Federation Centres The Glen

ESD Management Plan

Federation Centres The Glen Shopping Centre Redevelopment
235 Springvale Road, Glen Waverley

Revision: 02
Job No: 2558
Date: 27 March 2015

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Contents

1. Introduction

1.1 REPORT OBJECTIVES

This report forms the Environmentally Sustainable Development (ESD) Management Plan for the Glen redevelopment project. The project involves alterations to the existing shopping centre located on Springvale road and the development of three new residential towers to sit on top of the shopping centre. The redevelopment proposes the incorporation of sustainable design initiatives in order to achieve the following goals:

- Low Energy Use
- Low Water Consumption
- High Indoor Environment Quality
- Reduced waste
- Reduced environmental impact

A STEPS assessment has been completed in conjunction with this report and the results show that the residential building design satisfies the requirements of the STEPS scorecard. In addition, a response to the 10 key sustainable building categories is provided. These are:

- Indoor environment quality
- Energy efficiency
- Water efficiency
- Stormwater management
- Building materials
- Transport
- Waste management
- Urban ecology
- Innovation
- Construction and building management

The initiatives & design objectives specified in this ESD Management Plan are preliminary in nature only. Further consideration will be given to each measure through a detailed design process to ensure that the ESD outcome suggested is both achievable & warranted.

1.2 SUMMARY OF KEY INITIATIVES

- Good natural ventilation to apartments
- Daylighting to living and bedroom areas
- High levels of insulation in roof, walls and underfloor
- An average apartment energy rating of 6.0 stars for the development, as per BCA requirements
- Efficient gas hot water systems
- Efficient reverse cycle air conditioning systems
- Average residential lighting power density of 3.5 W/m^2, exceeding BCA energy efficiency requirements by 30%
- Occupancy sensors on common area and car park lighting and daylight sensors on external lighting
- Car park ventilation controlled by CO sensors
- Water efficient fixtures and fittings
- 100% STORM rating
- Bike parking facilities
- Excellent access to public transport
- Rainwater harvesting for irrigation and toilet flushing.

2. Passive Design Features

The buildings are proposed to incorporate passive design features in order to minimise the energy consumption. Incorporating passive design features into the buildings reduces the load on the mechanical and electrical systems within the building and should be the first step in maximising the sustainable design potential of a building. Passive design features proposed include:

- High Performance Glazing
- High Levels of Thermal Insulation
- Daylighting
- External Shading

2.1 HIGH PERFORMANCE GLAZING

It is proposed to provide performance glazing to new building areas. The objective of the performance glazing is to maximise daylighting opportunities whilst controlling solar gains and heat transfer to minimise energy use associated with air conditioning systems.

Performance glazing types to be considered include double glazing and high performance low-E glazing, subject to BCA Section J requirements.

Glazing for the residential component will be selected in order to meet the average 6 Star NatHERS rating standard.

2.2 HIGH LEVELS OF INSULATION

The buildings are proposed to incorporate bulk insulation within the floor, roof and walls to minimise the heat loss in winter and heat gain in summer.

Insulation levels will equal or exceed the minimum provisions outlined in the Building Code of Australia.

TABLE 1: INSULATION VALUES

Residential	
Building element	**Insulation R-value**
Roofs	R3.5
External walls	R2.5
Internal envelope walls	R1.5
Floor above unconditioned space	R1.0
Non-Residential	
Building element	**Total construction R-value**
Roofs	R3.2
External envelope walls	R2.8
Internal envelope walls	R1.0 – R1.8
Floor above unconditioned space	R1.0 – R2.0

2.3 EXTERNAL SHADING

External shading is proposed to allow full benefit of the winter sun whilst controlling unwanted heat gain from the summer sun.

Different methods of external shading are to be considered for the shopping centre, including fixed architectural elements and appropriately sized overhangs which will be provided on the north, east and west facades.

The layout and alignment of the apartments on each level of the buildings helps ensure each apartment has adequate shading. The projection of the balconies/shading devices will help reduce solar gain during summer, but still allow heat gain during winter as the sun is at a lower angle.

2.4 AIRLOCK

To maintain indoor conditions and reduce the heat gain/loss through opening doors, consideration will be given to air locks at entrances.

2.5 HOUSE ENERGY RATING

The residential development will achieve at least a 6.0 star average NatHERS rating demonstrating the high energy efficiency of the building fabric.

These rating values indicate that the thermal properties of the building exceed the minimum requirement of the 2014 Building Code of Australia (BCA) Section J requirements. The major reasons for this high achievement are high thermal properties of the glass and building fabric, effective shading and good orientation.

3. Active Design Features

The heat and lighting loads on the building will be minimised via the passive design features as seen in the previous section of this report. To further reduce the energy consumed by the building active systems are proposed to minimise energy through design and control. Active design features proposed include the following:

- Air conditioning incorporating free cooling and night purging
- Independent zoning of air conditioning
- Efficient artificial lighting systems
- Intelligent artificial lighting control systems
- Energy management and monitoring
- Efficient refrigeration systems

3.1 AIR-CONDITIONING INCORPORATING FREE COOLING AND NIGHT PURGING

To minimise the energy used by the air conditioning plant the system may incorporate:

- Free Cooling
- Night Purging

Free cooling provides increased outside air to the space when the external conditions are favourable, providing free cooling instead of operating the compressors within the air conditioning equipment.

Outside air economy on retail centres can provide exceptional energy savings in a Melbourne climate and the associated reduction of energy use is high. To put this energy saving into context, the addition of outside air economy operation is equivalent to increasing the plant efficiency by 35%.

Night purging introduces cool night-time air into the retail/mall spaces when unoccupied during the summer months to pre-cool the space and reduce the load and hence energy consumed by the air conditioning equipment. This can be achieved when the conditions are suitable by running the air-handling units in fresh-air economy mode while using the smoke exhaust fans to exhaust warm air from the mall areas.

3.2 INDEPENDENT ZONING OF AIR CONDITIONING

It is proposed to maximise the use of independently zoned air conditioning systems. This results in reduced energy use due to the following:

- Air conditioning systems operate more efficiently because their capacity and selection are able to be closely matched to the specific requirements of the particular zone that they serve.
- Some tenancies will operate on their own systems to allow for street-front trading outside centre opening hours.

3.3 AIR CONDITIONING FOR APARTMENTS

The apartments will be generally heated and cooled via efficient reverse cycle split system air conditioning. All residential air conditioning systems will utilise refrigerant which has zero Ozone Depletion Potential (ODP).

