**Air temperature**	Assessed using publicly available climate data
	Solar radiation	
	Sea-surface temperature	
	Precipitation	Assessed using publicly available climate data
	Humidity	
	Wind	Assessed using publicly available climate data
Which results in changes to derived variables and climate impacts including:		
Secondary Effects	**Relative humidity**	Assessed using publicly available climate data
	Bushfire weather	
	Sea-level rise	Assessed using publicly available climate data
	Drought	Assessed using publicly available climate data
	Flood	Assessed using publicly available climate data
	Cyclones	
	Coastal inundation	
	Heatwave	Assessed using publicly available climate data

3.2 Climate projections

This climate risk assessment uses Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Bureau of Meteorology's (BoM) most recent regional climate projections for Australia. These are based on 54 different types of natural resource management (NRM) regions. The NRM regions are grouped into 'clusters' and 'sub clusters', which are broader climate and bio-physical regions around Australia for which tailored climate projections have been modelled. The project is located within the Southern Slopes (Victoria West) sub cluster.



The CSIRO projections use a range of scenarios, or Representative Concentration Pathways (RCPs), which consider levels of future emissions based on current trends that may increase, decrease or stay constant. To achieve the agreed Paris target of a 1.5°C rise in temperature (upper limit 2°C rise) by 2050, greenhouse gas (GHG) emission reductions to achieve the RCP4.5 pathway or below are required. We are currently tracking at or above the RCP8.5 pathway.

To establish climate projection data for the project, the following scenarios and time extents are used:

- Historical Melbourne regional office weather station data and projected climate conditions (detailed in the table below as "current").
- RCP4.5 scenario under a near future (2030) extent of modelled changes. RCP4.5 is a 'medium' emission scenario with emissions peaking around 2040 and atmospheric CO_2 levels stabilising at 540ppm by 2100; lower than current emissions levels.
- RCP8.5 scenario under a medium/long term (2070) extent of modelled changes. RCP8.5 is a high emissions scenario with atmospheric CO_2 concentration continuing to rise reaching 940ppm by 2100.

Table 2: Climate projections for Melbourne used in the climate risk analysis

		CURRENT	2030 (RCP4.5)	2090 (RCP8.5)
Annual temperature	Maximum	20.9°C	+ 0.7°C	+ 3.5°C
	Minimum	11.7°C	+ 0.6°C	+ 2.9°C
	Average		+ 0.6°C (+0.5 to 0.9°C)	+ 3.1°C (+2.5 to 4.0°C)
Extreme temperature	Days over 35°C	11	Increase to 13	Increase to 24
Urban Heat Island (UHI)	CBD temperatures can be up to 7°C higher than less urbanised areas			
Average annual rainfall		648.3 mm	Reduce 1% (-7% to +4%)	Reduce 5% (-19% to + 5%)
Rainfall intensity		NA	High confidence heavy rainfall intensity events will increase, though the magnitude and timing cannot be reliably projected. (-7.7 to +15%)	(-24.8 to +48.9%)
Severe fire danger days			3.0 to 4.2 days	22.2 to 24.0 days
Sea level rise			+7 – 19 cm	+27 – 89 cm
Projection data obtained from Climate Change in Australia Southern Slopes Cluster Report and Climate Change in Australia Technical Report, CSIRO & BOM 2015[2]				

[2] "Southern Slopes Cluster Report", Climate Change in Australia, Projections for Australia's NRM Regions, CSIRO, 2015

3.3 Climate impacts

Climate change projections for the Melbourne region show that average rainfall is expected to decline, however the intensity of rainfall events is projected to increase. Average and extreme temperatures are also expected to increase. The changing climate is likely to have an increased impact on assets and infrastructure, affect occupants, staff and visitors to the development, as well as increasing threats to the natural environment.

Direct climate impacts, or hazards, relate primarily to the changes in the following climate variables:

3.3.1 Temperature

Average temperatures are increasing across all seasons. There will likely also be more days of extreme heat (days over 35ºC) and longer hot spells. The impacts of rising mean and extreme temperatures include higher rates of heat stress, greater need for cooling, declining civil infrastructure network efficiencies (such as water, communication) and possible asset deterioration.

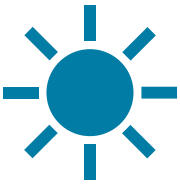
3.3.2 Precipitation

Annual average rainfall may decrease, with declines particularly in spring rainfall by 2070. However, there may also be an increase in the frequency and intensity of heavy downpours, which can lead to localised flooding, particularly in urban areas where drainage capacity can be overwhelmed. This can be expected to result in increased flood damage.

3.3.3 Storm and wind

Storm events are expected to increase in intensity and duration. This has the potential to result in more flooding, storm damage to assets, disruption of services and business, and increased maintenance and insurance costs. Strong winds often increase the magnitude of accompanying storm surges and intense rainfall. Projections for annual wind speed vary and are uncertain and winds may increase or decrease. CSIRO data suggests there may be a large increase in annual mean wind speed by 2070 of more than 3%. However, it is important to consider an increased frequency and intensity of extreme events, which average wind speed measurements would not capture.

3.3.4 Drought



There is likely to be an increase in the amount of time spent under drought conditions in the future, with over 70% of models (CSIRO Climate Data Online) predicting an increase in the annual time spent in drought by 2030. 50% of the models predict that there will be a large increase (>30% increase in the annual time spent in drought). By 2070, over 70% of models predict an increase in annual time spent in drought, while 69% of models predict a large increase in the annual time spent in drought. This will likely result in restrictions on the use of water for possible external use (if required) and possible restrictions in the use of water for other purposes, which may impact on the availability and price of water for geothermal heating.

3.3.5 Humidity

There likely to be little change in humidity in 2030. 71% of models predict a small decrease (1-10%) in annual humidity by 2070. This is likely to have limited impact on the development.

3.4 Risk screening

The projected climate change impacts present risks to assets, infrastructure, operations (including to users of the buildings) and to the environment. A risk assessment has identified and prioritised these risks.

To guide the detailed risk assessment, an initial screening of exposure and sensitivity to projected primary and secondary changes in climate variables for the project's infrastructure, community, experience and environment was undertaken to identify potential risks and vulnerabilities of the 50 Queens Road development to climate change.

The following shows the outcomes from this initial exposure and sensitivity assessment. The ticked boxes indicate that the asset type has a potential climate risk exposure.

Table 3: Climate risk screening for the proposed development

Climate variable	Power supply	Water supply	Residential operations	Residents	Building Systems	Natural landscape systems
Temperature	✓	✓	✓	✓	✓	✓
Precipitation	✓	✓	✓	✓	✓	✓
Relative humidity	✓	✓	✓	✓	✓	✓
Drought		✓		✓		✓
Flood	✓	✓	✓	✓	✓	✓
Storms and Wind	✓	✓	✓	✓	✓	✓
Bushfires		✓		✓	✓	

4. Risk Analysis

Understanding the likelihood and consequence of the risk of impacts of future climate change events is necessary for the design team to identify the key areas of the development that are vulnerable to climate change impacts and how the planning, design and ongoing operations and management of the building may assist to mitigate and adapt to these risks and impacts over time.

4.1 Risk assessment

The risk analysis methods used is consistent with *AS 5334-2013 Climate Adaptation for Settlements and Infrastructure – A risk-based approach*.

In-line with the climate projections, the risk analysis of impacts of climate change events has been undertaken for two time frames – 2030 and 2070 compared with the current climate.

4.1.1 Likelihood of risk

The first stage of the risk analysis identified the likelihood of the risk for each of the three timeframes – current, 2030 and 2070. Likelihood was assessed as either: rare, unlikely, possible, likely or almost certain.

4.1.2 Consequence of risk

The second stage assessed the level of consequence for each risk in the given timeframes. The consequence of each risk is rated on a scale of insignificant, minor, moderate, major or catastrophic, considering the impacts to assets and infrastructure, people, the environment and business continuity.

In assessing the likelihood and consequence of the key risks, the following key areas of impact have been identified:

1. Experience – considering the direct impacts and flow-on effects of climate change to the experience for staff, visitors and shoppers.
2. Core business – considering the direct impacts and flow-on effects of climate change to business continuity the building owner and tenants.
3. Enablers - considering the direct impacts and flow-on effects of climate change to whole of life costs, ecosystem services, assets, external assets and the company reputation.

This process identified the risk rating or risk priority level.

Table 4: Risk priority levels

	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Low	Medium	Medium
Rare	Low	Low	Low	Medium	Medium

4.2 Risk summary

The key risk scenarios that were identified for the 50 Queens project are:

4.2.1 Changing temperatures

- An increase in summer cooling loads on buildings could result in higher energy demand/costs.
- An increase in mean temperatures, droughts and incidence of higher temperature could lead to more building maintenance.
- An increase in extreme heat days and higher summer cooling loads on buildings may result in higher energy demand/costs.
- An increase in mean temperatures and warmer winters could lead to changes in species that inhabit on site vegetation and features (e.g. invasive species or mosquitoes) resulting in increased maintenance costs.
- An increase in soil dryness could lead to more dust particles in the atmosphere resulting in a higher number of air pollution incidents.
- An increase in the number of extreme heat days could lead to heat stress, solar exposure and reduced thermal comfort of occupants, resulting in increased sickness.
- An increase in the number of extreme heat days could lead to higher exposure (and heating) of transport and utility infrastructure servicing assets resulting in loss of power and service provision to water and wastewater assets and, an increase in the number of environmental and safety/health related incidents.
- An increase in the number of extreme heat days could lead to power supply disruptions from programmed load shedding and heat damage to network infrastructure (increases in black outs and brown outs) causing inconvenience and interruption.
- An increase in the number of extreme heat days could lead to higher summer cooling loads on buildings resulting in increased water and energy demand/costs.
- An increase in the number of extreme heat days could lead to heat stress and UV exposure of occupants resulting in decreased use of open space and recreational facilities.
- An increase in the number of extreme heat days could lead to heat stress and solar exposure of the occupants, resulting in increased illness, dehydration related illness and/or morbidity.
- An increase in extreme heat days would reduce thermal comfort in buildings where HVAC systems are not able to ensure thermal comfort.

