

Warringah Stage – 2 Redevelopment

Sustainability Management Plan

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EXECUTIVE SUMMARY

This Ecologically Sustainable Development report documents the sustainability commitments for the proposed stage 2 development at Westfield Warringah Mall Shopping Centre. This plan has been written to address the Northern Beaches Council – Warringah DCP- 2011. This report is consistent with the Stage-1 of the project that has been handed over and is in operation.

The report summarises the key initiatives that Scentre Group will be implementing to deliver the benefits of best practice sustainable design as practically as possible.

The development will be designed to achieve superior performance compared to the mandatory section J and will be based on a holistic methodology outlined by the Green Building Council of Australia within their Green Star Design and As Built rating tools to achieve a 4 star Green Star Design As Built equivalency. This is similar to stage-1 of the project.

This report defines the environmental commitments and performance outcomes to be achieved under the following environmental categories:

- Outdoor Environmental Quality
- Indoor Environmental Quality
- Energy
- Transport
- Water
- Materials
- Emissions

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1 INTRODUCTION

1.1 The Project

Westfield Warringah Mall is one of Sydney's Northern beaches leading regional shopping centres. Located approximately 15km's from the CBD, being first opened for business on 4th April 1963. The stage 2 redevelopment of the mall comprises of an extension to the existing shopping centre.

1.2 Limitations

It should be noted that the environmental initiatives targeted by the development reflect the points which should be met by the Development at this early stage, however this may vary during the Design development stage of the project to achieve the objectives of the project.

2 Outdoor Environmental Quality

2.1 Environmental Professional

Scentre group will involve in-house accredited professional(s) who are enrolled in the Green Building Council of Australia's CPD Program from schematic design through to practical completion.

The professional(s) will be the project contact providing advice and support to ensure that the project team has access to information covering sustainability principles, structure, timing and process including:

- Environmental Categories
- Point allocation and scores
- Documentation and Compliance Requirements

The professional(s) will also deliver at least one workshop to the project team covering the topics above at project inception.

Furthermore, the professional(s) will also provide guidance and support at all stages of the project, as follows:

- Participate in meetings and workshops;
- Review documentation.

2.2 Climate Analysis

Local climate assessments were carried out to understand the prevailing weather conditions in Warringah including the typical ambient air temperature, annual wind speed distribution and direction. For the purposes of this analysis, a Test Reference Year (TRY) file was utilised for the local region taken at the closest comparable weather data. A TRY file contains measure hourly weather data (8760 hours) deemed by the Bureau of Meteorology to represent one typical year this includes complete data for dry bulb air temperature, solar radiation, cloud cover, relative humidity and wind speed/direction. Weather files are constructed to represent the most average conditions for the previous 20 years and are commonly used for building energy simulation and allow building designers to test the effect that modifying design features will have upon typical annual conditions. In most instances this requires

extensive, line by line manipulation of the data to ensure it is both complete and accurate.

2.2.1 Dry Bulb Temperature (DBT)

The following Figure 2-1 illustrates the annual distribution of the dry bulb temperature of the climate revolved around Warringah Mall. It can be observed that for majority of the year (up to 38%), the dry bulb temperature is between 15°C and 20°C during the operational hours of the centre (8am to 6 pm). Hence, it is established that air temperatures generally lie within the ideal range for majority of the year.