3.4 EFFICIENT ARTIFICIAL LIGHTING SYSTEMS

Poorly designed or controlled lighting systems can use a significant amount of energy. By selecting efficient light fittings, significant energy savings can be achieved. A list of commonly used lamps with typical efficacies (~ lamp efficiency) is shown below:

- Fluorescent 100 lumens/watt
- Metal Halide 90 lumens/watt
- Light Emitting Diodes (LED) 80 lumens/watt
- Dichroic (Low Voltage) 30 lumens/watt

The development will be designed to create an effective set out of light fixtures and minimise the problem of over-lighting. Efficient light fittings, such as a combination of LED, compact fluorescent and metal halide lighting will be used dependant on the requirement of the particular area. No incandescent or dichroic (halogen downlight) lighting will be used in this development.

Utilising efficient fittings will allow the development to achieve an average 30% improvement compared to the BCA minimum requirements (3.5 W/m^2, compared to 5 W/m^2).

3.5 INTELLIGENT ARTIFICIAL LIGHTING CONTROL SYSTEMS

Whilst efficient artificial lighting systems are used throughout the project, the most energy and greenhouse gas emissions savings can be made by implementing a control system that allows the artificial lighting to be switched off when not in use. To minimise the energy consumed by artificial lighting when not required the following control strategies to be considered for implementation are:

- Car park and internal public lighting to be controlled via a timing switch and/or motion detectors
- External lighting to be controlled by daylight sensors
- Internal public lighting in zones near glazing and skylights to be controlled/dimmed by daylight sensors (daylight harvesting)
- Each tenancy/zone within the centre to be individually switched.
- Lobbies to be controlled via occupancy sensors.
- Each zone within the apartments to be individually switched.

3.6 INTELLIGENT MONITORING FOR MECHANICAL VENTILATION

Sensors will be provided to ensure that mechanical ventilation systems do not operate more than they are required. Initiatives may include:

- Carbon monoxide (CO) monitoring for car park ventilation and variable-speed-drive (VSD) fan motors.
- Carbon dioxide (CO2) monitoring for air-conditioning to control the outside-air supply rate.
- Temperature sensors monitoring ambient conditions to allow the use of 100% outside-air economy operation of air-conditioning when the conditions are suitable.
- Toilet exhausts operated with timer switching to operate only when the centre is in use. This will be controlled by the centre's BMS.

3.7 DOMESTIC HOT WATER SYSTEMS

The development will incorporate high efficiency continuous flow gas hot water systems to serve the residences. This system will be comprised of centralised rooftop plant providing hot water to each apartment. These systems have the following advantages over other hot water systems:

- Low greenhouse gas emissions using natural gas
- On-demand hot water supply
- Metering at each apartment providing accurate billing and price signalling
- High efficiency systems will be used.

3.8 ENERGY MANAGEMENT AND MONITORING

A large proportion of energy can be wasted by a poorly tuned building, which can be difficult to determine without adequate sub metering. To enable the building energy to be monitored for fluctuations from normal operation (fault indication) and observe variations from the design, sub meters will be provided on all base building energy systems. Metering is provided on all substantial loads, including:

- Mechanical
  - Air conditioning
  - Car park ventilation
  - Common area supply air system
- Electrical
  - Internal public lighting
  - External lighting and signage
- Vertical Transportation
  - Passenger lifts/escalators

Individual metering will also be provided for each tenancy to allow the users to monitor and control their own energy use.

3.9 RENEWABLE ENERGY SYSTEMS

Renewable energy technologies will be investigated for use in the development to reduce the development's greenhouse emissions and help protect the centre from rising energy prices. Technologies that will be investigated include:

- Solar hot water
- Solar PV

4. Indoor Environment Quality

4.1 NATURAL VENTILATION

Buildings with effective natural ventilation allow air conditioning systems to be switched off and also have the advantage of improved indoor environment quality. This residential development supports the use of natural ventilation by providing large sliding doors to balconies and courtyards, as well as openable windows to other areas. Natural ventilation for air movement can be expected to occur under the following conditions:

- Single sided, single opening: 1.5 x ceiling height = 4m zone
- Single sided, multiple openings: 2.5 x ceiling height = 6.75m zone
- Cross-ventilation: 5 x ceiling height = 13.5m zone

Following these guidelines, the development provides good natural ventilation potential, with all living areas and bedrooms opening onto balconies, external façade, or light courts.

The natural ventilation zones and openings for typical apartments are shown in the following figures.

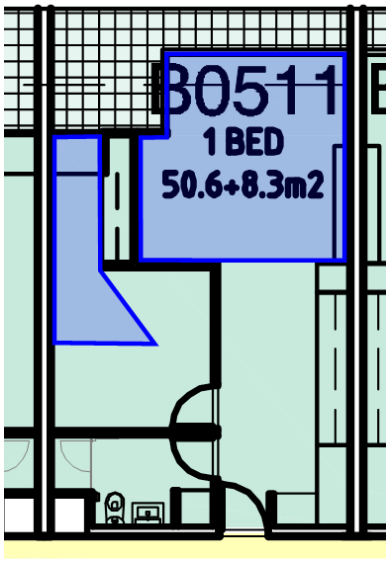


FIGURE 1: NATURAL VENTILATION ZONES AND OPENINGS – TYPICAL 1 BED APARTMENT

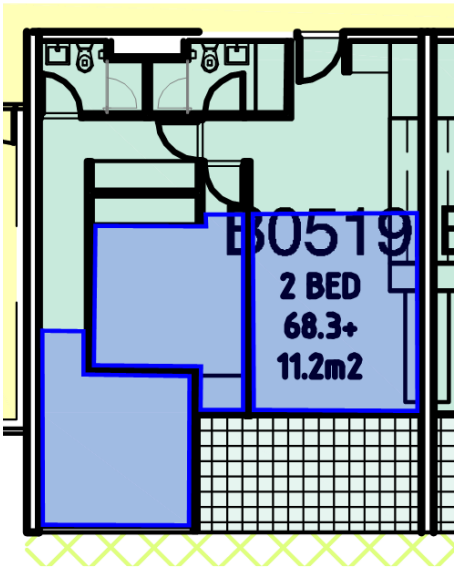


FIGURE 2: NATURAL VENTILATION ZONES AND OPENINGS – TYPICAL 2 BED APARTMENT

4.2 NATURAL LIGHTING

Providing a high level of day lighting allows artificial lighting to be switched off, saving energy and also improving the indoor environment quality.

It is proposed to provide good access to natural light to occupied areas of the development, generally providing improved internal environment quality.

