

Residential Development

Sustainable Management Plan

46-70 Stanley Street,
Collingwood VIC 3066

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1. Introduction

This report provides an overview of the sustainable strategy for the proposed residential development at 46-70 Stanley St, Collingwood.

1.1 REPORT OBJECTIVES

The objective of the report is to indicate how best practice environmentally sustainable design features are being included in the Stanley Street residential development. The report will highlight specifically the ESD objectives for the development and the proposed initiatives to meet these objectives.

The site is situated within the established suburb of Collingwood, contained within the municipal boundaries of the Yarra City Council.

Yarra City Council requires the SDAPP (Sustainable Design Assessment in the Planning Process) to be followed to ensure the efficiency of the building achieves its full potential. As this is a residential development of over 10 dwellings, it is required that a Sustainable Management Plan (SMP) be produced, submitted for planning approval and implemented into the design. This report covers the 10 key sustainable building categories as outlined by the Yarra City Council SDAPP.

2. ESD Objectives and Environmental Initiatives

The residential building development will incorporate sustainable design considerations to improve building operation efficiency and maintain a comfortable indoor environment quality for the occupants. The following section will provide breakdown of the environmentally sustainable design initiatives for the project, in line with the project brief.

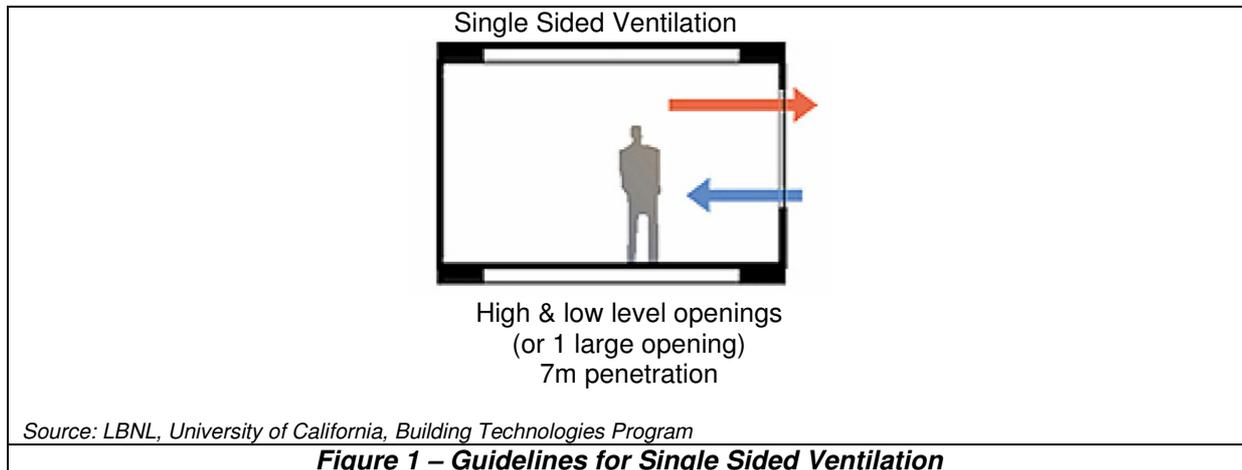
The following key ESD objectives will be targeted:

- Improve Indoor Environment Quality
- Low Energy
- Low Water Consumption
- Effective Management of Stormwater
- Sustainable Material Use
- Efficient Transport
- Reduced Site Emissions
- Responsible Land Use
- Good Management Practices

2.1 INDOOR ENVIRONMENT QUALITY

2.1.1 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. The effectiveness of a natural ventilation system is dependent on many factors, with one of the key factors being the separation between the inlet and outlet. For simple natural ventilation systems Figure 1 provides guidance on the air penetration into a room with a single inlet.



The guidelines in Figure 1 have been applied to the occupied areas for the dwellings to ensure good natural ventilation. Through the help of vertical precast fins at this development, pressure differentials are created which help improve the natural ventilation into the apartments.

