

Sustainable Design Assessment

14 Hopetoun Avenue,
Reservoir VIC

17/09/2024



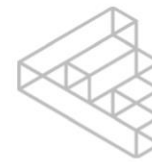
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Sustainability
Tech Partners Pty Ltd

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Sustainable Design Assessment (SDA)

Proposed Residential Development

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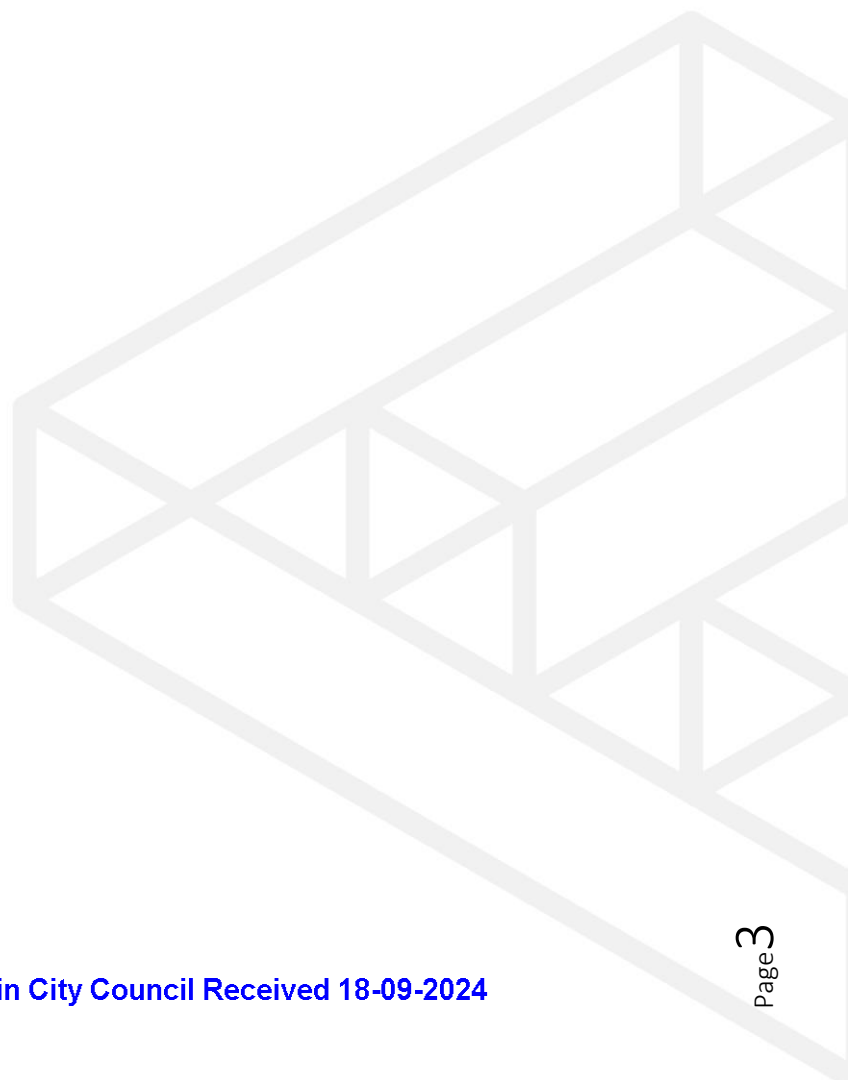
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DOCUMENT VERSION

Version	Date	Changelog	Author	Review
0	13/09/24	Issued for Client Review (FCS 60509)	PS	JC
1	17/09/24	Updated as per client's comments (FCS 60509)	PS	-



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INITIATIVES TO BE MARKED ON DRAWINGS

Water & Stormwater Management

- Mark-up showing new roof catchment area to be diverted to the Rainwater tank for each dwelling – If required, the use of charged pipe system will be explicitly acknowledged on the drawings and charged pipes will not be running underneath the building footprint
- Location and size of Rainwater tank proposed
- Note showing connection to the new toilets and laundry
- Location of the proposed Envis[®] Pit treating the driveway
- Mark-up showing the 57m² of driveway to divert to the proposed Envis[®] Pit
- Note showing the use of native or drought-tolerant species for new landscaped areas. Watering will not be required after the initial period when plants are established. If irrigation is required, it will be connected to rainwater tanks.
- Note showing WELS rating for water fittings/fixtures (refer to report) – Fixtures (e.g. dishwasher) provided as part of base building work have to be chosen within one WELS star of best available at the time of purchase

Energy Efficiency

- Note showing commitment to 4W/m² lighting density in the new dwelling
- Retractable external clothes drying line
- Lighting sensors for new external lighting (motion detectors, timers etc.)
- Commitment to 7.0 Star minimum energy rating for the new dwelling (on planning and construction drawings)
- All-electric development

Indoor Environment Quality

- Note showing double glazing on all new habitable rooms (floor plans and elevations)
- Openable windows to all new habitable rooms to allow cross ventilation
- Operable shading for west-facing window of first floor bedroom

Transport

- Bike space location for new dwelling provided in the garage or POS not installed over the bonnet

Waste

- Four bins system including rubbish, recycling, organic/garden waste and glass.

Urban Ecology

- Taps and floor waste in each POS/balcony
- Show the extent of vegetated areas around the site (including lawn)

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INTRODUCTION

Frater Consulting Services has been engaged to undertake a Sustainable Design Assessment for the proposed townhouse development located at 14 Hopetoun Avenue, Reservoir. This has been prepared to address the Darebin City Council's sustainability requirements Planning Policy Clause 22.12 *Environmentally Sustainable Development*.

Within Clause 22.12, the City of Darebin has identified the following key categories to be addressed:

- Energy Performance;
- Water Resources;
- Stormwater Management;
- Indoor Environment Quality;
- Construction, Building & Waste Management;
- Building Materials;
- Transport; and
- Urban Ecology.

The site has been assessed using the BESS tool. BESS was developed by an association of councils led by the Merri-bek City Council. This tool assesses the energy and water efficiency, thermal comfort and overall environmental sustainability performance of new buildings or alterations. It was created to demonstrate how new development can meet sustainability requirements as part of a planning permit application for the participating council.

Each target area within the BESS tool generally receives a score of between 1% and 100%. A minimum score of 50% is required for the energy, water, stormwater and IEQ areas. An overall score of 50% represents 'Best Practice' while a score over 70% represents 'Excellence'. The result of the BESS assessment is included in Appendix E.

The Stormwater Treatment Objective – Relative Measure (STORM) calculator which addresses stormwater quality considerations has been used for the development to ensure that stormwater management best practice requirements have been achieved. The result of the STORM assessment is included in Appendix A.



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SITE DESCRIPTION

The proposed site is located at 14 Hopetoun Avenue, Reservoir. The 512m² site is currently occupied by a single-storey house which is proposed to be retained. The development is located approximately 12 km north of the Melbourne CBD.

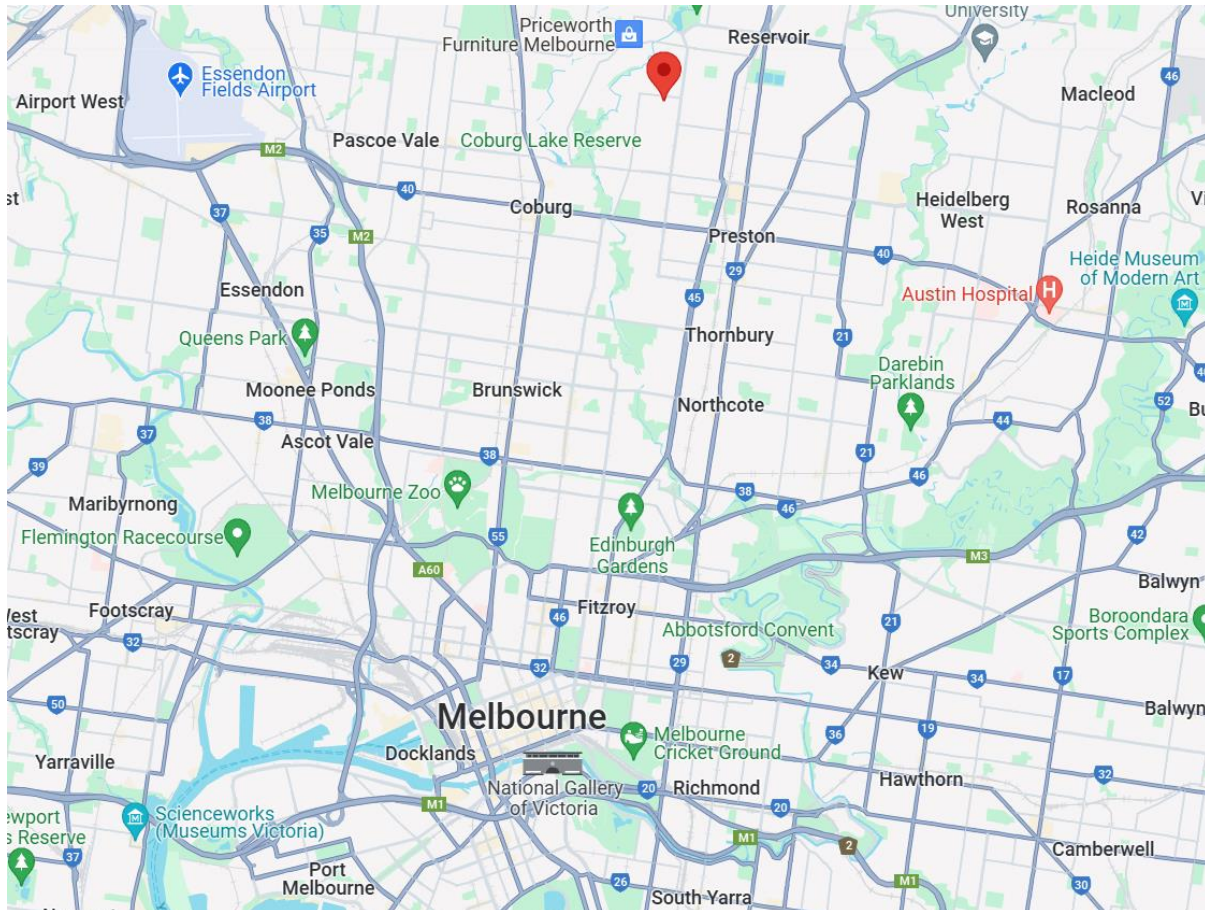


Figure 1: Location of the proposed development in Reservoir in relation to Melbourne CBD
(Source: Google Maps)

PROPOSED DEVELOPMENT

The proposal consists of developing an additional double-storey townhouse (1 x 2-bedroom) at the rear of the lot. The site area is 512m². The new townhouse will have an undercover garage, and another garage will be provided for the existing townhouse. Both dwellings will have a shared driveway opening on Hopetoun Avenue.

