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ALLIANCE**

**SUSTAINABILITY SOLUTIONS**



**KEYSTONE ALLIANCE SUSTAINABILITY SOLUTIONS**

277 Plenty Road, Preston Vic 3072 T (03) 9478 8991 F (03) 9478 8997

E [REDACTED] W [www.keystonealliance.com.au](http://www.keystonealliance.com.au)

**SUSTAINABLE MANAGEMENT PLAN - SMP  
PROPOSED CHILDCARE**

**1157-1165 BURWOOD HIGHWAY,  
UPPER FERNTREE GULLY**

**P/2020/6347**

**FOR  
TAG - FERNTREE GULLY PTY LTD  
C/- FD ARCHITECTS PTY LTD**

REF 18504  
JUNE 2024



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ISSUE	DATE	PREPARED	STATUS
A	14.06.2024		DRAFT
B	18.07.2024		FINAL

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# 1.0 Introduction

Keystone Alliance Sustainability Solutions has been engaged to prepare a Sustainable Management Plan for the proposed development at **1157-1165 BURWOOD HIGHWAY, UPPER FERNTREE GULLY 3156 .**

This report addresses most of the ESD requirements for **Knox City Council** and provides an overview of the sustainable design initiatives **Clause 22.04** for the proposed development and demonstrates how it will be achieved in the project.

## The project

Architectural drawings prepared by	Fd Architects Pty Ltd
Reference - Revision - Date	UP2404FD - TP - 11.2022





## 2.0 Site Description

The project consists of the following:

- 120 children childcare centre.
- Basement carpark.

Site area	4013m <sup>2</sup>
Location	Upper Ferntree Gully.
Municipality	Knox City Council.

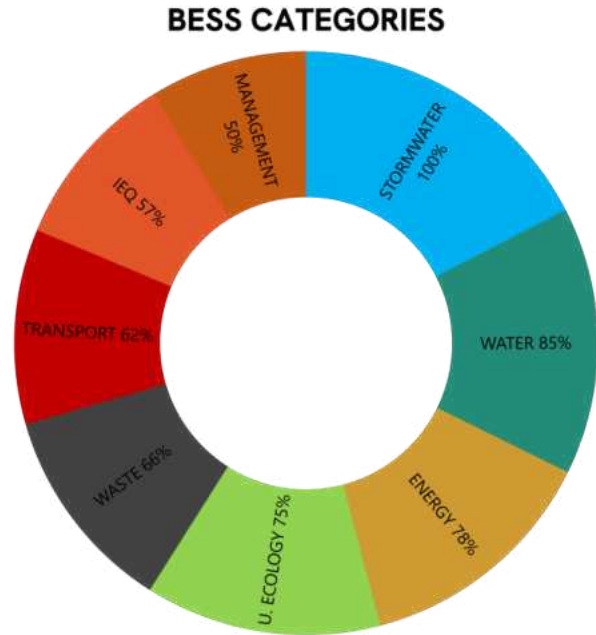


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## 3.0 ESD Initiatives and Categories

The report has been prepared in response to City of Knox planning scheme and outlines the key Environmentally Sustainable Design (ESD) initiatives for 1157-1165 Burwood Highway, Upper Ferntree Gully. The proposed development will target a high level of environmental performances.

	<b>MANAGEMENT</b> Preliminary NCC 2022 Section. Building User Guide (BUG).
	<b>WATER</b> High Efficient Water fixtures and appliances. Rainwater tanks connected to toilet flushing, laundry and garden irrigation.
	<b>ENERGY</b> Gas free development. 10Kwh Photovoltaic Cells. High efficient HVAC and Hot Water systems. High efficient internal lighting. CO monitoring to control the operation of the carpark exhaust fans.
	<b>STORMWATER</b> This development is able to achieve the industry best practice. Bioretention system.
	<b>IEQ</b> Low-VOC paints, sealants and adhesives minimum E1 or E0-grade. Double glazed windows and doors
	<b>TRANSPORT</b> Electrical vehicle infrastructure. Motorbikes spaces.
	<b>WASTE</b> Recycling target to be at least 80% for both demolition and construction phases.
	<b>URBAN ECOLOGY</b> Communal spaces and dedicated food production areas. All insulation used must not contain any Ozone depleting substances. All HVAC selected to have zero Ozone Depletion Potential.



**BESS SCORE**  
**67%**



## BUILT ENVIRONMENT SUSTAINABILITY SCORECARD (BESS)

### 4.1 MANAGEMENT

Best practice for building management means that sustainability is integrated from concept design through the construction process. Good decisions made early will always deliver the maximum benefit for the lowest cost.

Best practice building management also means giving future occupants the information they need to be able to run their buildings in the most efficient way.

ELEMENT	PERFORMANCE
Thermal Performance Modelling Non- Residential	Preliminary Section J assessment has been completed in accordance with NCC 2022. "Please refer to Appendices A for more information."
Building User Guide (Bug)	A simple building user guide will be produced and will include information on the building services, energy and environmental strategies, monitoring and targeting transport facilities, waste policy, references and any other relevant information. <ul style="list-style-type: none"> <li>▪ Rainwater tank and bioretention system maintenance.</li> <li>▪ Waste reduction and opportunities for recycling and diversion.</li> <li>▪ Making use of natural ventilation.</li> <li>▪ Efficient use of appliances.</li> <li>▪ Electrical infrastructure that is available for the future installation of car chargers.</li> </ul> The building user guide should be kept in a location that is easily accessible to all building occupants and stakeholders. This may include: <ol style="list-style-type: none"> <li>1. The guide can be made available on a secure website or shared online platform that can be accessed from any location.</li> <li>2. A copy of the guide can be provided to each tenant in their unit.</li> </ol> It is important to ensure that the building user guide is stored in a format that is easily accessible to all building occupants and stakeholders, regardless of their location or device. This helps to ensure that the information is readily available if questions arise about the building's facilities and systems.



## 4.2 WATER

Best practice water efficiency means using fixtures and appliances with a high WELS rating, and substituting precious drinking water with alternative water sources (such as greywater and rainwater) for uses such as toilet flushing and garden irrigation, where appropriate.

ELEMENT	PERFORMANCE	
Fixtures, Fittings and Connections	Showerheads Taps Toilets Appliances	not less than 3 Star WELS between 9.0 and 7.5L\minute 5 Star WELS 4 Star WELS A minimum 4 Star WELS rating will be provided as part of the fit-out.
Rainwater Harvesting	Rainwater tanks will be installed. A minimum tanks total capacity of 10KL. A minimum catchment area of 734m <sup>2</sup> (100% roof catchments). Rainwater collected to be used for toilet flushing, laundry and garden irrigation.	
Rainwater Treatment	A rainwater tank filter to be installed after the pump. A triple action filtration system in the 10" and 20" range provides filtration of fine sediments (down to 15 micron), color and odor in the one cartridge.	
Water Efficient Landscape	Where applicable, drought tolerant and native species where applicable - as per local council guidelines.	



### 4.3 ENERGY

Best practice design for energy efficiency means designing buildings that need minimal heating and cooling because they are well insulated, have appropriate summer shading, have good orientation to take advantage of the sun for heating, and have high efficiency fittings and appliances. Onsite-site renewable energy generation is also encouraged to supplement or meet energy needs.

<b>COMMERCIAL TENANCY</b>	
<b>ELEMENT</b>	<b>PERFORMANCE</b>
Renewable Energy	Provide 10KWh solar photovoltaic system installed at a minimum of 10° inclination angle which is considered suitable for self-cleaning.
Gas supplied into building	Gas free development.
Heating and Cooling	Reverse cycle space heating and cooling system will be provided. The systems should be selected within 1 star of the best available or of a minimum of 3 Star (Seasonal Energy Efficiency Ratios - SEER).
Hot Water System	The system will be selected within one star of the best available, or 85% or better than the most efficient equivalent capacity unit.
External Lighting	Install motion sensors.
Internal Lighting	The maximum to comply with the relevant building class meet the requirements in Table J7D3a of the NCC 2022 Vol 1
All exposed floors and ceilings (forming part of the envelope) demonstrate meeting the required NCC2022 insulation levels (total R-value upwards and downwards)?	To meet NCC 2022 Section J for the roofs and floors will be specified.
Wall and glazing	The glazing will comply with NCC 2022 façade calculator.





#### 4.4 STORMWATER

Best practice stormwater management means incorporating water sensitive urban design strategies such as rainwater tanks, raingardens, porous paving and landscaping to reduce the volume of run-off and the pollutant load on local waterways.

ELEMENT	PERFORMANCE
Stormwater quality	INSITE WATER Storm tool was used to assess the storm rating for this development. The site storm rating achieved is equivalent to 100% Melbourne Storm Water. "Please refer to Appendices D for more information."
	a) Install a filtration system to achieve best practice reduction of stormwater pollutants. The filtration system consists of the following: <ul style="list-style-type: none"> <li>- Pre-treatment devices (such as gutter mesh, rain heads).</li> <li>- Rain filters are installed after the pump. A triple action filtration system in the 10" and 20" range provides filtration of fine sediments (down to 15 micron), color and odor in the one cartridge.</li> </ul> b) A minimum 150m <sup>2</sup> of the proposed playground to be drained via a 4.5 m <sup>2</sup> raingarden.



#### 4.5 INDOOR ENVIRONMENTAL QUALITY (IEQ)

Best practice design for Indoor Environment Quality means that building occupants can enjoy a comfortable space with good air quality, adequate daylight and ventilation. Indoor environment quality is affected by building orientation and layout, window sizes and specifications, shading devices, products used for construction and fit-out and neighbouring structures.

ELEMENT	PERFORMANCE
Daylight	The proposed development will achieve at least 2% daylight factor for 64% of the children's rooms and meet the Council's 'best practice' standard for daylight. "Please refer to Appendices D for more information."
Ventilation	All rooms are fitted with openable sliding doors and are effectively naturally ventilated.
Air quality	Low-VOC paints, Low formaldehyde engineered wood products, sealants and adhesives minimum E1 or E0-grade. The timber used at the site will be either reused, post-consumer recycled or certified under a forest certification scheme. "Please refer to Appendices D for more information."



#### 4.6 TRANSPORT

Best practice design for transport means creating buildings that encourage walking, cycling, public transport, car sharing, and the use of lower emissions vehicles.

ELEMENT	PERFORMANCE
Bicycle facilities	4 bike spaces for visitors are provided.
Electric vehicle infrastructure	EV infrastructure is pre-wiring via a dedicated breaker, cabling and external GPO capable of level 3 (mode 2) 32Amp EV charging (and not just the capacity within the board) will be provided. Provision for a load management system if required to ensure grid capacity for the site is not exceeded.
Motorbikes / Mopeds	5 spaces are provided in the basement.



## 4.7 WASTE

Best practice design for waste means re-using materials during construction where possible, and making sure future building occupants have opportunities to easily re-use and recycle their waste.

ELEMENT	PERFORMANCE
Construction Waste	<ul style="list-style-type: none"> <li>▪ 80% recycling target of construction and demolition waste has been adopted for the construction phase of the development.</li> <li>▪ A site induction to all personnel to explain the waste plan and ensure that the waste generated is minimised.</li> <li>▪ Arranging with recycling contractors to provide clearly marked bins for material separation.</li> <li>▪ Waste segregation onsite - Waste materials can be separated onsite into dedicated bins/areas for either reuse onsite or collection by a waste contractor and transport to offsite facilities. Source separation is particularly important in minimising damage to salvaged materials.</li> <li>▪ Commitments to recycle or reduce construction waste.</li> <li>▪ Prefabricated materials to be specified in the project to reduce the material waste, off-cuts will be recycled.</li> <li>▪ An environmental site management plan (ESMP) to be implemented to the council guidelines.</li> <li>▪ A private contractor to be engaged for waste collection during construction.</li> <li>▪ A logbook that records waste management and collection should be maintained on-site.</li> <li>▪ The main contractor should provide waste reports including volumes and performance compared to the 90% recycling target to the project manager or development manager for the project on a regular basis.</li> <li>▪ Create measures to minimise on-site litter and remove litter from the site and litter entering the stormwater system.</li> </ul>
Operational Waste	Dual bins in kitchen joinery will be provided. <ul style="list-style-type: none"> <li>▪ Commingled waste bin.</li> <li>▪ Recycling bin.</li> </ul>



## 4.8 URBAN ECOLOGY

Best practice for urban ecology means creating more green spaces for a range of health, social, environmental, biodiversity and economic benefits.

