ENERGY CONCEPTS GROUP

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ABSA
Association of Building Sustainability Assessors
Member # 21164

4219 – 527 Gregory Terrace, Bowen Hills
SUSTAINABLE DESIGN INITIATIVES
SHORT FORM REPORT
12 March 2015, Revision C

1.0 Sustainable design values

1.1 Aim

The aim of this report is to provide a short non-technical review of some of the environmentally sustainable design initiatives that are currently proposed within the development.

1.2 Development

The development referred to within this report is the proposed multi use development at 527 Gregory Terrace, Bowen Hills, as shown on the Nettleton Tribe DA submission drawings noted as Page 01 through to Page 60 inclusive dated 09 March 2015.

1.3 Limitation

This report is limited to providing a short form non technical review of some of the environmentally sustainable design initiatives that are currently proposed within the development. It does not provide the technical details of how these initiatives are achieved.

1.4 Summary

This report addresses the following categories:

- Defines sustainable design values
- Integrated collaborative process
- Design philosophy
- Natural ecosystem
- Appropriate use of land
- Integrated water management
- Energy use
- Appropriate Building Materials / Reuse
- Manage Waste
- Cost efficiency
- Healthy indoor environment
- Green transport
- Adaptable spaces
- Safe and diverse community
- Informed owners and managers

2.0 Sustainable design Values

The development aims to achieve an appropriate balance of sustainable principles and cost-effectiveness by adopting the following sustainable design values:

- Provide a framework for the design, construction and operation of the development to achieve appropriate sustainable outcomes.
- Ensure the natural ecosystem is not adversely affected by the construction or operation development.

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- Use appropriate building materials to reduce the impact of construction and operation of the development.
- Create healthy indoor environment for the development users and occupants.
- Ensure the users and occupants of the development can capitalise on green transport options.
- Ensure the development contributes to a safe and diverse community by integrating the CPTED strategies and by providing adaptable spaces.

3.0 Integrated collaborative process

A professional Sustainable Development Consultant will be engaged to assist the project team with the integration of the Sustainable Development principles and processes.

The Sustainable Development Consultant (SDC) will be engaged to provide sustainability advice throughout every part of the design and construction phases. The Sustainable Development Professional scope of work will include:

- Ensuring the commitments given in this report are included in the design. This will involve the SDC attending the design meetings and approving the design documentation for construction. The design meeting minutes will include a record of the sustainability process and decisions.
- Form 16's will be required from the installation contractors indicating the commitments given in this report have been included in the installation.
- The SDC will assist the design team in exploring further sustainability options and integrating them into the design where appropriate.
- The SDC will assist the design team in undertaking the life cycle analysis.

4.0 Design philosophy

The design of the project implements the design values by:

- Minimising the negative impact of the development on the local environment.
- Minimising the negative impact of the development on the users.
- Minimising the developments negative impact on global warming

The balanced, contemporary design utilizes a variety of materials to capitalise on the lifestyle & climate of Brisbane. The design makes the most of Brisbane's sub-tropical climate, creating a relaxed lifestyle for the residents.

The project enhances the liveability through the design, community engagement and sustainability components.

5.0 Natural ecosystem

5.1 Ecological Impact

The development site is ideal for the proposed style of development as the site has limited ecological value to the natural ecosystem due to:

- It being located in a built up urban area.
- It does not have significant agricultural value.
- It is not near ecologically sensitive habitat.
- The site does not contain endangered or threatened species.

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5.2 Environmental Impact

The development site is ideal for the proposed style of development as the sites existing conditions facilitate the construction of a mixed use development with a lower environmental impact that a similar development constructed on a greenfield site.

By developing a multilevel, multiuse facility, the development will be able to obtain the greatest environmental benefit and minimise the negative impact. This is achieved by providing common facilities and amenities to be shared between users. Underground parking and plant will be provided to avoid clearing land for car parking and plant rooms.