Retail
In order to maximise the indoor environment quality and reduce artificial lighting energy, tenancies that are on the external perimeter will use a reasonable proportion of performance glazing to provide natural lighting penetration. Access to daylight will also be provided via the skylights at selected locations through the common mall areas. Where practical, daylight control measures shall be included (such as louvers, awnings, etc.) such that natural light can be maximised whilst minimising associated heat gain.

Residential
In order to maximise the indoor environment quality and reduce artificial lighting energy use it is recommended that all occupied spaces achieve a high level of natural lighting. Indirect natural light penetration is generally limited to within 1.5 to 2.5 times the window head height (WHH).

Daylit depth for bedrooms and living areas in typical apartments is shown in the following figures.

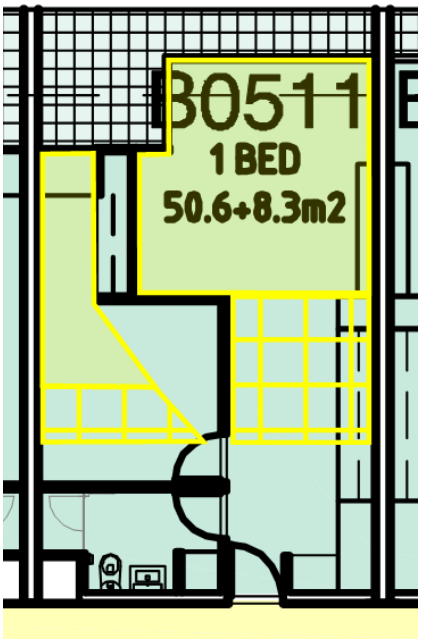


FIGURE 3: DAYLIT DEPTH FOR TYPICAL 1 BED APARTMENT

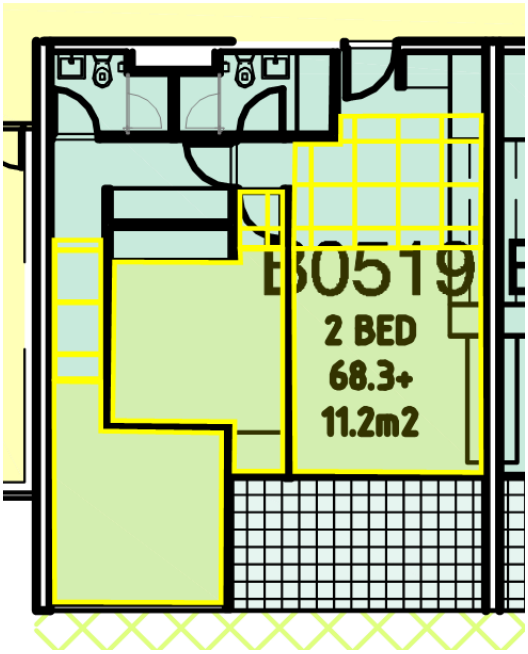


FIGURE 4: DAYLIT DEPTH FOR TYPICAL 2 BED APARTMENT

4.3 ARTIFICIAL LIGHTING

Residential

High levels of lighting (minimum 300 Lux) will be provided at all task-specific locations throughout the apartments, specifically:

- Kitchen Sink
- Stove/Cooktop
- Vanity Basins

4.4 THERMAL COMFORT AND CONTROL

Residential

Thermally comfortable indoor environments depend on two over-arching design strategies:

- Moderation of outdoor extremes using passive design
- Control of the indoor environment via manually controlled adaptive devices, such as fans, heaters, or air conditioners

These are both provided by the design. Achieving NatHERS ratings of average 6.0 stars ensures the building fabric, glazing and orientation appropriately moderate the external environment and reduce reliance on active heating and cooling. In addition, control is provided by efficient reverse cycle air conditioning systems and openable windows.

4.5 MECHANICAL VENTILATION

Retail

Mechanical extraction will be required for amenities and other areas to the requirements of AS1668.2. This helps ensure the air quality within the centre remains high by effectively removing any air that might contain pollutants or odours.

The air-conditioning system will allow the supply of 100% outside air in suitable weather conditions, which provides clean, fresh air to the centre.

Residential

Dedicated mechanical extraction will be provided for all bathrooms and kitchens. This ensures the air quality within the apartment remains high and helps avoid mould and condensation problems. All other habitable spaces will have access to operable windows for natural ventilation, thus saving on fan, heating and cooling energy when possible.

4.6 HAZARDOUS MATERIALS AND VOC'S

In all stages of construction and operation, the development will minimise the use of products and materials that are considered hazardous in nature or which have significant VOC levels. Refer to Materials section for further details.

4.7 ACOUSTIC TREATMENT

Appropriate acoustic treatment will be provided for the residential apartments and the portion of the shopping centre that is being altered to ensure the EPA guidelines and the requirements of AS2107 are met.

5. Water Consumption

The project aims to minimise potable water consumption, through a range of measures including:

- Rainwater capture storage and re-use (Refer to Stormwater Management section)
- Efficient fixtures and fittings
- Efficient appliances
- Drought tolerant planting and landscaping
- Water metering

5.1 EFFICIENT FIXTURES

To minimise the water consumed, water fittings and fixtures will be selected to achieve high water efficiency ratings as follows:

- Basins: 5 Star WELS rating (not more than 6 L/min)
- Toilets: 4 Star WELS rating (4.5L / 3L)
- Showers: 3 Star WELS rating (not more than 7.5 L/min)
- Urinals: 6 Star WELS (waterless)
- Accessible Taps: 3 Star WELS

5.2 LANDSCAPING

To reduce water consumption due to landscape irrigation, the landscaping design will give preference to species that are either indigenous or drought-tolerant.

5.3 MINIMISE DEAD LEGS

Water wastage will be reduced through careful design by reducing heated water outlet piping length (dead leg) to reduce water consumption before full temperature water delivery.

5.4 WATER METERING

Water sub-metering will be included as part of the tenancy requirements for high water using tenants (i.e. food, mini-majors etc) and also on major public water uses if applicable.

Individual cold water meters will be provided for every apartment.

5.5 HEAT REJECTION WATER

The new residential development will utilise only air-cooled mechanical plant, which will save significant quantities of water compared to an equivalent system that rejects heat through a cooling tower.

6. Stormwater Management

6.1 STORMWATER

The collection and storage of rainwater from roof areas for non-potable water uses is the most economic and practically manageable water efficiency approach; following demand management strategies and provides the added advantage of reducing the load on the stormwater system.

