# 2 Bowen Cres

## Sustainable Management Plan

10/11/2015

WSP | Built Ecology

# Sustainability Assessment Framework

## TOWN PLANNING

The development at 2 Bowen Cres residential development contains 18 levels of residential apartments, one level consisting of lobby and retail,  plus two levels of underground car park and four additional levels of above ground car park. The development provides an opportunity to implement holistic sustainability initiatives that will achieve environmental benefit while retaining commercial viability and maintaining an optimal user experience. This report will provide an overview of the sustainability approach for the development, as well as demonstrating how the proposed development aims to achieve the Port Phillip City Planning requirements for producing an energy, water and waste efficient development. The following table sets out the policy guidelines and how the 2 Bowen Cres development will achieve this:

| Policy Item | Policy requirement for residential buildings containing 50+ dwellings | Proposed method of meeting policy requirement for 2 Bowen Cres |
|---|---|---|
| Sustainability | Sustainable Management Plan | Sustainability Management Pan (SMP) prepared by WSP outlining all sustainability initiatives incorporated for the development. This document fulfils the requirement. |
| Energy | BCA Minimum | The development will meet the minimum BCA requirements for Section J across the entire development. The city requires no additional energy compliance |
| Water | Stormwater management report via STORM or MUSIC | STORM report showing 100% STORM rating is achieved for the development |
| Green Star | Benchmark against Green Star rating tool | The development is benchmarking against the nominated tool. The benchmarking matrix will incorporate sufficient points to confirm that the project has the design potential to achieve 5 Star Green Star Design & As Built rating. A combination of targeted points and points to be confirmed via design development will enable flexibility regarding the final 5 Star benchmarking pathway. |

This report has been prepared prior to detailed design, and provides an overall strategy combined with performance commitments to achieve the above criteria. Further details of how the targets will be met will be finalised through the detailed design stage.

## GREEN STAR

As part of the Port Phillip City Planning criteria, the project will benchmark its sustainable design to a 5 Star Green Star rating. This strategy produces sustainability initiatives across the full spectrum of rating categories including management,  indoor environment quality, transportation, water, and energy. The Green Building Council of Australia (GBCA) released the Green Star - Design and As Built tool v1.1 in July 2015 to promote the design and construction of high-performance sustainable developments.


The Green Star - Design and As Built rating tool v1.1 has been developed by the GBCA to help building owners and developers to:

- minimise the environmental impacts of their developments
- reduce Australia's greenhouse gas emissions
- capitalise on the environmental benefits of their initiatives
- receive recognition for more environmentally sustainable design


The project has developed a Green Star matrix highlighting sufficient points to establish the preliminary design potential for 5 Stars. The pathway, provided in Appendix A of this report, highlights which points are committed to at this stage and further points yet to be confirmed depending on factors to be established throughout design development and contractor engagement. The development is committed to pursuing sufficient points in the final design and construction to establish a 5 Star Green Star benchmark for the development (i.e. 60 points).

## ENERGY

The greenhouse performance strategy will be based on a carbon efficient building. The carbon efficient building design will deliver on the BCA Section J energy efficiency requirements.

In line with Section J, the residential component of the building must meet the NatHERS requirements for the building wit h a minimum rating of 5 Stars and an  average rating of 6 Stars. In addition to meeting BCA requirements for energy efficiency, the development is targeting a 25% energy reduction compared to the Green Star benchmark building, with savings to be achieved via a combination of energy efficient services and a high performance façade.

NATIONWIDE HOUSE ENERGY RATING SCHEME

## WATER

The City of Port Phillip requires a minimum 100% rating via the Melbourne Water STORM rating calculator. This ensures that the construction does not contribute to increased runoff and pollution during rain events. In order to achieve this requirement and utilise onsite rainfall, a stormwater harvesting system will be incorporated in the design, providing captured rainwater for toilet flushing. In addition to the minimum requirements for stormwater management, the project will be pursuing water efficient measures as part of the Green Star benchmarking strategy. One point is achieved  under the Green Star calculator, via water efficient fittings, which will be selected to reduce the potable water consumption for the building. Maximum flow rates for fittings and fixtures are provided in the Water section of this report.