4.2.2 Changing rainfall

- Decreases in annual rainfall will affect potable water availability (water restrictions) which may impact ability to operate buildings optimally.
- Short-duration droughts could lead to increased dehydration of vegetation and other green spaces and the degradation of natural and landscaped areas resulting in increased maintenance costs for landscaping.
- An increase in rainfall and runoff could lead to greater impact and erosion of natural and landscaped areas resulting in increased maintenance costs.
- An increase in rainfall intensity and runoff could lead to higher growth rates for some plants and weeds resulting in additional vegetation maintenance and associated costs.
- A decrease in annual precipitation leading to drought conditions could result in reduced water availability for gardens and landscaped areas resulting in reduced amenity, recreation and respite areas.
- An increase in intense rainfall, runoff, wind and hail events (in combination or in isolation) could result in higher costs of property maintenance and clean up.
- An increase in rainfall and runoff could lead to localised flooding causing damage to building resulting in increased insurance premiums for assets.
- An increase in rainfall has the potential to cause flash flooding from overflow of stormwater drainage creating hazardous conditions and health & safety risks for the visitors to the site.
- An increase in frequency of storms could lead to impacts on the ICT networks – in turn this may affect communication, emergency response management and other ICT based applications.

4.2.3 Severe weather events

- Short-duration droughts could lead to higher pressure on urban water resources resulting in increased need for alternative water supplies such as wastewater recycling.An increase in extreme winds could lead to a higher frequency of falling trees and branches, causing injury and impeding access.
- An increase in the number of extreme heat days could lead to more bushfires resulting in an increase in smoke and air-borne pollutants causing respiratory issues for residents
- An increase in frequency and severity of extreme storms and high winds could lead to higher exposure of built assets and property resulting in more damage to assets with associated costs and losses of service.
- An increase in extreme winds could lead to a higher exposure of built assets and property to strong winds resulting in a higher frequency of falling trees and branches impacting assets, building users and local community members
- An increase in frequency and severity of storms could lead to a higher exposure of electricity and communications infrastructure to rain/wind/lightning, resulting in increased stresses and damage to power infrastructure (gas and electricity), telecommunications and vital equipment resulting in power interruptions.
- An increase in high wind events, coupled with high humidity and storms generating extreme pollen conditions impacting on health and amenity (i.e. thunderstorm asthma)

4.3 Stakeholder engagement

The primary author actively participated in the project, consulting stakeholders to incorporate resilience and assess existing controls, measures, and potential adaptations.

4.4 Current controls and measures

The table, derived from stakeholder engagement and workshops, lists existing and planned controls and measures to mitigate climate change impacts.

Table 5: Current controls and measures used in the development to reduce climate change impact risks

Current controls and measures
> NCC Energy efficiency requirements; NatHERS average of 6-stars and minimum of 5-stars
> Statutory cooling load caps being met reduce the risk of excessive heat.
> Air-cooled VRF with heat recovery units that meet Green Star requirements for energy efficiency.
> Current planting selection is a mix of Australian Native species and exotic species that have been selected for drought resilience.
> Current NCC standards account for soil dryness in structure and foundations.
> AHUs are equipped with F5 filters at a minimum which are effective at removing: dust, pollen, mold spores, larger smoke particles, some bacteria fine dust particles.
> Main building entrances to the building will have dust entry mitigating interventions like floor mats.
> Development has excellent end-of-trip facilities reducing reliance on public transport system.
> Project has a co-working/business centre to allow residents to work from home in the event of public transport disruptions.
> HVAC system uses air-cooled systems therefore no water usage in AC.
> Recreational spaces such as gym are air-conditioned
> The form of the building provides shade to the communal courtyard area
> Minimum statutory requirements on fixtures and fittings for WELS ratings.
> Mulched surfaces maintain a 75mm depth to assist in moisture retention in soil.
> A landscaping maintenance program will be implemented by Altis
> Groundskeeping maintenance contracts in place ensure regular maintenance is implemented
> Area is not flood prone according to SES Local Flood Guide
> DAS and Comms Room are located in Basement 1, the highest of basement levels allowing water drain beneath.
> Head contractor reviews design for buildability, maintainability and durability.

4.5 Residual risk rating

Following the workshop each risk was rated again to determine its residual risk rating using the risk definition and rating tables. Residual risks rated high and extreme are the focus for adaptation planning, summarised in Appendix A.

5. Climate Adaptation Plan

Mitigation measures and adaptation options were explored for risks rated medium, high or extreme. No risks were rated as extreme. These options were investigated with ADP engineers, the Bates Smart design team and Altis stakeholders and Hickory, the ECI contractor.

The Climate Adaptation Plan brings together the outputs of the workshop and stakeholder engagement, the risk assessment and residual risk assessment. It identifies a list of design initiatives that are being integrated into the development planning and design, or that will form part of the ongoing operations, risk and business continuity management of the development.

No risks were identified as extreme, and a 8 were nominated as high. These risks arise from the more extreme weather events, particularly relating to extreme heat and extreme weather events rather than the annual changes in climate. Extreme events (such as hail, strong wind, heat waves, and localised flooding) are identified as the likely cause of infrastructure failures, with flow on impacts mostly to the resident experience.

The following table details all the actions that have been identified as a result of risk assessment and the rationale and responsibility for each.

Additionally there are some actions listed for the Altis facilities management and operations team to consider implementing in operation.

Regular review of the risk assessment through the design development process, and during building operations may reduce the residual risks further.

Table 6. Adaptation Action Plan

Action	Reason	Implementation Responsibility
Targeting 7.5-star NatHERS average rating and the minimum rating is 6.2-stars.	A high standard of building fabric and good passive design, demonstrated by a higher NatHERS rating ensures that energy used to keep the building comfortable is kept to a minimum. This ensures more affordability for residences and ensures a greater level of thermal comfort and greater resilience to heat based shocks and stresses	> Architect > ESD Consultant > Head Contractor
Light coloured finishes on roofing and façade	The light-coloured finishes mitigate the effects of the urban heat island.	> Architect > Head Contractor
BMS set up to raise alarm when AHU filters are dirty	To ensure filters are functioning correctly in the even of dusty conditions or bushfire smoke.	> Mechanical Contractor

Action	Reason	Implementation Responsibility
Facility management team to have strategy for heatwave e.g. vulnerable resident register, can check in on them during extreme heat conditions.	To ensure risk of serious illness of fatality is mitigated in the event of extreme heat.	> Altis Facilities Management
Project has implemented a highly vegetated courtyard area with substantial tree planting providing shade to sitting areas.	To ensure outdoor spaces are still usable in warmer months in the future when hotter days will be more intense and frequent.	> Landscape Architect > Head Contractor
Central lawn area uses real lawn mitigating the heat island effect.	Use of natural lawns reduces the heat island effect with its ability to absorb solar radiation without significantly heating up and adding to heat island effect.	> Landscape Architect > Head Contractor
Rooftop communal area has included shade canopy.	Additional shading ensures that common areas are still used on hotter days	> Architect > Head Contractor
Two 40kL Rainwater tanks collect rainwater and reuse. One for toilet flushing and the other for irrigation, significantly reducing the reliance on mains water supply for non-potable water uses.	Rainwater capture and reuse systems ensure that on site water retention is maximised and reliance on mains water is minimised.	> Hydraulic Engineer > Head Contractor
Irrigation type is sub-surface drip irrigation, which is the most efficient, with moisture sensors to prevent overwatering and water wastage.	Subsurface drip irrigation reduces the amount of evaporation and is the most efficient irrigation systems. The moisture sensor will monitor how moist the soils are and ensure watering only occurs when needed.	> Landscape Architect > Head Contractor
High efficiency fixtures and fittings: > Showers: 3 Stars or 4 Stars (7.5 L/min or lower) > Toilets: 4 Stars > Taps: 5 Stars > Dishwashers: 5 Stars	High efficiency fixtures and fittings reduces the projects reliance on mains potable water and contributes to greater drought resilience.	> Architect > Head Contractor

Action	Reason	Implementation Responsibility
Operational Considerations		
Altis to consider having facility management team trained in first aid.	To ensure risk of serious illness of fatality is mitigated in the event of extreme heat.	> Altis Facilities Management
Altis to consider developing an emergency response plan in the event of power and ICT infrastructure outages.	To ensure negative resident experience mitigated during infrastructure outage events	> Altis Operations
Altis to consider a regular landscaping maintenance plan will tend to any high risk landscaping features.	To spot and prevent accidents or events that may have large impact on resident experience.	> Altis Facilities Management
Facility management team to have strategy for heatwave e.g. vulnerable resident register, can check in on them during extreme heat conditions.	To ensure risk of serious illness of fatality is mitigated in the event of extreme heat.	> Altis Facilities Management
Altis to consider use of umbrellas in seated areas for additional shading.	To ensure outdoor spaces are still usable in warmer months in the future when hotter days will be more intense and frequent.	> Altis Facilities Management
Altis to consider implementing routine annual landscape maintenance inspections that review for weeds and pests and how best to mitigate them.	To ensure the success of the landscaping and plant selection	> Altis Facilities Management
Altis to consider preparation of blackout preparedness plan to assess assets and facilities management ability to respond to blackout or infrastructure outage.	To ensure negative resident experience mitigated during infrastructure outage events and blackouts	> Altis Operations
Altis to consider issuing residents alerts when air quality is poor, alerting residents to close windows and rely on filtered, mechanical ventilation.	To prevent adverse health outcomes for residents who are vulnerable to poor air quality.	> Altis Operations

6. References

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Appendix A – Climate Risk Assessment

ADP
Consulting : Engineering

Appendix D
Preliminary NatHERS CAN

Document Set ID: 8174958
Version: 1, Version Date: 11/07/2024

ADP Consulting : Engineering

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Consultant Advice Notice

From	Max Anderson	**Advice No.**	CAN No-ESD-07
Project	50 Queens Road	**Project No.**	MEL3110
Date	6 June 2024	**Pages**	
Subject	Sample Glass Test NatHERS Performance w/ sliding double stack values	**Revision:**	R02

Distribution to:

Attention	Company	Email
Relevant Parties from	Hickory	
	Bates Smart	

Introduction

This CAN provides the results of a NatHERS test exercise with the following glazing system values:

> Overall glazing system values provided by Hickory on 20/04/2024 via email

> Revised double stack sliding door glazing system values provided by Hickory on 29/05/2024 via Aconex HICKORY-RFI-000372.