ELEMENT	PERFORMANCE
Communal spaces	Staff room and playgrounds are provided.
Vegetation	Approximately 50% of the existing vegetation is retained, therefore the ecological value of the site is slightly affected.
Food production	Minimum 10m <sup>2</sup> food production area will be provided.
Heat island effect	75% of all horizontal surfaces of the site that have an unobstructed direct vertical sky view have a solar reflectance of >0.64



## 4.9 MATERIALS

ALL MATERIALS USED TO BE CERTIFIED GOOD ENVIRONMENTAL CHOICE AUSTRALIA (GECA) OR ECOSPECIFIER.

ELEMENT	PERFORMANCE
Paint and sealants	Low VOC, water-based and non-toxic paints, sealants, adhesive to be used and minimum E1 or E0-grade.
Concrete	Subject to structural engineer design. Concrete mixes to incorporate at least 40% replacement of coarse aggregate with slag. Concrete mixes to incorporate at least 50% reclaimed water. Concrete mixes to incorporate at least 30% reduction in Portland cement.
Steel	The steel reinforcement is manufactured using energy-reducing strategies and to be to be supplied by a steel fabricator/contractor accredited to the Environmental Sustainability Charter of the Australian Steel Institute and certified ISO 1400. Environmental Management System (EMS) in place and be a member of the World Steel Association's (WSA) Climate Action Program (CAP).
Timber	Forest Stewardship Council (FSC), Program for the Endorsement of Forest Certification (PEFC) or recycled. 20% of the project timber cost to be directed for recycled timber
Flooring	75% of cables, pipes and flooring either do not contain PVC or meet Best Practice Guidelines for PVC.
Carpet	Underlay with recycled components is to be used

## ARCHITECTURAL AND DECORATIVE COATING PRODUCTS VOC LIMITS

ELEMENT	VOC LIMIT (G/L)	
	AVERAGE	MAXIMUM
Timber Coloured Spirit Stain - Low VOC		75
Timber Coloured Spirit Stain - Standard		130
Clear Timber Finish - One Pack Interior - Low VOC Clear		75
Timber Finish - One Pack Interior - Standard		130
Latex Primer for Galvanised Iron & Zincolume		20
Interior Latex Sealer (Buildings)		30
Latex Wood Primer (Buildings)		30
Interior Latex Paint - Gloss, Low odour, very low VOC		<5
Interior Latex Paint - Semi-Gloss, Low odour, very low VOC		<5
Interior Latex Paint - Low Gloss, Low odour, very low VOC		<5
Interior Latex Paint - Washable Flat, Low odour, very low VOC		<5
Interior Latex Paint - Ceiling Flat, Low odour, very low VOC		<5
Interior Water Based Paint for Buildings - Gloss	≤60	70
Interior Water Based Paint for Buildings - Semi-Gloss	≤60	70
Interior Water Based Paint for Buildings - Low Gloss	≤40	60
Interior Water Based Paint for Buildings - Flat - Washable	≤45	60
Interior Water Based Paint for Buildings - Flat - Ceilings	≤40	50
Exterior Water Based Paint for Buildings - Gloss	≤55	60
Exterior Water Based Paint for Buildings - Semi-gloss	≤55	60
Exterior Water Based Paint for Buildings - Low Gloss or Matt	≤40	45
Exterior Water Based Paint for Buildings - Gloss, Heavily Pigmented DTS <sup>1</sup>	≤50	70
Exterior Water Based Paint for Buildings - Low Sheen - Heavily Pigmented DTS <sup>1</sup> Finish	≤45	55

NOTE: <sup>1</sup> DTS = direct to substrate

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## 5.0 IMPLEMENTATION SCHEDULE

Recommendations in this report to be included in the architectural plans and to be communicated with the project team (Architect, builder and building consultants).  
 Ensure the report is endorsed with the town planning drawings.

ESD CATEGORY	REQUIREMENTS	RESPONSIBILITY	STAGE
<b>MANAGEMENT</b>	Undertake building services fine tuning each quarter for the first 12 months of occupation	Building manager	Post Construction
	Provide a Building User Guide (BUG). Provide NCC Section J	Project Manager/ ESD consultant	
<b>Water</b>	Taps 5 star WELS and 4 star WELS for toilets. Appliances 4 star WELS.	Architect	Design Development
	Specify drought tolerant vegetation and irrigation.	Landscape Designer	
<b>Energy</b>	Gas free development. Provide 10KWh PV cells. HVAC system to be selected within 1 star of the best available or of a minimum of 3 Star (Seasonal Energy Efficiency Ratios - SEER). HWS system to be selected within one star of the best available, or 85% or better than the most efficient equivalent capacity unit. The illumination power to comply with Table J7D3a of the NCC 2022 Vol 1 External lighting to be controlled by motion sensors. CO sensors to be installed	Services Consultant	Design Development
	Section J and façade calculator to be provided.	ESD consultant	
<b>Water Sensitive Urban Design (WSUD)</b>	Rainwater tank 10000L RWT total capacity. 4.5m <sup>2</sup> raingarden	Civil Engineer Landscape Designer	Design Development
<b>Indoor Environmental Quality (IEQ)</b>	Provide Double glazing to all windows and doors.	Architect	Design Development
<b>Transport</b>	Provide EV infrastructure pre-wiring. Motorbikes spaces and bicycle racks.	Architect Services Consultant	Design Development
<b>Waste</b>	80% recycling target of construction and demolition waste. An environmental site management plan (ESMP) to be implemented to the council guidelines. Dual bins in kitchen joinery.	ESD consultant Architect	Design Development
<b>Urban Ecology</b>	10m <sup>2</sup> food production areas 75% of all horizontal surfaces of the site that have an unobstructed direct vertical sky view to have a solar reflectance of >0.64	Architect	Design Development
<b>Materials</b>	Provide materials that can be Locally Sourced and Certified. Low VOC. Recycled materials where applicable.	Architect Builder	Design Development

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## 6.0 Conclusion

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This report addresses all the features incorporated into the design and specifications of the development. The development exceeds the Built Environment Sustainability Scorecard (BESS) and also the National Construction Code standards.

In addition, the proposed development is able to reduce the site stormwater run-off and re-using it within the proposed building.

This development is able to achieve the industry's best practice.

The proposed development will be able to reduce greenhouse gas emissions by 100%. The development also provides the opportunity to install future photovoltaic cells and electric vehicle chargers. The development aims to respond to Victoria's changing climate, including higher temperatures and drought stress.

With thermal efficiency, good light and flow-through ventilation.

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# APPENDICES



# APPENDICES A

## BESS SCORECARD SUMMARY

BESS, 1157-1165 Burwood Hwy, Upper Ferntree Gully VIC 3156, Australia 1157-...

### BESS Report

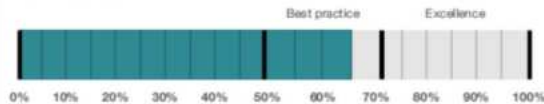
Built Environment Sustainability Scorecard



This BESS report outlines the sustainable design commitments of the proposed development at 1157-1165 Burwood Hwy Upper Ferntree Gully Victoria 3156. The BESS report and accompanying documents and evidence are submitted in response to the requirement for a Sustainable Design Assessment or Sustainability Management Plan at Knox City Council.

Note that where a Sustainability Management Plan is required, the BESS report must be accompanied by a report that further demonstrates the development's potential to achieve the relevant environmental performance outcomes and documents the means by which the performance outcomes can be achieved.

#### Your BESS Score



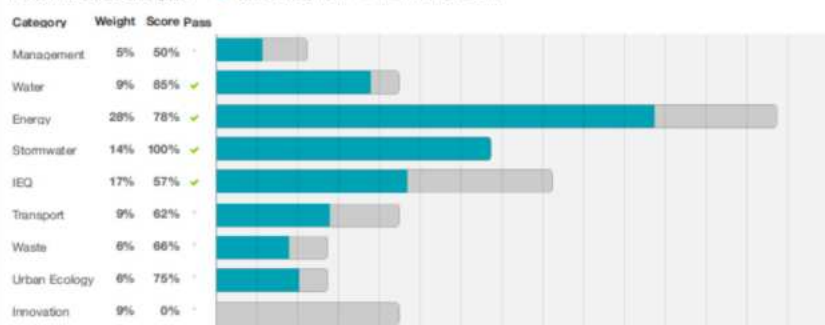
# 67%

#### Project details

Address: 1157-1165 Burwood Hwy Upper Ferntree Gully Victoria 3156  
 Project no: 1B31C57F-R1  
 BESS Version: BESS-8  
 Development type: Non-residential development  
 Application no: P/2022/05347  
 Site area: 4,013.00 m<sup>2</sup>  
 Building floor area: 742.00 m<sup>2</sup>  
 Date: 18 July 2024  
 Software version: 2.0.0-B.533



#### Performance by category



The Built Environment Sustainability Scorecard is an initiative of the Council Alliance for a Sustainable Built Environment (CASBE). For more details see [www.bess.net.au](http://www.bess.net.au)

BESS, 1157-1165 Burwood Hwy, Upper Ferntree Gully VIC 3156, Australia 1157-...

### Buildings

Name	Height	Footprint	% of total footprint
UPPER FERNTREE GULLY CHILDCARE CENTRE	1	742 m <sup>2</sup>	100%

### Dwellings & Non Res Spaces

#### Non-Res Spaces

Name	Quantity	Area	Building	% of total area
Other building				
CHILDCARE	1	742 m <sup>2</sup>	UPPER FERNTREE GULLY CHILDCARE CENTRE	100%
<b>Total</b>	<b>1</b>	<b>742 m<sup>2</sup></b>		<b>100%</b>

### Supporting information

#### Floorplans & elevation notes

Credit	Requirement	Response	Status
Water 3.1	Annotation: Water efficient garden details		-
Energy 3.1	Carpark with natural ventilation or CO monitoring system		-
Energy 4.2	Location and size of solar photovoltaic system		-
Stormwater 1.1	Location of any stormwater management systems (rainwater tanks, rain gardens, buffer strips)		-
Transport 1.4	Location of non-residential bicycle parking spaces		-
Transport 2.1	Location of electric vehicle charging infrastructure		-
Transport 2.3	Location of nominated motorcycle parking spaces		-
Waste 2.1	Location of food and garden waste facilities		-
Waste 2.2	Location of recycling facilities		-
Urban Ecology 1.1	Location and size of communal spaces		-
Urban Ecology 2.1	Location and size of vegetated areas		-
Urban Ecology 3.2	Location of food production areas		-

#### Supporting evidence

Credit	Requirement	Response	Status
Management 2.3a	Section J glazing assessment		-
Management 2.3b	Preliminary modelling report		-
Energy 1.1	Energy Report showing calculations of reference case and proposed buildings		-
Energy 3.1	Details of either the fully natural carpark ventilation or CO monitoring system proposed		-
Energy 3.7	Average lighting power density and lighting type(s) to be used		-
Energy 4.2	Specifications of the solar photovoltaic system(s)		-
Stormwater 1.1	STORM report or MUSIC model		-

The Built Environment Sustainability Scorecard is an initiative of the Council Alliance for a Sustainable Built Environment (CASBE). For more details see [www.bess.net.au](http://www.bess.net.au)

BESS, 1157-1165 Burwood Hwy, Upper Ferntree Gully VIC 3156, Australia 1157-...