5.3 Refrigerant ODP

To reduce the potential long-term damage to the Earth's stratospheric ozone layer through the accidental release of ozone depleting substances to the atmosphere the development will utilise R407 and R410A refrigerants that have no ozone depletion potential.

5.4 Insulant ODP

To reduce the potential long-term damage to the Earth's stratospheric ozone layer through the release of ozone depleting substances to the atmosphere the development will utilise thermal insulation that does not use ozone depleting substances in either its manufacture and composition.

6.0 Appropriate use of land

The impact of the development on the natural ecosystem is minimised as the site has already been fully developed thus eliminating the need for further land clearing.

The site is ideally suited to a mixed use development as it is located with convenient pedestrian access to public transport, the CBD and associated facilities.

The existing facility on the site has little in the way of sustainable features.

- Poor shading.
- Poor insulation and thermal performance.
- Minimal shared facilities or resources.
- High levels of PVC use.
- High levels of formaldehyde use.
- High levels of VOCs.
- Minimal potable water conservation.
- No rain water harvesting.

7.0 Integrated water management

7.1 Occupant Amenity Potable Water Efficiency

The development will be provided with the following features to reduce the demand of the potable water consumption of building occupants.

- Rainwater harvesting.
- Leak detection facility.
- High efficiency fixtures and fittings.
- Recycling of fire protection system test water.
- Minimal delay in the availability of hot water.

The development will be provided with a leak detection device fitted to the incoming town water service to ensure that leaks in the reticulation system do not go undetected.

Water efficiency will be achieved by the use of 4 star WELS rated fixtures and tapware.

- Toilets will be dual flush 4.5 litre / 3 litre.
- Shower roses will be 9 litres per minute.
- Sink taps will be 6 litres per minute.
- Basin taps will be 6 litres per minute.