Table 1 below contains these glazing system values used in the NatHERs models of this CAN.

Table 1 Assessed glazing system performance values.

	Window Wall								Curtain Wall			
	ww sliding single stack		ww sliding double stack		ww fixing		ww awning		cw fixing		cw awing	
	U value	*SHGC*	*U value*	*SHGC*	*U value*	*SHGC*	*U value*	*SHGC*	*U value*	*SHGC*	*U value*	*SHGC*
Regular Glass	3.114	0.325	3.05	0.347	2.784	0.356	3.434	0.299	2.277	0.348	2.545	0.276
Bronze Glass	3.066	0.196	2.984	0.219	2.733	0.216	3.397	0.198	2.227	0.210	2.510	0.180

All remaining building fabric used in the NatHERS modelling has been derived from the architectural documentation dated 28/03/2024.

NatHERS Targets

The Victorian amendment of the National Construction Code (NCC) 2019 requires that buildings achieve a minimum average 6 Star NatHERS rating.

The project is targeting an average NatHERS star rating of 7.5 star, and a minimum rating of 5.5 stars in any one apartment. Further to the above NatHERS Star ratings targets, the project must also adhere to the following heating and cooling load limits in Table 2:

Table 2 NatHERS heating and Cooling Load Limits – Executive Summary

	Heating Load	**Cooling Load**
Limit (MJ/m^2 per annum)	96	30
Source	*NatHERS Climate Zone 21 Limit*	*City of Melbourne Planning Permit*

Results

Table 3 NatHERS test exercise results - 06/06/2024

	Heating Load	**Cooling Load**	**Star Rating**	**Weighted Star Rating**
Minimum	7.40	2.9	6.1	
Maximum	90.6	25.2	9.2	
Average	50.27	14.19	**7.61**	**7.62***

** The average Star rating is calculated using the average result of the apartment sample set seen in Table 4. The weighted star rating is calculated using the expected distribution of apartment sizes (based on number of bedrooms), calculating the average star rating from the sample set for each apartment size, and combing the data together. The sample set has a greater dominance of larger apartments, and the average star rating of this sample set being lower reflects this, since larger apartments typically score lower than smaller ones. Overall building performance can be expected to be closer to the weighted star rating.*

With the completion of the NatHERS sample set, ADP reiterates it's belief that the glazing systems selected will be compliant with the targeted NatHERS average and minimum star rating. There is still a level of risk that would be undertaken with this glass procurement, given how close the Star Rating and Weighted Star Rating are to the Star Rating target. For more certainty on the expected performance of this glazing suite, increasing the size of the sample set from ~10% of the building's apartments to ~20% of the buildings apartments is advised.

ADP Consulting : Engineering

Appendix – Individual Apartment Results

Table 6 NatHERS sample set results 06/06/2024 using Table 1 glazing systems

Unit Number	Heating Load (MJ/m² per annum)	Cooling load (MJ/m² per annum)	Total (MJ/m² per annum)	Star Rating
01.05	44.4	19.5	63.9	7.6
01.07	77.2	11.2	88.4	6.8
01.08	86.1	17.2	103.3	6.3
01.22	45.9	11.2	57.1	7.9
01.33	39.8	16.1	55.9	7.9
02.01	23.6	8.2	31.8	8.8
02.03	7.4	13.4	20.8	9.2
02.25	15.1	11.1	26.2	8.9
02.27	38.9	12.9	51.8	8.1
02.32	45.3	20.3	65.6	7.6
02.37	29.1	16.3	45.4	8.3
03.09	48.2	15.8	64.0	7.6
03.14	63.1	11.5	74.6	7.3
03.19	50.2	14.4	64.6	7.6
03.29	14.3	6.8	21.1	8.1
09.12	65.4	9.5	74.9	7.6
09.13	41.3	15.8	57.1	7.9
09.16	49.7	12.3	62.0	7.7
09.21	24.2	9.4	33.6	8.7
09.26	56.4	13.6	70.0	7.4
09.27	41.2	11.7	7.9	8.0
12.20	53.8	18.3	72.1	7.4
13.02	70.1	17.4	87.5	6.8
13.06	68.8	19.1	87.9	6.8
13.07	90.6	19.9	110.5	6.1
13.08	65.6	22.9	88.5	6.8
13.09	45.3	17.4	62.7	7.7
13.12	49.6	25.2	74.8	7.3
00.01	31.5	11.7	43.2	8.4
00.12	68.4	2.9	71.3	7.4
00.16	74.9	11.3	86.2	6.8
00.20	83.1	9.9	93.0	6.7

ADP
Consulting : Engineering

Appendix E
Preliminary Section J CAN

ADP Consulting : Engineering

ABN 81 139 719 529
adpconsulting.com.au

Consultant Advice Notice

From	Max Anderson	**Advice No.**	CAN No-ESD-03
Project	50 Queens Road, South Melbourne	**Project No.**	MEL3110
Date	14/05/2024	**Pages**	1/4
Subject	NCC2019 Section J Part J1 Advice - Updated	**Revision:**	01

Distribution to:

Attention	Company	Email
Relevant members from	Hickory	
	Bates Smart	
	Essence PM	

Introduction

The following advice note has been prepared to outline the NCC 2019 Section J Part J1 compliance requirements for the subject project at 50 Queens Road 3004.

This preliminary review has been updated based on the architectural drawings by Bates Smart Architects dated 26.03.2024.

Section J Part J1 Requirements

28/06/2024 Note on S87a: The latest drawing set (dated 25/06/2024 from Bates Smart Architecture) has been reviewed. No major changes have been found that would have a noticeable effect on the fabric requirements and results seen below.

General Information

Table 1 summarises general project's information that form the basis of this advice.

Table 1 General project information

Building Class	2 Common Area
Climate Zone	6
Applicable NCC version	NCC 2019
Assessment pathway	Deemed-to-Satisfy

Opaque Components

Table 2 lists the thermal performance parameters that must be achieved for the opaque components forming part of the building thermal envelope.

Building Component	Total R Value of Component
Ceiling Adjacent to an unconditioned area	Total R3.2
Exposed Floor or Slab on Ground	Total R2.0
External Wall	Total R1.4
Internal wall – adjacent to conditioned area.	Total R1.4

Total R-values must also take into consideration thermal bridging (generally in accordance with AS/NZ4859.2)

Translucent Components

Table 3 lists the thermal performance parameters that must be achieve for the translucent components forming part of the building thermal envelope.

Table 2 Translucent components' performance requirements

Component	U_w (W/m^2.K)	$SHGC_w$
Ground level – Residential amenities & lobby	3.0	0.32
Level 1 – Co working space	3.0	0.32
Level 13 – Amenity Space	3.0	0.32

Section J Part J1 & J3 Report

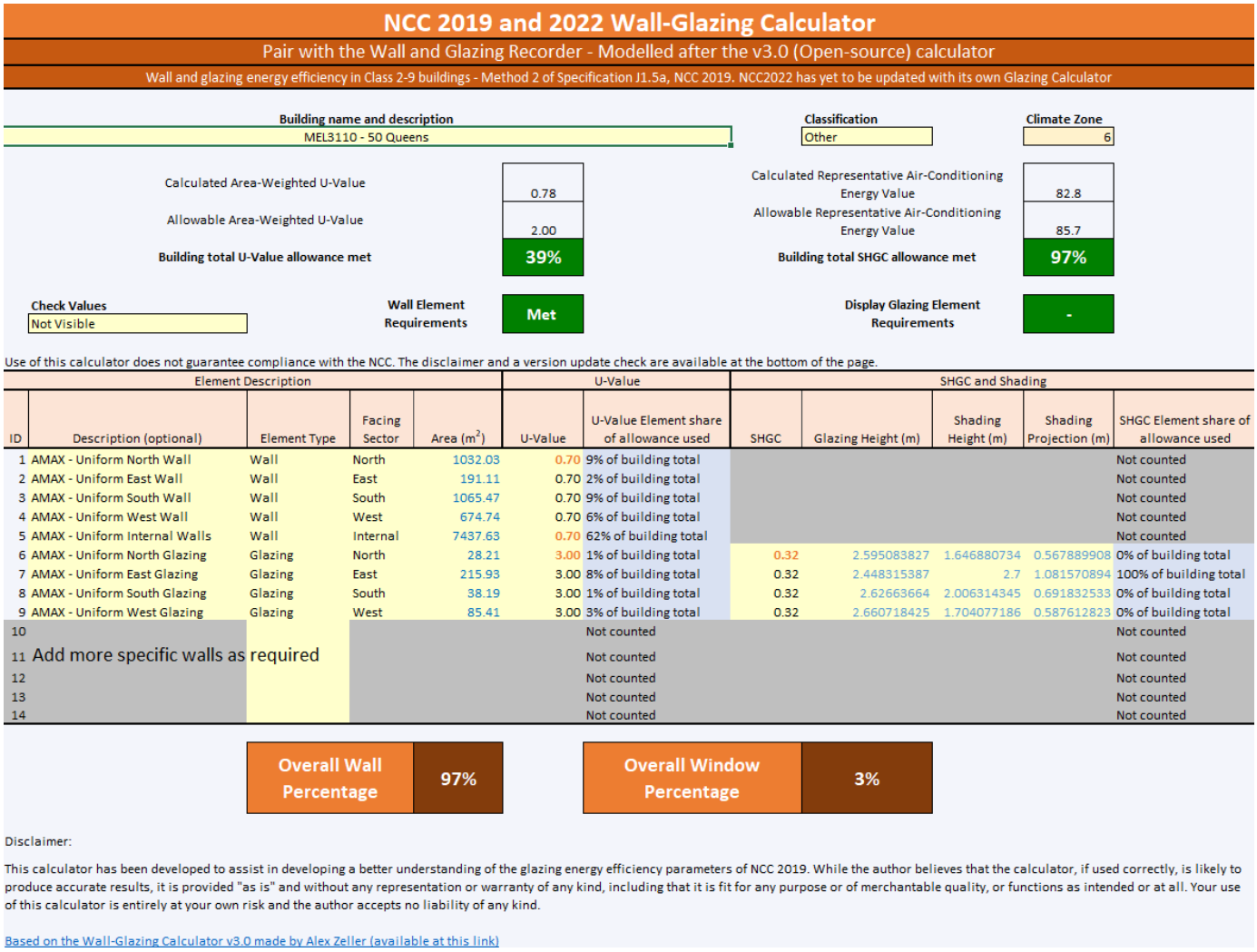
This advice note is not a statement of compliance and cannot be used to obtain a Building Permit. Rather, it provides relevant stakeholders information relating to the performance targets that must be achieved by the building thermal envelope to ensure compliance with Section J Part J1-J3 can be met. An indicative insulation markup has been provided in **Error! Reference source not found.**