Credit	Requirement	Response	Status
EQ 1.4	A short report detailing assumptions used and results achieved.	-	-

#### Credit summary

**Management** Overall contribution 4.5%

Requirement	Response	Status
50%		
1.1 Pre-Application Meeting		0%
2.3 Thermal Performance Modelling - Non-Residential		100%
3.2 Metering - Non-Residential		N/A <span style="color: orange;">◆</span> Scoped Out
N/A SINGLE TENANCY		
3.3 Metering - Common Areas		N/A <span style="color: orange;">◆</span> Scoped Out
N/A SINGLE TENANCY		
4.1 Building Users Guide		100%

**Water** Overall contribution 9.0%

Requirement	Response	Status
Minimum required 50% <b>85%</b> <span style="color: green;">✔</span> Pass		
1.1 Potable Water Use Reduction		100%
3.1 Water Efficient Landscaping		100%
4.1 Building Systems Water Use Reduction		0%

**Energy** Overall contribution 27.5%

Requirement	Response	Status
Minimum required 50% <b>78%</b> <span style="color: green;">✔</span> Pass		
1.1 Thermal Performance Rating - Non-Residential		37%
2.1 Greenhouse Gas Emissions		100%
2.2 Peak Demand		100%
2.6 Electrification		100%
2.7 Energy consumption		100%
3.1 Carpark Ventilation		100%
3.2 Hot Water		100%
3.7 Internal Lighting - Non-Residential		100%
4.1 Combined Heat and Power (cogeneration / trigeneration)		N/A <span style="color: orange;">◆</span> Scoped Out
No cogeneration or trigeneration system in use.		
4.2 Renewable Energy Systems - Solar		100%
4.4 Renewable Energy Systems - Other		N/A <span style="color: orange;">◆</span> Scoped Out
No other (non-solar PV) renewable energy is in use.		

The Built Environment Sustainability Scorecard is an initiative of the Council Alliance for a Sustainable Built Environment (CASBE). For more details see [www.bess.net.au](http://www.bess.net.au)

BESS, 1157-1165 Burwood Hwy, Upper Ferntree Gully VIC 3156, Australia 1157-...

**Stormwater** Overall contribution 13.5%

Requirement	Response	Status
Minimum required 100% <b>100%</b> <span style="color: green;">✔</span> Pass		
1.1 Stormwater Treatment		100%

**IEQ** Overall contribution 16.5%

Requirement	Response	Status
Minimum required 50% <b>57%</b> <span style="color: green;">✔</span> Pass		
1.4 Daylight Access - Non-Residential		64% <span style="color: green;">✔</span> Achieved
2.3 Ventilation - Non-Residential		83% <span style="color: green;">✔</span> Achieved
3.4 Thermal comfort - Shading - Non-Residential		0%
3.5 Thermal Comfort - Ceiling Fans - Non-Residential		0%
4.1 Air Quality - Non-Residential		100%

**Transport** Overall contribution 9.0%

Requirement	Response	Status
62%		
1.4 Bicycle Parking - Non-Residential		100%
1.5 Bicycle Parking - Non-Residential Visitor		0%
1.6 End of Trip Facilities - Non-Residential		0%
2.1 Electric Vehicle Infrastructure		100%
2.2 Car Share Scheme		0%
2.3 Motorbikes / Mopeds		100%

**Waste** Overall contribution 5.5%

Requirement	Response	Status
66%		
1.1 - Construction Waste - Building Re-Use		0%
2.1 - Operational Waste - Food & Garden Waste		100%
2.2 - Operational Waste - Convenience of Recycling		100%

**Urban Ecology** Overall contribution 5.5%

Requirement	Response	Status
75%		
1.1 Communal Spaces		100%
2.1 Vegetation		100%
2.2 Green Roofs		0%
2.3 Green Walls and Facades		0%
3.2 Food Production - Non-Residential		100%

The Built Environment Sustainability Scorecard is an initiative of the Council Alliance for a Sustainable Built Environment (CASBE). For more details see [www.bess.net.au](http://www.bess.net.au)

## APPENDICES B

### J4 SECTION J

Childcare - class 9b

157-1165 Burwood Highway, Upper Ferntree Gully

BCA Climate zone 6

Hours of operation is assumed to 7am to 6pm \ 6 days a week

#### J4.1 ROOF CONSTRUCTION

Metal

Typical R Value

**R0.36**

Required added insulation (NCC 2022 benchmark)

R3.5 added insulation (System value R4.0)

#### J4.1 WALLS

NCC Requirements to achieve min total R value of the U2.0

Wall construction

Lightweight Cladding

Typical R Value

**R0.42**

Required added insulation (NCC 2022 benchmark)

R2.5 added insulation (System value R2.9)

Window-glazing U-Value (W/m<sup>2</sup>.K)

1.28

#### J4.2 FLOORS

Floor construction

Solid concrete / Suspended slab above carpark

Typical R Value

0.60

Required added insulation

No added insulation - without an inslab heating or cooling system / R2.0

#### J4.3 EXTERNAL GLAZING

Window System

*U Value 4.12, 4.02, 3.67, 3.98 - SHGC 0.53, 0.54, 0.57, 0.55*

#### J4.4 ARTIFICIAL LIGHTING AND POWER

Max illumination power

To comply with table J7D3a

	Comments
<b>5 Application of Part</b>	
The clauses below only apply to building elements forming the envelope of the building or a conditioned space. This includes walls, roofs, slabs etc	
<b>Chimneys and Flues</b>	
	n/a
<b>Roof Lights</b>	
	a) A roof light must be sealed, or capable of being sealed, when serving— (i) a conditioned space; or (ii) a habitable room in climate zones 4, 5, 6, 7 or 8. b) A roof light required by (a) to be sealed, or capable of being sealed, must be constructed with— (i) an imperforate ceiling diffuser or the like installed at the ceiling or internal lining level; or (ii) a weatherproof seal; or (iii) a shutter system readily operated either manually, mechanically or electronically by the occupant.
<b>Windows and Doors</b>	
Openable external windows and doors serving a conditioned space are to be sealed on all edges with a foam or rubber compressible strip, fibrous seal or the like. This does not apply to windows complying with AS 2047, external louvre door, louvre window, fire doors, roller shutters or any device installed for after-hours security.	Seal of foam or rubber compressible strip, fibrous seal or the like will be provided to all windows and doors that are not exempt.
Main entrances to building if conditioned space, must have an airlock, self-closing door or revolving door	To have self-closing doors.
<b>Exhaust Fans</b>	
5) is applicable to the building	Sealing device such as self-closing damper or the like will be fitted to all exhaust fans

<b>Construction or Roofs, Walls and Floors</b>	
Roofs, external walls, external floors and any openings such as a window, door or the like must be constructed to minimise air leakage when forming part of the external fabric of a conditioned space. Does not apply to openings, grilles or the like required for smoke hazard management	The construction required to minimise air leakage must be either: <ul style="list-style-type: none"> <li>▪ Enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or</li> <li>▪ Sealed by caulking, skirting, architraves, cornices or the like</li> </ul>
<b>Evaporative Coolers</b>	
	n/a
<b>66 AIR CONDITIONING AND VENTILATION SYSTEMS</b>	
An air-conditioning unit or system must be capable of <ol style="list-style-type: none"> <li>a) deactivated when the sole-occupancy unit, building or part of the building served is not occupied; and</li> <li>b) Where the air-conditioning unit or system has motorised outside air and return dampers, close the dampers when the air conditioning unit or system is inactivated.</li> </ol>	Applies to conditioned spaces
<b>Air Conditioning And Ventilation</b>	
<b>Time switch</b>	Required for A/C units greater than 10kW.
<b>Heating and chilling systems</b>	n/a
<b>Miscellaneous exhaust system</b>	If exhaust fan supply air is greater than 1000 l/s, then a variable speed fan would be required.
<b>77 ARTIFICIAL LIGHTING AND POWER</b>	
Maximum illumination power density 90% of the relevant building class to comply with table J7D3a	
<b>88 HOT WATER SUPPLY AND SWIMMING POOL AND SPA POOL PLANT</b>	
Within one star of the best available, or 85% or better than the most efficient equivalent capacity unit.	
<b>89 ACCESS FOR MAINTENANCE AND FACILITIES FOR MONITORING</b>	
By others	



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Glazing References		FIXED ENTRY	ENTRY	
Glazing System Types		Fixed Sliding Door	Sliding Door	
Glass Types		DEFAULTS (GENERIC)	DEFAULTS (GENERIC)	
Frame Types		Aluminium	Aluminium	Aluminium
Average Glazing U-Value (W/m <sup>2</sup> .K)		3.75	3.98	
Average Glazing SHGC	0.00	0.51	0.52	0.00
Shading Systems	Horizontal	Horizontal	Horizontal	Horizontal
Wall Area (m <sup>2</sup> )		129	88	
Wall Types		Wall	Wall	
Methodology	Wall			
Wall Construction		BENTONS	BENTONS	BENTONS
Wall Thickness		210	210	
Average Wall R-value (m <sup>2</sup> .K/W)		2.90	2.90	
Solar Absorptance	0.5	0.5	0.5	0.5

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## APPENDICES C

### STORM RATING



# Stormwater Calculations





## Report for Knox

Date report printed: 19/06/2024

### Project Details

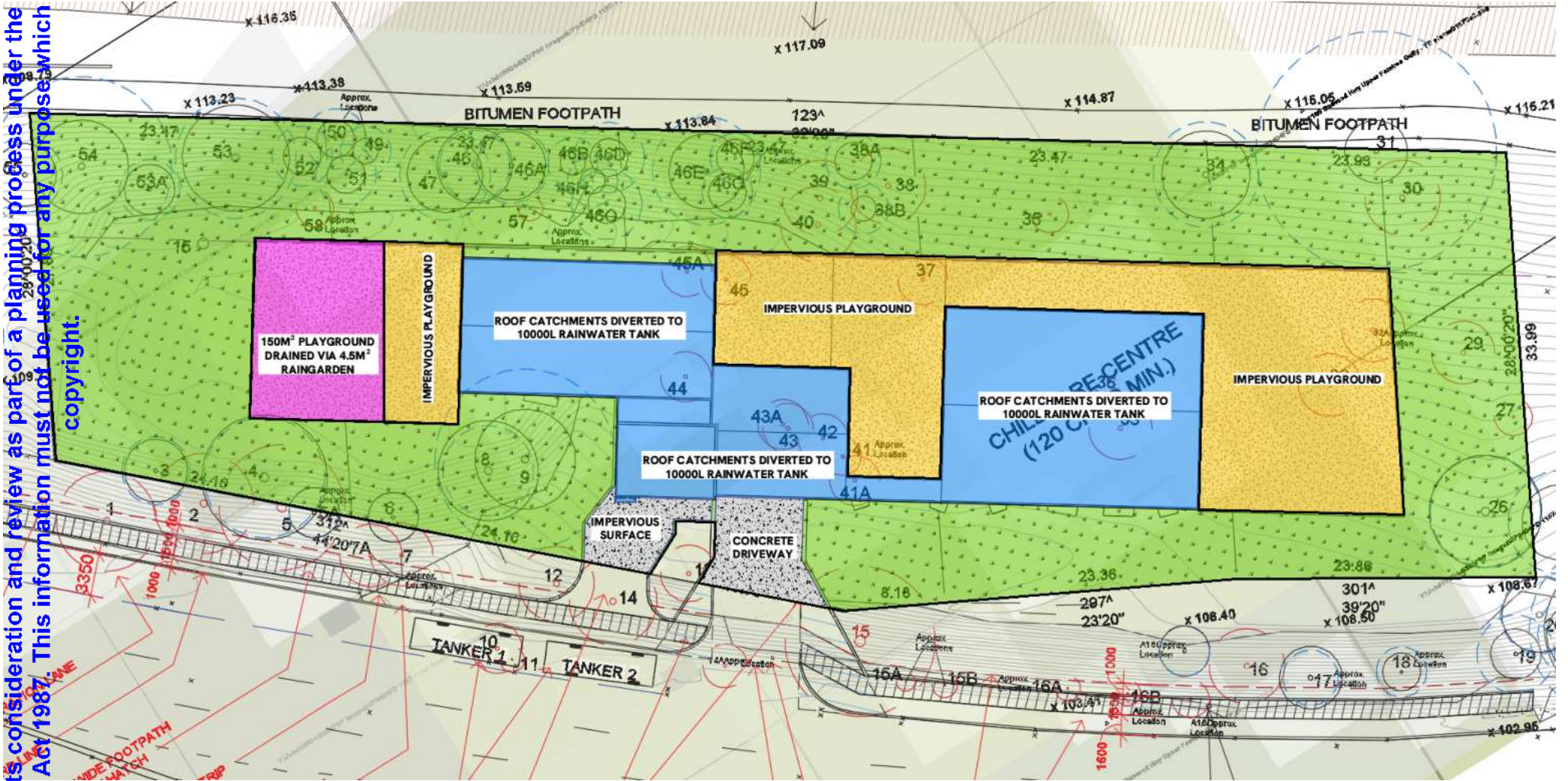
Project Name	1157-1165 Burwood Hwy Upper Ferntree Gully		
InSite User Email	[REDACTED]		
Web files link			
Site Area (m2)	4014	Project ID	4342
Planning number	P/2020/6347		
Development type	Non-residential development		
Existing site details	Residential >750m2 per dwelling		
Street address	1157-1165 Burwood Hwy, Upper Ferntree Gully VIC, Australia		