Melbourne Water STORM Rating Report

TransactionID:	204614
Municipality:	MONASH
Rainfall Station:	MONASH
Address:	235 Springvale Rd
	Glen Waverley
	VIC 3150
Assessor:	ADP Consulting
Development Type:	Residential - Multiunit
Allotment Site (m2):	15,358.00
STORM Rating %:	101

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
Roof	1,470.00	Rainwater Tank	20,000.00	40	95.00	77.10
Roof	937.00	None	0.00	0	0.00	0.00
Roof	1,890.00	Rainwater Tank	15,000.00	25	57.00	82.00
Carpark/footpaths	9,479.00	Raingarden 100mm	125.00	0	120.00	0.00

FIGURE 5: STORM ASSESSMENT

The installation of rainwater tanks for the purposes of irrigation and toilet flushing will be implemented for this residential development. A preliminary STORM assessment shows that a 20000 Litre rainwater tank for Tower C and a 15000 Litre rainwater tank for Tower B, connected to all the toilets on Level 3, Level 3.5 and Level 4 (of Towers B and C) will exceed the minimum score for on-site stormwater treatment with good water reliability (average 80%).

In conjunction with this a rain garden of 125 m^2 minimum size will be implemented to receive and filter rain run-off from roofs or hard surfaces such as paving.

7. Site Emissions and Waste Management

The project aims to minimise the site emissions in the form of:

- Sewerage
- Operational waste
- Construction waste
- Construction environmental impacts

7.1 SEWERAGE

Sewerage emissions will be significantly reduced through utilising efficient fixtures and fittings.

7.2 RECYCLING

Sufficient space for the separation and collection of recycling and other waste streams will be provided. The waste systems will consider receptacle volumes, the frequency and paths for waste to be centralised, and the access, frequency and timing of collection service.

Recyclable materials entering the general waste stream will be minimised from the development by providing:

- Recycling bins within the mall areas for customer use
- Recycling facilities within the waste areas for the tenants use

7.3 EXISTING VEGETATION

No native trees or shrubs are present on the site that is being redeveloped, hence the project will not result in a reduction in existing vegetation.

7.4 CONSTRUCTION WASTE

A construction waste management plan (WMP) must be provided prior to works commencing which includes but is not limited to, the following:

- The WMP must address all requirements of the City of Monash
- The contractor must ensure that at least 80% by mass of waste generated during construction is diverted to landfill and instead re-used or recycled. This may be carried out on site or on bulk basis by the waste contractor. This requirement excludes soil or other materials from clearing or excavation and hazardous materials.

8. Construction and Building Management

8.1 ENVIRONMENTAL MANAGEMENT

The contractor is required to prepare and implement a project-specific Environmental Management Plan (EMP) for site construction works, to the satisfaction of the consenting authority. The implementation of the EMP in compliance with requirement should be demonstrable via an internal audit trail.

The EMP must include a statement outlining construction measures to prevent litter, sediments and pollution entering stormwater systems.

8.2 COMMISSIONING OF BUILDING SYSTEMS

Building services will be commissioned in line with AIRAH, ASHRAE and/or CIBSE recommendations.

During design and construction the project team will ensure that the design team and contractor will provide a full suite of documentation to the building owner covering As-Built drawings, operations and maintenance manuals, and commissioning reports.

8.3 BUILDING USERS GUIDE

A simple building users guide will be produced which will include information relevant to building owners, occupants and tenants' representatives.

The guide will include information on energy and environmental strategies, monitoring and targeting, building services, transport facilities, materials and waste policy, references and any other relevant information.

9. Materials

Materials used within the development will, where possible, be selected to minimise the environmental impact. Materials will be selected with the following considerations:

- Durability
- Environmentally preferable products
- Material Origin

9.1 DURABILITY

Materials will be selected to be durable to minimise replacement.

9.2 ENVIRONMENTALLY

Materials, in particular timbers, are to be selected to be sourced from forests incorporating sustainable practices.

9.3 ENVIRONMENTALLY PREFERABLE PRODUCTS

Material selections are to consider the environmental impact of production. In particular:

- All feature timber is to be sourced from plantations complying with the Australian Forestry Standard or Forest Stewardship Council.
- 60% of typical PVC uses on the project are to utilise PVC complying with the Green Building Council of Australia's Best Practice Guidelines, or use non-PVC materials.
- All concrete proposals must include incorporation of industrial waste products, recycled aggregate, and/or recycled water.
- Precast concrete which has a low embodied energy shall be used in lieu of in-situ concrete where appropriate.

9.4 MATERIAL ORIGIN

Materials will be selected with a preference given to local over imported materials, due to the transportation emissions associated with imported materials.

9.5 FORMALDEHYDE MINIMISATION

Any engineered timber products used within the project will have low or no formaldehyde content. Products containing formaldehyde must comply with E0 or E1 standards, or equivalent.

9.6 STEEL

The steel that is used in this project will consist of the following:

Structural Steel

- High strength material and permanently marked with its strength grade.
- Supplied by a steel supplier that is accredited to the Environmental Sustainability Charter of the Australian Steel Institute.

Reinforcing Steel

- High strength material.
- Produced using energy-reducing processes (measured by average mass by the steel maker annually)
- To have a recycled material content of 50% or greater

9.7 THERMAL INSULATION

All thermal insulation materials will have zero Ozone Depletion Potential (ODP).

9.8 LOW-TOXICITY MATERIALS

Materials containing Volatile Organic Compounds (VOCs) emit fumes at room temperatures and have been linked to a variety of health problems including respiratory disorders and eye, nose and throat irritation. They are commonly found in products such as paints, sealants, adhesives, and wall, ceiling and floor coverings. When selecting these items, Table 2 through Table 5 will be followed.

TABLE 2: TOTAL VOC LIMITS FOR PAINTS AND VARNISHES

Product Type	Max TVOC Content (g/l of ready-to-use product)
Walls and ceilings – interior semi gloss	16
Walls and ceilings – interior low sheen	16
Walls and ceilings – interior flat washable	16
Ceilings – interior flat	14
Trim – gloss, semi gloss, satin, varnishes and woodstains	75
Timber and binding primers	30
Latex primer for galvanized iron and zincalume	60
Interior latex undercoat	65
Interior sealer	65
One and two pack performance coatings for floors	140
Any solvent-based coatings whose purpose is not covered in table	200

TABLE 3: MAX TVOC CONTENT LIMITS FOR ADHESIVES AND SEALANTS

Product Type	Max TVOC Content (g/l of product)
Indoor carpet adhesive	50
Carpet pad adhesive	50
Wood flooring and Laminate adhesive	100
Rubber flooring adhesive	60
Sub-floor adhesive	50
Ceramic tile adhesive	65
Cove base adhesive	50
Dry Wall and Panel adhesive	50
Multipurpose construction adhesive	70
Structural glazing adhesive	100
Architectural sealants	250

TABLE 4: CARPET TVOC EMISSIONS LIMITS

Carpet	Max TVOC Emission Limit (mg/m^2 per hour)
Total VOC Limit	0.5
4-PC (4-Phenylcyclohexene)	0.05

TABLE 5: WALL, FLOOR AND CEILING COVERING TVOC EMISSIONS LIMITS

Coverings other than carpets	Max TVOC Emission Limit (mg/m^2 per hour)
TVOC at 3 days	5
TVOC at 28 days	0.5

10. Transport

10.1 PUBLIC TRANSPORT

The site has good access to public transport. Located on High street and Springvale road, there is direct access to multiple bus routes outside the existing shopping centre entrance and it is a short walk to Glen Waverley train station. Refer to Figure 6.