A Section J Part J1-J3 Report will be developed based on 'For Building Permit' or 'For Construction' documentation which as a minimum must include:

- Site Plan
- Floor Plans
- Elevations
- Sections
- Wall Type Schedule and Wall Set-out Plan
- Windows and Doors Schedule

A.1 Wall- Glazing Calculator

Figure 1 Glazing calculator



NCC 2019 and 2022 Wall-Glazing Calculator

Pair with the Wall and Glazing Recorder - Modelled after the v3.0 (Open-source) calculator

Wall and glazing energy efficiency in Class 2-9 buildings - Method 2 of Specification J1.5a, NCC 2019. NCC2022 has yet to be updated with its own Glazing Calculator

Building name and description	Classification	Climate Zone
MEL3110 - 50 Queens	Other	6

Calculated Area-Weighted U-Value	0.78	Calculated Representative Air-Conditioning Energy Value	82.8
Allowable Area-Weighted U-Value	2.00	Allowable Representative Air-Conditioning Energy Value	85.7
Building total U-Value allowance met	39%	Building total SHGC allowance met	97%

Check Values	Wall Element Requirements	Display Glazing Element Requirements
Not Visible	Met	-

Use of this calculator does not guarantee compliance with the NCC. The disclaimer and a version update check are available at the bottom of the page.

	Element Description				U-Value		SHGC and Shading				
ID	Description (optional)	Element Type	Facing Sector	Area (m^2)	U-Value	U-Value Element share of allowance used	SHGC	Glazing Height (m)	Shading Height (m)	Shading Projection (m)	SHGC Element share of allowance used
1	AMAX - Uniform North Wall	Wall	North	1032.03	0.70	9% of building total					Not counted
2	AMAX - Uniform East Wall	Wall	East	191.11	0.70	2% of building total					Not counted
3	AMAX - Uniform South Wall	Wall	South	1065.47	0.70	9% of building total					Not counted
4	AMAX - Uniform West Wall	Wall	West	674.74	0.70	6% of building total					Not counted
5	AMAX - Uniform Internal Walls	Wall	Internal	7437.63	0.70	62% of building total					Not counted
6	AMAX - Uniform North Glazing	Glazing	North	28.21	3.00	1% of building total	0.32	2.595083827	1.646880734	0.567889908	0% of building total
7	AMAX - Uniform East Glazing	Glazing	East	215.93	3.00	8% of building total	0.32	2.448315387	2.7	1.081570894	100% of building total
8	AMAX - Uniform South Glazing	Glazing	South	38.19	3.00	1% of building total	0.32	2.62663664	2.006314345	0.691832533	0% of building total
9	AMAX - Uniform West Glazing	Glazing	West	85.41	3.00	3% of building total	0.32	2.660718425	1.704077186	0.587612823	0% of building total
10						Not counted					Not counted
11	Add more specific walls as required					Not counted					Not counted
12						Not counted					Not counted
13						Not counted					Not counted
14						Not counted					Not counted

Overall Wall Percentage	97%	Overall Window Percentage	3%

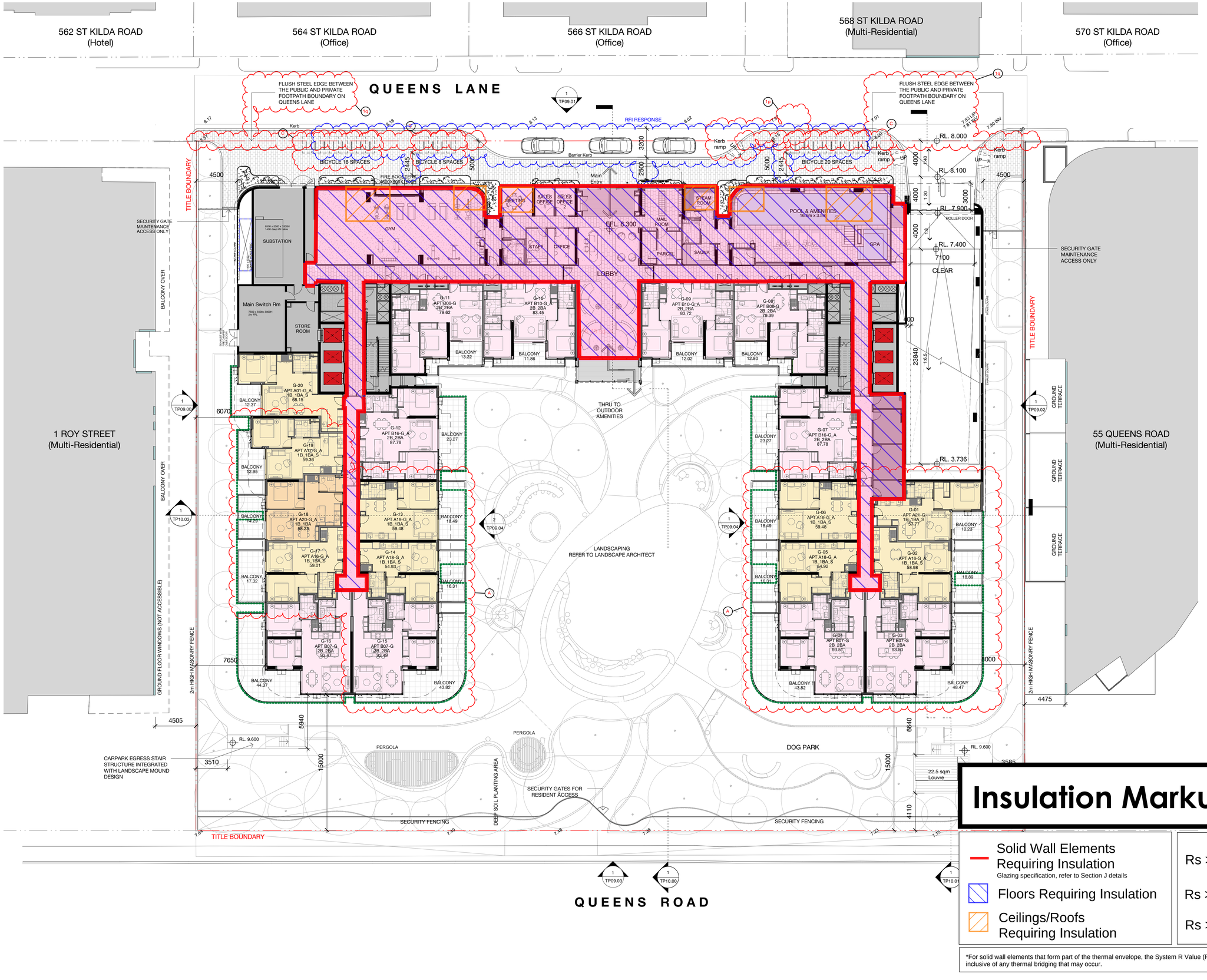
Disclaimer:

This calculator has been developed to assist in developing a better understanding of the glazing energy efficiency parameters of NCC 2019. While the author believes that the calculator, if used correctly, is likely to produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all. Your use of this calculator is entirely at your own risk and the author accepts no liability of any kind.

Based on the Wall-Glazing Calculator v3.0 made by Alex Zeller (available at this link)

A.2 Indicative Insulation Markup.

Figure 2 Indicative Insulation Markup – Ground Level



L00 Apartment Count

1B_1BA	1
1B_1BA_S	9
2B_2BA	10
TOTAL APARTMENTS: 20	

Apartment Count - Whole Building

1B_1BA	174
1B_1BA_S	49
2B_2BA	129
3B_2BA	18
STUDIO	64
TOTAL APARTMENTS: 434	

Apartments to achieve average 7.5 star NatHERs rating as maximum cooling load as per SMP

All non-residential spaces to achieve 10% improvement on Section J Energy efficiency building fabric requirements of the National Construction Code (NCC)

DDO26 BUILDING HEIGHT AND SETBACK ENVELOPE

EXISTING NATURAL GROUND LEVEL FROM SURVEY, TAKEN AT FACADE LINE OR SECTION LINE

CONDITION 1 ENVELOPE (24.10.23),

Note: The ground level for the purposes of approximating the DDO26 envelope for the St Kilda Road properties has been taken from the existing natural ground level at Queens Lane. This can be considered to represent a conservative height envelope, noting the natural ground level actually elevates towards St Kilda Road which permits building height to increase correspondingly

Rev	Date	Description	Initial	Checked
F	26.03.24	TOWN PLANNING APARTMENT REMIX	CL	DR
E	25.03.24	VCAT CONDITION 1 FINAL UPDATES	DR	DR
18	14.03.24	Town Planning Apartment Remix	CL	DR
17	05.03.24	Draft - Issued for Coordination	CL	DR
16	23.02.24	Draft - Issued for Coordination	CL	DR
15	16.02.24	Draft - Issued for Coordination	CL	DR
14	30.01.24	Draft - Issued for Coordination	CL	DR
13	22.01.24	Draft - Issued for Coordination	CL	DR
D	20.12.23	VCAT CONDITION 1 RFI RESPONSE	CL	DR
C	24.10.23	VCAT CONDITION 1 UPDATES	CL	DR
12	15.09.23	Draft - Issued for Coordination	CL	DR
11	31.07.23	Draft - Issued for Coordination	CL	DR
10	06.04.23	Draft - Issued For Coordination	CL	DR
B	07.03.23	VCAT Submission Issue	CL	DR
9	03.03.23	Draft - issued for coordination	CL	DR
8	24.02.23	Draft - issued for coordination	CL	DR
7	02.02.23	Draft - issued for coordination	CL	DR
6	16.08.22	Draft - issued for coordination		
5	12.08.22	Draft - issued for coordination		
4	10.08.22	Draft - issued for coordination		
3	08.08.22	Draft - issued for coordination		
A	01.06.22	Planning Permit Issue		
2	18.05.22	Draft - issued for coordination		
1	03.05.22	Draft - issued for coordination	ZJ	RB

50 QUEENS RD
-

General Arrangement
Ground Floor

Status	TOWN PLANNING
Scale	1 : 200 @ A1
Drawn	CL Checked DR
Project No.	M12568
Plot Date	26/03/2024 6:07:22 PM
BIM	
Drawing no.	TP03.00
Revision	F

Insulation Markup

Solid Wall Elements Requiring Insulation Glazing specification, refer to Section J details	Rs >1.4*
Floors Requiring Insulation	Rs > 2.0
Ceilings/Roofs Requiring Insulation	Rs > 3.2

*For solid wall elements that form part of the thermal envelope, the System R Value (Rs) is inclusive of any thermal bridging that may occur.