Horizontal (slab extensions/balconies) and vertical elements (party walls) in this scheme are manipulated to create and emphasize pressure differentials across the face of the apartments to improve the natural ventilation air change effectiveness within the apartments and thereby improving the internal environment quality and reducing reliance on artificial cooling. Variation and undulation within the building skin creates an aerodynamic 'roughness' which engages the building with the natural wind flows, combined with the blade wall projections and careful placement of openings within the glazing line, enables effective natural flow through. Elenberg Fraser & Vipac Engineers and scientists have collaborated for over 10 years developing and testing the concepts of aerodynamics in architecture, in particular in developing commercially viable effective means of naturally ventilating single sided high density apartment types, improvements of 20-40% have been tested on other comparable projects. Combined with the other passive design features of this proposal, a holistic commercially viable strategy is employed to reduce the reliance on artificial building technologies, and, reconnect the interiors to the natural world.

Figure 2 below demonstrates how ventilation within this multi residential development will provide effective natural ventilation.

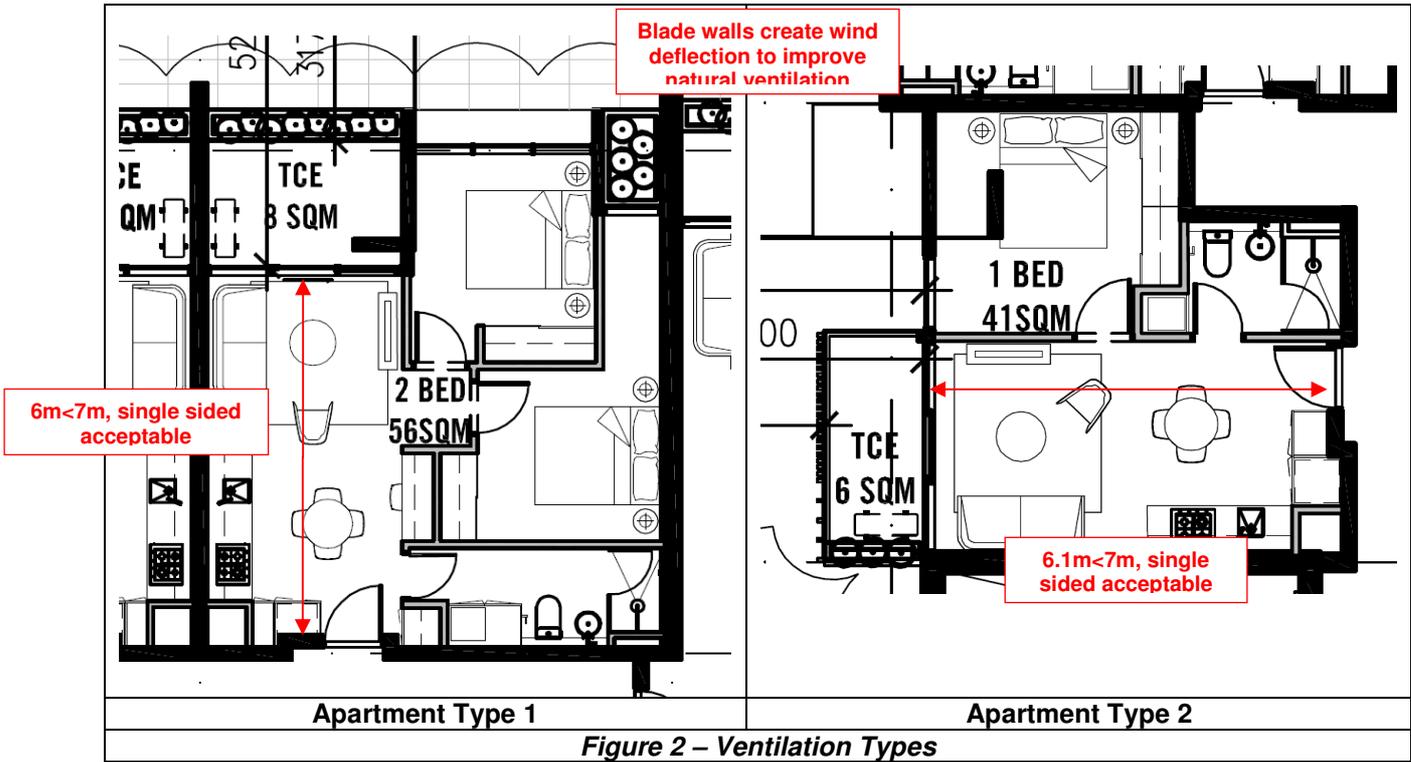