Melbourne Water

# NCC Section J Requirements

## APARTMENTS

To comply with Section J of the NCC—all apartments within the building must achieve a minimum 5 star NatHERS rating and an average rating across the development of 6 star. All apartments will be provided with insulation, shading and glazing properties to achieve this outcome. Furthermore, the building is aiming to improve upon the stipulated BCA minimum average NatHERS rating requirements by 10%.

Results from the preliminary NatHERS study show that the target NatHERS ratings will able to be achieved with the building fabric and glazing as outlined in this section.

### FirstRate5 Modelling

Software package FirstRate5 has been used to determine the building fabric and glazing requirements for the building in order to achieve the targeted NatHERS ratings. FirstRate5 models have been completed for several of the apartments units with varying layouts and orientations to capture the full spectrum of energy use in the development. Many of the “worst case” units (for instance units with southern exposure or more building fabric exposed to unconditioned spaces) were modeled to ensure that the NatHERS minimum 5 Star rating can be achieved in each of the units.

Screen shots from FirstRate5 showing indicative modelled apartments and their zoning are provided below:


**Unit # 1512**


**Unit # 1513**

### Building Fabric

The following table summarises the minimum insulation performance that will be implemented into the building fabric for this development as modelled in the NatHERS models. This generally aligns with the BCA 2013 building fabric performance requirements, except for the car park soffit where it is anticipated that insulation will not be able to be added due to height restrictions. This reduction in performance will be compensated for by ensuring a sufficiently high performance glazing selection to achieve the minimum NatHERS target:

| Building Element | Proposed Thermal Performance |
|---|---|
| **External and envelope walls** | R2.8 |
| **Internal walls (within apartments)** | Not Required |
| **Inter-apartment walls and walls to corridors** | Not Required |
| **Ceiling (between floors)** | Not Required |
| **Roof and roof below plant spaces** | R3.2 |
| **Floors between conditioned areas and car park** | Not included |

### Glazing

The preliminary NatHERS modelling has been used to optimise the glazing performance for the building to achieve lower heating and cooling demands.

In selecting glazing parameters, consideration has been given to achieving beneficial winter solar gains without overly compromising summer performance. The following glazing performance has been determined to achieve the apartment performance targets:

| Parameter | Description |
|---|---|
| **Glazing type** | Double glazed |
| **Maximum window system U-value** | 3.5 W/m²K |
| **SHGC range** | 0.4—0.6 |

## CONDITIONED NON-RESIDENTIAL AREAS

Non-residential conditioned areas will be designed to comply with Section J of NCC 2015 As NatHERS ratings do not apply to non-residential spaces, these spaces will comply with the requirements of J1-3 of Volume 1 of NCC 2015.

# MANAGEMENT

## BUILDING COMMISSIONING

A robust commissioning process and handover is critical to ensuring that all building services can operate to optimal design potential.

The 2 Bowen Cres development plans to implement commissioning and handover initiatives in line with the Green Star best practice benchmarks outlined in credit Man-2 Commissioning Clauses. This will include the following:

- Comprehensive pre-commissioning, commissioning, and quality monitoring are contractually required to be performed for all building services (BMS, mechanical, electrical and hydraulic)
- The works outlined above will be completed in accordance with CIBSE Commissioning Codes or ASHRAE Commissioning Guideline 1-1996 (for mechanical services only) and CIBSE Commissioning Codes for the other Services.
- The design team and contractor will be required to transfer project knowledge to the building owner through all of the following:
  - ◊ Documented design intent
  - ◊ As-built drawings
  - ◊ Operations and Maintenance Manual
  - ◊ Commissioning Report
  - ◊ Training of building management staff

## ENVIRONMENTAL MANAGEMENT

The development is aiming to achieve best practice environmental management practices by implementing a comprehensive, project-specific Environmental Management Plan (EMP). This plan will be in accordance with Section 3 of the NSW Environmental Management System guidelines which includes the following compliance areas:

- Identification of risks and control measures
- Setting objectives and targets
- Designation of roles and responsibilities
- Training and awareness
- Emergency preparedness and response
- Internal and Management Review

Creating a project EMP is required by the Green Star  Construction Environmental Management Credit 7.0, and a independently verified and formalised version earns a point under credit 7.1.

## CONSTRUCTION WASTE MANAGEMENT

The development will target a minimum of 80% waste reduction through recycling or reused for the construction and demolition works. The contractor will monitor the achievement of this target through regular waste performance reports.