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(Multi-Residential)

570 ST KILDA ROAD
(Office)

1 ROY STREET
(Multi-Residential)

55 QUEENS ROAD
(Multi-Residential)

TITLE BOUNDARY

BALCONY PRIVACY SCREENING

CANOPY

LOBBY BELOW

Co-Work
124.74

FFL. 12.300

5000

9000

3000

6000

6350

2650

7650

8000

15000

01-18 APT A03_A 1B_1BA 48.92
01-19 APT A13_A 1B_1BA_S 64.30
01-20 APT B01 STUDIO 43.23
01-21 APT S01 STUDIO 43.62
01-22 APT A04 1B_1BA 56.72
01-23 APT A06_A 1B_1BA 58.19
01-24 APT B10_A 2B_2BA 84.23
01-25 APT B01 2B_2BA 85.89
01-26 APT B11_A 2B_2BA 82.69
01-27 APT A11_A 1B_1BA_S 54.34
01-28 APT A10 1B_1BA 49.86
01-29 APT B07 2B_2BA 93.49
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01-31 APT A08_A 1B_1BA 50.14
01-32 APT A12_A 1B_1BA 48.88
01-33 APT A09_A 1B_1BA 56.74
01-34 APT A02_A 1B_1BA 56.45

01-02 APT B10_A 2B_2BA 84.23
01-01 APT B01 2B_2BA 85.89
01-04 APT A04 1B_1BA 56.72
01-03 APT A06_A 1B_1BA 58.19
01-05 APT S01 STUDIO 43.62
01-06 APT S01 STUDIO 43.23
01-07 APT A13_A 1B_1BA_S 64.30
01-08 APT A03_A 1B_1BA 48.92
01-09 APT A02_A 1B_1BA 56.45
01-10 APT A09_A 1B_1BA 56.74
01-11 APT A12_A 1B_1BA 48.88
01-12 APT A08_A 1B_1BA 50.14
01-13 APT B07 2B_2BA 93.50
01-14 APT B07 2B_2BA 93.49
01-15 APT A10 1B_1BA 49.86
01-16 APT A11_A 1B_1BA_S 54.34
01-17 APT B11_A 2B_2BA 82.69

BALCONY 8.41
BALCONY 8.03
BALCONY 8.20
BALCONY 8.65
BALCONY 8.64
BALCONY 8.44
BALCONY 8.00
BALCONY 8.16
BALCONY 8.19
BALCONY 10.08
BALCONY 8.25
BALCONY 8.66
BALCONY 8.05
BALCONY 7.74

1 TP10.02
1 TP09.00
1 TP10.03
2 TP09.04
1 TP09.01
1 TP09.04
1 TP09.02
1 TP09.03
1 TP10.00
1 TP10.01

L01 Apartment Count

1B_1BA	16
1B_1BA_S	4
2B_2BA	10
STUDIO	4
TOTAL APARTMENTS: 34	

DDO26 BUILDING HEIGHT AND SETBACK ENVELOPE

EXISTING NATURAL GROUND LEVEL FROM SURVEY, TAKEN AT FACADE LINE OR SECTION LINE

CONDITION 1 ENVELOPE (24.10.23),

Note: The ground level for the purposes of approximating the DDO26 envelope for the St Kilda Road properties has been taken from the existing natural ground level at Queens Lane. This can be considered to represent a conservative height envelope, noting the natural ground level actually elevates towards St Kilda Road which permits building height to increase correspondingly

Insulation Markup

Solid Wall Elements Requiring Insulation Glazing specification, refer to Section J details	Rs >1.4*
Floors Requiring Insulation	Rs > 2.0
Ceilings/Roofs Requiring Insulation	Rs > 3.2

*For solid wall elements that form part of the thermal envelope, the System R Value (Rs) is inclusive of any thermal bridging that may occur.

Rev	Date	Description	Initial	Checked
E	26.03.24	TOWN PLANNING APARTMENT REMIX	CL	DR
D	25.03.24	VCAT CONDITION 1 FINAL UPDATES	DR	DR
12	14.03.24	Town Planning Apartment Remix	CL	DR
11	05.03.24	Draft - Issued for Coordination	CL	DR
10	23.02.24	Draft - Issued for Coordination	CL	DR
9	16.02.24	Draft - Issued for Coordination	CL	DR
8	30.01.24	Draft - Issued for Coordination	CL	DR
7	22.01.24	Draft - Issued for Coordination	CL	DR
C	24.10.23	VCAT CONDITION 1 UPDATES	CL	DR
6	15.09.23	Draft - Issued for Coordination	CL	DR
B	07.03.23	VCAT Submission Issue	CL	DR
5	03.03.23	Draft - issued for coordination	CL	DR
4	24.02.23	Draft - issued for coordination	CL	DR
3	02.02.23	Draft - issued for coordination	CL	DR
A	01.06.22	Planning Permit Issue		
2	18.05.22	Draft - issued for coordination		
1	03.05.22	Draft - issued for coordination	ZJ	RB

50 QUEENS RD
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General Arrangement
Level 01

Status	TOWN PLANNING
Scale	1 : 200 @ A1
Drawn	CL
Checked	DR
Project No.	M12568
Plot Date	26/03/2024 6:08:29 PM
BIM	
Drawing no.	TP03.01
Revision	E

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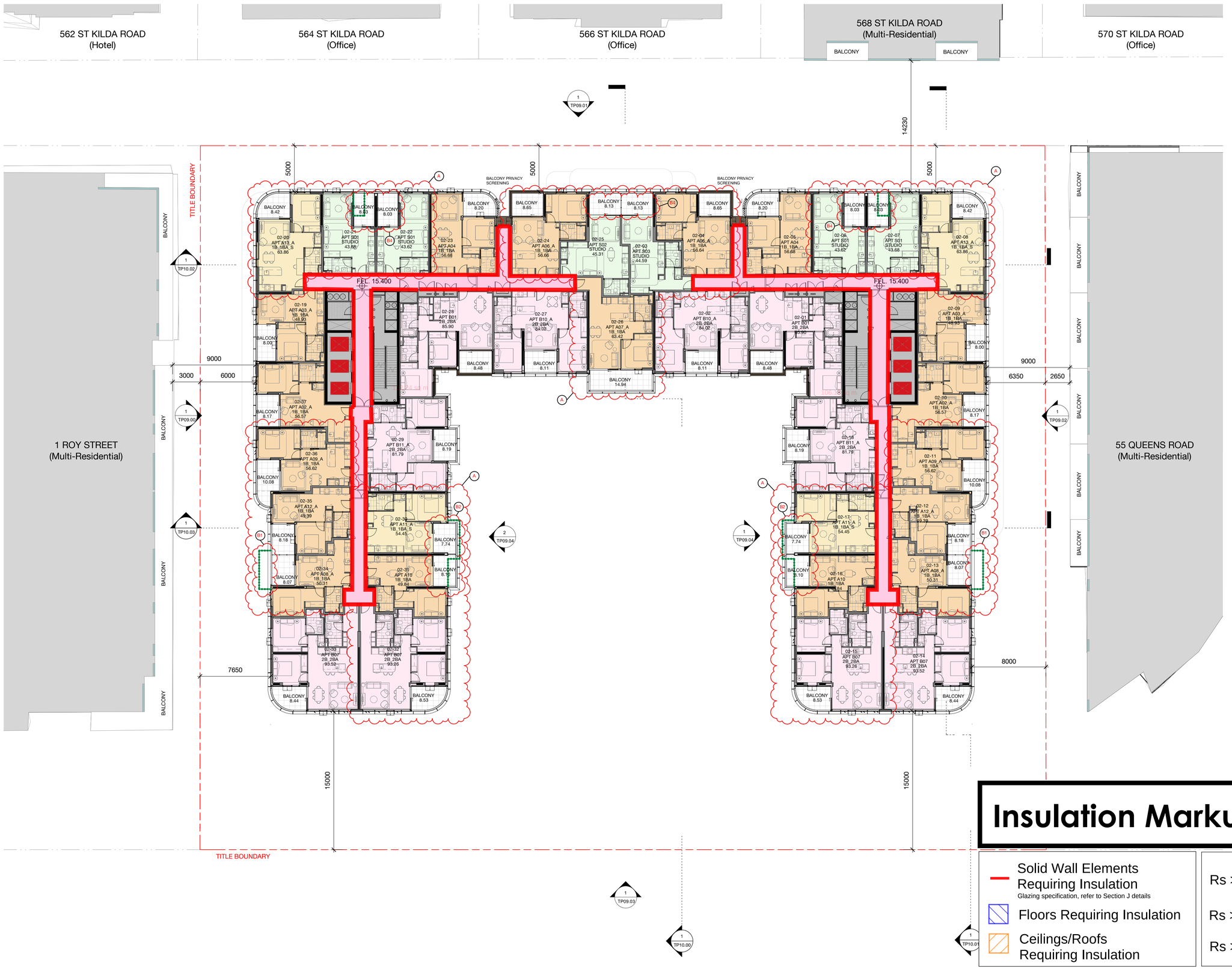

L02 Apartment Count

1B_1BA	17
1B_1BA_S	4
2B_2BA	10
STUDIO	6
TOTAL APARTMENTS: 37	

DDO26 BUILDING HEIGHT AND SETBACK ENVELOPE

EXISTING NATURAL GROUND LEVEL FROM SURVEY, TAKEN AT FACADE LINE OR SECTION LINE

CONDITION 1 ENVELOPE (24.10.23),

Note: The ground level for the purposes of approximating the DDO26 envelope for the St Kilda Road properties has been taken from the existing natural ground level at Queens Lane. This can be considered to represent a conservative height envelope, noting the natural ground level actualy elevates towards St Kilda Road which permits building height to increase correspondingly

Insulation Markup

Solid Wall Elements Requiring Insulation Glazing specification, refer to Section J details	Rs >1.4*
Floors Requiring Insulation	Rs > 2.0
Ceilings/Roofs Requiring Insulation	Rs > 3.2

*For solid wall elements that form part of the thermal envelope, the System R Value (Rs) is inclusive of any thermal bridging that may occur.