Figure 2 – Ventilation Types

2.1.2 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.

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 4-5m of a window and as such room layout and artificial lighting design should take this into account.

Full height, low-e double glazing is provided to all living areas to ensure the maximum amount of daylight is able to enter each space while also reducing the glare from direct sunlight.

Figure 3 provides an estimate on the areas receiving daylight within a typical apartment.

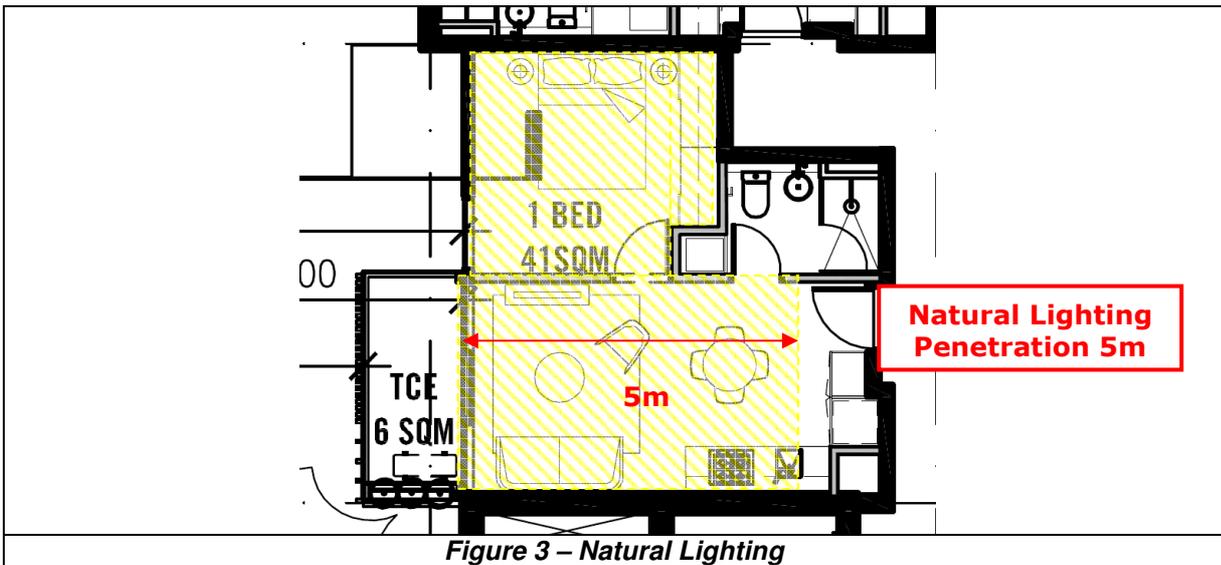


Figure 3 – Natural Lighting

As shown in Figure 3, apartments achieve a large amount of natural lighting within occupied spaces, such as the living areas and bedrooms which will maximise indoor environment quality and reduce the energy usage of artificial light.

2.1.3 External Views

All apartments will have external views from the living areas with the majority also having views from the bedrooms. The line of site will either be to the landscaped green areas between each tower, or beyond the site boundary.

2.1.4 Natural Habitat

This development is taking the initiative to install a large amount of natural planting both horizontally and vertically. Planter boxes will be installed on each floor level with timber screening on upper levels to allow plants to grow vertically up the building.