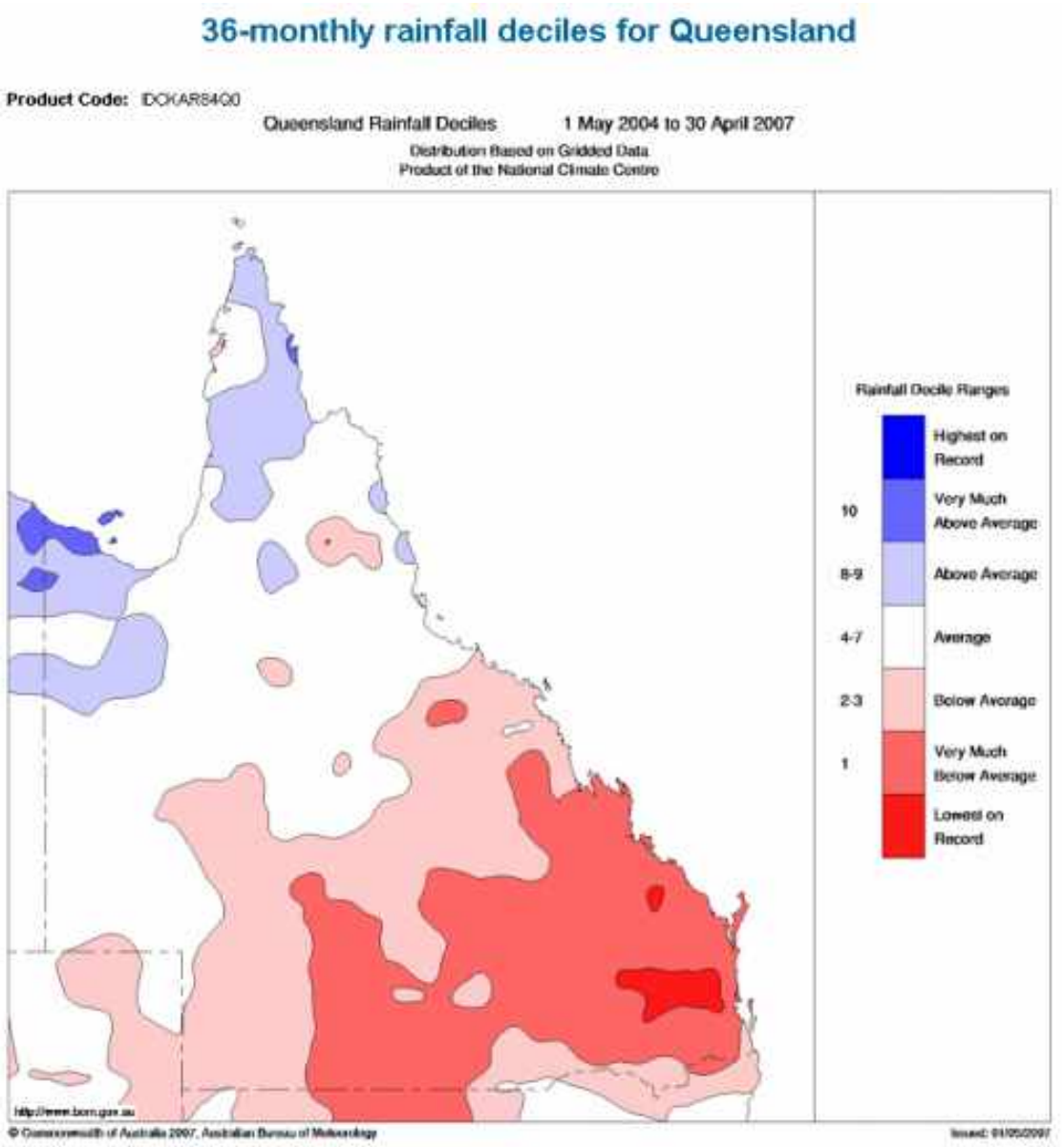
The expected delay for hot water delivery to each outlet will be less than 5 seconds and to the most remote outlet within each apartment will be 10-12 seconds. This will reduce the water that is wasted by waiting for the hot water to arrive when compared to a typical multi use building central hot water system.

7.2 Non Potable Water

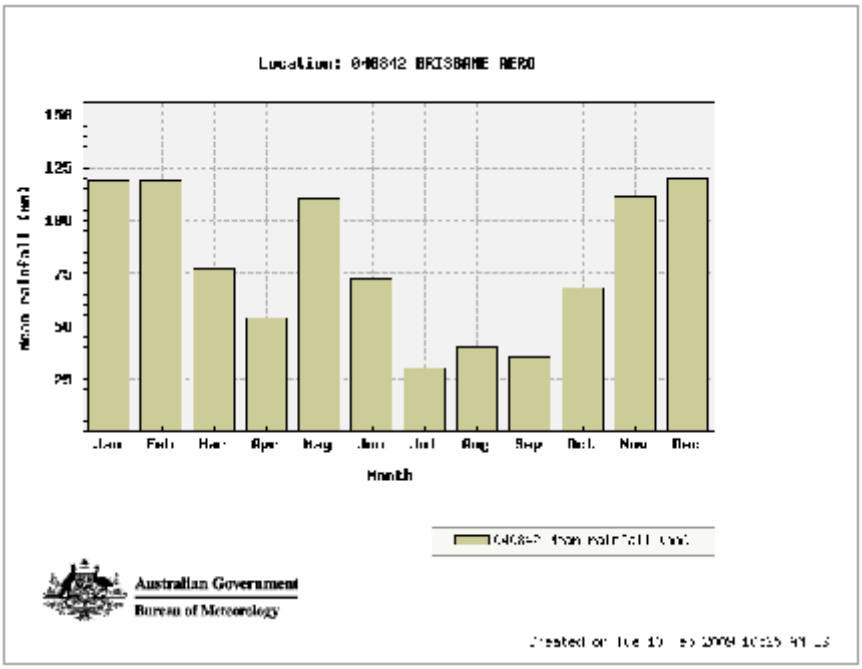
The non potable water uses including common WC flushing landscape irrigation, land hose taps will be supplied with an alternative water source. Rainwater collected from the building roof, the airconditioning condensate and the fire system test water will be harvested.