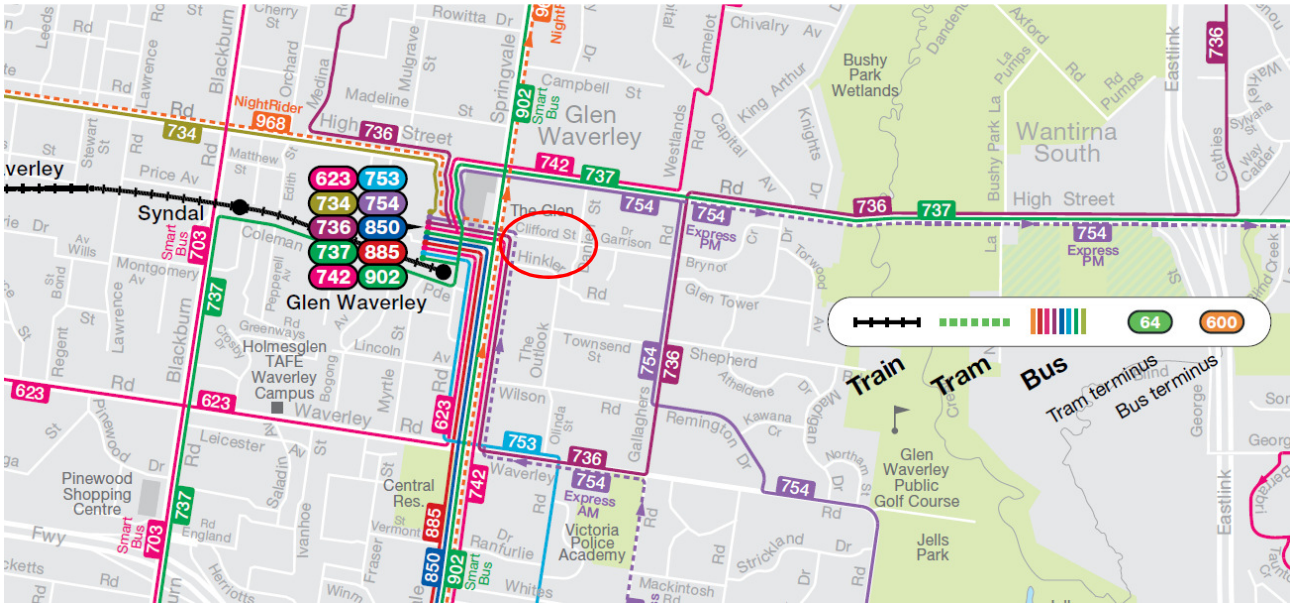


FIGURE 6: PUBLIC TRANSPORT MAP SOURCE: METLINK MELBOURNE

An initiative that will be explored for this development is to provide extensive public transport information at key points (entrances, central mall areas etc) around the centre (not just at the existing bus interchange). This could include timetables, route maps, walking directions to nearby bus stops and the train station, and real-time departure information connected to the transport authorities' vehicle tracking systems.

10.2 CYCLIST FACILITIES

Retail

To promote visitors and staff to cycle to the centre, the following initiatives will be incorporated and/or are currently existing:

- Staff end-of-trip facilities, including showers, lockers and bike storage.
- Visitor bike storage located in the Level 1M retail carpark. Total of 182 bike spaces.

Residential

To encourage cycling (reducing private vehicle use) at the site, convenient and secure bicycle facilities for residents and visitors will be provided at the following locations:

- Level 3 (Residential Parking Level) - A total of 21 bike spaces are provided.
- Level 3M (Residential Parking Level) – A total of 63 bike spaces are provided.
- Level 4 (Residential Parking Level) – A total of 20 bike spaces are provided.

Additional options for bicycle storage include lift access to apartments.

10.3 PEDESTRIANS

Pedestrians will be encouraged through the inclusion of safe footpaths and zebra crossings.

10.4 WALKABILITY

Walkscore.com measures the walkability of any address worldwide by assessing proximity to nearby amenities such as schools, groceries, shopping, parks, errands and entertainment. Amenities within a 5 minute walk are given maximum points, decreasing to a maximum walk distance of 30 minutes. The score out of 100 corresponds with a rating (Table 6).

The development is rated as 'Walker's Paradise' with a walk score of 92, meaning daily errands do not require a car.

TABLE 6: WALK SCORE RATING SYSTEM

Walk Score	Description
90–100	**Walker's Paradise** Daily errands do not require a car.
70–89	**Very Walkable** Most errands can be accomplished on foot.
50–69	**Somewhat Walkable** Some errands can be accomplished on foot.
25–49	**Car-Dependent** Most errands require a car.
0–24	**Car-Dependent** Almost all errands require a car.