All initiatives described in this report will apply to the additional dwelling any new element of the development.

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ENERGY EFFICIENCY

Energy and its key elements should be integrated into the design of the proposed development. These elements contribute to reducing greenhouse gas emissions by utilising energy-efficient appliances, energy conservation measures and renewable energy.

Thermal Performance

Energy rating will be completed at the building approval stage. A commitment is made that the development will meet the energy efficiency requirements of a minimum 7.0-Star minimum energy rating for the new dwelling. This will be achieved using appropriate insulation levels in all external walls, roofs and floors as well as the use of **double-glazing windows** throughout habitable rooms. For the purpose of the BESS assessment, 7.0-star result has been assumed.

Heating and Cooling Systems

Heating and cooling systems can account for up to 40% of a household's energy use. Therefore, to reduce energy consumption heating and cooling will be provided by energy-efficient air conditioners chosen **with 3-Star rating minimum (cooling and heating) or within one star of the best available product in the range at the time of purchase whichever is greater.**

COP/EER 85% or better than the most efficient equivalent capacity unit available if no star rating is available.

Please note that 3 Star energy rating has been entered in BESS as an average however actual star rating will depends on the product range.

Hot Water Heating

Hot water for the new townhouse will be provided with an efficient electric instantaneous system.

All-Electric Development

No gas connection will be provided for the new development. This will reduce reliance on fossil fuels and will be in line with local and state targets of decarbonisation.

Internal Lighting

Energy consumption from artificial lighting within the new townhouse will be reduced by using LED lighting. A lighting level of 4W/m² will not be exceeded in the townhouses. The use of light internal colours will improve daylight penetration thus reducing the need for artificial lighting.

External Lighting

External lighting for the new townhouse and common areas (driveway/pathway) will be LED and will include controls such as motion detectors or timers to minimise consumption during off-peak times.

Clothes Drying

External retractable clothes drying lines or racks will be provided for the new townhouse within the identified private open spaces.

WATER EFFICIENCY & STORMWATER MANAGEMENT

Water saving-use and reuse and its key elements should be integrated into the design of the proposed development. These principles contribute to reducing the water demand in addition to promoting water reuse. Stormwater management and its key elements should be integrated into the design of the proposed development. These principles contribute to ensuring natural systems are protected and enhanced whilst promoting on-site retention and aim to reduce runoff or peak flows.

Water Efficient Fittings

The development will include efficient fittings and fixtures to reduce the volume of mains water used in the development. The following WELS star ratings will be specified;

- Toilets – 4 Star;
- Taps (bathroom and kitchen) – 5 Star;
- Showerhead – 4 Star with aeration device (6.0-7.5L/min); and
- Dishwasher – 5 Star.

Rainwater Collection & Use

Rainwater runoff from roof area of the new townhouse will be collected and stored in a rainwater tank¹. The dwelling will be provided with a 3,000L tank.

If required, a charged pipe system or multiple tanks will be installed to collect water from part of the roof of the dwelling.

In the case of a charged pipe system, the charged pipes will not be running underneath the building footprint (slab) and the stakeholders (builder/ developer/ architect) will be required to explicitly acknowledge this solution and have the capacity to install it.

Rainwater collected will be used for toilet flushing and laundry in the townhouse. These initiatives will reduce significantly the stormwater impacts of the development and help achieve compliance with the STORM calculator (See Appendix A).

Stormwater Treatment - Stormwater Filtering Pits

Part of the main common driveway (57m²) will be designed to be diverted to a minimum of one Envis[®] Sentinel pits. This will treat the stormwater runoff from part of the driveway by filtering coarse pollutants before releasing the outflows to the legal point of discharge on site (See Appendix A for details).

Water Efficient Appliances

All appliances if provided in the new development as part of the base building work (e.g. dishwasher) will be chosen within one WELS star of the best available.

Water Efficient Landscaping

Native or drought-tolerant plants will be implemented for the new landscaped areas on site. Use of water or irrigation will not be required after an initial period when plants are getting established. If irrigation is required, it will be connected to rainwater tanks.

¹ Please note that any stormwater detention volume requirement for the site will be in addition to the proposed rainwater retention and that the proposed tank will not be directly topped up by mains water.



INDOOR ENVIRONMENT QUALITY

Indoor Environment Quality and its key elements should be integrated into the design of the proposed development. These elements play a significant role in the health, well-being and satisfaction of the development occupants. Facilitating a good (IEQ) design provides a naturally comfortable indoor environment and less dependence on building services such as artificial lighting, mechanical ventilation and heating and cooling device.

Volatile Organic Compounds

All new paints, adhesives and sealants and flooring will have low VOC content. Alternatively, products will be selected with no VOCs. Paints such as eColour, or equivalent should be considered. Please refer to Appendix D for VOC limits.

Formaldehyde Minimisation

All new engineered wood products will have 'low' formaldehyde emissions, certified as E0 or better. Alternatively, products will be specified with no Formaldehyde. Products such as ecological panels – 100% post-consumer recycled wood (or similar) will be considered for use within the development. Please refer to Appendix D for formaldehyde limits.

Daylight Levels

Daylight penetration will be enhanced with the use of light internal colours to improve daylight reflection. All new bedrooms and living rooms will be provided with windows to allow for natural sunlight and ventilation. There are no bedrooms that rely on borrowed daylight. Installation of mirrored wardrobe doors could improve even further the daylight spread within the bedrooms. Natural light will be provided to garages through the provision of skylights, or glazed doors.

Double Glazing

New glazing will be chosen in accordance with the energy rating requirements at the building approval stage. However, as a minimum, double glazing will be provided to all living areas and bedrooms. This will provide better thermal performance and reduce condensation which helps prevent the formation of mould within the dwellings.

Task Lighting

A higher illuminance level (300Lux) will be provided for all new task areas (e.g. kitchen bench, bathroom basin) to ensure appropriate light is provided to do any tasks in these areas.

Shading

Operable external sun shading to the west-facing first floor bedroom window will be provided. This will help to reduce glare and control solar gains, improving the thermal comfort of the townhouses.

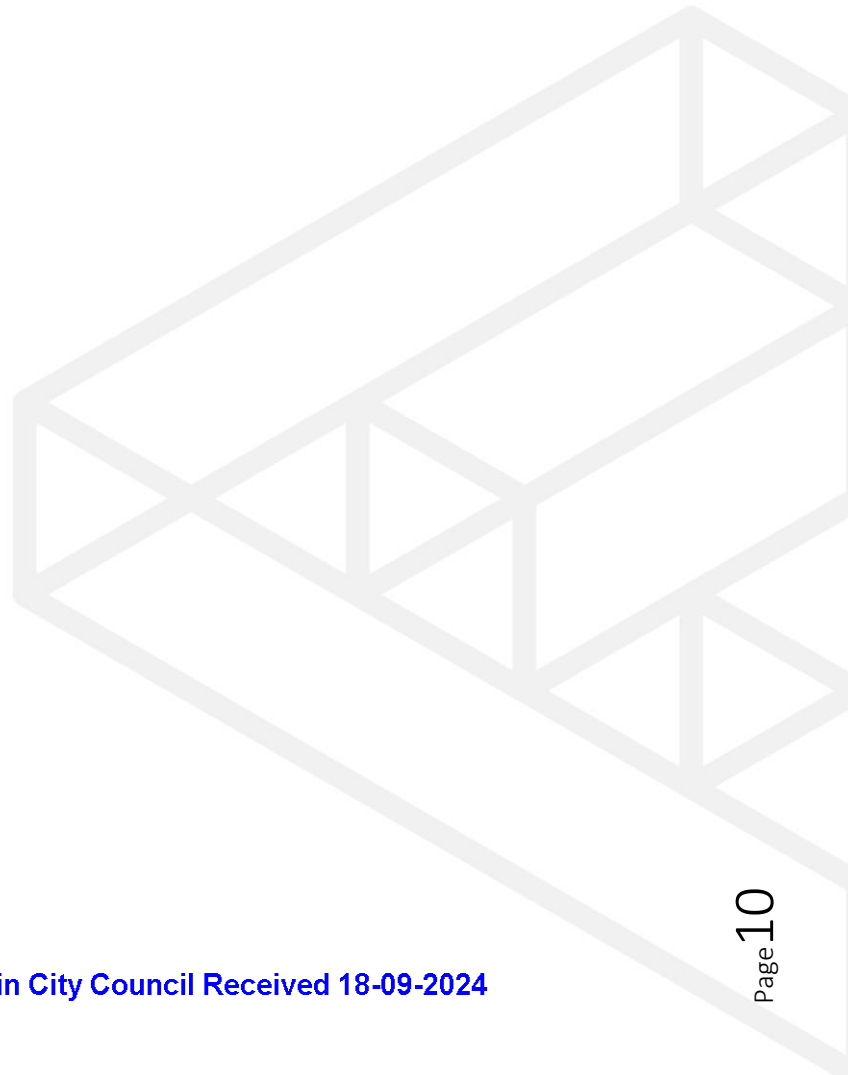
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Ventilation

New kitchen will have a separate dedicated exhaust fan (range-hood) which will be directly exhausted out of the building.

The new townhouse will have access to effective crossflow ventilation through openable windows. It will provide fresh air to the occupants and reduce the need for mechanical cooling. Window locks and door catches will be included to encourage and improve natural ventilation in the dwellings.



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CONSTRUCTION, BUILDING & WASTE MANAGEMENT

Building Management and its key elements should be integrated into the design of the proposed development. These principles contribute to ensuring efficient and effective ongoing building performance. Waste management and its key elements should be integrated into the design of the proposed development. These principles contribute to ensuring minimal waste is transported to landfill through disposal, recycling and on-site waste storage and/or collection methods.