The Irrigation system will be automatic including the following operational features:

- Timed to ensure maximum efficiency,
- Zoned and stationed to ensure plants that require less water are not regularly irrigated,
- Water after hours, at night so evaporation can be minimised,
- The systems source will be harvested rainwater to ensure it does not impact on our cities potable supply.



The following graph from the BOM website shows that the rainfall is highly seasonal, with the majority of the year's rain falling between November and February. The rainwater collection system will be sized in order to make the most effective use of the available rain.



7.3 Water Meters

Metering of the water used by each major use within the proposed development will be provided to highlight differences in water use and allow the water consumption to be actively managed.

Details of how to read and interpret the meters will be included in the building managers guide.

The building managers will be able to access details of the water usage including the following information:

- The total amount used during that period.
- The average daily amount used during that period.
- The total amount used over the previous three periods.
- The total amount used over the same period during the previous year.

7.4 Sewer

The use of 4 star WELS rated fixtures and tapware will have a significant impact in reducing the volume of sewerage discharging from the site.

7.5 Stormwater

The development will be provided with rainwater tanks installed to capture rainwater runoff from the roof.

The installation of rainwater tanks that captures the roofwater runoff will have a significant impact in reducing the volume of discharge from the site for most storm events.

8.0 Energy use

8.1 Electrical Sub-metering

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Electrical consumption is the biggest contributor of greenhouse gas emissions arising from buildings (approximately 89% according to the Australian Greenhouse Office). To successfully manage energy consumption it is important that sufficient data is available to building managers to allow them to monitor consumption and compare historically. As such Sub-metering will be provided to allow the building managers to fine-tune there operation and to minimise consumption.

Details of how to read and interpret the meters will be included in the building users guide.

The building users will be able to access details of the electricity usage detailing the following information:

- The total amount of energy used during that period.
- The average daily amount of energy used during that period.
- The total amount of energy used over the previous three periods.
- The total amount of energy used over the same period during the previous year.
- The total amount of greenhouse gas emissions generated during that period.
- The average daily amount of greenhouse gas emissions generated during that period.
- The total amount of greenhouse gas emissions generated over the previous three periods.
- The total amount of greenhouse gas emissions generated over the same period during the previous year.

8.2 Lighting Efficiency

To reduce the environmental impact of the building, the average lighting will be provided with an efficiency better than 5.0 W/m². To ensure the lighting is not over-designed consuming excess raw materials and excess energy the lighting will be designed to meet the minimum appropriate requirements without excess spill or over lighting.

A traditional 80m^2 unit with 20% fluorescent iron core lighting and 80% incandescent lighting will have an efficiency of 15.2w/m^2.

4 x 24w = 96w
12 x 60w = 720w
4 x 100w = 400w

Total 1,216w

1,216w / 80m^2 = 15.2w/m m^2

This is approximately 26,400Kwh over 15 years

The project will utilise 100% electronic ballasted fluorescent lighting or better in the residences with an efficiency of 4.4w/m^2.

10 x 20w = 200w
10 x 15w = 150w

Total 350w

350w / 80m^2 = 4.4w/m m^2

This is approximately 11,500Kwh over 15 years

This results in a 14,900 Kwh saving over 15 years which equals 186.25 Kwh /m^2 over 15 years.

All common area lighting will have an average efficiency better than 5 w/m m^2.

8.3 Lighting Control

To provide greater flexibility for light switching, making it easier to light only occupied areas and thus reduce the environmental impact, the building lighting it will be provided as follows:

- All non public individual or enclosed spaces have individual switches;
- Switching function that is clear and easily accessible by building occupants and managers.
- The apartments will be provided with a room access control system that disables the apartment lighting when the room is not occupied.