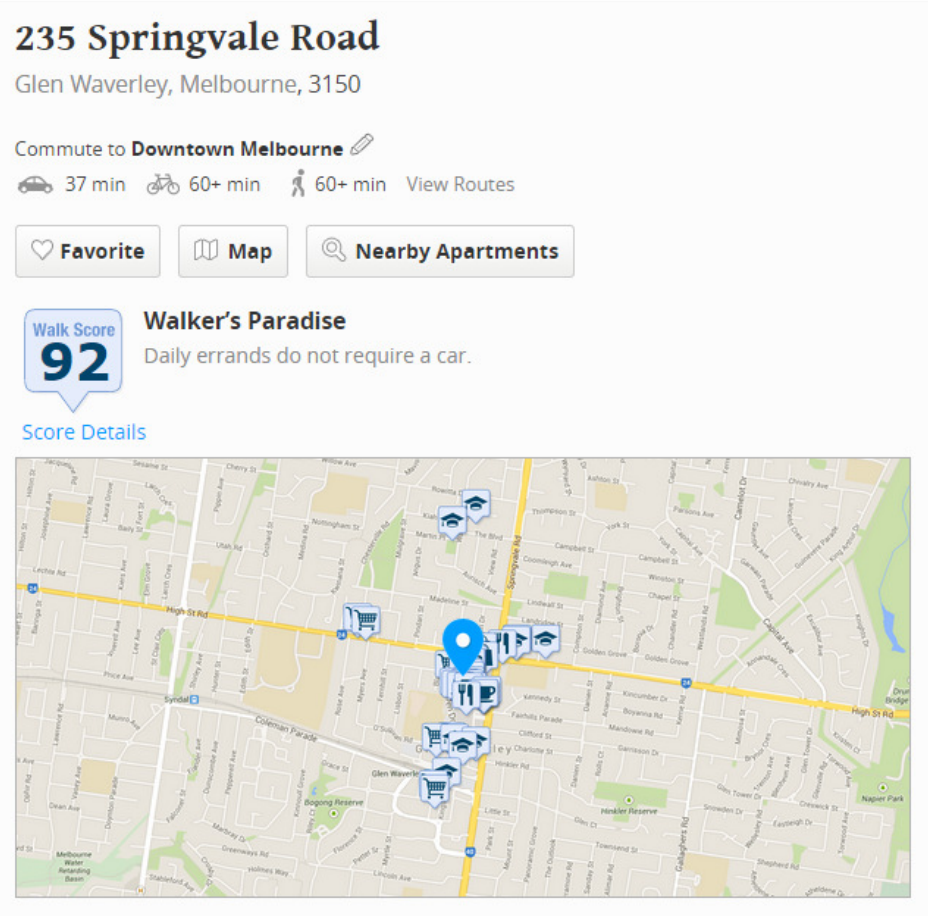


FIGURE 7: WALKABILITY SCORE

11. Urban Ecology

11.1 REUSE OF DEVELOPED LAND

The site is already fully developed; hence the ecological value of the site is not being reduced as a result of the proposed development.

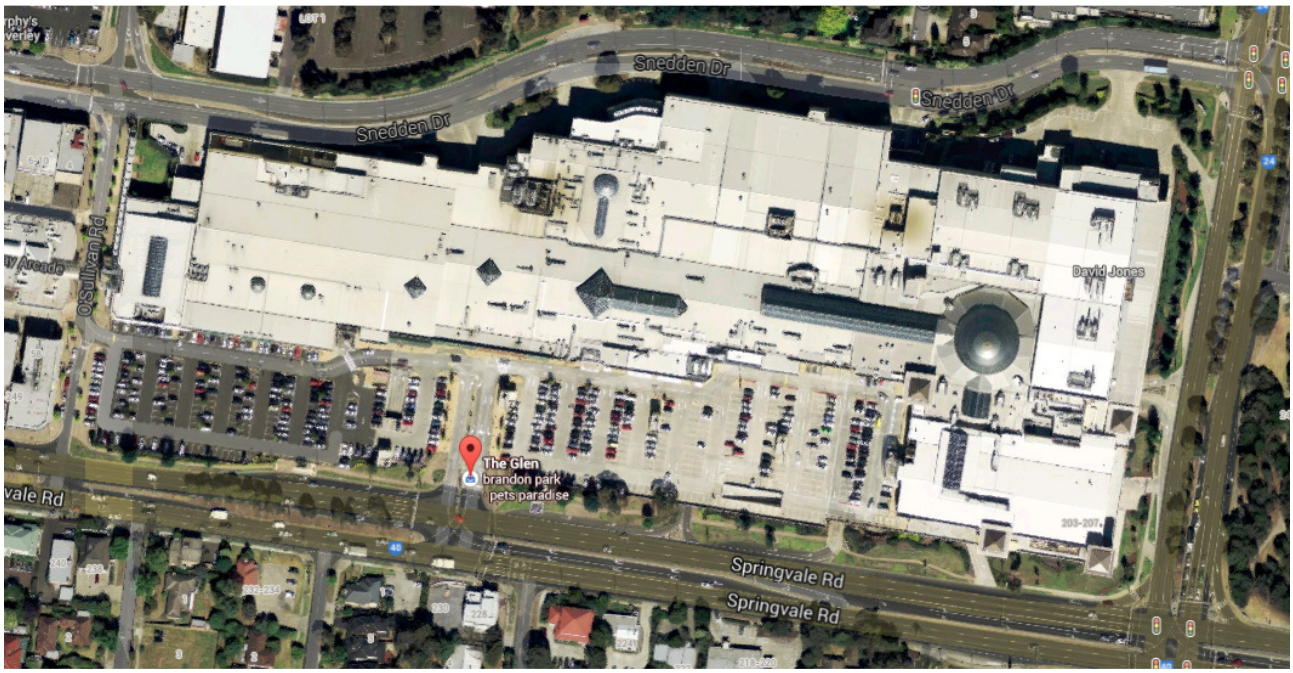


FIGURE 8: EXISTING USE OF PROJECT SITE

11.2 TOPSOIL

Where topsoil does not contain contaminants and is fit for reuse, it will be reused on the site for landscaping.

12. Innovation

The following innovative approaches to design have been incorporated into this project:

- Good apartment indoor environment quality through natural ventilation and lighting.
- Excellent shading of apartments.
- Excellent energy efficiency for air conditioners, gas hot water systems and lighting.

13. Implementation Schedule

The following schedule identifies the member of the project team responsible for implementing each ESD initiative, and the approximate timing for this to be carried out.

TABLE 7: IMPLEMENTATION SCHEDULE

Item	Responsible Party	Timing
High performance glazing Insulation Daylighting External shading Airlock	Architect	Construction documentation
Economy cycle and night purge Air conditioning zoning CO_2 monitoring and control Efficient refrigeration Mechanical ventilation Heat rejection water	Mechanical Services Engineer	Construction documentation
Efficient artificial lighting systems Lighting control systems Energy management and monitoring Renewable energy systems	Electrical Services Engineer	Construction documentation
Volatile organic compounds	Architect	Construction documentation
Efficient water fixtures	Architect	Construction documentation
Landscaping	Landscape Architect	Construction documentation
Minimise dead legs Water sub-metering Rainwater harvesting Sewerage	Hydraulic Services Engineer	Construction documentation
Recycling	Architect Waste Management Consultant	Construction documentation
Existing vegetation	Landscape Architect Civil Engineer	Construction
Construction waste	Builder	Construction
Durability Environmentally preferable products Material origin	Architect Builder	Construction documentation
Cyclist facilities Pedestrians	Architect Landscape Architect	Construction documentation

Appendix A – STEPS Assessment

A STEPS assessment has been completed for the development to provide a guide to the sustainability initiatives that will be implemented in the design.