Metering and Monitoring

Separate utility meters (water and electricity) will be provided for the new townhouse. This will allow residents to monitor and reduce their consumption.

Construction Waste Management

A waste management plan will be introduced to all on-site staff at a site orientation session to ensure that the waste generated on-site is minimised and disposed of correctly. A minimum of 80% of all construction and demolition waste generated on-site will be reused or recycled.

Construction Environmental Management

The builder will identify environmental risks related to construction and include management strategies such as maintaining effective erosion and sediment control measures during construction and operation and ensure that appropriate staging of earthworks (e.g. avoid bare earthworks in high-risk areas of the site during dominant rainfall period).

Operational Waste

Each townhouse will be provided with bins for general, recycling waste, garden/organic waste and glass.



Figure 2: bins for each stream including glass bin

Recycling bins will be provided next to general waste bins in the kitchen.

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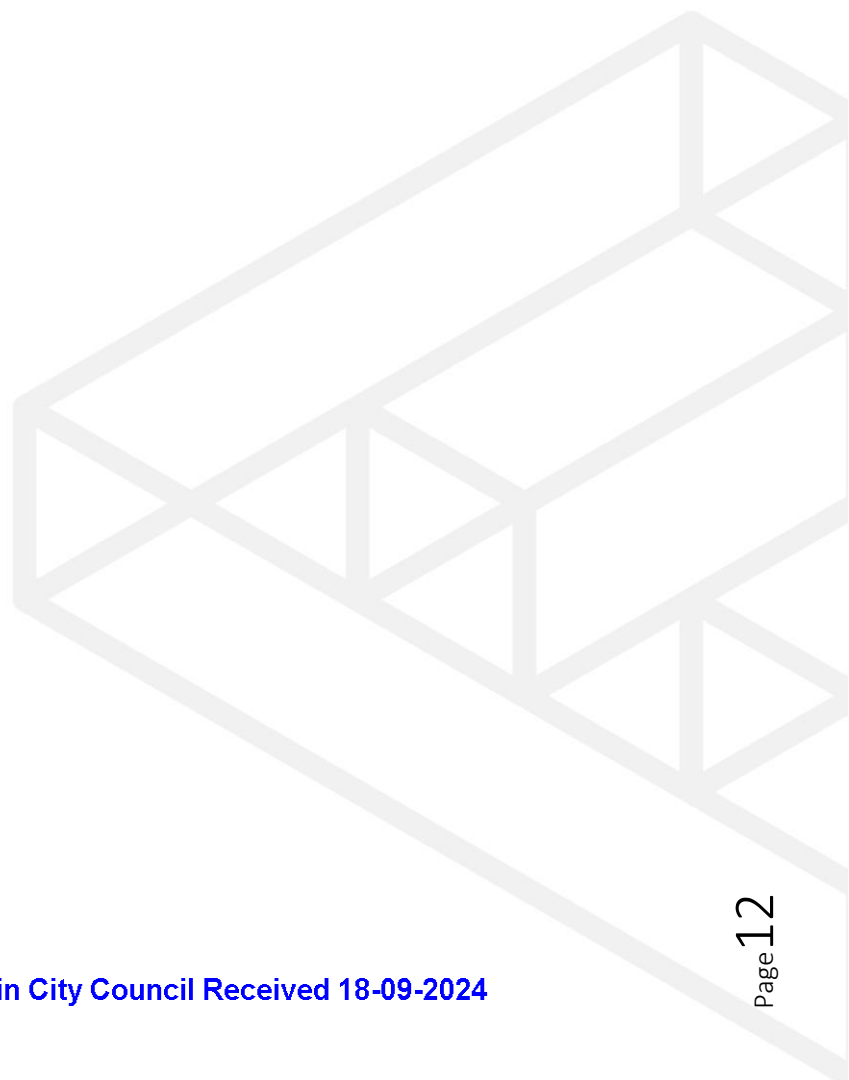


Figure 3: Examples of kitchen receptacles for general waste and recycling.

TRANSPORT

Bicycle Parking – Residents and Visitors

Residents will be able to securely park their bicycles within the new townhouse's garage or POS. This will provide for a total of at least 1 bicycle space provided for residents and their visitors. The bike spaces will not be installed over the bonnet.



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BUILDING MATERIALS

Materials selection should be integrated into the design of the proposed development. The criteria for appropriate materials used are based on economic and environmental costs.

Timber

All timber used in the development will be Forest Stewardship Council (FSC) or Program for the Endorsement of Forest Certification (PEFC) certified, or recycled/reused.

Flooring

The use of timber flooring will be preferred for all living areas and bedrooms. Wherever possible, flooring will be selected from products/materials certified under any of the following:

- Carpet Institute of Australia Limited, Environmental Certification Scheme (ECS);
- Global GreenTag - <https://www.globalgreentag.com/>; and/or
- Good Environmental Choice (GECA).

Alternatively, flooring must be durable, include some eco-preferred content, be modular and/or come from a manufacturer with a product stewardship program and ISO14001 certification.

Joinery

Wherever possible, joinery will be manufactured from materials/products certified under any of the following:

- Global GreenTag - <https://www.globalgreentag.com/>; and/or
- Good Environmental Choice (GECA).

Steel

Wherever possible, steel for the development will be sourced from a Responsible Steel Maker². Reinforcing steel for the project will be manufactured using energy-reducing processes commonly used by large manufacturers such as Bluescope or OneSteel.



² A Responsible Steel Maker must have facilities with a currently valid and certified ISO 14001 Environmental Management System (EMS) in place, and be a member of the World Steel Association's (WSA) Climate Action Program (CAP).

URBAN ECOLOGY

In highly urbanised environments, such as metropolitan Melbourne, it is important to recognise the importance of maintaining and increasing the health of our urban ecosystems to improve living conditions not only for the fauna but also ourselves. We can improve our urban ecosystem through the incorporation of vegetation through landscaping for both new and existing developments.

Vegetation

A large, landscaped area will be provided around the site and within the private open spaces. It will provide the occupants with a pleasant surrounding environment. The design will incorporate a mix of native species to help maintain local biodiversity.

Insulant ODP

All thermal insulation used in the development will not contain any ozone-depleting substances and will not use any in its manufacturing.

IMPLEMENTATION & MONITORING

The proposed development will meet the best practice requirement of the City of Darebin through the different initiatives described in this report such as a thermally efficient building envelope, efficient air conditioning and hot water system and sustainable materials. An appropriate implementation and monitoring of the initiatives outlined within this report will be required.

Implementation of the ESD initiatives outlined in this report requires the following processes:

- Full integration with architectural plans and specifications
- Full integration with building services design drawings and specifications
- Endorsement of the ESD Report with town planning drawings
- ESD initiatives to be included in plans and specifications for building approval

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APPENDIX A – WSUD REPORT / STORM ASSESSMENT

New development must comply with the best practice performance targets for suspended solids, total phosphorous and total nitrogen, as set out in the Urban Stormwater Best Practice Environmental Management Guidelines, Victoria Stormwater Committee 1999. Currently, these water quality performance targets require:

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

The STORM tool, an industry-accepted tool, was used to assess the development and ensure that the best practice targets described above are met. A minimum compliance score of 100% is required to achieve for the development.

For the stormwater assessment, only the area of the site where new construction will occur will be considered. Unit 1 and its roof will be preserved, and its impact on stormwater in the surrounding environment will remain the same. The unchanged area of Unit 1 is 129.6m². Therefore, the area to be considered for the stormwater assessment is 512m² - 129.6m² = 382.4m².

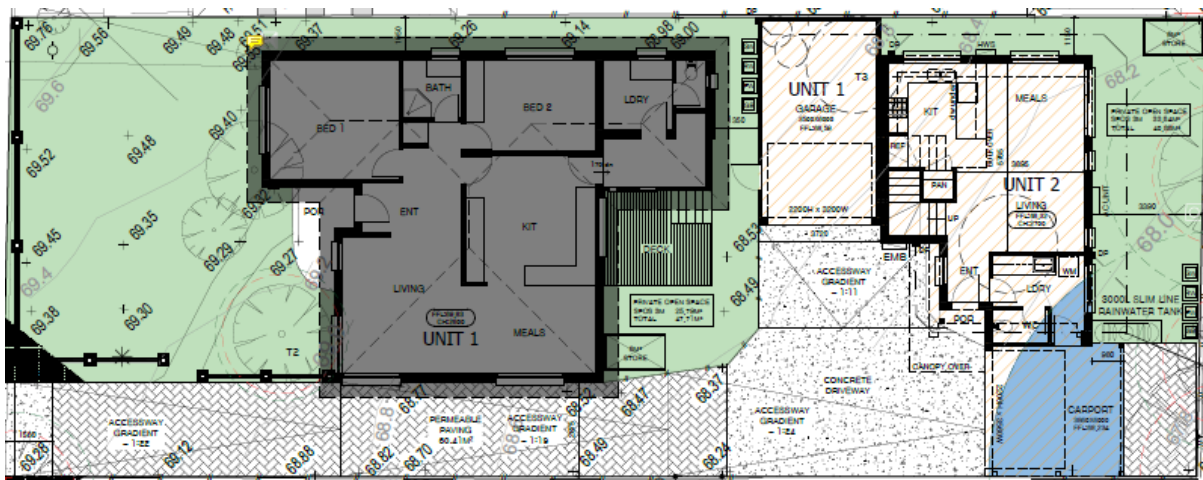


Figure 4: Area excluded (Dark Grey) from the assessment as the impact will be unchanged.