Rev	Date	Description	Initial	Checked
E	26.03.24	TOWN PLANNING APARTMENT REMIX	CL	DR
D	25.03.24	VCAT CONDITION 1 FINAL UPDATES	DR	DR
14	14.03.24	Town Planning Apartment Remix	CL	DR
13	05.03.24	Draft - Issued for Coordination	CL	DR
12	23.02.24	Draft - Issued for Coordination	CL	DR
11	16.02.24	Draft - Issued for Coordination	CL	DR
10	13.02.24	Draft - Issued for Coordination	CL	DR
9	30.01.24	Draft - Issued for Coordination	CL	DR
8	22.01.24	Draft - Issued for Coordination	CL	DR
7	16.01.24	Draft - Issued for Coordination	CL	DR
C	24.10.23	VCAT CONDITION 1 UPDATES	CL	DR
6	15.09.23	Draft - Issued for Coordination	CL	DR
B	07.03.23	VCAT Submission Issue	CL	DR
5	03.03.23	Draft - issued for coordination	CL	DR
4	24.02.23	Draft - issued for coordination	CL	DR
3	02.02.23	Draft - issued for coordination	CL	DR
A	01.06.22	Planning Permit Issue		
2	18.05.22	Draft - issued for coordination		
1	03.05.22	Draft - issued for coordination	ZJ	RB

50 QUEENS RD
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General Arrangement
Level 02

Status	TOWN PLANNING
Scale	1 : 200 @ A1
Drawn	CL
Checked	DR
Project No.	M12568
Plot Date	26/03/2024 6:09:29 PM
BIM	
Drawing no.	TP03.02
Revision	E

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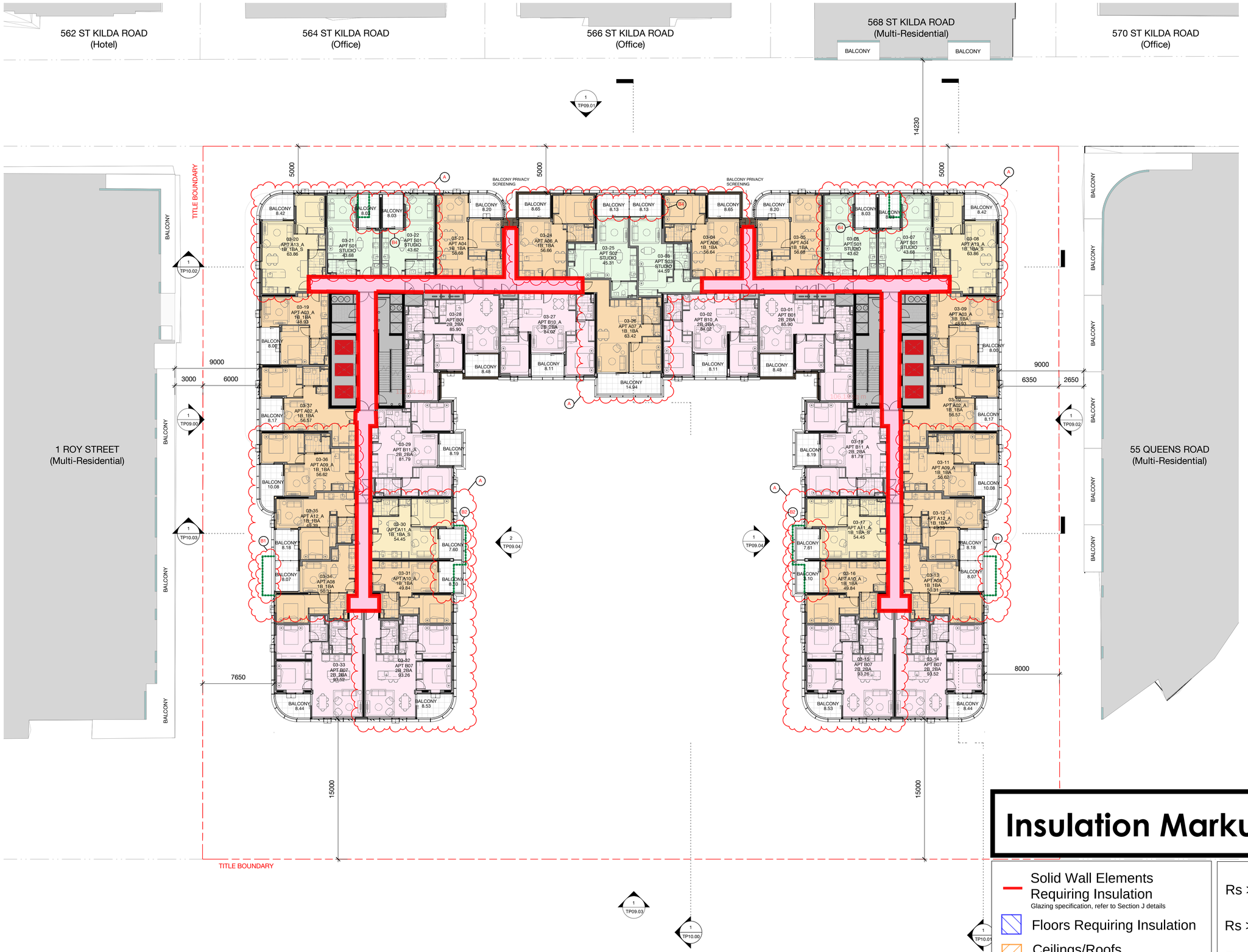

L03 Apartment Count

1B_1BA	17
1B_1BA_S	4
2B_2BA	10
TOTAL APARTMENTS: 31	

DDO26 BUILDING HEIGHT AND SETBACK ENVELOPE

EXISTING NATURAL GROUND LEVEL FROM SURVEY, TAKEN AT FACADE LINE OR SECTION LINE

CONDITION 1 ENVELOPE (24.10.23),

Note: The ground level for the purposes of approximating the DDO26 envelope for the St Kilda Road properties has been taken from the existing natural ground level at Queens Lane. This can be considered to represent a conservative height envelope, noting the natural ground level actually elevates towards St Kilda Road which permits building height to increase correspondingly

Insulation Markup

Solid Wall Elements Requiring Insulation Glazing specification, refer to Section J details	Rs >1.4*
Floors Requiring Insulation	Rs > 2.0
Ceilings/Roofs Requiring Insulation	Rs > 3.2

*For solid wall elements that form part of the thermal envelope, the System R Value (Rs) is inclusive of any thermal bridging that may occur.

Rev	Date	Description	Initial	Checked
E	26.03.24	TOWN PLANNING APARTMENT REMIX	CL	DR
D	25.03.24	VCAT CONDITION 1 FINAL UPDATES	DR	DR
10	21.03.24	Town Planning Apartment Remix	CL	DR
9	14.03.24	Town Planning Apartment Remix	CL	DR
8	05.03.24	Draft - Issued for Coordination	CL	DR
C	24.10.23	VCAT CONDITION 1 UPDATES	CL	DR
7	15.09.23	Draft - Issued for Coordination	CL	DR
B	07.03.23	VCAT Submission Issue	CL	DR
6	03.03.23	Draft - issued for coordination	CL	DR
5	24.02.23	Draft - issued for coordination	CL	DR
4	17.02.23	Draft - issued for coordination	CL	DR
3	02.02.23	Draft - issued for coordination	CL	DR
A	01.06.22	Planning Permit Issue		
2	18.05.22	Draft - issued for coordination		
1	03.05.22	Draft - issued for coordination	ZJ	RB

50 QUEENS RD
-

General Arrangement
Level 03

Status	TOWN PLANNING
Scale	1 : 200 @ A1
Drawn	CL
Checked	DR
Project No.	M12568
Plot Date	26/03/2024 6:10:19 PM
BIM	
Drawing no.	TP03.03
Revision	E