Plantings such as this have a number of advantages such as reducing the pollutant levels of some airborne contaminants, increasing the habitat for birds and animals and stabilising the micro-climate.

Plantings are proposed to be native species with preference given to site specific species where possible.

2.1.5 Individual Control of Indoor Environment

Individual control allows occupants to control their own thermal and lighting environment according to perceived comfort levels. These can vary substantially from person to person. A further advantage of individual control is that it encourages occupants to understand and take responsibility for control over their own environment in response to external ambient conditions.

This will be provided for in this development through every apartment having a balcony with operable doors and operable windows, as well as individual control of heating and cooling systems and lighting within apartments.

2.1.6 Mechanical Ventilation

Mechanical extraction will be required for bathrooms and kitchens. This helps ensure the air quality within the apartment remains high. All other habitable spaces will have access to operable windows for natural ventilation, thus saving on fan, heating and cooling energy when appropriate. All apartments will have one balcony accessed from the living area of the apartment.

2.2 ENERGY USE

2.2.1 Passive Design Features

The building has incorporated passive design features in order to minimise the energy consumed by the building. Incorporating passive design features into the building reduces the use of heating and cooling systems as well as the use of artificial lighting. Maximising the passive design of the building should be the first step in reducing energy consumption and increasing occupant comfort. Passive design features included are as follows:

- High levels of insulation
- Natural ventilation of apartments
- Natural lighting of apartments

2.2.2 High Levels of Insulation

The building has been designed to incorporate bulk insulation within the floor (exposed floor including car park soffit), roof and walls to minimise the heat loss in winter and heat gain in summer. The proposed insulation levels are as follows:

Roof:	R3.5
Walls:	R2.5
Floor:	R1.0

2.2.3 Shading

Shading has been designed in this development to optimise solar gain in winter and minimise it in summer. This is achieved to the north by overhanging balconies shading the glazing below.

On the south, vertical shading has been implemented to restrict the late afternoon and early morning sun in summer. On the east and west facades, a combination of horizontal and vertical shading has been implemented to restrict the hot summer sun when it is low in the sky.

Timber screening is proposed for upper levels to help reduce solar gain while also allowing vegetation to grow vertically, further improving the shading to these apartments.

Figure 4 demonstrates how shading reduces the sun in summer and allows the sun to penetrate into the apartment during the winter months.

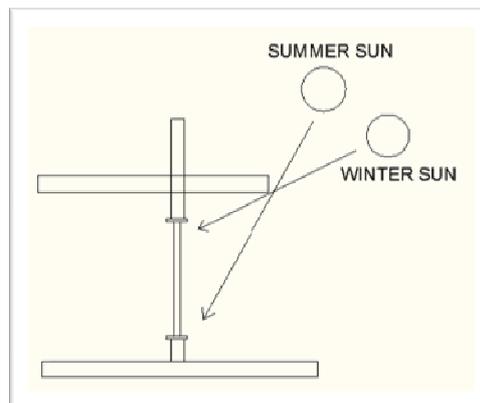


Figure 4 – Shading Diagram



Figure 5 –Image of development showing vertical and horizontal shading

2.2.4 House Energy Rating

In addition to the passive design features detailed in the previous section of this report, the development will achieve a 6 Star Minimum House Energy Rating and 7 Star Average Rating demonstrating the high energy efficiency of the building.

These rating values indicate that the thermal properties of the building far exceed the minimum requirement of the 2011 Building Code of Australia – Section J requirements. The major reasons for this high achievement are high thermal properties of the glass and building fabric, effective shading, good orientation and good overall design of the apartments.

2.2.5 Active Design Features

To further reduce the energy consumed by the building, active systems have been designed to minimise energy through system selection and system control. The heating, cooling and lighting requirements of the building have been minimised via the passive design features as demonstrated in the previous sections of this report, with active features of the building selected to reduce the energy used further.

High energy users that will be targeted include:

- Heating/ Air-conditioning Systems
- Domestic Hot Water Systems
- Artificial Lighting

2.2.6 Heating / Air Conditioning Systems

The requirements for heating and air-conditioning has been minimised through passive design including glazing orientation and natural ventilation, however active systems will still be required to provide a suitable level of comfort.

