Federation Centres The Glen

ESD Management Plan

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

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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/m², 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>
<thead>
<tr>
<th>TABLE 1: INSULATION VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential</strong></td>
</tr>
<tr>
<td>Building element</td>
</tr>
<tr>
<td>Roofs</td>
</tr>
<tr>
<td>External walls</td>
</tr>
<tr>
<td>Internal envelope walls</td>
</tr>
<tr>
<td>Floor above unconditioned space</td>
</tr>
<tr>
<td><strong>Non-Residential</strong></td>
</tr>
<tr>
<td>Building element</td>
</tr>
<tr>
<td>Roofs</td>
</tr>
<tr>
<td>External envelope walls</td>
</tr>
<tr>
<td>Internal envelope walls</td>
</tr>
<tr>
<td>Floor above unconditioned space</td>
</tr>
</tbody>
</table>

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/m², compared to 5 W/m²).

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.
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 (W HH).

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](image-url)
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.

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 m² 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.
The Glen Redevelopment – ESD Management Plan

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>
<thead>
<tr>
<th>TABLE 2: TOTAL VOC LIMITS FOR PAINTS AND VARNISHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Type</td>
</tr>
<tr>
<td>Walls and ceilings – interior semi gloss</td>
</tr>
<tr>
<td>Walls and ceilings – interior low sheen</td>
</tr>
<tr>
<td>Walls and ceilings – interior flat washable</td>
</tr>
<tr>
<td>Ceilings – interior flat</td>
</tr>
<tr>
<td>Trim – gloss, semi gloss, satin, varnishes and woodstains</td>
</tr>
<tr>
<td>Timber and binding primers</td>
</tr>
<tr>
<td>Latex primer for galvanized iron and zincalume</td>
</tr>
<tr>
<td>Interior latex undercoat</td>
</tr>
<tr>
<td>Interior sealer</td>
</tr>
<tr>
<td>One and two pack performance coatings for floors</td>
</tr>
<tr>
<td>Any solvent-based coatings whose purpose is not covered in table</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 3: MAX TVOC CONTENT LIMITS FOR ADHESIVES AND SEALANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Type</td>
</tr>
<tr>
<td>Indoor carpet adhesive</td>
</tr>
<tr>
<td>Carpet pad adhesive</td>
</tr>
<tr>
<td>Wood flooring and Laminate adhesive</td>
</tr>
<tr>
<td>Rubber flooring adhesive</td>
</tr>
<tr>
<td>Sub-floor adhesive</td>
</tr>
<tr>
<td>Ceramic tile adhesive</td>
</tr>
<tr>
<td>Cove base adhesive</td>
</tr>
<tr>
<td>Dry Wall and Panel adhesive</td>
</tr>
<tr>
<td>Multipurpose construction adhesive</td>
</tr>
<tr>
<td>Structural glazing adhesive</td>
</tr>
<tr>
<td>Architectural sealants</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 4: CARPET TVOC EMISSIONS LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpet</td>
</tr>
<tr>
<td>Total VOC Limit</td>
</tr>
<tr>
<td>4-PC (4-Phenylcyclohexene)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 5: WALL, FLOOR AND CEILING COVERING TVOC EMISSIONS LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverings other than carpets</td>
</tr>
<tr>
<td>TVOC at 3 days</td>
</tr>
<tr>
<td>TVOC at 28 days</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Walk Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>90–100</td>
<td>Walker’s Paradise</td>
</tr>
<tr>
<td></td>
<td>Daily errands do not require a car.</td>
</tr>
<tr>
<td>70–89</td>
<td>Very Walkable</td>
</tr>
<tr>
<td></td>
<td>Most errands can be accomplished on foot.</td>
</tr>
<tr>
<td>50–69</td>
<td>Somewhat Walkable</td>
</tr>
<tr>
<td></td>
<td>Some errands can be accomplished on foot.</td>
</tr>
<tr>
<td>25–49</td>
<td>Car-Dependent</td>
</tr>
<tr>
<td></td>
<td>Most errands require a car.</td>
</tr>
<tr>
<td>0–24</td>
<td>Car-Dependent</td>
</tr>
<tr>
<td></td>
<td>Almost all errands require a car.</td>
</tr>
</tbody>
</table>

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.