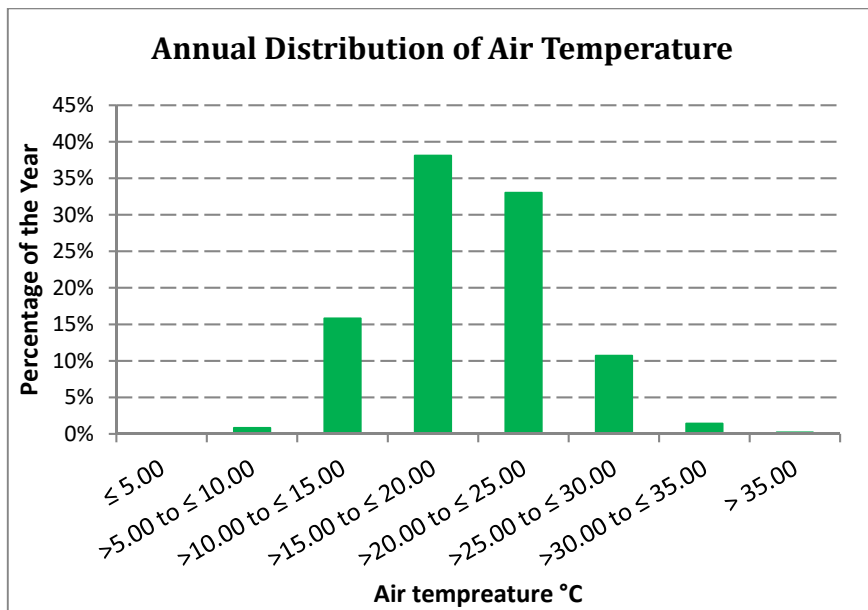


Figure 2-1: Annual Distribution of Outdoor Dry-bulb Air Temperature

2.2.2 Relative Humidity (RH)

RH range has been found to be primarily within the comfortable range of 49% to 60%. Nevertheless, results also indicate that it is expected to be relatively humid within the region where RH is expected to be above 60% for approximately half of the year.

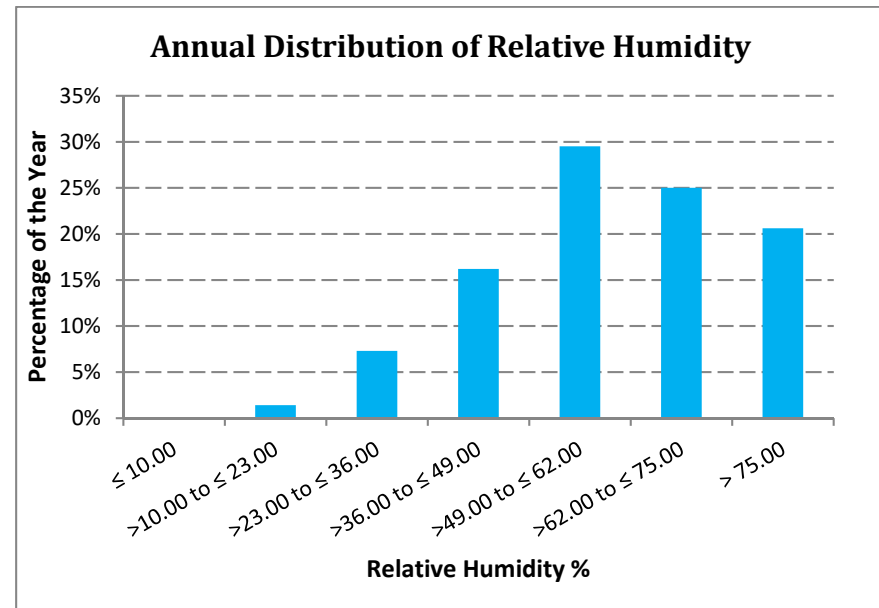


Figure 2-2: Annual Distribution of Outdoor Relative Humidity

2.2.3 Wind Study

Wind studies were executed for the Warringah site to determine annual wind pattern for the development. The following Figure 2-3 demonstrates that PV may be exposed to moderate wind conditions with expected

average wind speeds to be approximately 4m/s. Observable effect of such wind conditions on land may include rustling of leaves. The wind roses in figure below depicts summer afternoon breezes predominantly from the NE, E, SE & S with an average mean wind speed of 17.9 km/hr. Mid-season afternoon breezes predominantly from the NE & E with an average mean wind speed of 19.1 km/hr.