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Site Delineation

For the purpose of the assessment, the development has been delineated into the following surface types:

- Assessed Area of 382.4m²;
- The roof area runoff of dwelling 2 of 92.2m² which will be diverted into rainwater tank(s);

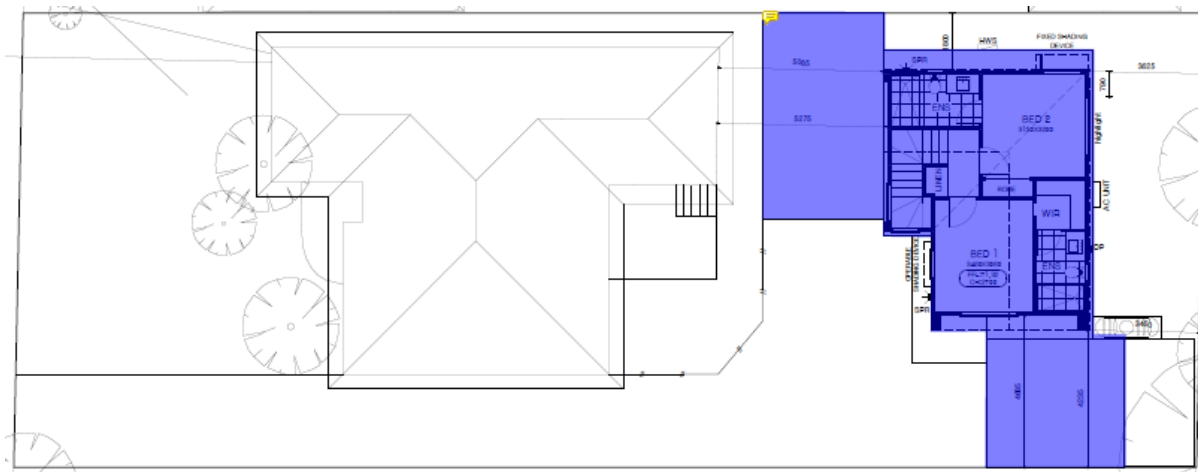


Figure 5: Roof catchment area for dwelling 2 to RWT (blue)

- Permeable area of 177.5m² comprised of landscaped area and other pervious surfaces in the backyards;
- Part of the shared driveway of a minimum of 57m² to be diverted to Envis Pit; and
- The remainder of 55.7m² consists of impervious areas around the site.

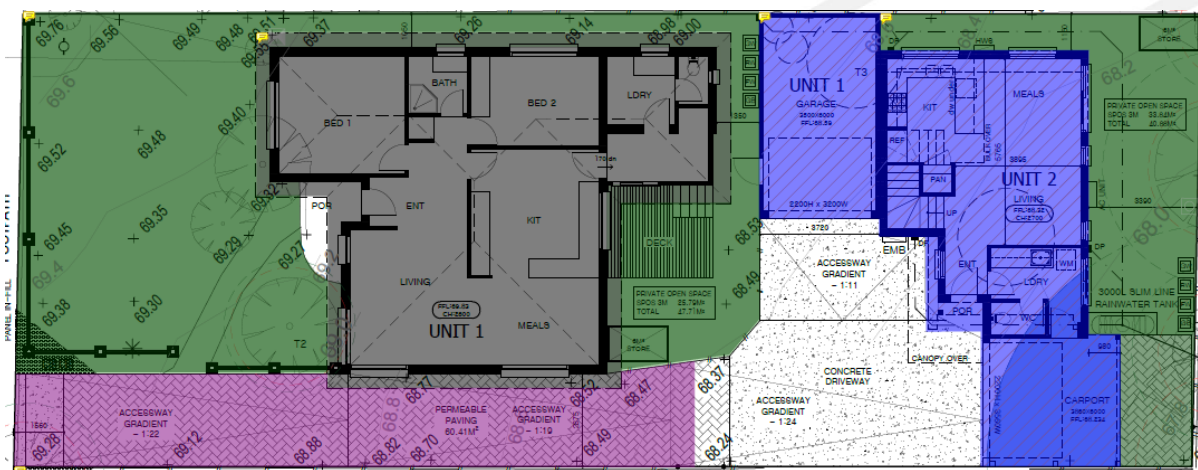


Figure 6: roof to RWT (blue), part of driveway to Envis Pit (purple), and permeable landscape (green).

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Stormwater initiatives

Rainwater Tank

(Rainwater tank for toilet flushing and laundry for dwelling 2)

The roof catchment area of dwelling 2 (as described above) will be diverted into a 3,000L rainwater tank. The rainwater collected will be used for toilet flushing and laundry in this townhouse.

If required, a charged pipe system or multiple tanks will be installed to collect water from part of the roof of dwelling 2.

In the case of a charged pipe system, the charged pipes will not be running underneath the slab and the stakeholders (builder/developer/architect) will be required to explicitly acknowledge this solution and have the capacity to install it.

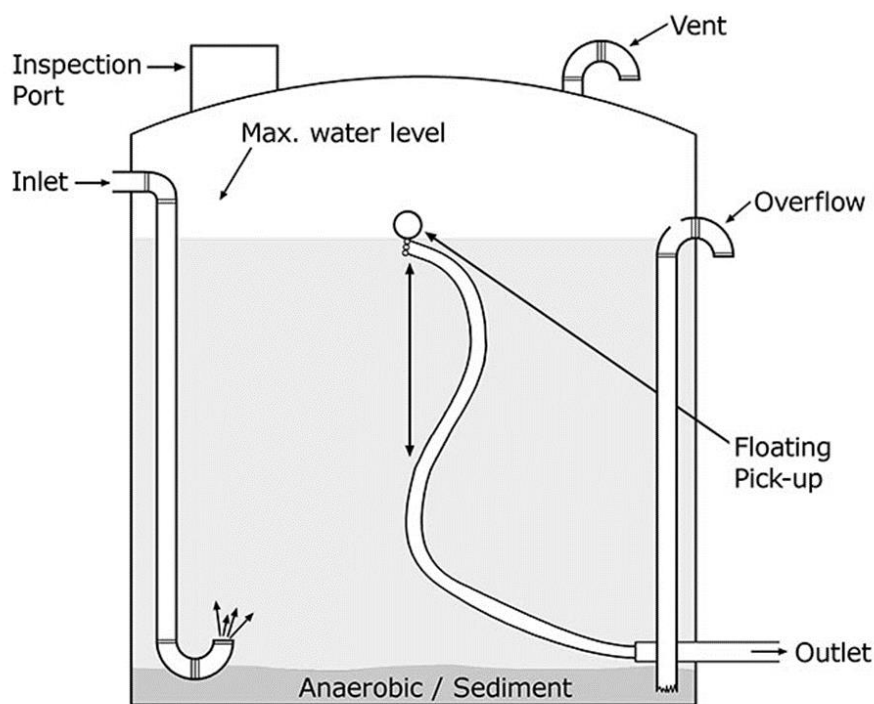


Figure 6: Typical Cross-Section of RWT.

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Enviss® Sentinel Pits

A minimum of 57m² of driveway runoff will be diverted towards a minimum of one Enviss® sentinel pit before being released at the legal point of discharge. This will reduce coarse and fine sediment levels. More information about the Enviss® Pits is provided in Appendix C.

The remainder of impervious areas will directly be released at the legal point of discharge on site.

Permeable areas are excluded from the STORM assessment.

It should be noted that permeable areas have been maximised in the development which will reduce the overall stormwater outflows from the site. Vegetated areas are provided in the proposed development reducing the heat island effect and improving the local habitat.

Stormwater Results

The initiatives and areas described above have been applied to the STORM calculator and the proposed development has achieved a score of 100%.



STORM Rating Report

TransactionID: 0
 Municipality: DAREBIN
 Rainfall Station: DAREBIN
 Address: 14 Hopetoun Avenue
 Reservoir
 VIC 3073
 Assessor: Frater Consulting Services
 Development Type: Residential - Extension
 Allotment Site (m2): 382.40
 STORM Rating %: 100

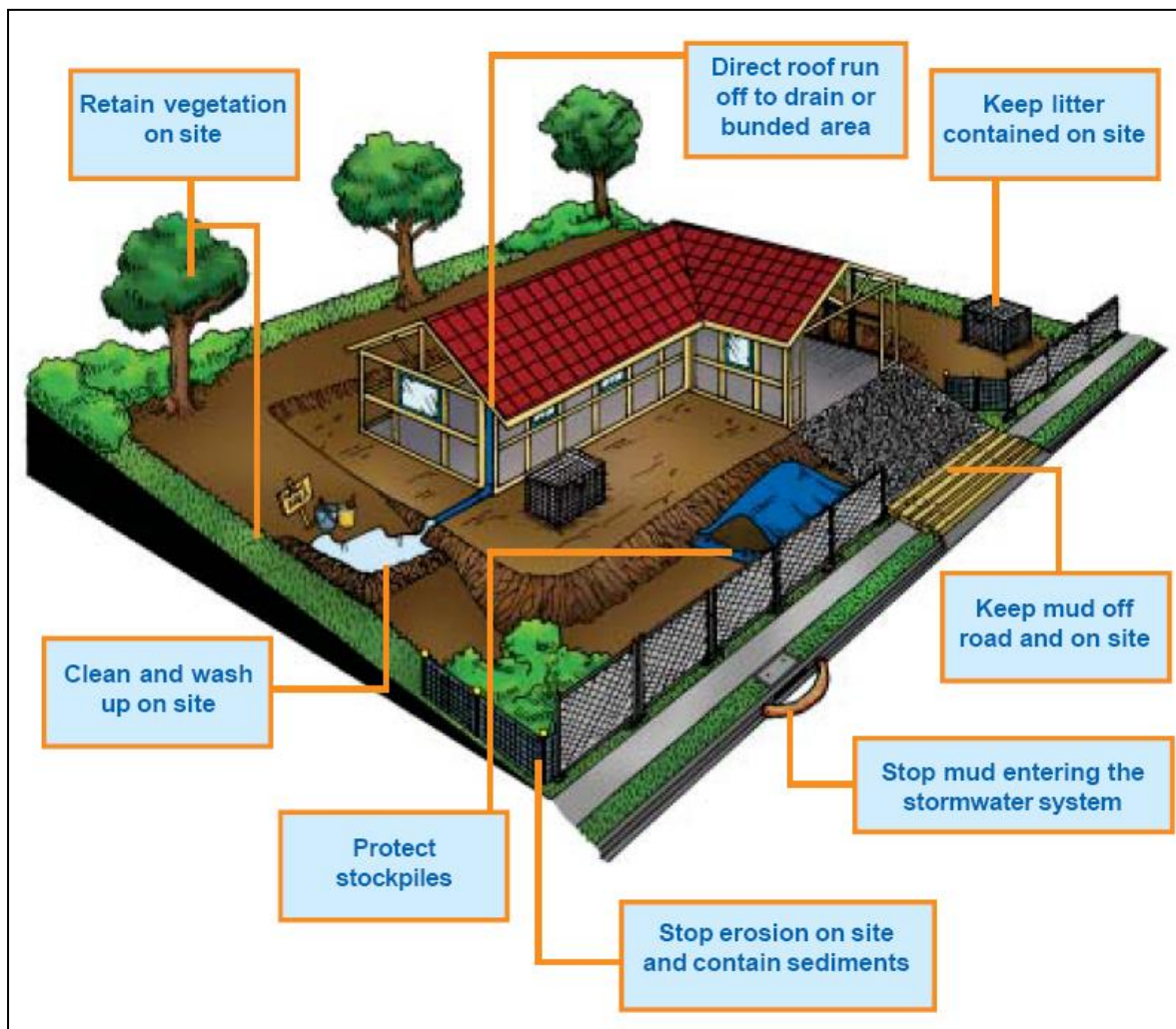
Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
U2 Roof to RWT	92.20	Rainwater Tank	3,000.00	3	142.60	90.70
Driveway to Enviss Pits	57.00	Raingarden 300mm	0.85	0	127.60	0.00
Other impervious areas	55.70	None	0.00	0	0.00	0.00

Please note that an additional occupant has been input in STORM for dwelling 2 to account for the laundry connection.