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**

<table>
<thead>
<tr>
<th>Item</th>
<th>Responsible Party</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>High performance glazing</td>
<td>Architect</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Insulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daylighting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External shading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airlock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economy cycle and night purge</td>
<td>Mechanical Services Engineer</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Air conditioning zoning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO₂ monitoring and control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficient refrigeration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat rejection water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficient artificial lighting systems</td>
<td>Electrical Services Engineer</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Lighting control systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy management and monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewable energy systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volatile organic compounds</td>
<td>Architect</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Efficient water fixtures</td>
<td>Architect</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Landscaping</td>
<td>Landscape Architect</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Minimise dead legs</td>
<td>Hydraulic Services Engineer</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Water sub-metering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainwater harvesting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewerage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recycling</td>
<td>Architect</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Waste Management</td>
<td>Consultant</td>
<td></td>
</tr>
<tr>
<td>Minimise dead legs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing vegetation</td>
<td>Landscape Architect</td>
<td>Construction</td>
</tr>
<tr>
<td>Civil Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction waste</td>
<td>Builder</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Durability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmentally preferable products</td>
<td>Architect</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Material origin</td>
<td>Builder</td>
<td></td>
</tr>
<tr>
<td>Cyclist facilities</td>
<td>Architect</td>
<td>Construction documentation</td>
</tr>
<tr>
<td>Pedestrians</td>
<td>Landscape Architect</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Category</th>
<th>Required</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse emissions from energy use</td>
<td>25%</td>
<td>32%</td>
</tr>
<tr>
<td>Peak energy use</td>
<td>10%</td>
<td>76%</td>
</tr>
<tr>
<td>Mains (drinking) water use</td>
<td>25%</td>
<td>36%</td>
</tr>
<tr>
<td>Stormwater quality impacts</td>
<td>100%</td>
<td>101%</td>
</tr>
<tr>
<td>Building material impacts</td>
<td>12%</td>
<td>16%</td>
</tr>
<tr>
<td>Waste management</td>
<td>102.25m²</td>
<td>TBC</td>
</tr>
<tr>
<td>Secure bicycle parks</td>
<td>108</td>
<td>104</td>
</tr>
</tbody>
</table>

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: 41f8a09ea377c98326c249f88ba3b4f

Project Details

Read the Guide to using STEPS before you begin an assessment

Project name: The Glen
Assessor: ADP Consulting
Contact email address: s.hutchinson@adpconsulting.com.au
Street number and name: 235 Springvale
Street type: Road
Suburb: Melbourne
Postcode: 3150
Municipality: Moreland City Council
Permit number: Help
Applicant: Help

Land size: 15358 m²
Type of residence: Apartment
Number of bedrooms: 141
Total number of apartments (multi-unit developments only): 102

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 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 m²
Building Envelope Energy Rating cooling score: 27.6 MJ per m²
Building Envelope Energy Rating conditioned area: 54.5 m²
Building Envelope Energy Rating energy star rating: 6 stars

- Heating system type: Reverse Cycle heating 3 stars (minimum)
- Heating system options: Room/Space Heating Only
- Cooling system type: Air-Conditioning, 3 stars (minimum required)
- Cooling system options: Room/Space Cooling Only
- Water heater type: Gas Instantaneous 3 stars (minimum)
- Lighting in living areas: LED Downlights / Spotlights
- Clothes-drying facility: No provision for drying space
- Renewable Electricity Generation: kW (kilowatt peak output)
- Renewable System Size: kW (kilowatt peak output)