### Results

 VOLUME	 FLOW	 QUALITY	 EFFICIENCY
<b>Objective:</b> Reduce annual average runoff volume by harvesting or infiltrating stormwater	<b>Objective:</b> Control peak discharge flow (litres per second) with adequate on site detention	<b>Objective:</b> Improve stormwater runoff water quality (Equivalent to STORM score)	<b>Objective:</b> Increase drought resilience
<b>Target:</b> No increase in pre-development annual average runoff volume (Up to a 10% increase is allowed to account for uncertainties)	<b>Target:</b> less than or equal to zero. If greater than zero this is the additional Site Storage Requirement (SSR) volume required	<b>Target:</b> Achieve a score of 100 or more This corresponds to a 45% reduction in nitrogen runoff	<b>Target:</b> Achieve greater than 25% potable water use reduction
<b>VOLUME RESULT</b>	<b>FLOW RESULT</b>	<b>QUALITY RESULT</b>	<b>EFFICIENCY RESULT</b>
-45.9	0.0	101	26.5
% change in annual average volume	m <sup>3</sup> of additional site storage required	Pollution reduction score (out of 100)	% water saving
VOLUME PASSES	FLOW PASSES	QUALITY PASSES	EFFICIENCY PASSES



CATCHMENTS PLAN



## APPENDICES D

### STORMWATER MAINTENANCE SCHEDULE

#### RAINWATER TANKS

<p><b>Leaf litter / debris in gutters</b></p>	<p><b>Pump not working</b></p>
<p>Regularly clear your gutters. Make sure you cover the tank inlet if you're rinsing down the gutters to avoid debris entering the tank</p>	<p>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.</p>
<p><b>Blocked downpipe</b></p>	<p><b>Mains backup or pump not working</b></p>
<p>If you see water spilling from the edge of the gutters check that the downpipe is not blocked, removing any debris.</p>	<p>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.</p>
<p><b>Filter flush diverter clogging</b></p>	<p><b>Overflow</b></p>
<p>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.</p>	<p>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.</p>
<p><b>Debris on the mesh cover over inlets / outlets</b></p>	<p><b>Sediment / debris build-up in tank (more than 20mm thick)</b></p>
<p>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.</p>	<p>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.</p>
<p><b>Dirt and debris around the tank base or side.</b></p>	<p><b>Base area</b></p>
<p>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.</p>	<p>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.</p>
<p><b>Stinky water or mosquitos</b></p>	<p><b>Monitoring the water level</b></p>
<p>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).</p>	<p>A range of devices are available to monitor water level. Some simple float systems can be used effectively.</p>

ITEM	KEY ACTIVITIES	INSPECTION FREQUENCY
Roof Gutters and Downpipes	Ensure they are in good condition and there is no contamination from the roof catchment area.	In accordance with supplier's recommendations (otherwise 3 monthly).
First flush	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.	
Rainwater Tank	Check that they are in good structural condition and that there is no evidence of contamination.  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 the tank.	
Pumps	Check the potable mains back up is not permanently on. Repair or replace pump.	
Overflow	Remove blockages and/or restore connections to stormwater network.	

**Maintenance frequency**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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).

**Inspection and maintenance form**

System	
Location	
Inspection Officer's Name	
Date	Date Of Last Rainfall

Photos of site (explanatory notes)

General comments, sketches, and description of maintenance undertaken



**RAINGARDEN**

<p><b>SCOUR OR EROSION</b></p> <p>Erosion and scour reduce the overall area of treatment by directing flows to certain areas only. Erosion or scour can be re-profiled with hand tools, limiting the damage to adjacent vegetation. If fill material is required to create a flat surface, use an appropriate raingarden planting media mix. If erosion / scour keeps happening at the inlet, place some small rocks where erosion occurs.</p>	<p><b>Weeds</b></p> <p>Weeds can take over the plants which are needed in the raingarden for treatment. Hand pull weeds and dispose of appropriately. Plant bare patches if needed. Weeding should take place before the plants flower to reduce the likelihood of seed dispersal and further regeneration.</p>
<p><b>RUBBISH, LEAF LITTER OR SEDIMENT</b></p> <p>A lot of rubbish or leaf litter at the inlet or on the surface of the raingarden can affect how well water can enter and filter through the raingarden. This material can be removed easily by hand or with tongs / rakes. Collected litter should be placed into bags or similar for disposal.</p>	<p><b>MOSS OR CLAY ON SURFACE</b></p> <p>Moss or clay on the surface of the raingarden can result in a crust forming which prevents water from filtering and being treated. Use hand tools to scrape off the clay or moss and dispose of appropriately. Check raingarden drains.</p>
<p><b>UNEVEN SURFACE</b></p> <p>An uneven surface may result in some areas not getting wet during rain events, reducing the area of treatment. Depressions or mounds can be flattened with hand tools, limiting the damage to vegetation.</p>	<p><b>RAINGARDEN OUTLETS NOT DRAINING</b></p> <p>Blockages of outlet pits and pipes can cause a flooding risk for the property as water is unable to leave the raingarden. Blockages are typically caused by sediment, leaf litter and rubbish. Blockages should be removed manually, by hand or with hand tools such as tongs and shovels. Large blockages in pits may require vacuuming or other appropriate machinery.</p>
<p><b>RAISED SURFACE LEVEL / LOTS OF EXCESS SEDIMENT ON SURFACE</b></p> <p>If sediment has entered the system and has raised the level of the surface, this reduces the amount of water which can be filtered. Use hand tools to remove/scrape sediment from around the plants. Remove sediment from the raingarden and dispose of appropriately.</p>	<p><b>IMPERMEABLE LINER</b></p> <p>An impermeable liner (e.g. geotextile or flexible membrane) is sometimes used to ensure water does not move into the surrounding soils. This may be required if the surrounding soils are very sensitive to any added moisture (e.g. sodic soils, shallow groundwater or close proximity to significant structures such as building foundations).</p>
<p><b>UNHEALTHY OR DYING PLANTS / BARE PATCHES</b></p> <p>Good plant cover is critical for raingardens so if plants are looking stressed in dry periods, irrigation may be required. Remove (prune) any areas affected by disease or pests. If the plants are dying and have created bare patches, the plants need to be replaced. If the plants keep struggling, replace with a plant type which is growing well in the raingarden.</p>	<p><b>RAINGARDEN HOLDING WATER ON THE SURFACE BECAUSE OF BLOCKED PLANTING MEDIA</b></p> <p>Generally raingardens should be able to filter water at a rate of ~100mm per hour. If the surface of the raingarden is clogged (by clay or moss etc.) or the underlying filter media is not appropriate then water will not be able to drain through the system to be treated. If the surface is clogged use hand tools to scrape off the clay or moss. If this doesn't fix the drainage issue remove an area of planting media to expose the filter media. Check that water can pass through the filter media by pouring water on its exposed surface. If the water can drain then replace the top planting media and check for blockages elsewhere. If the water does not drain the filter media will need to be replaced.</p>



This manual lists the key tasks required to maintain a domestic raingarden 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 raingarden. Once endorsed, the property owner is responsible for the continuous implementation of raingarden maintenance, in accordance with the guidance in this manual.

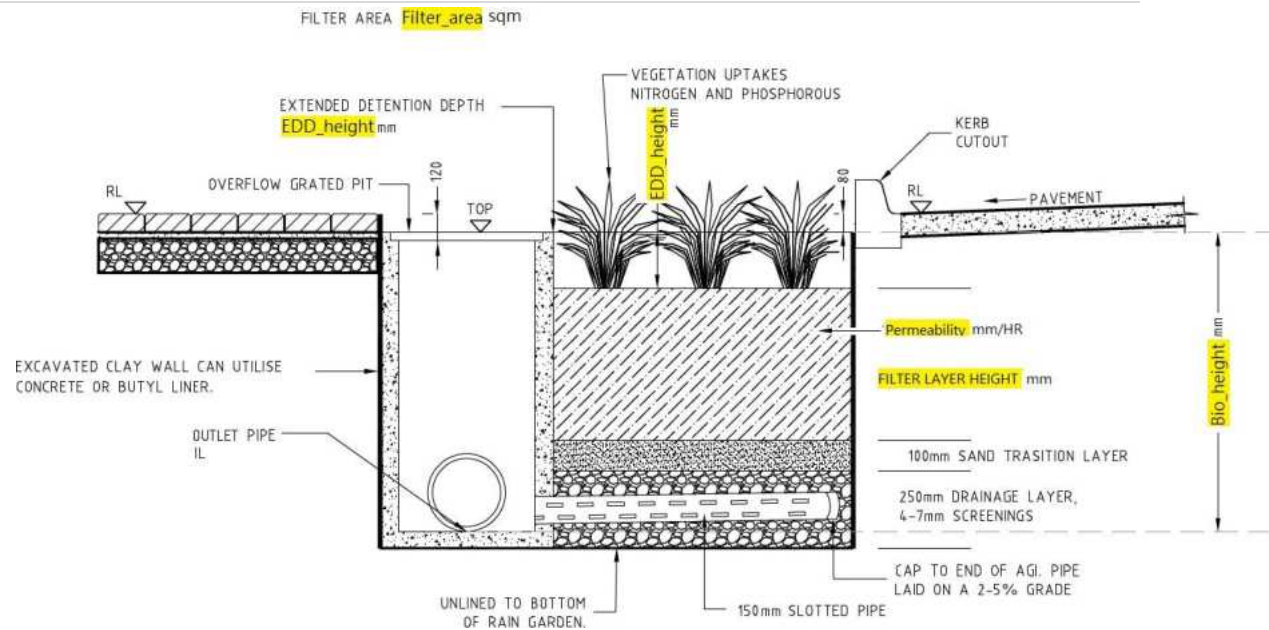
A raingarden is a specially designed garden that uses plants and soil to remove the pollutants from stormwater runoff that is generated from roofs, driveways and paths following rainfall events. These natural treatment systems help protect the environment by reducing the amount of stormwater runoff and pollutants that enter the waterways.

**Maintenance of raingardens is essential in order to ensure that they:**

- effectively treat stormwater,
- continue to look good, and
- don't cause local flooding.