We have assumed that, on average, a household will have a 3 WELS star washing machine and will run two loads per week. Based on data from WELS, 3-Star washing machines have an average consumption per load of 102 L. Two loads per week would represent 204 L/week for laundry or 29L/day. STORM input assumes that one bedroom/occupant represents a daily consumption of 20L/day; therefore, connection to laundry (29L/day) has been input as an additional occupant.

Stormwater Management at Construction Site

To manage stormwater management in the construction stage, measures will be put in place to minimise the likelihood of contaminating stormwater. This will mean ensuring buffer strips are in place, sediment traps are installed, and the site will be kept clean from any loose rubbish. The builder will follow the process outlined in “Keeping Our Stormwater Clean – A Builder’s Guide”.



Copies of “Keeping Our Stormwater Clean – A Builder’s Guide” booklet can be downloaded from the following website.

<https://www.clearwatervic.com.au/resource-library/guidelines-and-strategy/keeping-our-stormwater-clean-a-builders-guide.php>

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APPENDIX B – WSUD MAINTENANCE & INSTALLATION

Installation

Rainwater Tank(s)

The rainwater tank(s) will be installed above ground. Its manufacturer or material has not been nominated. It will be installed with a mesh insect cover over the inlet pipe to ensure the tank does not become a breeding ground for pests. Mesh needs to be installed over overflow pipes, and if a manhole is present, it needs to be properly sealed.

Please refer to the architectural drawings for the location of the rainwater tank.

Pumps

The pumps required either to divert the stormwater runoff to the rainwater tank or to distribute the collected water to the end use (toilets and laundry) will be required to be installed as per the chosen manufacturer specifications.

Enviss® Sentinel Pits

The Enviss® Sentinel pit will be installed on site to collect stormwater runoff from a total of 57m² of the driveways.

Each pit shall be installed in strict accordance with the site plans and Rocla's site specific general arrangement drawings. Enviss® Pits are pre-packaged and are installed similarly to a standard precast stormwater pit.

The installing contractor is responsible for using the correct lifting equipment and ensuring the Permapave grate does not become exposed or filled with deleterious materials. All pits should be set on a stable granular or compacted gravel sub-base in accordance with the project specifications for trafficable stormwater pits.

Inspection Requirements

Rainwater Tanks

Inspections of roof areas and gutters leading to the tank should take place every 6 months. Rainwater in the tanks should be checked every 6 months for mosquito infestation.

The rainwater tank should be examined every 2 years for sludge buildup.

Ensure the monitoring system (be it digital or a simple float system) is functioning properly by checking the water level in the rainwater tanks.

Pumps

The pumps required will be required to be routinely inspected by listening for the day-to-day operation of the pumps. Unusual noise or no noise should be investigated. Inspection should occur as per the chosen manufacturer's specifications.

Enviss® Sentinel Pits

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Regular monitoring is required to be undertaken within the first two-year maintenance period to ensure that the sediment trap does not block due to periods of above average sediment load (after period of heavy rainfall or every 6 months).

Clean Out / Maintenance Procedure

Rainwater Tank, Roof and Gutters

Rainwater tanks will require the roof and gutters onsite to be maintained; gutters should be checked, maintained and cleaned every six months to avoid blockages from occurring. If a leaf-blocking system is installed this can be completed annually.

Any trees onsite should be maintained every 6 months with branches overhanging the roof removed.

Water ponding in gutters should be avoided as this provides a breeding ground for mosquitos; tanks should also not become breeding grounds for mosquitoes. If mosquitoes are detected in the tank remedial steps need to occur to prevent breeding. If mosquitoes or other insects are found in rainwater tanks, the point of entry should be located and repaired. As well as preventing further access, this will prevent the escape of emerging adults. Gutters should be inspected to ensure they do not contain ponded water and be cleaned if necessary.

Please refer to <https://www.health.vic.gov.au/sites/default/files/2022-11/Keeping-your-rainwater-tank-safe-from-mosquitos.pdf> for more information on mosquito control.

Rainwater tanks should be checked by a regular maintenance person every 3-6 months to ensure that connection to the building is maintained and there are no blockages.

A simple way to ensure the tank is operating as intended would be through the installation of a smart monitoring device (e.g. OneBox®). These systems allow users to operate tanks remotely from the internet or smartphone, monitor and control the tanks in real time, allow the automatic release of stored water before storm events, alert users if there is any blockage and view tank history and usage patterns.

Alternatively, onsite tank gauges can help those familiar with the tank know if the tank is not working correctly.

Pumps

Maintenance should occur as per the chosen manufacturer's specifications. All strainers and filters should be cleaned every 6 months. Good quality pumps should provide trouble-free service for up to 10 years.

Enviss® Sentinel Pits

Each Enviss® Sentinel Pits consists of three layer of filter technology:

- Filtration grating;
- One sediment trap; and
- Two filter media bags.

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Each layer of the Enviss® pits should be replaced (bags) or thoroughly cleaned (grating) at least once every two years or where routine inspections show it to be necessary.

The filtration grate can be cleaned by mechanical vacuum or jetting. If jetting is used the grating must be first removed from the pit and cleaned in an area where runoff from jetting will not enter the Enviss pit. Remove and replace the grating using standard pit cover lifting tools and key where a lock down is fitted. Vacuum cleaning can be completed while the grate is in place.

The sediment trap bag is removed using the lifting points integrated into the sediment trap bag. Access to the sediment trap bag is achieved by removing the grating lid, using standard pit cover lifting tools and key where a lock down mechanism is fitted. The used sediment trap should be replaced with a clean one, and are available from Rocla® or Enviss®.

Each Sentinel pit contains two media bags. The bags are removed using the lifting points integrated into the bags. To remove the media bags, the grating and the sediment trap need to be removed. The media bags are heavy (approximately 80kg) particularly if they are still wet. Where possible the media bags should be replaced during dry periods to minimise the weight of the bags. The used media bags should be replaced with new ones and are available from Rocla® or Enviss®.

Commissioning

Rainwater Tank

All rainwater tanks should be washed or flushed out before use. All inlets and outlets should be correctly sealed to prevent insects from entering. Connection to all toilets and laundry in the development should be tested (dye test or equivalent).

Please note if new roof coating or paint is to be installed then the first few run-offs after installation need to be discarded.

Pumps

Commissioning should occur as per the chosen manufacturer's specifications.

Enviss® Sentinel Pits

Enviss® Sentinel pits are pre-packaged and ready to use when installed on site.

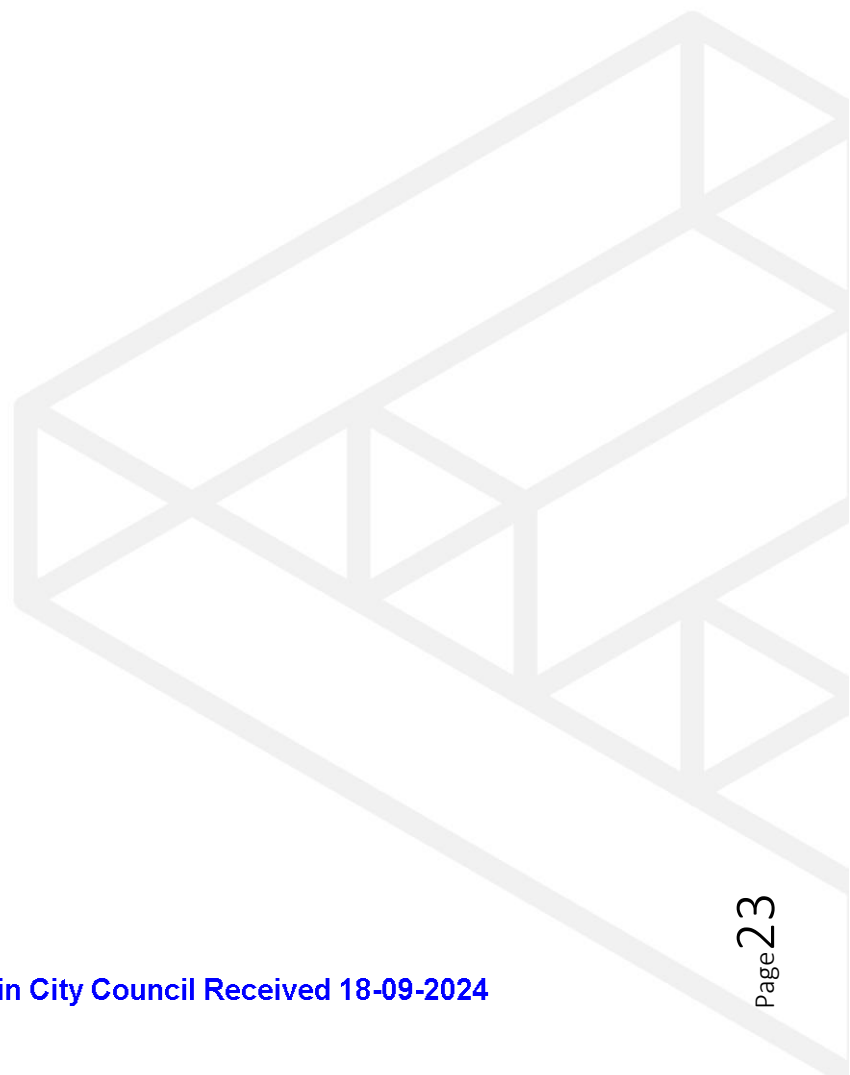
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Summary

The following needs to occur onsite to ensure compliance with WSUD requirements and maintain the operation of the rainwater tank and connections onsite.