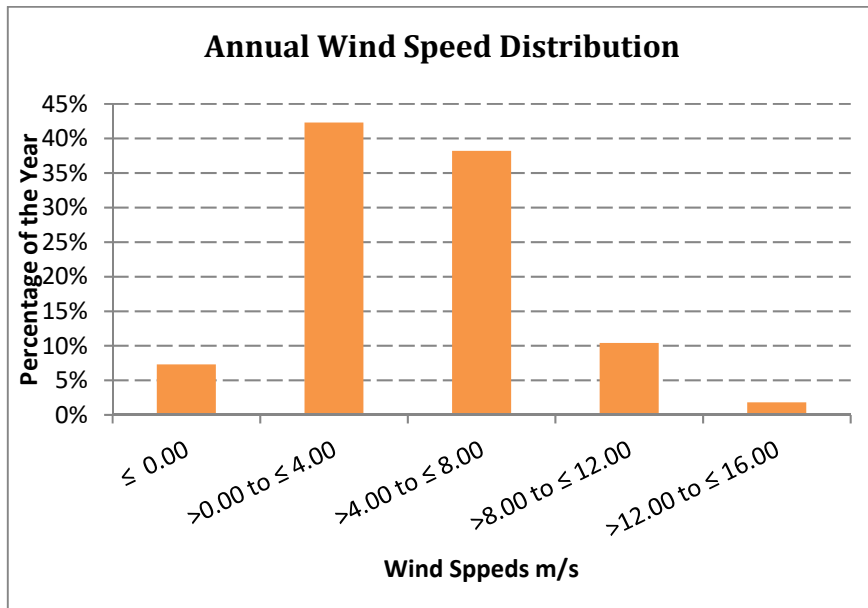


Figure 2-3: Annual Distribution of Wind Speeds

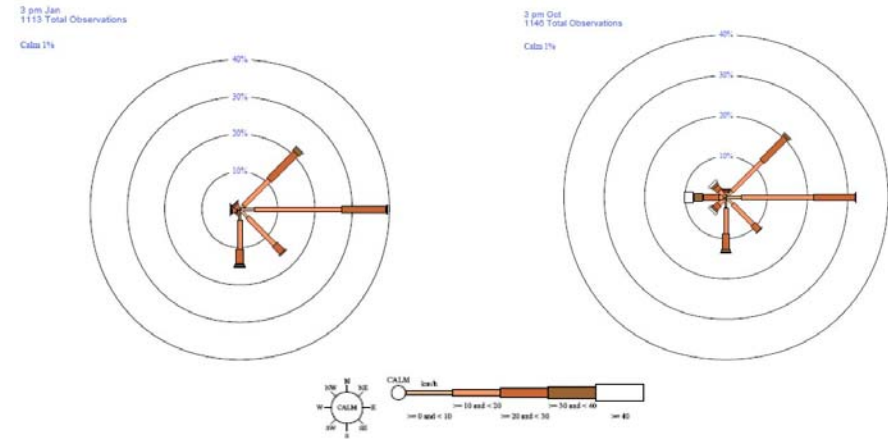


Figure 2-4: Wind Roses for Warringah, NSW

3 Indoor Environment Quality

Scentre Group’s purpose is to create extraordinary places connecting and enriching communities. This is supported by its commitment to design shopping centres mindful of customer’s health and well-being. The following key initiatives are being targeted in creating an energy efficient space that is also focused on occupant well-being.

3.1 Indoor Air Quality

The entry of outdoor air pollutants to the space will be minimised. The building services will be designed to comply with ASHRAE Standard 62.1:2013 in regards to minimum separation distances between pollution sources and outdoor air intakes. Compliance will be demonstrated in

accordance with the distances specified in Table 5.5.1 of the Standard. In addition, exceeding mandatory outdoor air rates by 50% to further dilute unpreventable internal pollution will be considered.