Per Green Star, separate bins/containers for general waste, paper and cardboard, glass, plastic, and one more waste stream will be provided in dedicated waste storage areas.

## BUILDING USER GUIDE

The success of sustainable design initiatives depends largely on the way the building is operated post-occupancy. The benefits of sustainable design can be maximised if all the people who use and operate the building over its lifetime understand the environmental features and operate the building as the design intended.

A Building User Guide will be generated for the building occupants at 2 Bowen Crescent containing the following:

- Energy and water strategy detailing the environmental features of the building
- Targets for energy and water consumption and waste production
- Building services such as heating, cooling and ventilation systems, domestic hot water and lighting
- Details on local public and private transport facilities including cycling, walking, car parking and public transport
- Materials and waste policy detailing location and correct use of waste and recycling facilities
- Refurbishment and repair requirements to maintain environmental initiatives detailed in the initial design.

# INDOOR ENVIRONMENT QUALITY

Good Indoor Environment Quality has been shown to increase occupant comfort and productivity and to reduce medical complaints. The current design implements good passive design measures to have a positive effect on the Indoor Environmental Quality (IEQ) of the apartments. IEQ is essential to creating a comfortable and healthy living environment for occupants and ESD principles have been employed to create a comfortable and healthy environment for the user.

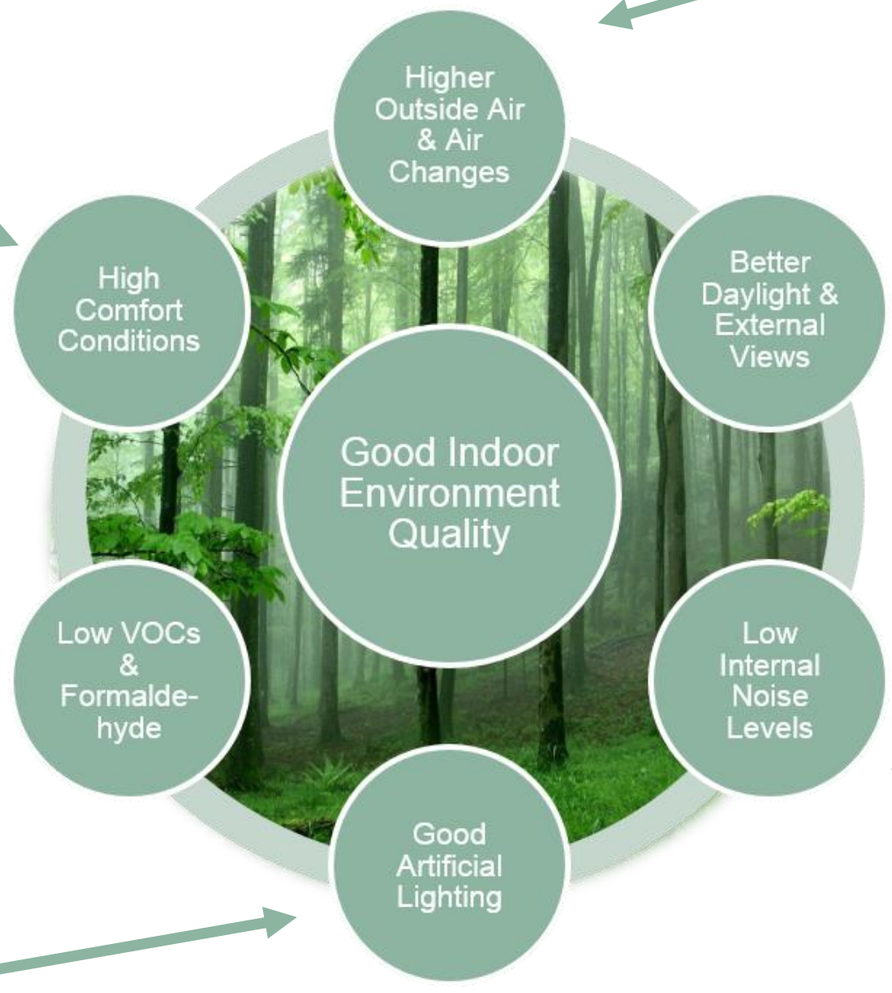
## ACHIEVING GOOD INDOOR ENVIRONMENTAL QUALITY

**The following chart indicates the key features incorporated in the design to achieve a high indoor environment quality**

Thermal comfort is calculated based on a combination of factors which affect how comfortable an occupant feels in a space including air temperature, mean radiant temperature, humidity, air movement, clothing levels and metabolic rates.