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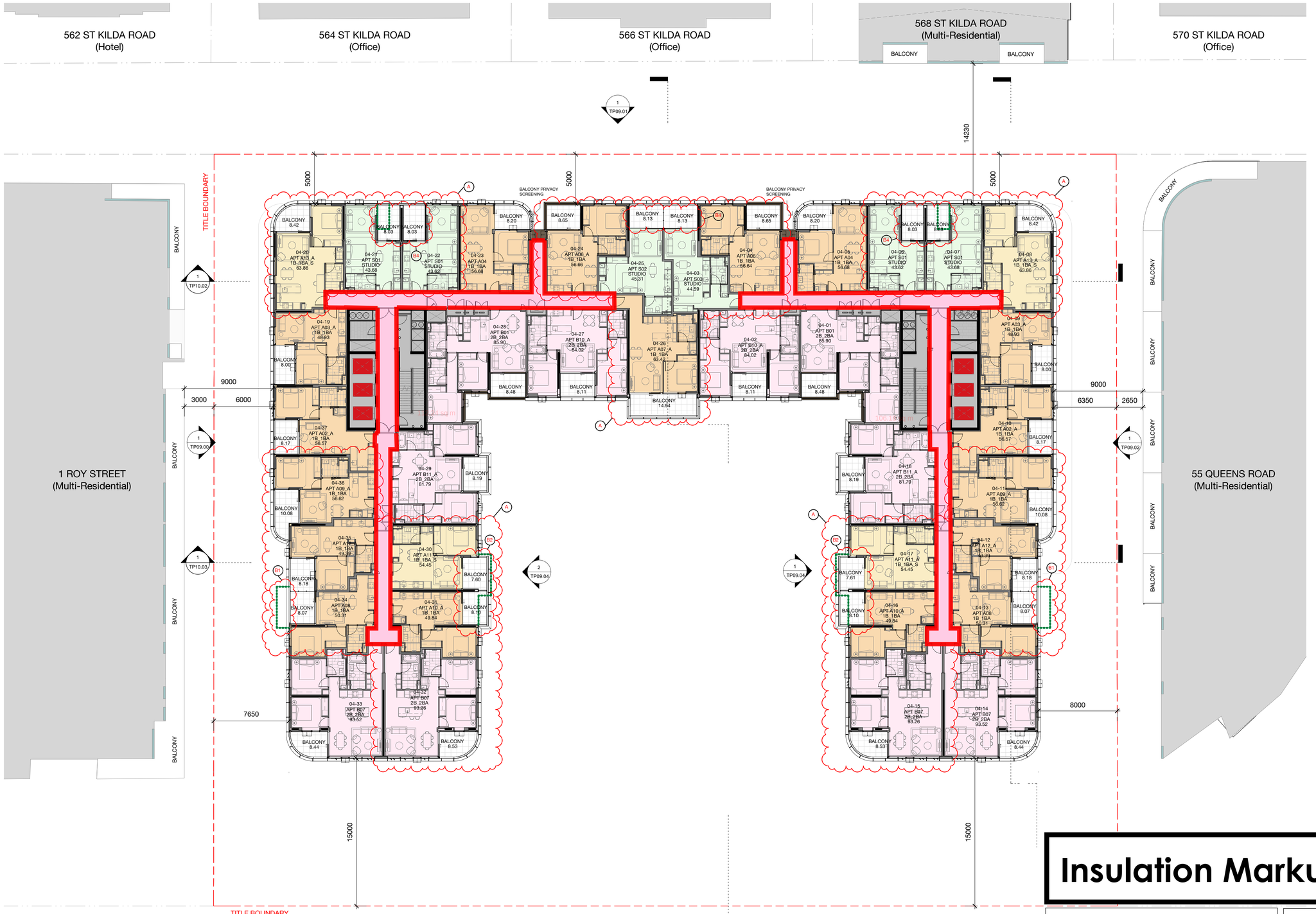

L04 Apartment Count

1B_1BA	17
1B_1BA_S	4
2B_2BA	10
TOTAL APARTMENTS: 31	

DDO26 BUILDING HEIGHT AND SETBACK ENVELOPE

EXISTING NATURAL GROUND LEVEL FROM SURVEY, TAKEN AT FACADE LINE OR SECTION LINE

CONDITION 1 ENVELOPE (24.10.23),

Note: The ground level for the purposes of approximating the DDO26 envelope for the St Kilda Road properties has been taken from the existing natural ground level at Queens Lane. This can be considered to represent a conservative height envelope, noting the natural ground level actually elevates towards St Kilda Road which permits building height to increase correspondingly

Insulation Markup

Solid Wall Elements Requiring Insulation Glazing specification, refer to Section J details	Rs >1.4*
Floors Requiring Insulation	Rs > 2.0
Ceilings/Roofs Requiring Insulation	Rs > 3.2

*For solid wall elements that form part of the thermal envelope, the System R Value (Rs) is inclusive of any thermal bridging that may occur.

Rev	Date	Description	Initial	Checked
E	26.03.24	TOWN PLANNING APARTMENT REMIX	CL	DR
D	25.03.24	VCAT CONDITION 1 FINAL UPDATES	DR	DR
8	14.03.24	Town Planning Apartment Remix	CL	DR
7	05.03.24	Draft - Issued for Coordination	CL	DR
C	24.10.23	VCAT CONDITION 1 UPDATES	CL	DR
6	15.09.23	Draft - Issued for Coordination	CL	DR
B	07.03.23	VCAT Submission Issue	CL	DR
5	03.03.23	Draft - issued for coordination	CL	DR
4	24.02.23	Draft - issued for coordination	CL	DR
3	02.02.23	Draft - issued for coordination	CL	DR
A	01.06.22	Planning Permit Issue		
2	18.05.22	Draft - issued for coordination		
1	03.05.22	Draft - issued for coordination	ZJ	RB

50 QUEENS RD
-

General Arrangement
Level 04 - 08

Status	TOWN PLANNING
Scale	1 : 200 @ A1
Drawn	CL
Checked	DR
Project No.	M12568
Plot Date	26/03/2024 6:11:04 PM
BIM	
Drawing no.	TP03.04
Revision	E

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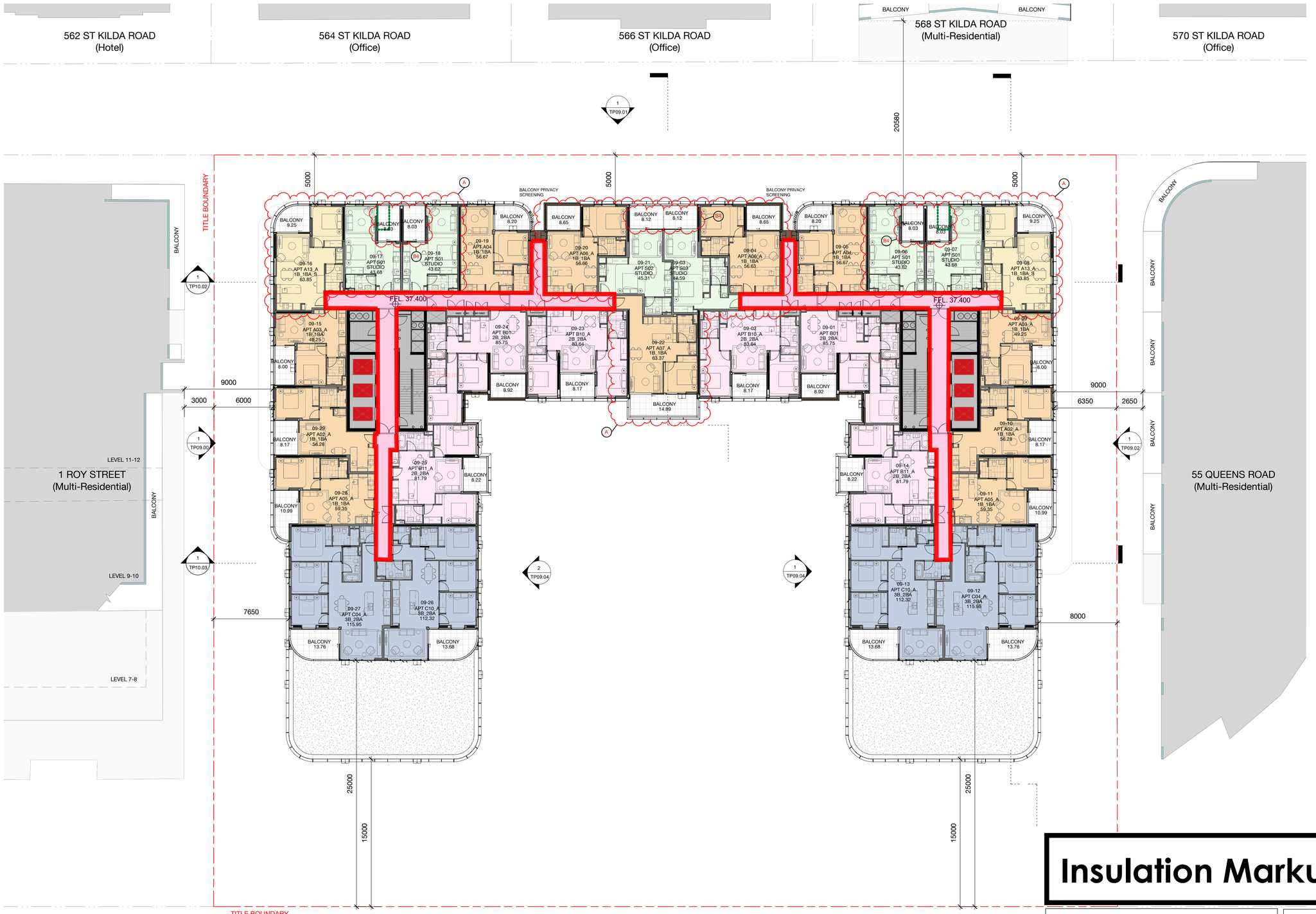

L09 Apartment Count

1B_1BA	11
1B_1BA_S	2
2B_2BA	6
3B_2BA	4
STUDIO	6

TOTAL APARTMENTS: 29

DDO26 BUILDING HEIGHT AND SETBACK ENVELOPE

EXISTING NATURAL GROUND LEVEL FROM SURVEY, TAKEN AT FACADE LINE OR SECTION LINE

CONDITION 1 ENVELOPE (24.10.23),

Note: The ground level for the purposes of approximating the DDO26 envelope for the St Kilda Road properties has been taken from the existing natural ground level at Queens Lane. This can be considered to represent a conservative height envelope, noting the natural ground level actually elevates towards St Kilda Road which permits building height to increase correspondingly

Rev	Date	Description	Initial	Checked
E	26.03.24	TOWN PLANNING APARTMENT REMIX	CL	DR
D	25.03.24	VCAT CONDITION 1 FINAL UPDATES	DR	DR
11	14.03.24	Town Planning Apartment Remix	CL	DR
10	05.03.24	Draft - Issued for Coordination	CL	DR
9	23.02.24	Draft - Issued for Coordination	CL	DR
8	16.02.24	Draft - Issued for Coordination	CL	DR
7	22.01.24	Draft - Issued for Coordination	CL	DR
C	24.10.23	VCAT CONDITION 1 UPDATES	CL	DR
6	15.09.23	Draft - Issued for Coordination	CL	DR
B	07.03.23	VCAT Submission Issue	CL	DR
5	03.03.23	Draft - issued for coordination	CL	DR
4	24.02.23	Draft - issued for coordination	CL	DR
3	02.02.23	Draft - issued for coordination	CL	DR
A	01.06.22	Planning Permit Issue		
2	18.05.22	Draft - issued for coordination		
1	03.05.22	Draft - issued for coordination	ZJ	RB

Insulation Markup

Solid Wall Elements Requiring Insulation Glazing specification, refer to Section J details	Rs >1.4*
Floors Requiring Insulation	Rs > 2.0
Ceilings/Roofs Requiring Insulation	Rs > 3.2

*For solid wall elements that form part of the thermal envelope, the System R Value (Rs) is inclusive of any thermal bridging that may occur.