In summary, the development achieves a total STEPS score of 261.6 against a minimum required score of 172 (Table 8). This highlights the high commitment to sustainable development in the design of the building.

TABLE 8: STEPS SUMMARY

Category	Required	Achieved
Greenhouse emissions from energy use	25%	32%
Peak energy use	10%	76%
Mains (drinking) water use	25%	36%
Stormwater quality impacts	100%	101%
Building material impacts	12%	16%
Waste management	102.25m²	TBC
Secure bicycle parks	108	104

Refer to the appendix for the full STEPS results.

STEPS v5.0 Report

Revision Timestamp: 2015-03-27 12:23:27
Base Project ID: 27997
Revision: 4f78a09caf373c98326c249f88ba3b4f

Project Details

Read the Guide to using STEPS before you begin an assessment

Project name	The Glen	Help
Assessor	ADP Consulting	Help
Contact email address	s.hutchinson@adpconsulting.com.au	
Street number and name	235 Springvale	Help
Street type	Road ▼	
Suburb	Melbourne	
Postcode	3150	
Municipality	Moreland City Council ▼	
Permit number		Help
Applicant		Help
Land size	15358 m^2	Help
Type of residence	Apartment ▼	Help
Number of bedrooms	141	Help
Total number of apartments (multi-unit developments only)	102	Help

Disclaimer:

The Moreland City Council does not accept any liability for loss or damages incurred as a result of reliance placed upon STEPS. STEPS is provided on the basis that all persons using STEPS undertake responsibility for assessing the relevance and accuracy of its content. Council takes no responsibility for any information or services on external websites linked to from this website.

STEPS predicts the environmental impacts of the development based on assumed usage patterns and long term climate. Actual environmental impacts will depend on actual building and appliance use patterns and efficiency as well as future climate. Information about environmental impacts should therefore be taken as indicative only and no guarantee is implied.

The Centre for Design at RMIT University makes no claim as to the accuracy or authenticity of the content of the materials element of STEPS, and does not accept liability to any person for the information or advice provided in it or incorporated into it by reference

Energy

For more information on products available for selection please see the Energy Appliances website.
Enter data and features of the average dwelling in the development.

Building Envelope Energy Rating heating score	110.4	MJ per m^2 Help
Building Envelope Energy Rating cooling score	27.6	MJ per m^2
Building Envelope Energy Rating conditioned area	54.5	m^2
Building Envelope Energy Rating energy star rating	6	stars
Heating system type	Reverse Cycle heating 3 stars (minimum)	Help
Heating system options	Room/Space Heating Only	Help
Cooling system type	Air-Conditioning, 3 stars (minimum required)	Help
Cooling system options	Room/Space Cooling Only	Help
Water heater type	Gas Instantaneous 3 stars (minimum)	Help
Lighting in living areas	LED Downlights / Spotlights	Help
Clothes-drying facility	No provision for drying space	Help
Renewable Electricity Generation		Help
Renewable System Size		kW (kilowatt peak output) Help

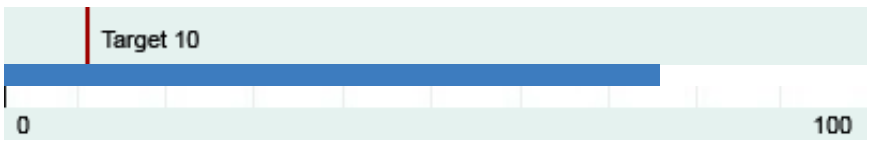
Output
Energy
Score **32**

0 equals the estimated average performance of a conventional design

Required Score	**25**	%
Project Score	**32**	%
Benchmark Emissions	**7551**	**kg CO_2 / yr / dwelling**
Target Emissions	**5663**	**kg CO_2 / yr / dwelling**
Heating Greenhouse Gas Emissions	192	kg CO_2 / yr / dwelling
Cooling Greenhouse Gas Emissions	97	kg CO_2 / yr / dwelling
Water Heating Greenhouse Gas Emissions	993	kg CO_2 / yr / dwelling
Lighting Greenhouse Gas Emissions	99	kg CO_2 / yr / dwelling
Clothes Drying	148	kg CO_2 / yr / dwelling
Misc incl TV, cooking, refrigerator, computer	3590	kg CO_2 / yr / dwelling
Minus Renewable Electricity Generation	-0	kg CO_2 / yr / dwelling
Total Emissions	**5119**	**kg CO_2 / yr / dwelling**

Peak Demand

Output
Peakdemand
Score **76**



0 equals the estimated average performance of a conventional design

Required Score	**10**	**%**
Project Score	**76**	**%**
Benchmark Peak Demand	**2**	**kW**
Target Peak Demand	**2**	**kW**
Calculated Peak Demand	**0.5**	**kW**

Water

For more information on products available for selection please see the WELS website.

Fittings (for the average dwelling)

Shower type	3 Star WELS (> 7.5 but <= 9.0) Help
Toilet	4 Star WELS rating Help
Basin taps	5 Star WELS rating Help
Bath type	Help

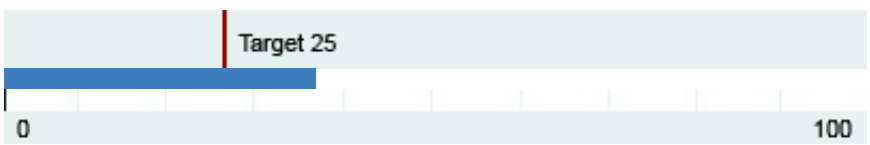
Re-use (for the whole building)

Rainfall area	Melbourne (Eastern) Help
Rainwater collection tank size	35000 L Help
Area of roof draining to rainwater tank	3360 m^2 Help
Comments on rainwater tank	Help
Alternative water supply other than rainwater tanks used (e.g. greywater, third pipe connection or on-site wastewater treatment and reuse)	Yes Help
Type of alternative water supply	
Are toilets permanently connected to the rainwater tank/alternative water source?	Yes Help
... and also, number of toilets connected to rainwater tank	65 Help
Is the irrigation system permanently connected to the rainwater tank/alternative water source?	Yes Help
Is the washing machine(s) permanently connected to the rainwater tank?	Yes Help
Is the hotwater services(s) permanently connected to the rainwater tank?	Yes Help
Irrigated garden area	1500 m^2 Help