3.2 Acoustic comfort

The project will have low noise plant so that the internal noise levels from all building services is in accordance with AS/NZS 2107:2000 table 1 for class 6 developments. This is expected to provide comfortable acoustic conditions for the occupants.

3.3 Lighting Comfort

Lighting comfort is a key initiative identified by Scentre Group. Scentre Group in-house lighting designers will ensure that all lighting systems are designed to maximise visual comfort, by adopting the following measures:

- Accurate colour perception of the space using high CRI fittings
- Flicker free lighting by use of high frequency
- Elimination of glare
- General lighting levels and quality comply with best practice guidelines
- In nominated areas a combination of lighting and surfaces improve uniformity of lighting

3.4 Visual comfort

The project will deliver well-lit malls that provide high levels of visual comfort to building occupants. The development will consider using architectural design (where practical) to harness available natural lighting

into the space through integration of light wells, sky lights and voids to reduce lighting energy consumption.

3.5 Indoor Pollutants

All paints, adhesives, sealants, carpets, and engineered wood products used in the building will meet the maximum Total Volatile Organic Compounds (TVOC) limits to provide a safe and healthy environment for the occupants. Emissions for each application will be acquired through recognised testing methods and reported through a recognised datasheet.

3.6 Thermal Comfort

Thermal comfort of the building will be assessed using the Predicted Mean Vote (PMV) method in accordance with the international standard for moderate thermal environments – determination of the PMV index and specification of the conditions for thermal comfort (ISO 7730). The PMV is an index that predicts the mean value of the votes of a large group of persons on the following seven point scale as shown in figure 3-1 below.

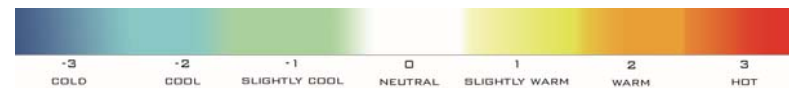


Figure 3-1: Predicted Mean Vote (PMV) chart

The PMV index can be determined when the activity (metabolic rate) and the clothing (thermal resistance) are estimated, and the following environmental parameters are measured;

- Air temperature
- Mean radiant temperature
- Relative air velocity; and
- Humidity

A PMV of -1 to +1 corresponds to a Percentage of People Dissatisfied (PPD) of no more than 25% (i.e. 25% of the people are dissatisfied or uncomfortable). A PMV of -0.5 to +0.5 corresponds to a PPD of 10%. It is important to note that a PMV of 0 would still have 5% of the occupants dissatisfied or uncomfortable.

The building will be designed to achieve high levels of thermal comfort.

This will include implementing the following design measures to target a PMV between ± 1

- Maintaining Dry bulb temperature between 20°C and 24°C in the space.
- Maintaining a relative humidity between 40% and 60%
- Maintaining air velocity to be no more than 0.2 m/s with no supply air directed at occupants
- Systems will be able to modulate with turn down capability
- Air conditioning zones will be provided separating perimeter from internal zones with separate air handling for these spaces
- Solar heat gain into the space will be restricted to less than 250 W/m² at the peak
- Total glazing u-value will be assessed using the glazing calculator and will be as low as feasible.

3.7 Environment Quality – Summary

The project is aiming to create a pleasant environment for the occupant to inhabit by implementing initiatives to increase comfort and well-being and also reducing their exposure to environmental contaminants.

The following table summarises the initiatives to be targeted in the design.