RAINGARDEN LOCATION	
PLANNING DRAWING NUMBER SHOWING RAINGARDEN LOCATION	
RAINGARDEN CONSTRUCTION DATE	
DATE OF FINAL BUILDING INSPECTION	
AREA OF RAINGARDEN (M <sup>2</sup> )	
AREA OF CATCHMENT (M <sup>2</sup> ) (E.G. ROOF AND/OR DRIVEWAYS) DIRECTED TO THE RAINGARDEN	

**Specifications and Typical Drawings - bioretention**



**STORMWATER AND SEDIMENT CONTROL**

<p>Stormwater and sediment runoff along roads, drains and footpaths etc</p>	<p><b>Drainage management:</b> Ensure that all works relating to drainage are promptly completed.</p> <p><b>Sediment traps:</b> A sediment control entry\exit system (rock pad) to be placed at the site entry. A suitable sediment barrier is placed down-slope of any on-site soil disturbance usually along the lowest site boundary with the ends returning up-slope. Use barriers to trap coarse sediment at all points where stormwater is leaving the site. Sweep and clean street gutters – do not hose it. Regularly clean litter and debris ‘trapped’ against site fencing and throughout the general site, and waste collection shall only occur during permitted nominated hours.</p> <p><b>Dewatering:</b> In case of rain ensure that all works relating to drainage are promptly completed.</p> <p><b>Stockpile protection:</b> Stockpiles to be covered during periods of strong wind or when strong winds are expected and with a waterproof cover when rain is expected.</p>
<p>Asbestos in soil</p>	<p>Asbestos to be handled packaged and removed in accordance with the occupational Health And Safety (asbestos) regulations 1992, EPA publication 364c the transport and disposal of waste asbestos October 2002, and the WorkSafe Australia asbestos code of practice.</p>
<p>On site Fill Material</p>	<p>Excavations will be examined for signs of contamination within any fill (e.g. staining, rubble).</p>
<p>Imported soil or fill</p>	<p>Any soil or fill imported to the site will be required to be tested by the supplier for contamination. No contaminated soil or fill will be imported to the site. Any imported material used onsite must be classified as suitable for commercial land use.</p>
<p>Protection of Council assets (streets, footpaths, laneways and reserves)</p>	<p>Prior to commencement of any works on the site, the builder or developer must apply for a new vehicular crossover or modification or alteration to an existing crossover proposal for assessment and approval by council’s infrastructure and traffic department.</p>



**Contribution to cooling and improving local habitat.**

Urban development dramatically changes the local habitat. It will reduce the process of rainwater evaporation and its plants absorption or soaking it into the ground. This happens when clearing land of vegetation and increasing impervious surfaces, which will cause the following:

- Put pressure and pollute the local stormwater in a very short time after a rain.
- Unnatural flows to the local waterways or rivers for a few hours after it rains.
- Making beaches unsuitable for swimming for 1-2 days after heavy rain
- Eroding stream banks and degrading streams
- Increase in pollutant runoff.

Implementing rainwater tanks and/or raingardens will reduce these negative impacts to the local habitat.

**Advantages of rainwater tanks are:**

- Minimise water usage when used in the toilet, laundry or garden.
- Reduce strain on the stormwater drainage system.
- Retain water close to source.
- Reduce site run-off and flood peaks.

**Advantages of raingardens are:**

- Reduce pollutant runoff to the creeks and bay.
- Increase green space to assist with cooling.

**Benefits of WSUD**

Economic	Environmental	Social
<p><b>Capital cost savings</b> - reduced sizing of off-site pipe work, mains and stormwater infrastructure.</p> <p><b>Construction cost savings</b> - grading and tree clearing.</p> <p><b>Water quality cost savings</b> - reducing the costs of water quality improvement by maintaining existing waterways.</p> <p><b>Developer cost savings</b> - reduced developer contributions to downstream drainage capacities and open space requirements.</p> <p><b>Improved market value</b> - making such developments more desirable and marketable.</p>	<p><b>Hydrological balance</b> - maintains the hydrological balance by using natural processes of storage, infiltration and evaporation.</p> <p><b>Sensitive area protection</b> - can contribute to protecting environmentally sensitive areas from urban development.</p> <p><b>Waterways restoration</b> - supports restorations and enhancement of urban waterways.</p> <p><b>Impact reduction</b> - minimises the impact of urban development on the environment.</p> <p><b>Natural habitats enhancement</b> - can enhance the diversity of natural habitats/landscapes.</p> <p>Groundwater recharge.</p>	<p>Amenable urban and residential landscapes.</p> <p>High visual amenity.</p> <p>Opportunities to link community nodes through open spaces.</p> <p>Improving urban heat island effects.</p>

**The use of trees and vegetation in the urban environment brings benefits beyond mitigating urban heat islands including:**

- Reduced energy use: Trees and vegetation that directly shade buildings decrease demand for air conditioning.
- Improved air quality and lower greenhouse gas emissions: By reducing energy demand, trees and vegetation decrease the production of associated air pollution and greenhouse gas emissions. They also remove air pollutants and store and sequester carbon dioxide.
- Enhanced stormwater management and water quality: Vegetation reduces runoff and improves water quality by absorbing and filtering rainwater.
- Reduced pavement maintenance: Tree shade can slow deterioration of street pavement, decreasing the amount of maintenance needed.



## APPENDICES D

### DAYLIGHT MODEL

The daylight analysis was carried out using Designbuilder Version 7.02.006 to determine the daylight performance for all levels.

#### ASSUMPTIONS:

GLAZING: 64% VLT FLOORS: 30% reflectivity WALLS: 70% reflectivity CEILINGS: 70% reflectivity CIE OVERCAST DESIGN SKY (10000LUX)

NEIGHBOURING STRUCTURES: 60%

Windows and doors dimensions as shown on the architectural drawings.

Service rooms, wet areas and passages are excluded from the model.

### GROUND FLOOR CONTOURS



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# BESS Report

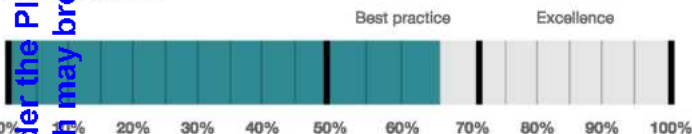


## Built Environment Sustainability Scorecard

This BESS report outlines the sustainable design commitments of the proposed development at 1157-1165 Burwood Hwy Upper Ferntree Gully Victoria 3156. The BESS report and accompanying documents and evidence are submitted in response to the requirement for a Sustainable Design Assessment or Sustainability Management Plan at Knox City Council.

Noting that where a Sustainability Management Plan is required, the BESS report must be accompanied by a report that further demonstrates the development's potential to achieve the relevant environmental performance outcomes and documents the means by which the performance outcomes can be achieved.

### Your BESS Score



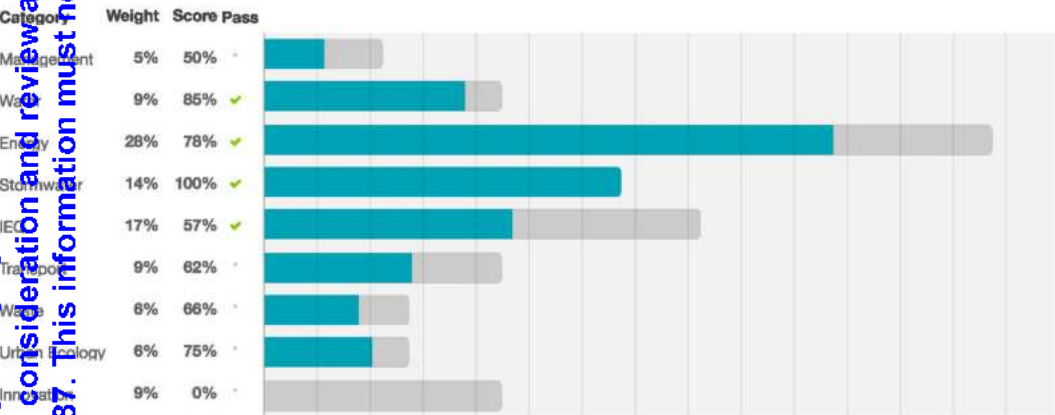
# 67%

### Project details

Address	1157-1165 Burwood Hwy Upper Ferntree Gully Victoria 3156
Project ID	1B31C57F-R1
BESS Version	BESS-8
Site type	Non-residential development
Accumulation	[REDACTED]
Application no.	P/2020/6347
Site area	4,013.00 m <sup>2</sup>
Building floor area	742.00 m <sup>2</sup>
Date	18 July 2024
Software version	2.0.0-B.533



### Performance by category



## Buildings

Name	Height	Footprint	% of total footprint
UPPER FERNTREE GULLY GULLY CHILD CARE CENTRE	1	742 m <sup>2</sup>	100%

## Dwellings & Non Res Spaces

### Non-res spaces

Name	Quantity	Area	Building	% of total area
Other building				
GULLY CHILD CARE CENTRE	1	742 m <sup>2</sup>	UPPER FERNTREE GULLY CHILD CARE CENTRE	100%
<b>Total</b>	<b>1</b>	<b>742 m<sup>2</sup></b>	<b>100%</b>	

## Supporting information

### Floor plans & elevation notes

Code	Requirement	Response	Status
Water 1.1	Annotation: Water efficient garden details		-
Energy 3.1	Carpark with natural ventilation or CO monitoring system		-
Energy 4.2	Location and size of solar photovoltaic system		-
Stormwater 1.1	Location of any stormwater management systems (rainwater tanks, raingardens, buffer strips)		-
Transport 1.4	Location of non-residential bicycle parking spaces		-
Transport 2	Location of electric vehicle charging infrastructure		-
Transport 3	Location of nominated motorcycle parking spaces		-
Waste 2.1	Location of food and garden waste facilities		-
Waste 2.2	Location of recycling facilities		-
Urban Ecology 1.1	Location and size of communal spaces		-
Urban Ecology 2.1	Location and size of vegetated areas		-
Urban Ecology 3.2	Location of food production areas		-

### Supporting evidence

Code	Requirement	Response	Status
Management 2.3a	Section J glazing assessment		-
Management 2.3b	Preliminary modelling report		-
Energy 1.1	Energy Report showing calculations of reference case and proposed buildings		-
Energy 3.1	Details of either the fully natural carpark ventilation or CO monitoring system proposed		-
Energy 3.2	Average lighting power density and lighting type(s) to be used		-
Energy 4.2	Specifications of the solar photovoltaic system(s)		-
Stormwater 1.1	STORM report or MUSIC model		-

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Credit	Requirement	Response	Status
CR 1	A short report detailing assumptions used and results achieved.		-

### Credit Summary

#### Management Overall contribution 4.5%

		<b>50%</b>
Pre-Application Meeting		0%
Thermal Performance Modelling - Non-Residential		100%
Modelling - Non-Residential		N/A  Scoped Out
N/A SINGLE TENANCY		
Modelling - Common Areas		N/A  Scoped Out
N/A SINGLE TENANCY		
Building Users Guide		100%

#### Water Overall contribution 9.0%

		<b>Minimum required 50%</b>	<b>85%</b> <b>Pass</b>
Possible Water Use Reduction		100%	
Water Efficient Landscaping		100%	
Building Systems Water Use Reduction		0%	

#### Energy Overall contribution 27.5%

		<b>Minimum required 50%</b>	<b>78%</b> <b>Pass</b>
Thermal Performance Rating - Non-Residential		37%	
Greenhouse Gas Emissions		100%	
Peak Demand		100%	
Electrification		100%	
Energy consumption		100%	
Compact Ventilation		100%	
Hot Water		100%	
Internal Lighting - Non-Residential		100%	
Combined Heat and Power (cogeneration / trigeneration)		N/A  Scoped Out	
No cogeneration or trigeneration system in use.			
Renewable Energy Systems - Solar		100%	
Renewable Energy Systems - Other		N/A  Scoped Out	
No other (non-solar PV) renewable energy is in use.			