50 QUEENS RD
-

General Arrangement
Level 09 - 11

Status	TOWN PLANNING
Scale	1 : 200 @ A1
Drawn	CL
Checked	DR
Project No.	M12568
Plot Date	26/03/2024 6:11:51 PM
BIM	
Drawing no.	TP03.09
Revision	E

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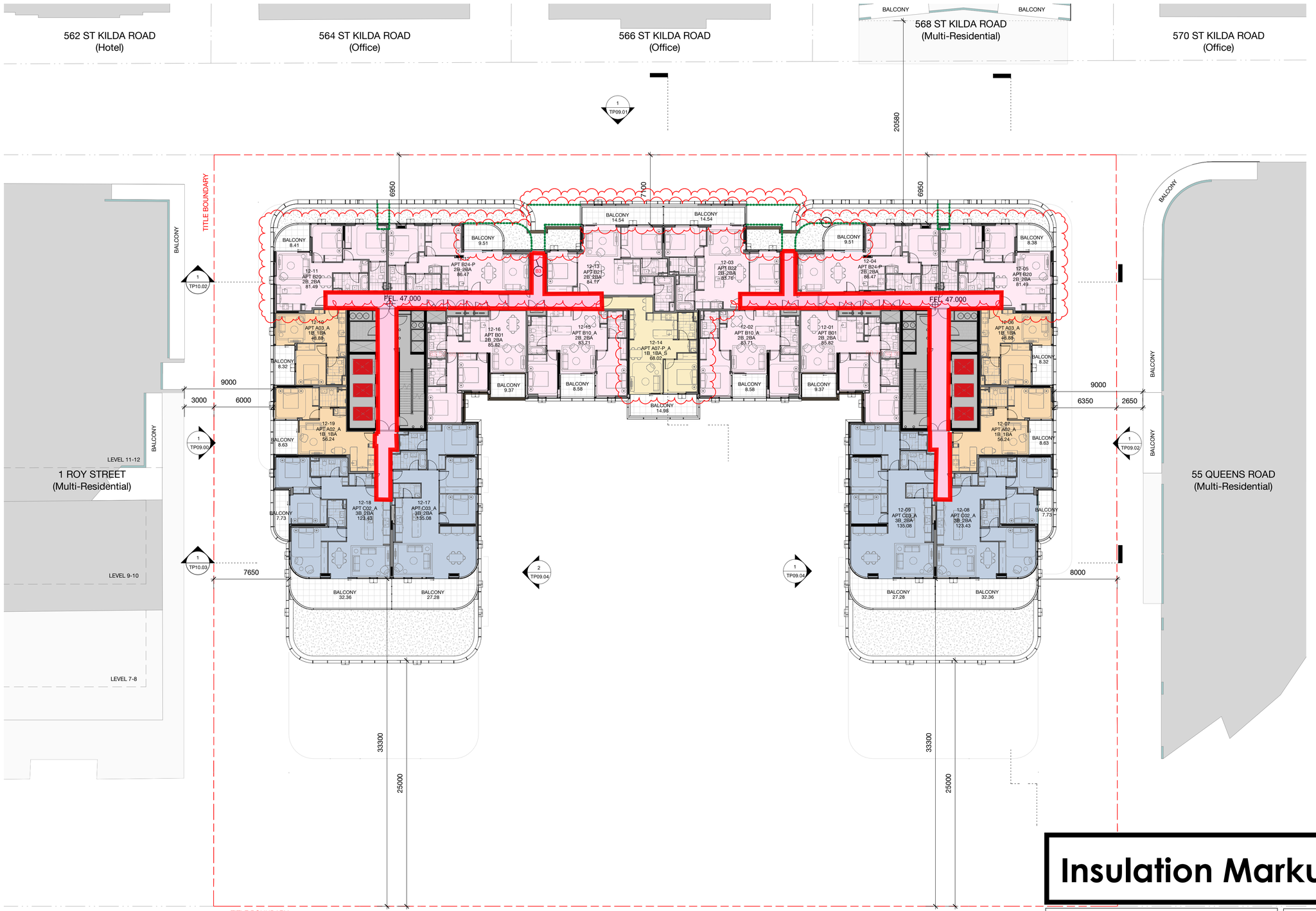

L12 Apartment Count

1B_1BA	4
1B_1BA_S	1
2B_2BA	10
3B_2BA	4
TOTAL APARTMENTS: 19	

A

DDO26 BUILDING HEIGHT AND SETBACK ENVELOPE

EXISTING NATURAL GROUND LEVEL FROM SURVEY, TAKEN AT FACADE LINE OR SECTION LINE

CONDITION 1 ENVELOPE (24.10.23),

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Rev	Date	Description	Initial	Checked
E	26.03.24	TOWN PLANNING APARTMENT REMIX	CL	DR
D	25.03.24	VCAT CONDITION 1 FINAL UPDATES	DR	DR
13	21.03.24	Town Planning Apartment Remix	CL	DR
12	14.03.24	Town Planning Apartment Remix	CL	DR
11	06.03.24	Draft - Issued for Coordination	CL	DR
10	05.03.24	Draft - Issued for Coordination	CL	DR
9	23.02.24	Draft - Issued for Coordination	CL	DR
8	22.01.24	Draft - Issued for Coordination	CL	DR
7	16.01.24	Draft - Issued for Coordination	CL	DR
C	24.10.23	VCAT CONDITION 1 UPDATES	CL	DR
6	15.09.23	Draft - Issued for Coordination	CL	DR
B	07.03.23	VCAT Submission Issue	CL	DR
5	03.03.23	Draft - issued for coordination	CL	DR
4	24.02.23	Draft - issued for coordination	CL	DR
3	02.02.23	Draft - issued for coordination	CL	DR
A	01.06.22	Planning Permit Issue		
2	18.05.22	Draft - issued for coordination		
1	03.05.22	Draft - issued for coordination	ZJ	RB

50 QUEENS RD
-

General Arrangement
Level 12

Status	TOWN PLANNING
Scale	1 : 200 @ A1
Drawn	CL
Checked	DR
Project No.	M12568
Plot Date	26/03/2024 6:12:30 PM
BIM	
Drawing no.	TP03.12
Revision	E

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Bates Smart Pty Ltd ABN 70 004 999 400

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562 ST KILDA ROAD
(Hotel)

564 ST KILDA ROAD
(Office)

566 ST KILDA ROAD
(Office)

BALCONY BALCONY
568 ST KILDA ROAD
(Multi-Residential)

570 ST KILDA ROAD
(Office)

1 ROY STREET
(Multi-Residential)

EAVE
RL. 48.400

55 QUEENS ROAD
(Multi-Residential)

TOP OF PARAPET
RL. 52.500

TERRACE/ROOF
RL. 51.00

TITLE BOUNDARY

FFL 50.400

6950 7100 6950

9000 3000 6000 9000 6350 2650

7650

37680 37680

BALCONY 8.37
13-09 APT C09 3B_2BA 111.25
BALCONY 9.51
13-10 APT B24 2B_2BA 79.38
BALCONY 8.00
13-11 APT B13 2B_2BA 74.64
BALCONY 8.00
13-03 APT B13 2B_2BA 74.64
BALCONY 9.49
13-04 APT B24 2B_2BA 79.38
BALCONY 8.37
13-05 APT B20 2B_2BA 81.55
13-06 APT A03_A 1B_1BA 48.98
BALCONY 3.93
13-14 APT B01 2B_2BA 86.26
13-13 APT B25 2B_2BA 87.38
13-12 APT A22 1B_1BA_S 64.12
13-02 APT B10_A 2B_2BA 83.97
13-01 APT B01 2B_2BA 85.80
BALCONY 8.53
BALCONY 8.06
BALCONY 14.29
BALCONY 8.06
BALCONY 8.53
13-15 APT B14 2B_2BA 79.19
BALCONY 6.07
3.2 sq m
TENANT AMENITY / LOUNGE 164.18
EXTERNAL TERRACE 127.05
13-07 APT B23 2B_2BA 100.98
13-08 APT C08_A 3B_2BA 118.54
BALCONY 79.30
BALCONY 41.90

1 TP10.02 · 1 TP09.00 · 1 TP10.03 · 2 TP09.04 · 1 TP09.04 · 1 TP09.02 · 1 TP09.03 · 1 TP10.00 · 1 TP10.01 · 1 TP09.01

L13 Apartment Count

1B_1BA	1
1B_1BA_S	1
2B_2BA	11
3B_2BA	2

TOTAL APARTMENTS: 15

DDO26 BUILDING HEIGHT AND SETBACK ENVELOPE

EXISTING NATURAL GROUND LEVEL FROM SURVEY, TAKEN AT FACADE LINE OR SECTION LINE

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3	22.01.24	Draft - Issued for Coordination	CL	DR
2	16.01.24	Draft - Issued for Coordination	CL	DR
B	18.12.23	VCAT CONDITION 1 RFI RESPONSE	CL	DR
A	24.10.23	VCAT CONDITION 1 UPDATES	CL	DR
1	15.09.23	Draft - Issued for Coordination	CL	DR

50 QUEENS RD
-

General Arrangement
Level 13

Status	TOWN PLANNING
Scale	1 : 200 @ A1
Drawn	CL
Checked	DR
Project No.	M12568
Plot Date	26/03/2024 6:13:05 PM
BIM	
Drawing no.	TP03.13
Revision	D

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ADP
Consulting : Engineering

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