8.4 Air-conditioning Control

To minimise the impact of the air-conditioning on the energy consumption the following control features will be provided:

- Individual manual control of the air-conditioning in each room.
- Individual toilet exhaust to each apartment to minimise the amount of air-conditioned air lost through the toilet exhaust system. .
- The controls are clear and easily accessible by building occupants and managers.
- The apartments will be provided with a room access control system that disables the apartments air-conditioning when the apartment is not occupied.
- High efficiency air cooled VRF plant.

8.5 Energy Efficient Appliances

All of the following appliances supplied as part of the base building will have the following minimum MEPS rating:

- Airconditioning cooling 5 Star.
- Airconditioning heating 4 Star.
- Cloths dryer 2 Star.
- Washing machine 4 Star.
- Dish washer 3 Star.
- Refrigerator / freezer 4 Star.

8.6 Carbon Reduction

To reduce the amount of carbon dioxide that is discharged into the atmosphere by the operation of the development the following measures will be adopted:

- Energy efficient lighting.
- Energy efficient appliances.
- Occupancy control of apartments lighting and air-conditioning.
- Ceiling fans in all bedrooms and living spaces.
- Individual toilet exhaust system per apartment.

8.7 Hot Water delivery

The hot water reticulation system will be a balanced flow and return system with minimal heat loss in the system by using Thermotec FPI 32mm thick insulation (or similar) on main pipe runs and Thermotec Sealed Tube 15mm thick insulation (or similar) on branch runs.

8.8 Thermal Performance

To allow the building occupants to capitalise on the Brisbane climate and reduce the need to use airconditioning the class 2 apartments will all achieve an average weighted NatHERS energy rating equal to or better than 6 stars in accordance with the BCA 2014 NatHERS protocols.

9.0 Appropriate Building Materials

9.1 Material Selection

Where practical low-maintenance materials from renewable and recycled sources will be used. The following major and common materials will be assessed using the following ESD Life Cycle Analysis:

- Structural materials.
- Cladding.
- Roofing.
- Glazing.
- Doors.
- Door hardware.
- Floor finishes.
- Internal fames.
- Internal linings.
- Paints.
- Insulation.
- Pipe work.
- Cabling.
- Luminaries.
- Fixings.
- Air conditioning.
- Flooring.

ESD Life Cycle Analysis

Qualitative ESD Lifte Cycle Analysis Matrix		CONSEQUANCE				
		INSIGNIFICANT 5	MINOR 4	MODERATE 3	MAJOR 2	CATASTROPHIC 1
LIKELIHOOD	ALMOST CERTAIN	Low	Medium	High	High	High
	LIKELY	Low	Medium	Medium	High	High
	MODERATE	Low	Low	Medium	Medium	High
	UNLIKELY	Low	Low	Low	Medium	Medium
	RARE	Low	Low	Low	Low	Low

DESCRIPTOR	EXAMPLE	PROBABILITY
ALMOST CERTAIN	It is almost certain that the Risk will occur in most circumstances	0.9
LIKELY	The Risk is likely to occur in most circumstances	0.5

DESCRIPTOR	EXAMPLE
CATASTROPHIC	Permanent environmental damage beyond the site
MAJOR	Permanent environmental damage limited to the site and environmental damage beyond the site that is reversible

MODERATE	There is uncertainty that the Risk could occur	0.1	MODERATE	Environmental damage limited to the site that can be reversed with a high financial cost and a high level of impact on the occupants
UNLIKELY	This Risk could occur at some time but there is confidence that it will not	0.01	MINOR	Environmental damage limited to the site that can be reversed with a medium financial cost and medium level of impact on the occupants
RARE	This Impact/Risk may occur only in exceptional circumstances	<.01	INSIGNIFICANT	Environmental damage limited to the site that can be reversed with a minimal financial cost and minimal level of impact on the occupants

If the residual risk is

High	then An alternative solution must be implemented
Medium	then The solution may be implemented with modifications and procedures necessary to reduce the risk to a low status.
Low	then The solution may be implemented in a manor that risk is maintained at the low status.