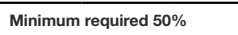




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**Stormwater Overall contribution 13.5%**

		<b>Minimum required 100%</b>	<b>100%</b>	<b>✓ Pass</b>
Stormwater Treatment			100%	





**Thermal Comfort Overall contribution 16.5%**

		<b>Minimum required 50%</b>	<b>57%</b>	<b>✓ Pass</b>
Daylight Access - Non-Residential			64%	✓ Achieved
Ventilation - Non-Residential			83%	✓ Achieved
Thermal comfort - Shading - Non-Residential			0%	
Thermal Comfort - Ceiling Fans - Non-Residential			0%	
Air Quality - Non-Residential			100%	

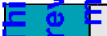

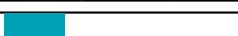



**Transport Overall contribution 9.0%**

			<b>62%</b>	
Bicycle Parking - Non-Residential			100%	
Bicycle Parking - Non-Residential Visitor			0%	
End of Trip Facilities - Non-Residential			0%	
Electric Vehicle Infrastructure			100%	
Car Share Scheme			0%	
Mopeds / Mopeds			100%	

**Waste Overall contribution 5.5%**

			<b>66%</b>	
Construction Waste - Building Re-Use			0%	
Operational Waste - Food & Garden Waste			100%	
Operational Waste - Convenience of Recycling			100%	

**Urban Ecology Overall contribution 5.5%**

			<b>75%</b>	
Communal Spaces			100%	
Vegetation			100%	
Green Roofs			0%	
Green Walls and Facades			0%	
Food Production - Non-Residential			100%	

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**Innovation Overall contribution 9.0%**

		0%
Innovation		0%

**Credit Breakdown**

**Management Overall contribution 2%**

<b>1.1 Pre-Application Meeting</b>		0%
Score Contribution	This credit contributes 50% towards the category score.	
Criteria	Has an ESD professional been engaged to provide sustainability advice from schematic design to construction? AND Has the ESD professional been involved in a pre-application meeting with Council?	
Question	Criteria Achieved ?	
Project	No	
<b>2.3 Thermal Performance Modelling - Non-Residential</b>		100%
Score Contribution	This credit contributes 33.3% towards the category score.	
Criteria	Has a preliminary facade assessment been undertaken in accordance with NCC2022 Section J4D6?	
Question	Criteria Achieved ?	
Other building	Yes	
Criteria	Has preliminary modelling been undertaken in accordance with either NCC2022 Section J (Energy Efficiency), NABERS or Green Star?	
Question	Criteria Achieved ?	
Other building	Yes	
<b>2.2 Metering - Non-Residential</b>	N/A	✦ Scoped Out
This credit was scoped out	N/A SINGLE TENANCY	
<b>2.3 Metering - Common Areas</b>	N/A	✦ Scoped Out
This credit was scoped out	N/A SINGLE TENANCY	
<b>3.1 Building Users Guide</b>		100%
Score Contribution	This credit contributes 16.7% towards the category score.	
Criteria	Will a building users guide be produced and issued to occupants?	
Question	Criteria Achieved ?	
Project	Yes	

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**Water** Overall contribution 8% Minimum required 50%

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<b>Water Approach</b>	
What approach do you want to use for Water?:	Use the built in calculation tools
<b>Project Water Profile Question</b>	
Do you have a reticulated third pipe or an on-site water recycling system?:	No
Are you installing a swimming pool?:	No
Are you installing a rainwater tank?:	Yes
<b>Fixtures, fittings &amp; connections profile</b>	
Showers/overhead:	Scope out
Baths:	Scope out
Kitchen Taps:	>= 5 Star WELS rating
Bathroom Taps:	>= 5 Star WELS rating
Dishwashers:	>= 4 Star WELS rating
WC:	>= 4 Star WELS rating
Urinals:	Scope out
Washing Machine Water Efficiency:	>= 4 Star WELS rating
What non-potable water source is the dwelling/space connected to?:	RWT
Non-potable water source connected to Toilets:	Yes
Non-potable water source connected to Laundry (washing machine):	Yes
Non-potable water source connected to Hot Water System:	No
<b>Rainwater tank profile</b>	
What is the total roof area connected to the rainwater tank?: RWT	734 m <sup>2</sup>
Tank Size: RWT	10,000 Litres
Irrigation area connected to tank: RWT	100 m <sup>2</sup>
Is connected irrigation area a water efficient garden?: RWT	Yes
Other external water demand connected to tank?: RWT	100 Litres/Day

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<b>3.1 Potable Water Use Reduction</b>		100%
Score Contribution	This credit contributes 71.4% towards the category score.	
Criteria	What is the reduction in total potable water use due to efficient fixtures, appliances, rainwater use and recycled water use? To achieve points in this credit there must be >25% potable water reduction.	
Output	Reference	
Project	1155 kL	
Output	Proposed (excluding rainwater and recycled water use)	
Project	859 kL	
Output	Proposed (including rainwater and recycled water use)	
Project	339 kL	
Output	% Reduction in Potable Water Consumption	
Project	70 %	
Output	% of connected demand met by rainwater	
Project	90 %	
Output	How often does the tank overflow?	
Project	Very Often	
Output	Opportunity for additional rainwater connection	
Project	156 kL	

<b>3.1 Water Efficient Landscaping</b>		100%
Score Contribution	This credit contributes 14.3% towards the category score.	
Criteria	Will water efficient landscaping be installed?	
Question	Criteria Achieved ?	
Project	Yes	


<b>4.1 Building Systems Water Use Reduction</b>		0%
Score Contribution	This credit contributes 14.3% towards the category score.	
Criteria	Where applicable, have measures been taken to reduce potable water consumption by >80% in the buildings air-conditioning chillers and when testing fire safety systems?	
Question	Criteria Achieved ?	
Project	No	

**Energy** Overall contribution 21% Minimum required 50%

Use the BESS Deem to Satisfy (DtS) method for Non-residential buildings?:	Yes
Do all exposed floors and ceilings (forming part of the envelope) demonstrate meeting the required NCC2022 insulation levels (total R-value upwards and downwards)?:	Yes
Do all wall and glazing demonstrate meeting the required NCC2022 facade calculator (or better than the total allowance)?:	Yes
Are heating and cooling systems within one Star of the most efficient equivalent capacity unit available, or Coefficient of Performance (CoP) & Energy Efficiency Ratios (EER) not less than 85% of the CoP & EER of the most efficient equivalent capacity unit available?:	Yes
Are water heating systems within one star of the best available, or 85% or better than the most efficient equivalent capacity unit available?:	Yes
<b>Non-residential buildings profile</b>	
Heating, Cooling & Comfort Ventilation - Electricity Reference fabric & services:	-
Heating, Cooling & Comfort Ventilation - Electricity - proposed fabric and reference services:	-
Heating, Cooling & Comfort Ventilation - Electricity Proposed fabric & services:	-
Heating - Wood - reference fabric and services:	-
Heating - Wood - proposed fabric and reference services:	-
Heating - Wood - proposed fabric and services:	-
Hot Water - Electricity - Reference:	-
Hot Water - Electricity - Proposed:	-
Lighting - Reference:	-
Lighting - Proposed:	-
Peak Thermal Cooling Load - Reference:	-
Peak Thermal Cooling Load - Proposed:	-
<b>Solar Photovoltaic system profile</b>	
System Size (lesser of inverter and panel capacity): PV	10.0 kW peak
Orientation (which way is the system facing)?: PV	North
Inclination (angle from horizontal): PV	10.0 Angle (degrees)
<b>1.1 Thermal Performance Rating - Non-Residential</b>	<b>37%</b>
Score Contribution	This credit contributes 34.8% towards the category score.
Criteria	What is the % reduction in heating and cooling energy consumption against the reference case (NCC2022 Section J)?
<b>2.1 Greenhouse Gas Emissions</b>	<b>100%</b>
Score Contribution	This credit contributes 8.7% towards the category score.
Criteria	What is the % reduction in annual greenhouse gas emissions against the benchmark?

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<b>2.2 Peak Demand</b>	100%
Score Contribution	This credit contributes 4.3% towards the category score.
Criteria	What is the % reduction in the instantaneous (peak-hour) demand against the benchmark?
<b>2.6 Electrification</b>	100%
Score Contribution	This credit contributes 13% towards the category score.
Criteria	Is the development all-electric?
Question	Criteria Achieved?
Project	Yes
<b>2.7 Energy consumption</b>	100%
Score Contribution	This credit contributes 17.4% towards the category score.
Criteria	What is the % reduction in annual energy consumption against the benchmark?
<b>3.1 Carpark Ventilation</b>	100%
Score Contribution	This credit contributes 4.3% towards the category score.
Criteria	If you have an enclosed carpark, is it: (a) fully naturally ventilated (no mechanical ventilation system) or (b) 40 car spaces or less with Carbon Monoxide monitoring to control the operation and speed of the ventilation fans?
Question	Criteria Achieved ?
Project	Yes
<b>3.2 Hot Water</b>	100%
Score Contribution	This credit contributes 4.3% towards the category score.
Criteria	What is the % reduction in annual energy consumption (gas and electricity) of the hot water system against the benchmark?
<b>3.7 Internal Lighting - Non-Residential</b>	100%
Score Contribution	This credit contributes 8.7% towards the category score.
Criteria	Does the maximum illumination power density (W/m2) in at least 90% of the area of the relevant building class meet the requirements in Table J7D3a of the NCC 2022 Vol 1?
Question	Criteria Achieved ?
Other building	Yes
<b>4.1 Combined Heat and Power (cogeneration / trigeneration)</b>	N/A  Scoped Out
This credit was scoped out	No cogeneration or trigeneration system in use.

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<b>4.2 Renewable Energy Systems - Solar</b>		100%
Score Contribution	This credit contributes 4.3% towards the category score.	
Criteria	What % of the estimated energy consumption of the building class it supplies does the solar power system provide?	
Output	Solar Power - Energy Generation per year	
Other building	12,118 kWh	
Output	% of Building's Energy	
Other building	58 %	

<b>4.4 Renewable Energy Systems - Other</b>		N/A	✦ Scoped Out
This credit was scoped out	No other (non-solar PV) renewable energy is in use.		

**Stormwater** Overall contribution 14% Minimum required 100%

Which stormwater modelling software are you using?:	Melbourne Water STORM tool
---	----------------------------

<b>4.1 Stormwater Treatment</b>		100%
Score Contribution	This credit contributes 100% towards the category score.	
Criteria	Has best practice stormwater management been demonstrated?	
Question	STORM score achieved	
Project	100	
Output	Min STORM Score	
Project	100	



Overall contribution 10% Minimum required 50%

<b>2.2 Daylight Access - Non-Residential</b>		64%	✓ Achieved
Score Contribution	This credit contributes 35.3% towards the category score.		
Criteria	What % of the nominated floor area has at least 2% daylight factor?		
Question	Percentage Achieved?		
Other building	64 %		
<b>2.3 Ventilation - Non-Residential</b>		83%	✓ Achieved
Score Contribution	This credit contributes 35.3% towards the category score.		
Criteria	What % of the regular use areas are effectively naturally ventilated?		
Question	Percentage Achieved?		
Other building	100 %		
Criteria	What increase in outdoor air is available to regular use areas compared to the minimum required by AS 1668.2:2012?		
Question	Percentage Achieved?		
Other building	50 %		
Criteria	What CO2 concentrations are the ventilation systems designed to achieve, to monitor and to maintain?		
Question	Value		
Other building	-		
<b>2.4 Thermal comfort - Shading - Non-Residential</b>		0%	
Score Contribution	This credit contributes 17.6% towards the category score.		
Criteria	What percentage of east, north and west glazing to regular use areas is effectively shaded?		
Question	Percentage Achieved?		
Other building	0 %		
<b>2.5 Thermal Comfort - Ceiling Fans - Non-Residential</b>		0%	
Score Contribution	This credit contributes 5.9% towards the category score.		
Criteria	What percentage of regular use areas in tenancies have ceiling fans?		
Question	Percentage Achieved?		
Other building	0 %		
<b>4.1 Air Quality - Non-Residential</b>		100%	
Score Contribution	This credit contributes 5.9% towards the category score.		
Criteria	Do all paints, sealants and adhesives meet the maximum total indoor pollutant emission limits?		
Question	Criteria Achieved ?		
Other building	Yes		
Criteria	Does all carpet meet the maximum total indoor pollutant emission limits?		
Question	Criteria Achieved ?		
Other building	Yes		