The apartments will be generally heated and cooled via reverse cycle split system air conditioning. Reverse cycle air-conditioning provides an efficient method of heating a space with approximately 3kW of heat being generated for every 1kW of electricity. High efficiency air conditioning units will be selected.

2.2.7 Car Park Exhaust System

Car Park exhaust systems will only operate as determined by CO monitoring sensors for the minimum ventilation demands. The exhaust fans will incorporate variable speed drives to allow turn down of motor power to precisely match ventilation needs.

2.2.8 Domestic Hot Water Systems

The building has incorporated a centralised gas hot water system to serve the apartments. High efficiency gas water heaters with electronic ignition and temperature control will be selected to minimise gas consumption.

Water distribution pipework will be designed to minimise hot water system piping length, piping diameter and maximise hot water piping insulation in accordance to the BCA to minimise heat loss.

2.2.9 Artificial Lighting System

Poorly designed or controlled lighting systems can use a significant amount of energy. By selected 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	100 lumens/watt
○ Light Emitting Diodes (LED)	80 lumens/watt
○ Dichroic (Low voltage)	30 lumens/watt
○ Incandescent	10 lumens/watt

The multi-unit residential development will be designed to utilise efficient lighting fittings, with a combination of LED, compact fluorescent and metal halide lighting to be used dependant on the requirement of the particular area. No incandescent or dichroic (halogen downlight) lighting will be used in this development.

2.2.10 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 have been implemented:

- Car Park to be controlled via occupancy sensors
- Lobbies to be controlled via occupancy sensors
- External lighting to be controlled by daylight sensors
- Each zone within the apartments to be individually switched

2.2.11 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 and including:

- Mechanical
 - Common area supply air system
 - Car park ventilation
- Electrical
 - Common area lighting
 - External lighting
- Vertical Transportation
 - Passenger lift

2.3 WATER CONSUMPTION

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

- Rainwater
- Efficient fixtures and fittings
- Drought tolerant planting and landscaping

2.3.1 Efficient Fixtures

To minimise the water consumed, water fitting and fixtures will be selected to achieve a minimum 4 Star WELS rating. By selecting fittings and fixtures with a low water consumption (high star rating) the potable water consumed will be significantly reduced.

2.3.2 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.

2.3.3 Public Area Water Consumption

Water usage to public area will be separately metered to allow Body Corporate to monitor usage of domestic cold water. A Body Corporate management plan will be developed to reduce potable water consumption for cleaning of bin storage and common area usage.

2.3.4 Landscaping

All landscaped areas will be designed to be drought tolerant and will be irrigated from rain water collected in a rainwater tank. See section 2.4 'Stormwater management' for rainwater storage sizing.

Preference will be given to drought tolerant species and species indigenous to the Yarra City Council area.

2.4 STORMWATER MANAGEMENT

The collection and storage of rainwater from roof areas for non-potable water uses is an economic and practically manageable approach to reducing the stormwater impact of the development.

Rainwater tanks will be installed on the ground level to collect runoff from the roof area. Captured rainwater will be used for two purposes – to flush toilets in the ground level apartments and to irrigate the landscaping.

A Melbourne Water STORM assessment has been completed for this project to determine the required catchment and storage sizes. Based on a roof area of 2000 square metres, a minimum 35,000 Litre storage tank will achieve the minimum 100% stormwater treatment requirement:

 STORM Rating Report						
TransactionID:	56089					
Municipality:	YARRA					
Rainfall Station:	YARRA					
Address:	46-70 Stanley St					
	Collingwood					
	VIC 3066					
Assessor:	ADP Consulting					
Development Type:	Residential - Mixed Use					
Allotment Site (m2):	4,056.00					
STORM Rating %:	102					
Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
Roof	2,000.00	Rainwater Tank	35,000.00	40	101.50	95.50

Extra storage capacity above 35,000 L will be required to provide irrigation for the landscaping – this value is to be determined based on specialist landscaping advice.