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
Indoor Environment Quality				17	
Indoor Air Quality	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes	1	1
		9.2	Provision of Outdoor Air	2	1
		9.3	Exhaust or Elimination of Pollutants	1	1
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels	1	1
		10.2	Reverberation	1	
		10.3	Acoustic Separation	1	
Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.0	Minimum Lighting Comfort	-	Complies
		11.1	General Illuminance and Glare R	1	
		11.2	Surface Illuminance	1	
		11.3	Localised Lighting Control	1	
Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12.0	Glare Reduction	-	
		12.1	Daylight	2	
		12.2	Views	1	
Indoor Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	13.1	Paints, Adhesives, Sealants and	1	1
		13.2	Engineered Wood Products	1	1
Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	1	1
		14.2	Advanced Thermal Comfort	1	1
Total				17	8

Table 3-1: Green Star Design As Built – Indoor Environment Quality Initiatives Summary

4 Material & Resource Sustainability

The development strives to implement standard best practice measures to address the consumption of resources during the building construction phase and to reduce the environment impacts of building materials. Initiatives may include the use of recycled content in concrete and

recycled timber. Timber that is used in the project may comprise of pre-existing timber in a building or/and timber that is procured from a second hand source. In addition, the project will target to include building materials that are responsibly sourced or have a sustainable supply chain which uses energy-reducing processes in its manufacture. For steel framed structures, steelwork sourced from a responsible steel maker/steel contractor will be incorporated as much as practically possible. Details of these initiatives will be explored further in a construction/environmental plan as it is developed.

5 Water Conservation Strategies

The Warringah Mall redevelopment will endeavour to consider water conservation. The project will implement initiatives to reduce the consumption of potable water through measures such as the incorporation of water efficient fixtures and building demand management systems and water re-use where practical. Reductions in operational water consumption may be achieved through maximisation of water efficiency within a project, as well as through the utilisation of reclaimed water sources. The following initiatives may be considered

- The selection of equipment that is more water efficient than comparable standard practice equivalents.

Fixture / Equipment Type	WELS Rating
Taps	6 star
Urinals	6 star
Toilet	4 star

Showers 3 star (>4.5 but <6.0 l/min)

Table 5-1: Summary of fittings and fixtures that will be proposed during design

- The use of water-efficient supplementary equipment.
- The selection of water-efficient toilets taps and showers.
- Precedent given to the specification of flora and fauna for any landscaping to be that of native origin with minimal water consumption.
- Integration of water metering and facilities management plans for prevention of excessive water consumption through leakages of amenities and hardware.
- Rainwater harvesting and reuse will be considered for feasibility.

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
Water				12	
Potable Water	Prescriptive Pathway	18A.1	Potable Water - Performance Pa	0	6
		18B.1	Sanitary Fixture Efficiency	1	1
		18B.2	Rainwater Reuse	1	
		18B.3	Heat Rejection	2	
		18B.4	Landscape Irrigation	1	1
		18B.5	Fire System Test Water	1	1
Total				6	9

Table 5-2: Green Star Design As Built - Water Initiative Summary

6 Waste Management

A construction management plan will be considered during the construction phase to minimise construction waste as well as diverting the amount of construction waste going to landfill. During the design, consideration will be given to the appropriate collection, separation and

management including the possibility of recycling/reuse of construction waste on site.

Recycling waste storage facilities including a 2 m³ cage will be considered during the design development stage for the separation of waste streams to encourage operational waste recycling. Waste avoidance measures including incorporation of design solutions that make use of modular and prefabricated installations will also be considered during the construction phase. To explore further the mentioned initiatives, a detailed waste management plan (WMP) will be developed by centre management as the development progress to the construction phase. The plan will mainly aim to address the requirements of separation of waste streams, dedicated waste storage area and access to waste storage area.

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
Materials				14	
Life Cycle Impacts	Prescriptive Pathway - Life Cycle Impacts	19A.1	Comparative Life Cycle Assessm	0	
		19A.2	Additional Life Cycle Impact Rep	0	
		19B.1	Concrete	3	
		19B.2	Steel	1	
		19B.3	Building Reuse	4	4
Responsible Building Materials	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	20.1	Structural and Reinforcing Steel	1	
		20.2	Timber Products	1	1
		20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	
Sustainable Products	To encourage sustainability and transparency in product specification.	21.1	Product Transparency and Sustainability	3	
Construction and Demolition Waste	Percentage Benchmark	22A	Fixed Benchmark	-	
		22B	Percentage Benchmark	1	1
Total				12	6