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Criteria	Does all engineered wood meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Other building	Yes

**Transport** Overall contribution 6%

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<b>1.4 Bicycle Parking - Non-Residential</b>		100%
Score Contribution	This credit contributes 25% towards the category score.	
Criteria	Have the planning scheme requirements for employee bicycle parking been exceeded by at least 50% (or a minimum of 2 where there is no planning scheme requirement)?	
Question	Criteria Achieved ?	
Other building	Yes	
Question	Bicycle Spaces Provided ?	
Other building	4	
<b>1.5 Bicycle Parking - Non-Residential Visitor</b>		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Have the planning scheme requirements for visitor bicycle parking been exceeded by at least 50% (or a minimum of 1 where there is no planning scheme requirement)?	
Question	Criteria Achieved ?	
Other building	No	
Question	Bicycle Spaces Provided ?	
Other building	-	
<b>1.6 End of Trip Facilities - Non-Residential</b>		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Where adequate bicycle parking has been provided. Is there also: * 1 shower for the first 5 employee bicycle spaces plus 1 to each 10 employee bicycles spaces thereafter, * changing facilities adjacent to showers, and * one secure locker per employee bicycle space in the vicinity of the changing / shower facilities?	
Question	Number of showers provided ?	
Other building	0	
Question	Number of lockers provided ?	
Other building	0	
Output	Min Showers Required	
Other building	1	
Output	Min Lockers Required	
Other building	4	
<b>2.1 Electric Vehicle Infrastructure</b>		100%
Score Contribution	This credit contributes 25% towards the category score.	
Criteria	Are facilities provided for the charging of electric vehicles?	
Question	Criteria Achieved ?	
Project	Yes	

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<b>2.2 Car Share Scheme</b>	0%
Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Has a formal car sharing scheme been integrated into the development?
Question	Criteria Achieved ?
Project	No

<b>2.3 Motorbikes / Mopeds</b>	100%
Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Are a minimum of 5% of vehicle parking spaces designed and labelled for motorbikes (must be at least 5 motorbike spaces)?
Question	Criteria Achieved ?
Project	Yes

**Waste** Overall contribution 4%

<b>1.1 Construction Waste - Building Re-Use</b>	0%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	If the development is on a site that has been previously developed, has at least 30% of the existing building been re-used?
Question	Criteria Achieved ?
Project	No

<b>2.1 Operational Waste - Food &amp; Garden Waste</b>	100%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	Are facilities provided for on-site management of food and garden waste?
Question	Criteria Achieved ?
Project	Yes

<b>2.2 Operational Waste - Convenience of Recycling</b>	100%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	Are the recycling facilities at least as convenient for occupants as facilities for general waste?
Question	Criteria Achieved ?
Project	Yes

**Urban Ecology** Overall contribution 4%

<b>1.1 Communal Spaces</b>	100%
Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Is there at least the following amount of common space measured in square meters : * 1m <sup>2</sup> for each of the first 50 occupants * Additional 0.5m <sup>2</sup> for each occupant between 51 and 250 * Additional 0.25m <sup>2</sup> for each occupant above 251?
Question	Common space provided
Other building	37.0 m <sup>2</sup>
Output	Minimum Common Space Required
Other building	37 m <sup>2</sup>

<b>2.1 Vegetation</b>	100%
Score Contribution	This credit contributes 50% towards the category score.
Criteria	How much of the site is covered with vegetation, expressed as a percentage of the total site area?
Question	Percentage Achieved ?
Project	50 %

<b>2.2 Green Roofs</b>	0%
Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Does the development incorporate a green roof?
Question	Criteria Achieved ?
Project	No

<b>2.3 Green Walls and Facades</b>	0%
Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Does the development incorporate a green wall or green façade?
Question	Criteria Achieved ?
Project	No

<b>3.2 Food Production - Non-Residential</b>	100%
Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	What area of space per occupant is dedicated to food production?
Question	Food Production Area
Other building	10.0 m <sup>2</sup>
Output	Min Food Production Area
Other building	10 m <sup>2</sup>

**Innovation** Overall contribution 0%

<b>1.1 Innovation</b>	0%
Score Contribution	This credit contributes 100% towards the category score.
Criteria	What percentage of the Innovation points have been claimed (10 points maximum)?

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# Stormwater Calculations





## Report for Knox

Date report printed: 19/06/2024

### Project Details

Project Name	1157-1165 Burwood Hwy Upper Ferntree Gully		
InSite User Email	[REDACTED]		
Web files link			
Site Area (m2)	4014	Project ID	4342
Planning number	P/2020/6347		
Development type	Non-residential development		
Existing site details	Residential >750m2 per dwelling		
Street address	1157-1165 Burwood Hwy, Upper Ferntree Gully VIC, Australia		

### Results

 VOLUME	 FLOW	 QUALITY	 EFFICIENCY
<p><b>Objective:</b> Reduce annual average runoff volume by harvesting or infiltrating stormwater</p>	<p><b>Objective:</b> Control peak discharge flow (litres per second) with adequate on site detention</p>	<p><b>Objective:</b> Improve stormwater runoff water quality (Equivalent to STORM score)</p>	<p><b>Objective:</b> Increase drought resilience</p>
<p><b>Target:</b> No increase in pre-development annual average runoff volume (Up to a 10% increase is allowed to account for uncertainties)</p>	<p><b>Target:</b> less than or equal to zero. If greater than zero this is the additional Site Storage Requirement (SSR) volume required</p>	<p><b>Target:</b> Achieve a score of 100 or more This corresponds to a 45% reduction in nitrogen runoff</p>	<p><b>Target:</b> Achieve greater than 25% potable water use reduction</p>
<p><b>VOLUME RESULT</b></p> <p>-45.9</p> <p>% change in annual average volume</p>	<p><b>FLOW RESULT</b></p> <p>0.0</p> <p>m<sup>3</sup> of additional site storage required</p>	<p><b>QUALITY RESULT</b></p> <p>101</p> <p>Pollution reduction score (out of 100)</p>	<p><b>EFFICIENCY RESULT</b></p> <p>26.5</p> <p>% water saving</p>
<p>VOLUME PASSES</p>	<p>FLOW PASSES</p>	<p>QUALITY PASSES</p>	<p>EFFICIENCY PASSES</p>



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## Design Criteria

The items on this page must be reflected on other project plans, specifications and engineering drawings.  
 The development must be designed and constructed in accordance with the following:

### Rainwater Tank Specifications

Total rainwater tank volume (L)	0	*This is the rainwater tank volume retention + detention	
Total rainwater retention* tank volume (L)	10000	*This is the rainwater tank volume that is available for reuse	
Total rainwater detention* tank volume (L)	0	*This is the rainwater tank volume that is reserved for slow release to stormwater	
Roof connected to rainwater tank (m <sup>2</sup> )	735.0		
Rainwater tanks connected to	Toilet , Laundry , Irrigation		
Other rainwater tank end uses (L/day)		Irrigated Garden Area (m <sup>2</sup> )	
% building rainwater end uses connected (to rainwater tanks)	100	First Flush Device?	0
Additional* Site Storage (L)	13540	*Site storage added adjacent to the legal point of discharge for peak flow detention or volume infiltration	
Recycled water source (Yes/No)			
<b>Water tank reliability %</b>	29.7		
<b>Rainwater tank overflow %</b>	23.8	*Note if this number is under 25%, then 30% of the tank's retention volume will be counted toward the detention volume	

### Water Efficiency Specifications

Basin WELS star rating	> 4 Star WELS rating
Toilet WELS rating	> 4 Star WELS rating
Bath WELS star rating	Default or unrated
Washing Machine WELS star rating	> 4 Star WELS rating
Kitchen Taps WELS rating	> 4 Star WELS rating
Urinal WELS rating	Not Applicable
Shower WELS star rating	3 Star WELS (> 7.5 but <= 9.0) (minimum requirement)
Dishwasher WELS star rating	> 3 Star WELS rating

540 litres of additional Site Storage Requirement (SSR) (in addition to the combined rainwater / detention tanks) which is provided by 13540 litres of additional site storage adjacent to the legal point of discharge.

### Stormwater management measures selected are

This includes all impervious areas in the site connected to Council or Stormwater Authority drains. This excludes pervious areas like garden, gravel, and lawn areas)

- 735m<sup>2</sup> of roof area Roof area, Raintank Volume = 10000 litres connected to 735m<sup>2</sup> of roof
- 150m<sup>2</sup> of Courtyard Outdoor play area draining to 4.5m<sup>2</sup> of treatment: Raingarden
- 100m<sup>2</sup> of Driveway Driveway and pedestrian entrance
- 39m<sup>2</sup> of Courtyard Untreated outdoor play area

## Building Occupancy Calculations

### Building Spaces

- Manually entered occupancy = 120

Estimated Total Building Occupancy	120.0
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## Stormwater VOLUME Calculations

Roof Area (m <sup>2</sup> )	4014
Post development total impervious area (m <sup>2</sup> )	1424.0
Rainwater Tank Overflow (kL/annum)	150.7
Pre-development Volume (kL/annum)	1243.7
Post-development Volume (kL/annum)	672.8
Change in volume %	-45.9

## Stormwater QUALITY Calculations

Rainwater Tank Runoff reduction (%)	76.2
Rainwater Tank(s) Total Nitrogen (TN) reduction	1244.6
Total Nitrogen (TN) % reduction	45.6
<b>Equivalent STORM Score</b>	101

## Water EFFICIENCY Calculations

Benchmark water use (kL/year)	10468.1	
Predicted potable water use (kL/year)	7694.3	
Predicted potable water use (L/person/day)	186.7	
Water savings from tank (kL/year)	481.9	
Water saving from efficiency (kL/year)	2291.90	
<b>Total water saving % (efficiency + tank + recycled water)</b>	26.5	
	Water saving (kL/year)	2773.8

## Stormwater FLOW Calculations - Swinburne Method

This section outlines rational method calculations for On Site Detention (OSD) and Site Storage Requirements (SSR)

### Permissible Site Discharge (PSD) Calculations

Calculated PSD	26.0
PSD Override Value Used	

### Site Storage Calculations

Preliminary On Site Detention (OSD) tank size required estimate (m <sup>3</sup> )	13.54	Swinburne Method Pipe formula
OSD and storages* provided (m <sup>3</sup> )	13.5	Includes storages: rainwater tank retention allowance, rainwater tank detention, and additional added storage volumes
Additional detention / retention volume required (m <sup>3</sup> )	0.0	
Base case (pre-development) fraction impervious (ratio)	0.40	
Base case runoff coefficient	0.45	
Post development total impervious area (in hectares)	0.1424	
Post development fraction impervious (ratio)	0.35	
Post development runoff coefficient	0.416	
Pre-development design storm	20% AEP (~1 in 5 year ARI) - default residential	
Post development detention required	10% AEP (~1 in 10 ARI) - default residential	
Critical Storm Duration - the Catchment time of concentration – Tc(catchment) in minutes	20	
Rainfall Depth (mm) for Critical Storm Duration - Tc(catchment)	15.02	
Rainfall intensity - i at Tc(catchment) (mm/h)	45.060	
Travel time from discharge point to catchment outlet (min) - Tcs	20.0	
Rainfall Depth (mm) for Tcs - (IFD at Tcs)	18.70	
Rainfall intensity - i at tc(site) (mm/h)	56.10	

OSD tank flow restrictor orifice diameter = 112 mm

### Detention Calculator - Site Storage Requirement (SSR)

Storm Duration (mins)	Rainfall Depth (mm)	Stored Volume (m <sup>3</sup> )
5		
7.5		
10		
12.5		
15		
20		
30		
40		
60		

## About In-Site Water

This report is generated by user inputs from the toolkit at InSite Water. In-Site water is an online Integrated Water Management tool designed for use on smaller sites (less than 2 hectares) in Australia that need quick and accurate stormwater engineering answers. InSite water is simple to use but provides robust stormwater design and engineering answers.