Output

Water

Score **36**



0 equals the estimated average performance of a conventional design

Required Score	**25**	%
Project Score	**36**	%
Benchmark Mains Water Consumption	**125**	**kL / yr / dwelling**
Target Mains Water Consumption	**94**	**kL / yr / dwelling**
Shower	27.2	kL / yr / dwelling
Bath	0.0	kL / yr / dwelling
Misc hot water	27.2	kL / yr / dwelling
Toilet flushing	8.3	kL / yr / dwelling
Basins	3.4	kL / yr / dwelling
Evaporative cooler	0.0	kL / yr / dwelling
Irrigation	5.2	kL / yr / dwelling
Misc other water use	13.1	kL / yr / dwelling
Total water consumption	**84.4**	**kL / yr / dwelling**
Re-used toilet flushing	3.8	kL / yr / dwelling
Re-used Irrigation	0.0	kL / yr / dwelling
Re-used Laundry	0.0	kL / yr / dwelling
Re-used Hot Water Service	0.0	kL / yr / dwelling
Re-used Total	**3.8**	**kL / yr / dwelling**
Toilet usage from mains	4.5	kL / yr / dwelling
Irrigation usage from mains	5.2	kL / yr / dwelling
Misc other usage from mains	13.1	kL / yr / dwelling
Total hot water usage from mains	54.4	kL / yr / dwelling
Total usage from mains	**80.6**	**kL / yr / dwelling**

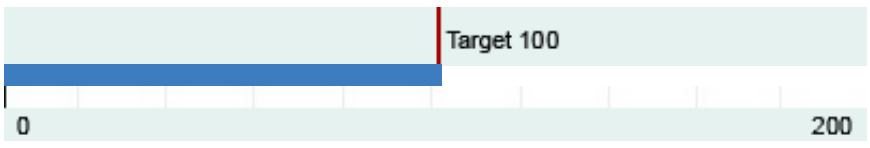
Stormwater

Read the Guide to STORM before you begin an assessment
Please visit the STORM website to obtain your STORM Score.

Enter STORM Score From Website 101 Help

Should MUSIC be used instead of STORM? Yes Help

Output
Stormwater
Score **101**



0 is equivalent to the typical urban pollutant loads

Required Score	**100**	**%**
Project Score	**101**	**%**
Best-Practice On-Site Stormwater Treatment	**100**	**%**

Materials

Read the Moreland Greenlist before you begin an assessment

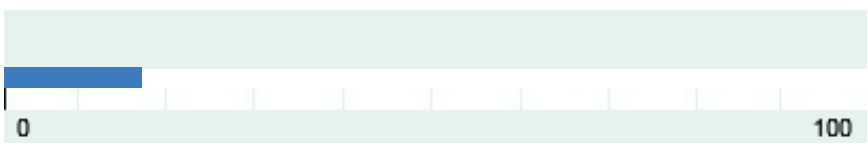
Building Element	Material Help	Points
Ground Floor Help		
Material 1	Standard Concrete Slab	10.8
Material 2		
Material 3		
Ground Floor Material average		**10.8**
Upper Floors Help		
Material 1	Standard Concrete Slab	3.0
Material 2	Timber Frame	3.2
Material 3		
Upper Floors Average		**3.1**
Wall Framing Help		
Material 1	Timber Frame	9.8
Material 2		
Material 3		
Wall Framing Average		**9.8**
Interior Wall Framing Help		
Material 1	Timber Frame	7.0
Material 2		
Material 3		
Interior Wall Framing Average		**7.0**
Wall Cladding Help		
Material 1	FC Sheet	11.7
Material 2		
Material 3		
Wall Cladding Average		**11.7**

Windows Help		
Material 1	Aluminium	3.0
Material 2		
Material 3		
Windows Average		**3.0**
Roof Framing Help		
Material 1	Timber frame	3.5
Material 2	Steel frame	2.2
Material 3		
Roof Framing Average		**2.9**
Roof Cladding Help		
Material 1	Steel sheet	3.5
Material 2		
Material 3		
Roof Cladding Average		**3.5**
Outdoor Structures Help		
Material 1		
Material 2		
Material 3		
Outdoor Structures Average		**0**
TOTALS:		**51.8**

Output

Materials

Score **16**



0 equals the estimated average performance of a conventional design

Required Score	**12**	**%**
Project Score	**16**	**%**
Benchmark Materials Impact	**45.5**	**points**
Target Materials Impact	**50.4**	**points**
Project Materials Impact	**51.8**	**points**

Note:
Points are derived from materials' fate, embodied energy, biodiversity, human health and toxicity. Target is dependant on the specified building elements

Report

Project Details

Contact	s.hutchinson@adpconsulting.com.au
Project	235 Springvale Road Melbourne 3150
Municipality	Moreland
Permit number	
Land size	15358 m^2
Type of residence	Apartment
Total number of bedrooms	141
Total number of apartments (multi-unit developments only)	102

Name	Required Score	Project Score
Greenhouse Emissions from Energy Use	25%	32%
Peak Energy Use	10%	76%
Mains (Drinking) Water Use	25%	36%
Stormwater Quality Impacts	100%	101%
Building Material Impacts	12%	16%
Waste Management - recyclables	76.50 m^2	
Waste Management - rubbish	25.50 m^2	
Waste Management - green waste	0.25 m^2	
Waste Management - TOTAL	102.25 m^2	
Transport: Secure bicycle parks required	108	
Project sustainability score		**261 / 500**

Upon completion of a STEPS assessment, prior to submission for a planning permit: print all pages of the assessment and ensure that the following are notated on the plans for endorsement (where applicable):

Energy

- fixed clothes drying racks; and
- the location of hot water systems (including marking solar panels on roof.)
- specifications used to achieve a 5-star FirstRate rating eg insulation and aluminium improved window framing;
- air-conditioning system and heating system types; and
- specified lighting types.

Water

- the rainwater tank, sized, and showing plumbing from the roof and to the toilets and/or garden.
- specified shower, toilet and basin types.

Stormwater

- the location, size and type of treatment systems;
- permeable paving areas;
- the proposed drainage to the treatment system; and
- section details, planting schedules and maintenance requirements of treatment types.

Materials

- material types.

Transport

- allocated bicycle parking spaces.

Waste

- allocated space for waste management.

Complete :

- an operational waste management plan for the site.

Innovation

Local Government encourages developers to consider inclusion of innovative environmental design solutions that may not be specified in STEPS. Should you wish to include additional environmentally sustainable design features in your proposed development, please notate them appropriately on the plans and include relevant design details in the planning application documentation.