Table 6-1: Green Star Design As Built - Materials Initiative Summary

7 Energy Consumption

Scentre Group is conscious of their large energy consumption and on a national level, NABERS energy ratings are being carried out to determine the current performance of the centres. The redevelopment will aspire to exceed the performance requirements of the NCC Section J. Some of the design initiatives that may be implemented are as follows:-

- High efficiency HVAC aimed at lower operating emissions
- High performing glazing
- High efficiency LED lighting
- Incorporation of commissioning, maintenance and building tuning into the project programme
- Incorporation of ongoing monitoring trends from energy metering.
- Consideration to passive design to minimise the need for mechanical heating and cooling of spaces.
- Integration of shading devices and ventilation of facades to reduce solar heat gains into mall space at high luminance periods of the day.
- Consideration to adaptive comfort. The design team recognises that the building occupants adapt to prevailing external conditions, therefore, the perceived optimum thermal comfort conditions is likely to drift in the direction of the external climate to which they have been exposed. Adaptive comfort theory suggests that on an extremely hot day (40°C) a person is less likely to perceive the difference between an internal air

conditioning set point temperature of 24 °C and 22 °C; therefore, there is an opportunity to save air conditioning energy by maintaining the internal environment at the higher set point temperature.

The following is a comprehensive list of all initiatives that will be targeted in this category.

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
Energy				22	
Greenhouse Gas Emissions	E. Modelled Performance Pathway	15A.0	Conditional Requirement: Presc	-	
		15A.1	Building Envelope	-	
		15A.2	Glazing	-	
		15A.3	Lighting	-	
		15A.4	Ventilation and Air-conditioning	-	
		15A.5	Domestic Hot Water Systems	-	
		15A.6	Building Sealing	-	
		15A.7	Accredited GreenPower	-	
		15B.0	Conditional Requirement: NatHI	-	
		15B.1	NATHERS Pathway	-	
		15C.0	Conditional Requirement: BASIX	-	
		15C.1	BASIX Pathway	-	
		15D.0	Conditional Requirement: NABE	-	
		15D.1	NABERS Energy Commitment Ag	-	
		15E.0	Conditional Requirement: Reference Building Pathway	-	
		15E.1	Comparison to a Reference Builc	20	11
Peak Electricity Demand Reduction	Performance Pathway	16A	Prescriptive Pathway - On-site E	-	
		16B	Performance Pathway - Referen	2	
Total				22	11