Output
Score 32

0 equals the estimated average performance of a conventional design

Required Score: 25 %
Project Score: 32 %

Target Emissions

- Heating Greenhouse Gas Emissions: 192 kg CO₂ / yr / dwelling
- Cooling Greenhouse Gas Emissions: 97 kg CO₂ / yr / dwelling
- Water Heating Greenhouse Gas Emissions: 993 kg CO₂ / yr / dwelling
- Lighting Greenhouse Gas Emissions: 99 kg CO₂ / yr / dwelling
- Clothes Drying: 148 kg CO₂ / yr / dwelling
- Misc incl TV, cooking, refrigerator, computer: 3590 kg CO₂ / yr / dwelling
- Minus Renewable Electricity Generation: -0 kg CO₂ / yr / dwelling
- Total Emissions: 5119 kg CO₂ / yr / dwelling

Peak Demand
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
Toilet
Basin taps
Bath type

Re-use (for the whole building)

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

Output

Water
Score 36

0 equals the estimated average performance of a conventional design

Required Score
Project Score

Benchmark Mains Water Consumption

Target Mains Water Consumption
Shower
Bath
Misc hot water
Toilet flushing
Basins
Evaporative cooler
Irrigation
Misc other water use

Total water consumption

Re-used toilet flushing
Re-used Irrigation
Re-used Laundry
Re-used Hot Water Service

Re-used Total

Toilet usage from mains
Irrigation usage from mains
Misc other usage from mains
Total hot water usage from mains

Total usage from mains

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

Target: 100

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

<table>
<thead>
<tr>
<th>Building Element</th>
<th>Material</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Floor Material average</td>
<td></td>
<td>10.8</td>
</tr>
<tr>
<td>Ground Floor Material 1</td>
<td>Standard Concrete Slab</td>
<td>10.8</td>
</tr>
<tr>
<td>Ground Floor Material 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground Floor Material 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Floors Material average</td>
<td></td>
<td>10.8</td>
</tr>
<tr>
<td>Upper Floors Material 1</td>
<td>Standard Concrete Slab</td>
<td>3.0</td>
</tr>
<tr>
<td>Upper Floors Material 2</td>
<td>Timber Frame</td>
<td>5.2</td>
</tr>
<tr>
<td>Upper Floors Material 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Floors Average</td>
<td></td>
<td>3.1</td>
</tr>
<tr>
<td>Wall Framing Material average</td>
<td></td>
<td>9.8</td>
</tr>
<tr>
<td>Wall Framing Material 1</td>
<td>Timber Frame</td>
<td>9.8</td>
</tr>
<tr>
<td>Wall Framing Material 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Framing Material 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Framing Average</td>
<td></td>
<td>9.8</td>
</tr>
<tr>
<td>Interior Wall Framing Material</td>
<td></td>
<td>7.0</td>
</tr>
<tr>
<td>Interior Wall Framing Material 1</td>
<td>Timber Frame</td>
<td>7.0</td>
</tr>
<tr>
<td>Interior Wall Framing Material 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interior Wall Framing Material 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interior Wall Framing Average</td>
<td></td>
<td>7.0</td>
</tr>
<tr>
<td>Wall Cladding Material average</td>
<td></td>
<td>11.7</td>
</tr>
<tr>
<td>Wall Cladding Material 1</td>
<td>FC Sheet</td>
<td>11.7</td>
</tr>
<tr>
<td>Wall Cladding Material 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Cladding Material 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Cladding Average</td>
<td></td>
<td>11.7</td>
</tr>
</tbody>
</table>
Windows
- Material 1: Aluminium ▼ 3.0
- Material 2 ▼
- Material 3 ▼
Windows Average: 3.0

Roof Framing
- Material 1: Timber frame ▼ 3.5
- Material 2: Steel frame ▼ 2.2
- Material 3 ▼
Roof Framing Average: 2.9

Roof Cladding
- Material 1: Steel sheet ▼ 3.5
- Material 2 ▼
- Material 3 ▼
Roof Cladding Average: 3.5

Outdoor Structures
- 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 m²
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% | 10%
Waste Management - recyclables | 76.50 m² | 
Waste Management - rubbish | 25.50 m² | 
Waste Management - green waste | 0.25 m² | 
Waste Management - TOTAL | 102.25 m² | 
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 noted 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 note them appropriately on the plans and include relevant design details in the planning application documentation.