Task	When?	Requirement
Inspect Rainwater tanks	Every 6 months	<ul style="list-style-type: none">• Check for any damage/compression• Mosquitoes infestation
	Every 2 years	<ul style="list-style-type: none">• Sludge Build up – if sludge build up occurs a vacuum tank needs to be called out to site.
Inspect roofs & gutters	Every 6 months	<ul style="list-style-type: none">• Clean out of leaves / debris.• Remove any overhanging branches onsite.
Inspection of Envis [®] Pits	Every 6 Months or following long period of heavy rainfall	<ul style="list-style-type: none">• Check Sediment build-up to avoid blocking of the grate



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APPENDIX C – ENVISS® SENTINEL TECHNICAL INFORMATION



envissSentinel™ Pits



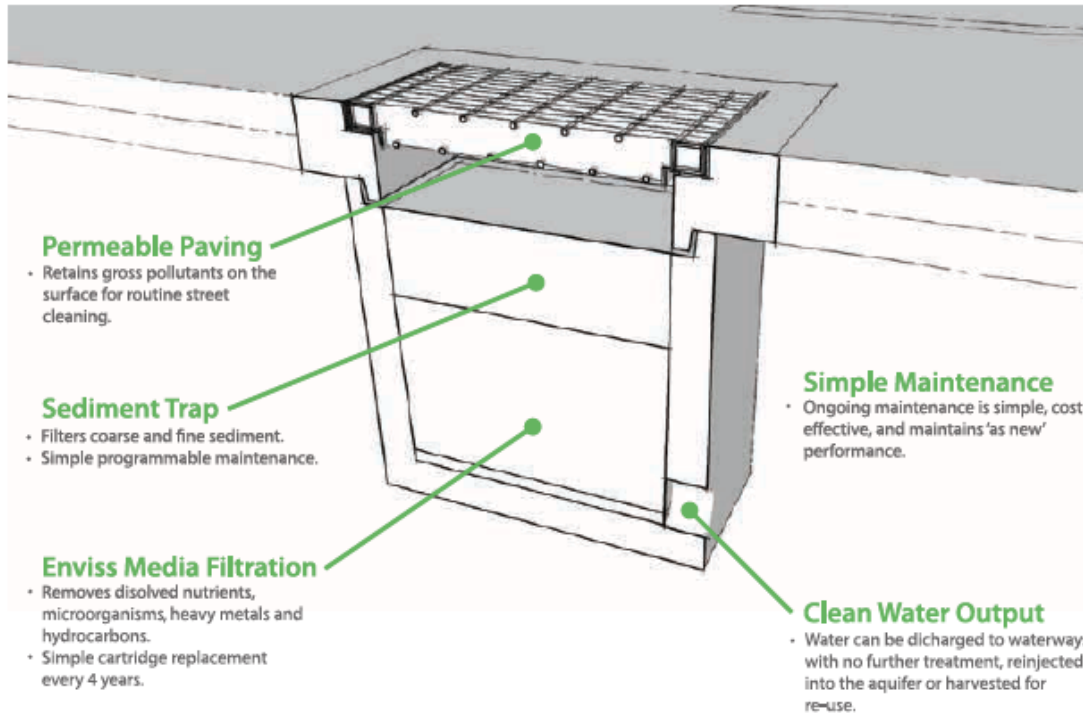
envissSentinel™ Pits are a unique alternative to raingardens and wetlands, to treat stormwater run-off in residential, commercial and industrial areas. Water filtered in the three-stage treatment train can be discharged, reinjected to the aquifer or harvested for re-use.

The unique design allows for increased flexibility in implementation and land area savings of 85% compared to alternatives. The pits are delivered complete, ready to install.

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envissSentinel™ Pits A Distributed Water Treatment Solution



Advantages

Verified Performance

- Developed, tested and verified by Monash University's Engineering Department.
- Reliable and predictable performance.
- Meets regulatory run-off requirements.

85% Space Saving

- Only 15% of equivalent raingarden or wetland surface area required.
- Trafficable surface allows for even greater land saving in high-density areas.

Simple Maintenance Cycle

- Sustainable, predictable and low cost maintenance cycle.
- No degradation in long-term performance.

Flexible, Modular Design

- Engineered to be scalable with low design costs.
- Simple MUSIC integration with EnvisDT modelling software provided.
- Increased design flexibility.

High Flow Rates And Treatment Performance

- Lowers cost of downstream treatment.
- Can target specific pollutants groups for trouble spots.

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Removal Rates Exceed Guidelines

Pollutants	Australian Run-off Quality Guidelines	envissSentinel™ Filter Media
Total Suspended Solids	80%	96%
Total Phosphorous	45%*	67%
Total Nitrogen	45%	79%
Aluminium		77%
Cadmium		95%
Chromium		87%
Copper		88%
Iron		85%
Lead		81%
Zinc		94%
Total Poly Aromatic Hydrocarbons		Not Detected
E.coli		N/A

*(60% in South-East Queensland)

Typical Maintenance Comparison

	Raingarden	envissSentinel™ Pits
Annual Maintenance	<ul style="list-style-type: none"> Remove sediment build-up Restore surface scouring Replace dead plants Remove weeds 	<ul style="list-style-type: none"> Clean grate and sediment trap.
Replacement	<ul style="list-style-type: none"> Divert flows around rain garden Excavate and remove media Clean under drains Replace media Revegetate system 	<ul style="list-style-type: none"> Replace media cartridge (after 4 years)

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Technical Bulletin

April 2015

envissSentinel™ Equivalency for STORM Calculator Raingardens

Melbourne Water has an on-line design tool - known as STORM Calculator - to assist in assessing the stormwater treatment requirements for small-scale developments within Melbourne.

The calculator uses basic input information about the subject catchment and assesses the relative compliance of the proposed solution in meeting the Melbourne Water 'Best Practice Environmental Management (BPEM) Guidelines – TSS – 80%, TP – 45%, TN – 45%. The output is presented as a rating (%) relative to these standard target figures.

Treatment measures available for selection include rainwater tanks, ponds, wetlands, infiltration, raingardens & buffer strips. Rocla has undertaken a comparative assessment of its envissSentinel™ Media Filter (using MUSIC V6.1) so as to provide a further option for design consultants to achieve desired treatment outcomes.

The following figures show relative equivalencies of the envissSentinel™ Media Filter to the Storm Calculator's raingarden estimate.

Raingarden Assumptions:

- Filter surface area is equal to ponding area
- Filter depth is 0.5m
- No soil exfiltration
- Hydraulic conductivity is 200mm/hr

Storm Calculator Assumptions:

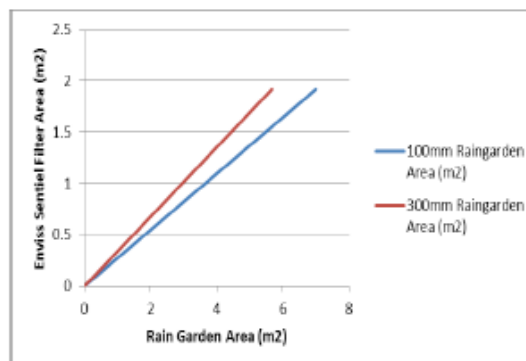
- 100% rating = BPEM Guidelines
- 80% TSS
 - 45% TP
 - 45%TN

General MUSIC V6.1 Assumptions:

MUSIC defaults are used except where replaced by Storm Calculator inputs.

envissSentinel™ Assumptions:

- Hydraulic conductivity is 2000mm/hr
- Ponding depth 50mm (flush with surface)

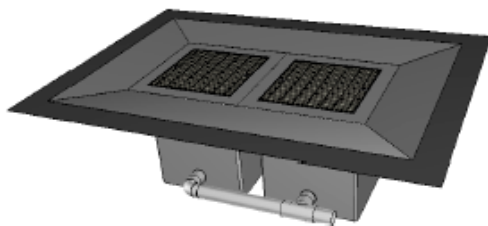




Technical Bulletin

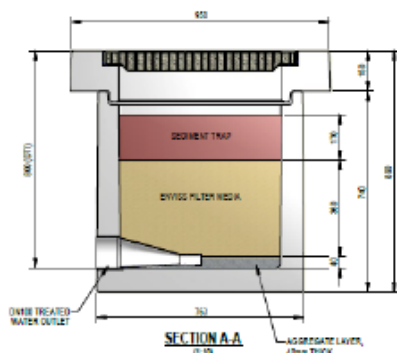
100mm Raingarden* Area (m ²)	300mm Raingarden#* Area (m ²)	EnvissSentinel™ (no. of Pits)
0.70	0.57	1
1.05	0.85	1
1.40	1.13	2
2.10	1.70	2
3.15	2.55	3
4.20	3.40	4
5.25	4.25	4
6.30	5.10	5
7.00	5.67	6

* Ponding depth above media surface with a projected area equal to the raingarden area.
 #** Needs to be positioned where extra ponding depth does not cause loss of serviceability or safety hazard



Typical Surface Inlet Arrangement

The comparison makes various assumptions about the options modelled (stated above), but key to the comparison is that the envissSentinel™ requires no pre-designated area be set aside for ponding and functional planting with pits placed directly within paved areas, flush with the surface.



envissSentinel™ Media Filter Pit

envissSentinel™ requires only 50mm ponding, which is provided between the permeable paver and the top of the sediment trap



APPENDIX D – VOC & FORMALDEHYDE EMISSION LIMITS

The following table is an extract of the Green Star Design and as-built submission guidelines:

Table 13.1.1: Maximum TVOC Limits for Paints, Adhesives and Sealants

Product Category	Max TVOC content in grams per litre (g/L) of ready to use product.
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	16
Trim, varnishes and wood stains	75
Primers, sealers and prep coats	65
One and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

The product complies with the Total VOC (TVOC) limits specified in the Table below.