2.5 MATERIALS

2.5.1 Material Selection

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

The building will primarily consist of a heavy concrete structure. While this represents a considerable initial investment of embodied energy, it also means the structure will have a long life span and will contain significant thermal mass to reduce the fluctuation of temperature in the units thereby improving the thermal performance of the apartments.

The following performance criteria will be considered for specified materials:

- Materials that promote indoor air quality (eliminate or minimise materials containing Volatile Organic Compounds (VOC's));
- Materials that reduce material use (e.g. recycled materials) and which have low impact disposal;
- Low embodied energy materials (to be assessed on a life cycle basis);
- Materials that are durable and fit for purpose;
- Materials from sustainable sources;
- Where possible, PVC will be replaced with alternative materials such as HDPE piping or cable trays; and
- Materials will be selected with a preference given to local over imported materials, due to the transportation emissions associated with imported materials.

2.5.2 Reduction of VOC's

Materials containing Volatile Organic Compounds (VOC's) emit fumes at room temperatures and have been linked to a variety of health problems including respiratory disorders and eye, nose and throat irritants, as well as suspected carcinogens.

They are commonly found in products such as paints, sealants, adhesives, medium density fibreboard (MDF), and vinyl floor coverings. When selecting these items, tables 1, 2 and 3 will be complied with as the maximum values for VOC in this development.

The palette of materials proposed for the development will be selected for their low-VOC properties as per the limits in tables 1, 2 and 3 below.

Table 1. Max TVOC Content Limits for Paints, Varnishes and Protective Coatings

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	140

floors	
Any solvent-based coatings whose purpose is not covered in table	200

Table 2. 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 3. 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

2.5.3 Sustainable Timber

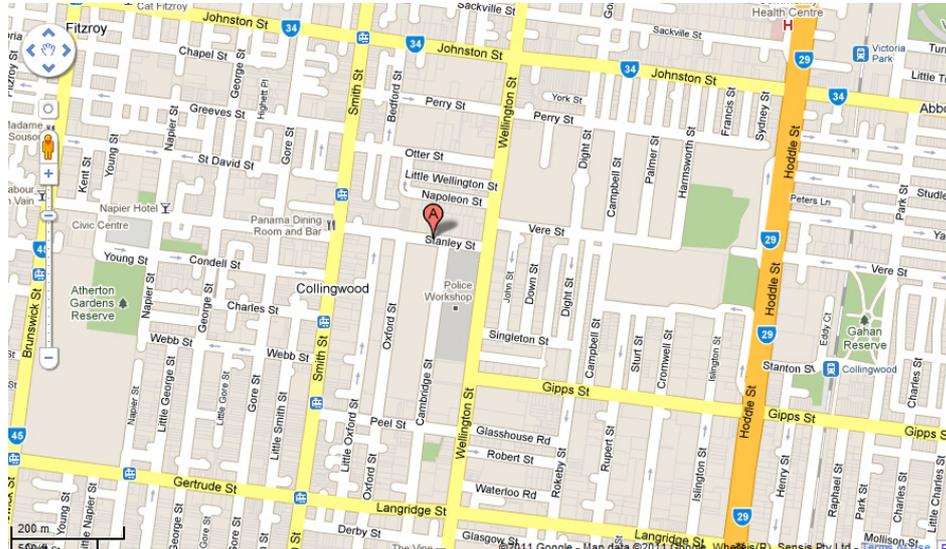
- Timber used at the site will be either reused, post consumer recycled or certified under a forest certification scheme

2.6 TRANSPORTATION

2.6.1 Public Transport

The site has excellent access to public transport. Located on Stanley Street there is direct access to tram 86 on Smith Street which travels to the city. It is also a short 850 meter walk to trams 11 & 112 on Brunswick Street.

Collingwood train station is located approximately 1 kilometre from the development with trains running regularly to the city.