Table 7-1: Green Star Design As Built – Energy Initiatives Summary

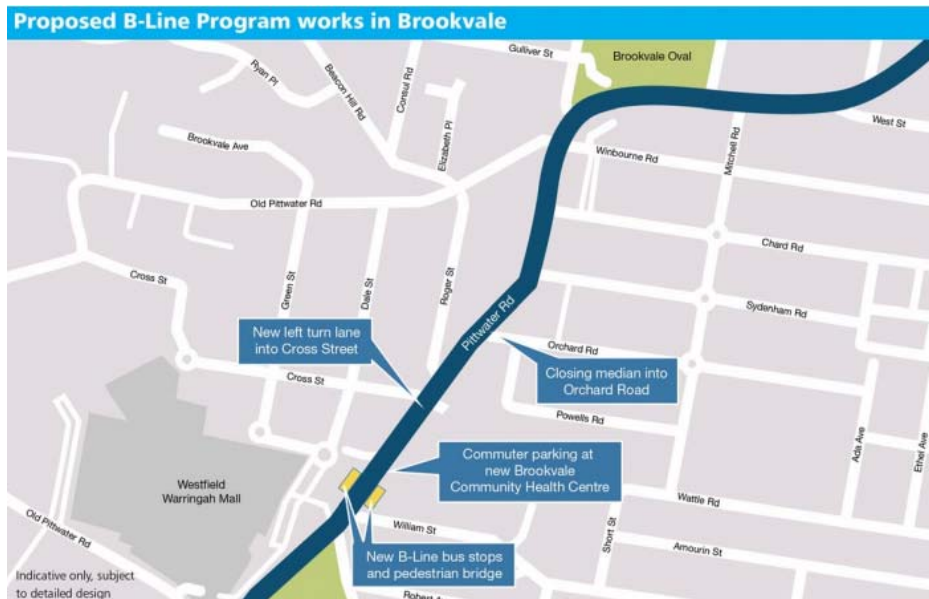
8 Sustainable Transport

The project will implement the following design and operational measures that reduce the carbon emissions arising from occupant travel to and from the shopping centre, when compared to a benchmark building. This is expected to promote the health and fitness of staff and consumers.

8.1 Access by public transport

Westfield Warringah Mall has good access to public transport with bus services located on Pittwater road directly adjacent to the centre. In particular, bus stops are located along Condamine Street as well as a dedicated bus terminal located within the vicinity of the mall with frequent buses arriving and departing.

The introduction of the new B-line has improved connectivity between the Northern Beaches and Sydney CBD. The B-line connects Mona Vale and the Sydney CBD via Brookvale and is a frequent bus service during the weekday morning and evening peak periods.



8.2 Active transport facilities

During the detailed design of the project, bicycle parking and associated facilities will be provided to a proportion of regular building occupants and visitors. End-of-trip facilities are defined as showers, changing amenities with appropriate drying space, and lockers.

8.3 Walkable Neighbourhood

The shopping centre development will provide improved connectivity including amenities that are easily accessible by the public and these include

- Restaurants
- Food and Beverage outlets
- Supermarket

8.4 Summary of Sustainable Transport

The following table summarises the list of initiatives that the project design will aim to target. Due to the central location of the site in the heart of the city all of the points can be targeted. The following is a comprehensive list of all initiatives that will be targeted in this category.

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
Transport				10	10
Sustainable Transport	Performance Pathway	17A.1	Performance Pathway	10	10
		17B.1	Access by Public Transport	0	
		17B.2	Reduced Car Parking Provision	0	
		17B.3	Low Emission Vehicle Infrastruct	0	
		17B.4	Active Transport Facilities	0	
		17B.5	Walkable Neighbourhoods	0	
Total				10	10

Table 8-1: Green Star Design As Built – Transport Initiatives Summary

9 Emissions

The project will endeavour to reduce emissions of the project with the aim of mitigating negative impacts to the environment through the following strategies (where practical):

- Refrigerants and insulants will be considered for their ozone depleting potential;
- Minimising impacts of external light pollution to the local community.

- Best practice application of microbial controls within air conditioning systems.
- Refrigerant leak detection system will be considered to prevent local refrigerant emissions.

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
Emissions				5	
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Reduced Peak Discharge	1	1
		26.2	Reduced Pollution Targets	1	
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring	-	Complies
		27.1	Light Pollution to Night Sky	1	1
Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	28.0	Legionella Impacts from Cooling	1	
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.0	Refrigerants Impacts	1	1
Total				5	3

Table 9-1: Green Star Design As Built - Emissions Initiatives Summary

10 Urban Ecology

Ecological value of the site will be preserved and initiatives such as

- Plantation of indigenous xeriscape species of plants
- Reducing the impact of heat island effects from hard surfaces

will be considered by the landscape architect to enhance the natural diversity.

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
Land Use & Ecology				6	
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vuln	-	Complies
		23.1	Ecological Value	3	1
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement	-	Complies
		24.1	Reuse of Land	1	1
		24.2	Contamination and Hazardous M	1	1
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.0	Heat Island Effect Reduction	1	
Total				6	3

Table 10-1: Green Star Design As Built - Land Use and Ecology Initiatives Summary