Carpet Test Standards and TVOC Emissions Limits

Test protocol	Limit
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 - TVOC at three days	0.5 mg/m ² per hour
ISO 10580 / ISO/TC 219 (Document N238) - TVOC at 24 hours	0.5mg/m ² per hour

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Table 13.2: Formaldehyde Emission Limit Values for Engineered Wood Products

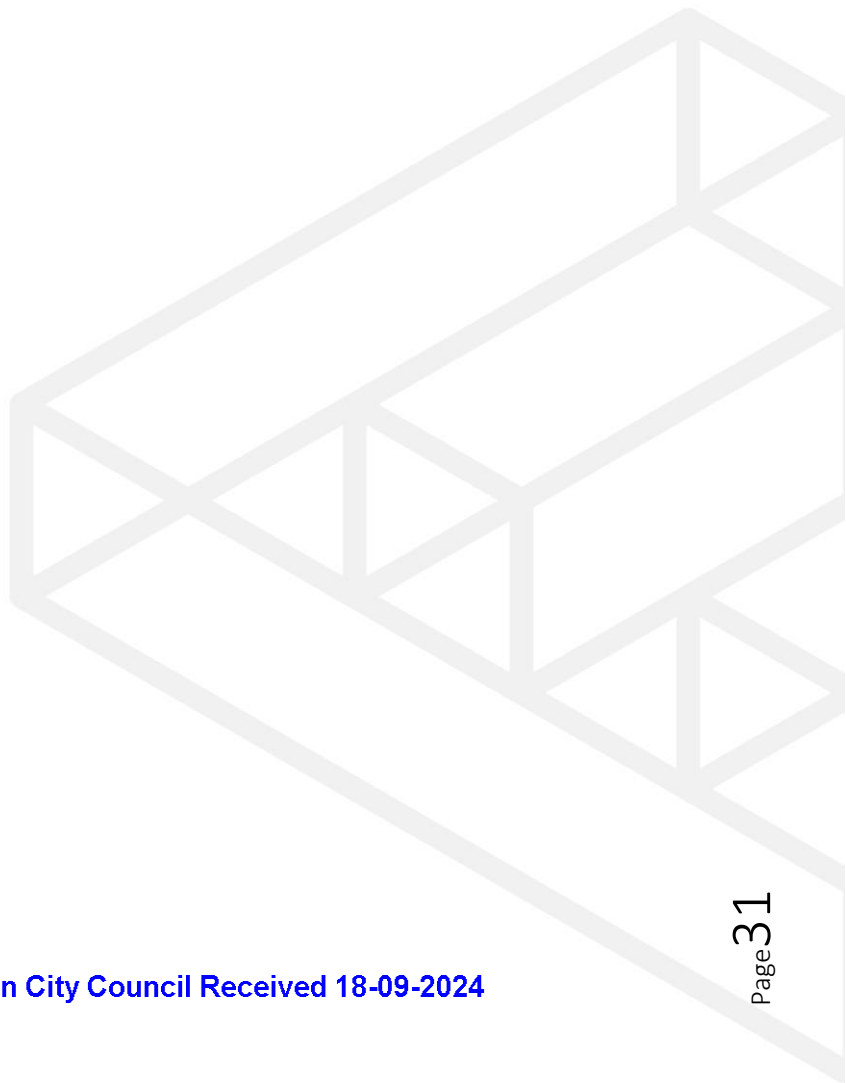
Test Protocol	Emission Limit/ Unit of Measurement
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1mg/ L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 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 ² hr*
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1 mg/m ² hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m ² hr (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 ² hr

*mg/m²hr may also be represented as mg/m²/hr.

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APPENDIX E – BESS ASSESSMENT



Darebin City Council Received 18-09-2024

BESS Report

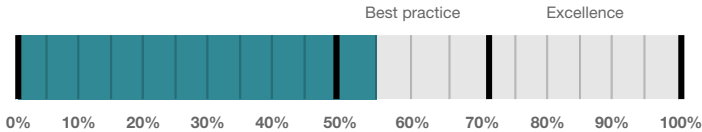
Built Environment Sustainability Scorecard



This BESS report outlines the sustainable design commitments of the proposed development at 14 Hopetoun Ave Reservoir Victoria 3073. 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 Darebin 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



56%

Project details

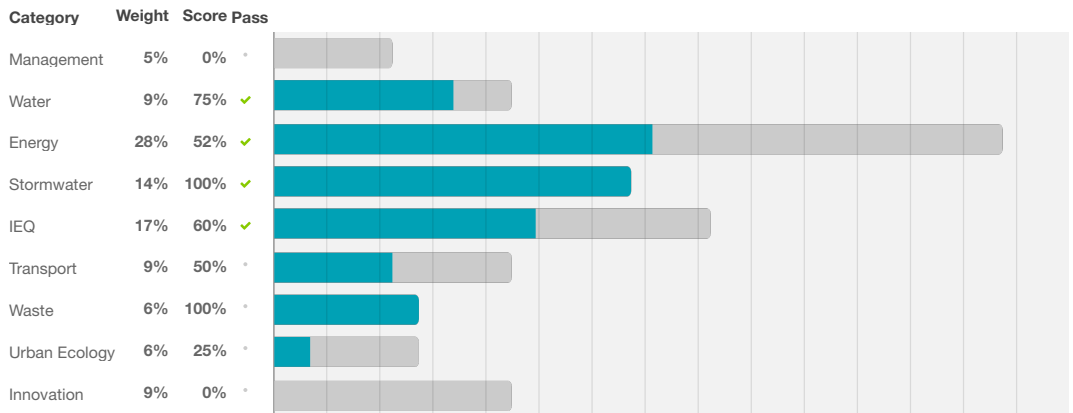
Address 14 Hopetoun Ave Reservoir Victoria 3073
Project no 8FD9C85E-R1
BESS Version BESS-8

Site type Multi dwelling (dual occupancy, townhouse, villa unit etc)
Account phillip@fraterconsultingservices.com.au
Application no.
Site area 512.00 m²
Building floor area 93.79 m²
Date 13 September 2024
Software version 2.0.0-B.559



Performance by category

● Your development ● Maximum available



Dwellings & Non Res Spaces

Dwellings

Name	Quantity	Area	% of total area
Townhouse			
Unit 2 (New)	1	93.8 m ²	100%
Total	1	93 m²	100%

Supporting information

Floorplans & elevation notes

Credit	Requirement	Response	Status
Water 3.1	Annotation: Water efficient garden details		-
Energy 3.3	Annotation: External lighting controlled by motion sensors		-
Energy 3.4	Location of clothes line (if proposed)		-
Stormwater 1.1	Location of any stormwater management systems (rainwater tanks, raingardens, buffer strips)		-
IEQ 2.2	Annotation: Dwellings designed for 'natural cross flow ventilation' (If not all dwellings, include a list of compliant dwellings)		-
IEQ 3.1	Annotation: Glazing specification (U-value, SHGC)		-
Transport 1.1	Location of residential bicycle parking spaces		-
Waste 2.1	Location of food and garden waste facilities		-
Urban Ecology 2.1	Location and size of vegetated areas		-

Supporting evidence

Credit	Requirement	Response	Status
Energy 3.5	Average lighting power density and lighting type(s) to be used		-
Stormwater 1.1	STORM report or MUSIC model		-
IEQ 2.2	A list of dwellings with natural cross flow ventilation		-
IEQ 3.1	Reference to floor plans or energy modelling showing the glazing specification (U-value and Solar Heat Gain Coefficient, SHGC)		-
Waste 1.1	Details regarding how the existing building is being reused on-site		-

Credit summary

Management Overall contribution 4.5%

		0%
1.1 Pre-Application Meeting		0%
2.2 Thermal Performance Modelling - Multi-Dwelling Residential		0%
4.1 Building Users Guide		0%

Water Overall contribution 9.0%

		Minimum required 50%	75%	✓ Pass
1.1 Potable Water Use Reduction			70%	
3.1 Water Efficient Landscaping			100%	

Energy Overall contribution 27.5%

		Minimum required 50%	52%	✓ Pass
1.2 Thermal Performance Rating - Residential			0%	✓ Achieved
2.1 Greenhouse Gas Emissions			0%	
2.6 Electrification			100%	
2.7 Energy consumption			100%	
3.3 External Lighting			100%	
3.4 Clothes Drying			100%	
3.5 Internal Lighting - Houses and Townhouses			100%	
4.4 Renewable Energy Systems - Other			N/A	✦ Scoped Out
No other (non-solar PV) renewable energy is in use.				
4.5 Solar PV - Houses and Townhouses			0%	⊘ Disabled
No solar PV renewable energy is in use.				