Source: Google Maps

The close proximity of both trains and trams will benefit the development through a reduced reliance on cars as a means of transport. This, in turn, will reduce greenhouse gas emissions associated with occupants of the development.

2.6.2 Bicycle Use

To encourage cycling (reducing private vehicle use) at the site, convenient and amenable bicycle facilities will be provided at ground level for residents. Visitor bicycle parking will also be provided on the ground floor of the development in an open, well lit and highly frequented location.

2.7 WASTE MANAGEMENT

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

- Sewerage
- Waste

2.7.1 Sewerage

Sewerage emissions will be significantly reduced through the requirement to utilise efficient fixtures and fittings.

2.7.2 Waste

General Waste Management

Recyclable materials entering the general waste stream will be minimised from the development by providing a dedicated waste and recycling facilities located within each residential level and designated waste segregation bins within the waste room.

Construction Waste Management

The builder will allocate an on-site waste management area for sorting and segregating waste. A waste reduction strategy and management plan will be developed during construction to reduce on-site waste to landfill.

2.7.3 Operational Waste Management

A strategy to deal with waste generated by the building in operation will be prepared for the site and may be incorporated into the OEMP. Many important decisions effecting this management will be made during the design process, which will fully consider the centralisation and collection of waste in the building.

Waste Collection: Adequate and practical spaces will be allocated for the collection of:

- General waste;
- Paper and cardboard; and
- Co-mingled container recycling.

The waste systems will need to consider receptacle volumes, the frequency and paths for waste to be centralised, storage areas for waste and recyclables to be stored prior to collection, and the access, frequency and timing of collection services.

2.8 URBAN ECOLOGY

2.8.1 Reclaimed Contaminated Land

The existing site is currently an abandoned two story textile facility along with a section of car parking. A land contamination assessment will be carried out which will identify if the site has been contaminated by the previous activities. Contaminated sites generally have the potential to cause adverse impact to the environment and environmental value.

As part of the development process, full remedial steps will be undertaken to decontaminate the site prior to construction if it is found to be contaminated.

Through the development process, the ecological value of the site will be improved from its current weed infested state.

2.8.2 Topsoil

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

2.8.3 Site Orientation

The ideal solar orientation is to have a site which is elongated in an east–west direction with the building footprint oriented similarly. This will allow maximising of passive solar design initiatives where passive ventilation strategies, access to daylight, and exterior environments contribute positively to the proposed building's outcomes.

As the site runs east-west, the building has been aligned accordingly and attempts to take full advantage of this by maximising the number of units facing directly north.

2.9 ONGOING BUILDING AND SITE MANAGEMENT

To achieve the sustainable outcomes designed into our built environment, effective management of active systems in both construction and operational phases of the building's life is crucial.

2.9.1 Building Operation & Maintenance

An operations and maintenance strategy will be established before the start of detailed design.

When the property and its services become fully operational, the maintenance strategy must be implemented and any revisions carefully assessed to determine the impact of any such changes on original design decisions. The building's operation is also linked to the development of an operation manual for handover to building management. This should detail maintenance requirements for the optimisation of building services and efficient running of the plant.

2.9.2 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.

2.9.3 Commissioning of Building Systems

The importance of commissioning building service systems to operate as designed is crucial in achieving the environmental benefits available from complex systems. Ensuring systems are properly configured and commissioned into operation is a crucial process that is commonly performed to low standards in the Australian commercial property sector.

The proposed development is committed to implement simple, low tech controls allowing for levels of active management that will reduce risks and costs associated with the commissioning and maintenance of complex control systems. These systems are designed to be 'user friendly' and can be customised according to ambient temperatures; they are sympathetic to environmental conditions.

2.9.4 Operational Environmental Management Plan (OEMP)

An OEMP may be developed at an appropriate time to provide a structure for the ongoing management of the facility in operation. It would include information on purchasing of building consumables, waste centralisation and collection systems and cleaning regimes. Chemical cleaning products in particular may create health concerns and a green cleaning programme should be developed at a later stage.