This report includes outputs from the InSite tool that has investigated:

- water tank sizing
- detention tank sizing
- water savings through efficiency
- water WSUD treatments such as raingardens

For enquiries, contact us through [www.insitewater.com.au](http://www.insitewater.com.au)

## Disclaimer

This guide is of a general nature only. Advice from a suitably qualified professional should be sought for your particular circumstances. Depending on each unique situation, there may be occasions where compliance is not achieved.

This report does not provide a detailed design and layout for the piping and general drainage system in your development, which should be prepared by a suitably qualified professional. In addition, InSite Water does not consider compliance for slope stability or foundation / slab / footing protection, which needs to come from a qualified geotechnical or structural engineer.

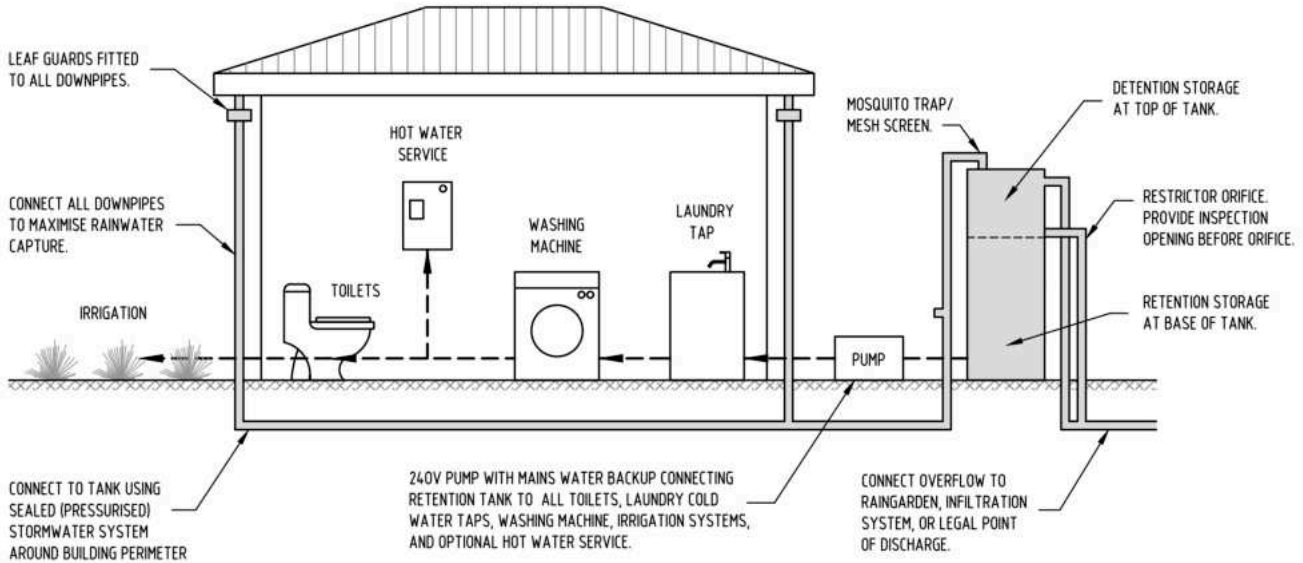
The following is outside the scope of InSite Water, however it is critical that all designers consider the following in drainage design and in using Water Sensitive Urban Design (WSUD) devices and approaches:

- *Manage expectations and risks around occasional surface water and ponding.*
- *Ensure that uncontrolled stormwater does not flow over property boundaries or otherwise cause a nuisance.*
- *Plan for major flood pathways – locate buildings away from, adapt (raise floors above predicted flood levels) and defend buildings against potential major flooding.*
- *Seek professional advice to reduce damage and safety risks.*
- *Design for local conditions such as vegetation, topography and soils (soil type, reactivity, permeability, water table level, salinity, dispersiveness, acid sulphate soils, contaminated land etc).*
- *Ensure that soil moisture and building clearance is considered in areas of reactive clays or where varying soil moisture levels could damage buildings or other infrastructure.*
- *For steeper sites, ensure the design includes geotechnical considerations such as slope stability with varying soil saturation levels.*
- *Ensure that a Stormwater Risk Assessment and Environmental Management Plan is undertaken for sites that pose a pollution risk.*
- *Ensure that a Construction Environmental Management Plan (CEMP) is implemented to control sediments and reduce stormwater pollution during construction.*
- *Compliance with ARR 2019, Australian Rainfall and Runoff: A Guide to Flood Estimation <http://arr.ga.gov.au/>*
- *Compliance with NCC plumbing and building standards.*
- *Compliance with AS/NZS 3500.*
- *Compliance with EPA and other environmental regulations.*
- *Compliance with other relevant Australian Standards, regulations and Council requirements.*

## Legal Disclaimer

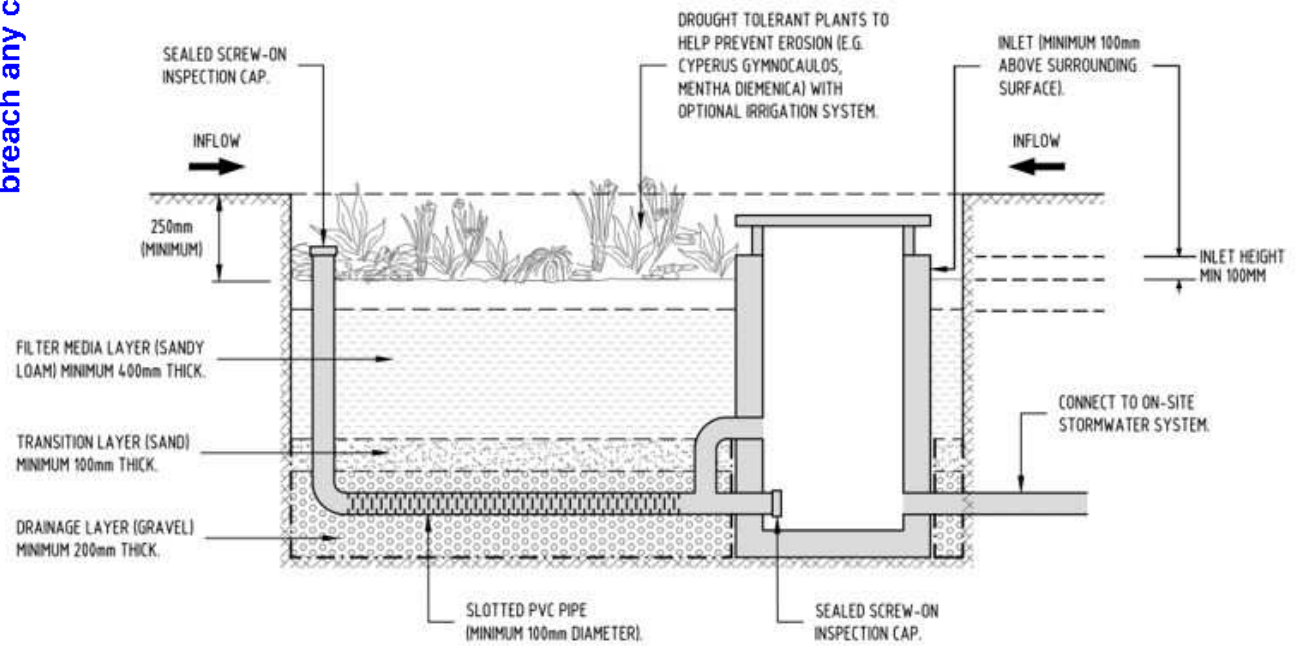
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Appendix A: attach further details for this project (if applicable):



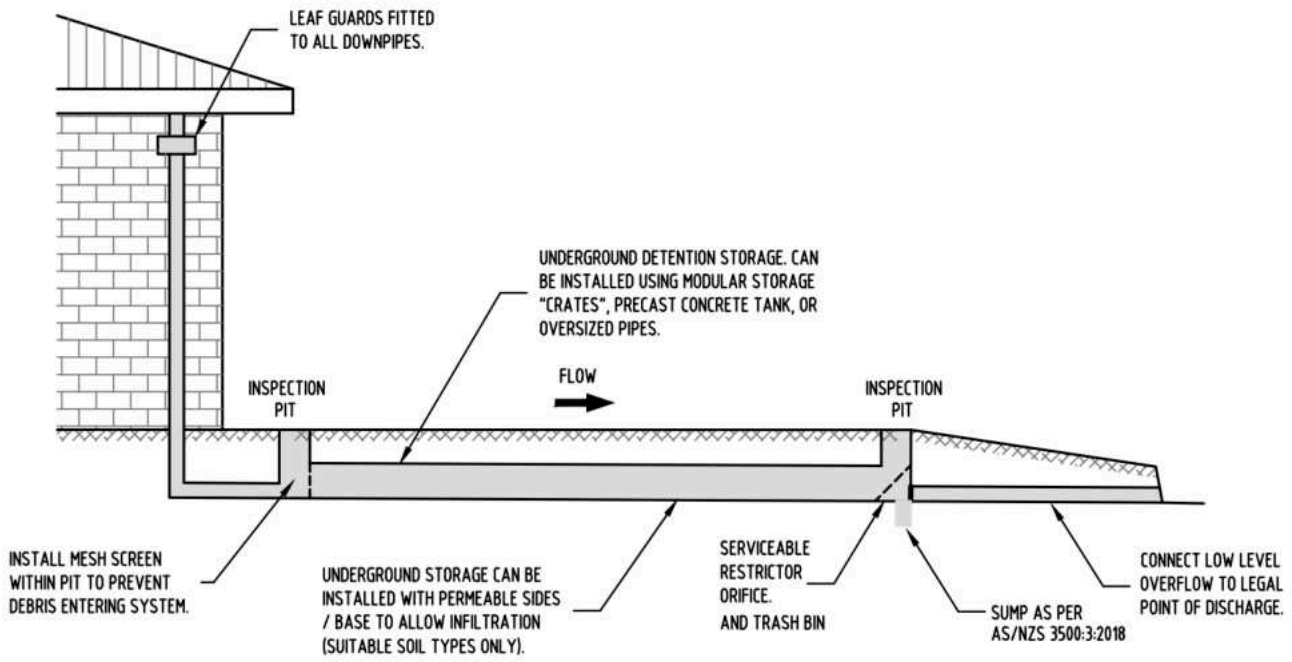
**RETENTION TANK RETICULATION DETAIL**  
 N.T.S.  
 NOTE: THE DESIGN AND INSTALLATION OF ALL STORMWATER SYSTEMS SHALL COMPLY WITH AS/NZS 3500.3:2018 "STORMWATER DRAINAGE".

Above: Roof area treatment drawing (draft for planning approvals only: not for construction, not to scale)



**RAINGARDEN**  
 N.T.S.  
 NOTE: THE DESIGN AND INSTALLATION OF ALL STORMWATER SYSTEMS SHALL COMPLY WITH AS/NZS 3500.3:2018 "STORMWATER DRAINAGE".

Above: Outdoor play area treatment drawing (draft for planning approvals only: not for construction, not to scale)



### UNDERGROUND DETENTION SYSTEM

N.T.S.

NOTE: THE DESIGN AND INSTALLATION OF ALL STORMWATER SYSTEMS SHALL COMPLY WITH AS/NZS 3500.3:2018 "STORMWATER DRAINAGE".

Above: Roof area, Outdoor play area, Driveway and pedestrian entrance, Untreated outdoor play area treatment drawing (draft for planning approvals only: not for construction, not to scale)