Stormwater Overall contribution 13.5%

		Minimum required 100%	100%	✓ Pass
1.1 Stormwater Treatment			100%	

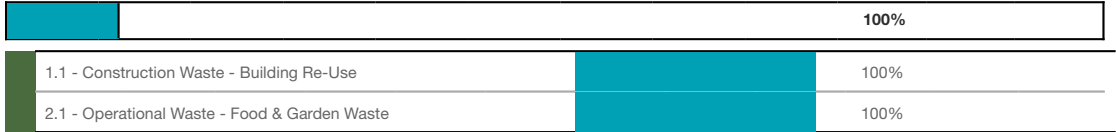
IEQ Overall contribution 16.5%

		Minimum required 50%	60%	✓ Pass
2.2 Cross Flow Ventilation			100%	
3.1 Thermal comfort - Double Glazing			100%	
3.2 Thermal Comfort - External Shading			0%	
3.3 Thermal Comfort - Orientation			0%	

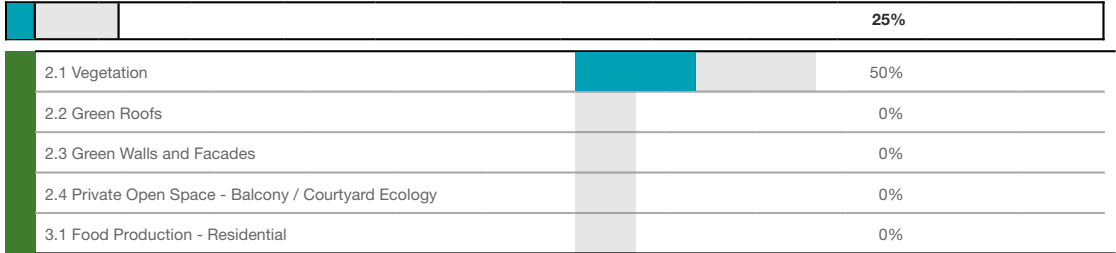
Transport Overall contribution 9.0%

			50%	
1.1 Bicycle Parking - Residential			100%	
1.2 Bicycle Parking - Residential Visitor			N/A	✦ Scoped Out
Not enough dwellings.				
2.1 Electric Vehicle Infrastructure			0%	

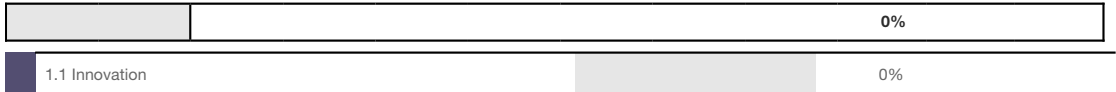
Waste Overall contribution 5.5%



Urban Ecology Overall contribution 5.5%



Innovation Overall contribution 9.0%



Credit breakdown

Management Overall contribution 0%

1.1 Pre-Application Meeting		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	
2.2 Thermal Performance Modelling - Multi-Dwelling Residential		0%
Score Contribution	This credit contributes 33.3% towards the category score.	
Criteria	Have preliminary NatHERS ratings been undertaken for all thermally unique dwellings?	
Question	Criteria Achieved ?	
Townhouse	No	
4.1 Building Users Guide		0%
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	No	



Water Overall contribution 7% Minimum required 50%

Water Approach	
What approach do you want to use for Water?:	Use the built in calculation tools
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
Fixtures, fittings & connections profile	
Showerhead:	4 Star WELS (>= 6.0 but <= 7.5)
Bath:	Scope out
Kitchen Taps:	>= 5 Star WELS rating
Bathroom Taps:	>= 5 Star WELS rating
Dishwashers:	>= 5 Star WELS rating
WC:	>= 4 Star WELS rating
Urinals:	Scope out
Washing Machine Water Efficiency:	Occupant to Install
Which 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
Rainwater tank profile	
What is the total roof area connected to the rainwater tank?: RWT	92.2 m ²
Tank Size: RWT	3,000 Litres
Irrigation area connected to tank: RWT	-
Is connected irrigation area a water efficient garden?: RWT	-
Other external water demand connected to tank?: RWT	-

1.1 Potable Water Use Reduction		70%
Score Contribution	This credit contributes 83.3% 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	138 kL	
Output	Proposed (excluding rainwater and recycled water use)	
Project	111 kL	
Output	Proposed (including rainwater and recycled water use)	
Project	72 kL	
Output	% Reduction in Potable Water Consumption	
Project	47 %	
Output	% of connected demand met by rainwater	
Project	100 %	
Output	How often does the tank overflow?	
Project	Very Often	
Output	Opportunity for additional rainwater connection	
Project	27 kL	
3.1 Water Efficient Landscaping		100%
Score Contribution	This credit contributes 16.7% towards the category score.	
Criteria	Will water efficient landscaping be installed?	
Question	Criteria Achieved ?	
Project	Yes	

Energy Overall contribution 15% Minimum required 50%

Dwellings Energy Approach	
What approach do you want to use for Dwellings?:	Use the built in calculation tools
Are you installing any solar photovoltaic (PV) system(s)?:	No
Are you installing any other renewable energy system(s)?:	No
Energy Supply:	All-electric
Dwelling Energy Profile	
Below the floor is:	Ground or Carpark
Above the ceiling is:	Outside
Exposed sides:	4
NatHERS Annual Energy Loads - Heat:	63.0 MJ/sqm
NatHERS Annual Energy Loads - Cool:	20.0 MJ/sqm
NatHERS star rating:	7.0
Type of Heating System:	Reverse cycle space
Heating System Efficiency:	3 Stars (2019 MEPS)
Type of Cooling System:	Refrigerative space
Cooling System Efficiency:	3 Stars (2019 MEPS)
Type of Hot Water System:	Electric Instantaneous
% Contribution from solar hot water system:	-
Clothes Line:	Private outdoor clothesline
Clothes Dryer:	Occupant to install
1.2 Thermal Performance Rating - Residential	0% ✔ Achieved
Score Contribution	This credit contributes 17.6% towards the category score.
Criteria	What is the average NatHERS rating?
Output	Average NATHERS Rating (Weighted)
Townhouse	7.0 Stars
2.1 Greenhouse Gas Emissions	0%
Score Contribution	This credit contributes 17.6% towards the category score.
Criteria	What is the % reduction in annual greenhouse gas emissions against the benchmark?
Output	Reference Building with Reference Services (BCA only)
Townhouse	2,034 kg CO2
Output	Proposed Building with Proposed Services (Actual Building)
Townhouse	2,368 kg CO2
Output	% Reduction in GHG Emissions
Townhouse	-17 %
2.6 Electrification	100%
Score Contribution	This credit contributes 17.6% towards the category score.
Criteria	Is the development all-electric?
Question	Criteria Achieved?
Project	Yes

2.7 Energy consumption		100%
Score Contribution	This credit contributes 23.5% towards the category score.	
Criteria	What is the % reduction in annual energy consumption against the benchmark?	
Output	Reference Building with Reference Services (BCA only)	
Townhouse	18,173 MJ	
Output	Proposed Building with Proposed Services (Actual Building)	
Townhouse	10,029 MJ	
Output	% Reduction in total energy	
Townhouse	44 %	
3.3 External Lighting		100%
Score Contribution	This credit contributes 2.9% towards the category score.	
Criteria	Is the external lighting controlled by a motion detector?	
Question	Criteria Achieved ?	
Townhouse	Yes	
3.4 Clothes Drying		100%
Score Contribution	This credit contributes 5.9% towards the category score.	
Criteria	What is the % reduction in annual energy consumption (gas and electricity) from a combination of clothes lines and efficient driers against the benchmark?	
Output	Reference	
Townhouse	455 kWh	
Output	Proposed	
Townhouse	90.9 kWh	
Output	Improvement	
Townhouse	80 %	
3.5 Internal Lighting - Houses and Townhouses		100%
Score Contribution	This credit contributes 2.9% towards the category score.	
Criteria	Does the development achieve a maximum illumination power density of 4W/sqm or less?	
Question	Criteria Achieved?	
Townhouse	Yes	
4.4 Renewable Energy Systems - Other		N/A  Scoped Out
This credit was scoped out	No other (non-solar PV) renewable energy is in use.	
4.5 Solar PV - Houses and Townhouses		0%  Disabled
This credit is disabled	No 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
1.1 Stormwater Treatment		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	

IEQ Overall contribution 10% Minimum required 50%

2.2 Cross Flow Ventilation		100%
Score Contribution	This credit contributes 20% towards the category score.	
Criteria	Are all habitable rooms designed to achieve natural cross flow ventilation?	
Question	Criteria Achieved ?	
Townhouse	Yes	
3.1 Thermal comfort - Double Glazing		100%
Score Contribution	This credit contributes 40% towards the category score.	
Criteria	Is double glazing (or better) used to all habitable areas?	
Question	Criteria Achieved ?	
Townhouse	Yes	
3.2 Thermal Comfort - External Shading		0%
Score Contribution	This credit contributes 20% towards the category score.	
Criteria	Is appropriate external shading provided to east, west and north facing glazing?	
Annotation	operable external sun shading to the west-facing first floor bedroom window will be provided	
Question	Criteria Achieved ?	
Townhouse	No	
3.3 Thermal Comfort - Orientation		0%
Score Contribution	This credit contributes 20% towards the category score.	
Criteria	Are at least 50% of main living areas orientated to the north?	
Question	Criteria Achieved ?	
Townhouse	No	

Transport Overall contribution 4%

1.1 Bicycle Parking - Residential		100%
Score Contribution	This credit contributes 50% towards the category score.	
Criteria	How many secure and undercover bicycle spaces are there for residents?	
Question	Bicycle Spaces Provided ?	
Townhouse	1	
Output	Min Bicycle Spaces Required	
Townhouse	1	
1.2 Bicycle Parking - Residential Visitor		N/A ✦ Scoped Out
This credit was scoped out		Not enough dwellings.
2.1 Electric Vehicle Infrastructure		0%
Score Contribution	This credit contributes 50% towards the category score.	
Criteria	Are facilities provided for the charging of electric vehicles?	
Question	Criteria Achieved ?	
Project	No	

Waste Overall contribution 6%

1.1 - Construction Waste - Building Re-Use		100%
Score Contribution	This credit contributes 50% 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	Yes	
2.1 - Operational Waste - Food & Garden Waste		100%
Score Contribution	This credit contributes 50% towards the category score.	
Criteria	Are facilities provided for on-site management of food and garden waste?	
Question	Criteria Achieved ?	
Project	Yes	

Urban Ecology Overall contribution 1%

2.1 Vegetation	50%
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?
Annotation	minimum of 10% of the site will be covered with vegetat
Question	Percentage Achieved ?
Project	10 %
2.2 Green Roofs	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
2.3 Green Walls and Facades	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
2.4 Private Open Space - Balcony / Courtyard Ecology	0%
Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Is there a tap and floor waste on every balcony and courtyard (including any roof terraces)?
Question	Criteria Achieved ?
Townhouse	No
3.1 Food Production - Residential	0%
Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	What area of space per resident is dedicated to food production?
Question	Food Production Area
Townhouse	-
Output	Min Food Production Area
Townhouse	1 m ²

Innovation Overall contribution 0%

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

Disclaimer

The Built Environment Sustainability Scorecard (BESS) has been provided for the purpose of information and communication. While we make every effort to ensure that material is accurate and up to date (except where denoted as 'archival'), this material does in no way constitute the provision of professional or specific advice. You should seek appropriate, independent, professional advice before acting on any of the areas covered by BESS.

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