The ESD risks that are to be assessed as part of the Life Cycle Analysis for each material / system include:

- The impact on the environment to obtain the energy and resources to manufacture the product.
- The impact on the environment to transport the product to site.
- The impact on the environment to install the product.
- The impact on the environment due to the normal use of the product.
- The impact on the environment due to the premature failure of the product.
- The impact on the environment due to the removal and disposal of the product at the products expected end of life.

9.2 Recycled Content of Concrete

To reduce the embodied energy within the concrete used within the development power station waste fly ash will be used to replace 10% of the Portland cement.

10.0 Manage Waste

10.1 Facility Management

A dedicated storage area will be provided for the occupants for the separation, collection and recycling of consumables with good access for all occupants for collection by recycling companies. The storage area will be adequately sized to allow for recycling of, paper, glass, plastics and metals.

In addition to management of conventional waste, a communal Materials Recovery Facility will be provided with good access for all occupants.

10.2 Construction

During construction the contractor will be required to develop and maintain a construction waste management plan to minimise the waste that is sent to landfill and relieve pressure on natural resources.

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11.0 Cost efficiency

11.1 Consumption

Where practical the design will aim to minimise the ongoing operational consumption costs for the life of the development such as energy, water and waste removal.

11.2 Maintenance

Where practical the design will aim to minimise the ongoing maintenance costs for the life of the development such as servicing costs, chemical requirements, replacement costs.

11.3 Design and Material Selection

The initial capital cost, product performance, product life, durability, embodied environmental impact and the operational cost will be considered when making design and material selections.

12.0 Indoor environment

12.1 High Frequency Ballasts

To prevent eyestrain and headaches associated with the flicker of conventional fluorescent lights that operate at a frequency of 50Hz, high frequency electronic ballasts that operate at over 32,0000Hz (32 kHz) will be provided for all fluorescent lighting. At this frequency the flicker is totally undetectable either consciously or unconsciously.

12.2 Internal Noise Levels

As internal noise is a significant factor in terms of occupant satisfaction and wellbeing the building will be provided to meet the following acoustic requirements:

- The building services noise will meet the recommended design sound levels provided in Table 1 of AS/NZS 2107:2000.

12.3 Ventilation

All of the living spaces and bedrooms will be provided with ceiling fans.

Each apartment will be provided with a dedicated mechanical ventilation system to exhaust the wet areas and the laundry where provided.

12.4 Volatile Organic Compounds

To address the health effects of exposure to VOC associated with ‘sick building syndrome’ such as – eye, nose and skin irritation, headache, lethargy the level of VOC’s used in the building construction will be restricted to the following levels:

Paints

VOCs are to be in accordance with The Australian Environmental Labelling Association, Inc. Standard No: AELA 23-2005 ‘ Australian Voluntary Environmental Labelling Standard Architectural and Protective Coatings’. Conformance with VOC levels listed in this standard (refer to table below) shall be demonstrated by providing test reports from laboratories accredited to carry out the relevant tests and/or calculations and appropriate documentation of production methods and quality controls.

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Product Type	Maximum VOC content (g/Litre)
Latex primer for galvanised iron and zincalume	60
Exterior latex undercoat	55
Interior latex undercoat	65
Interior sealer	65
Exterior timber primer	50
Interior gloss	75
Interior semi-gloss	16
Interior low sheen	16
Interior flat-washable	16
Interior flat-ceilings	14
Exterior gloss	75
Exterior semi-gloss	70
Exterior flat and low sheen	50

VOC limits on architectural coatings covered. Allowable levels include water content in the formulation.

For solvent based coatings the paint shall not contain VOCs in excess of 200g/litre. For recycled paints the VOC level (averaged across batches) in the paint must not exceed 100g/litre.

The VOC content of the paint shall either be calculated fro the VOC data for each of the raw materials or, experimentally by ATSM D3960, as qualified The Australian Environmental Labelling Association, Inc. Standard No: AELA 23-2005 'Australian Voluntary Environmental Labelling Standard Architectural and Protective Coatings'.

Where the raw material is a mixture of compounds, some of which contain VOCs, the VOC content of the mixture may in turn be calculated from the VOC content of the individual components. Where this is not known, it must be determined by the methodology detailed in AELA 23-2005.

Carpets

Reference: Carpet and Rug Institute Green Label (U.S)

- Total VOC limit 0.5 mg/m² per hour
- 4-PC (4-Phenylcyclohexene) 0.05mg/m² per hour

Compliance Testing: Carpet and Rug Institute Green Label (U.S) OR American Society for Testing and Materials (ASTM) D 5116 'Guide for Small-scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products'.

Adhesives and Sealants

Reference: South Coast Air Quality Management District (California, U.S.) – Rule 1168

- Indoor carpet adhesive 50 grams of VOC per litre
- Carpet pad adhesive 50
- Outdoor carpet adhesive 150
- Wood flooring adhesive 100
- Rubber flooring adhesive 60
- Sub-floor adhesive 50
- Ceramic tile adhesive 65
- Cove bas adhesive 50
- Dry Wall and Panel adhesive 50
- Multipurpose construction adhesive 70
- Structural glazing adhesive 100
- Architectural sealants 250

The VOC limits are less water and less exempt compounds.

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Compliance Testing: Refer South Coast Air Quality Management District Rule 1168 for testing methods and exempt compounds.

11.5 Lighting Levels

Adequate lighting for specific tasks and activities within the apartments will be provided with attention given to providing solutions that are not over-designed. Switching will be provided to allow the occupants to capitalise on natural lighting when available.

11.0 Green transport

The site has the inherent environmental advantage that it has good access to public transport networks presenting a number of travel options other than using private vehicles including:

- Frequent services.
- Availability of bus
- Close proximity to amenities allowing pedestrian travel.

14.0 Adaptable spaces

Careful thought has been given at the design stage to ensure the building has a long life and increased refurbishment cycle. The apartments can be retro fitted to accommodate people with different abilities.

Fixtures and fittings have been selected to allow ease of use for a wide range of people (eg, lever handles to doors, D handles to joinery etc.)

All public spaces have been designed to comply with disability discrimination legislation and will have level entries, making them easily accessible by people with different abilities.

15.0 Safe and diverse community

The crime prevention through environmental design (CPTED) features are integral to the planning of the development including the creation of spaces that have excellent visual security through social presence.

The key CPTED strategies include:

- Provide clear border definition of space
- Provide clearly marked transitions from public to private space
- Place gathering areas in locations with natural surveillance and access control
- Place safe activities in unsafe areas
- Place safe activities in safe areas
- Provide natural barriers to conflicting activities
- Improve scheduling of space to allow for ‘critical intensity’
- Increase the perception of natural surveillance
- Overcome distance and isolation through improved communications and design efficiencies

16.0 Informed owners and managers

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To encourage and enable building managers to optimise the building's environmental performance a Simple Building Users Guide, including information relevant to the building managers, (Managers and Users) will be provided.

The Building User's Guide will include an Environmental Health and Mission Statement, for use by the facility's management to complement the facility's functional design program. This statement is to be retained by the facility with the other design data to ensure that future alterations, additions, and program changes are consistent with the intent of the environmental health and mission statement.

The Building Users Guide will include a reference section relevant to all users, staff and maintenance workers of the building outlining the basic design intent of the facility, including principles surrounding waste management, recycling, energy and water efficiency.