The apartments will maximise thermal comfort for occupants via a high performance façade, ability to control the environment through operable windows, and heating and cooling con-

The development will include higher than required outside ventilation air per the Green Star benchmarking strategy. High quantities of fresh air and higher air change rates are essential components of a health indoor environment.




Access to both natural light and external views have been shown to improve productivity and health.

A daylighting study was conducted to ensure that residential spaces have adequate access to natural daylighting.

High levels of measurable pollutants such as formaldehyde and Volatile Organic Compounds (VOCs) are commonly associated with headaches, fatigue, coughing, sneezing and eye and skin irritation. For this reason, paints, sealants, adhesives and carpets supplied to the building will be specified to be low VOC in line with Green Star bench-

Internal noise is a significant factor affecting occupant satisfaction and wellbeing and is recognised as a health hazard by the World Health Organisation.

An acoustic engineer is being engaged on the project to ensure a high quality acoustic performance for the building.

Artificial lighting will aim to ensure sufficient lighting for appropriate tasks, such as lighting above stovetops to facilitate cooking.

# ENERGY

## NatHERS

The building is targeting a high efficiency thermal performance through provision of a high performance façade. The NatHERS requirements for the building to achieve BCA compliance are:

- Minimum rating of 5 Stars
- Average rating of 6 Stars

In addition to the above, the building is targeting a 35% improvement on the energy benchmarks set in the Green Star Ene-1 credit. It aims to achieve this through the following initiatives:

- High performance façade
- Energy efficient services design
- Energy efficient lighting design
- Installation of solar PV array

The building is targeting NatHERS ratings which exceed the minimum average rating requirement by at least 10%, i.e. to achieve a minimum average rating across the development of 6.6 Stars.

## AIR CONDITIONING

Reduction of air conditioning energy will be achieved via two methods:

1. Reduction of heating and cooling loads through high performing façade
2. Installation of energy efficient air conditioning system

Energy efficient air conditioning units within one star of the best available are proposed.

## LIGHTING

The development is targeting high efficiency lighting power density benchmarks and automated controls to achieve energy and carbon reductions beyond a benchmark BCA compliant building. This includes the following targets:

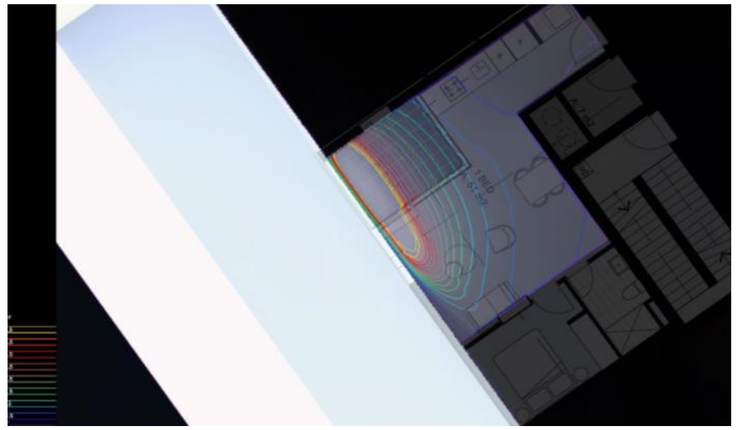
| Area | Lighting Power Density | Controls |
|---|---|---|
| Dwellings | 4 W/m² | Occupant manual control |
| Foyers/Corridors Areas | 7 W/m² | Occupancy sensors |
| Retail Area | 15 W/m$^2$ | Timers |
| Car park (except entry zone) | 2 W/m² | Occupancy sensors |

## DAYLIGHTING

Abundant access to natural lighting helps promote a healthy occupant environment. Good solar access and glazing extent mean the development at 2 Bowen Crescent achieves a high level of daylight amenity.

The Port Phillip City Planning requirements include recommendations for achieving minimum daylight levels in all living spaces. The Council benchmark—1% Daylight Factor (DF) for 90% of the living space in each unit—was used as a guideline to conduct a daylight modelling study using the daylight modelling software Radiance.

The results of the study were used to inform the design and determine which levels and locations were suitable for apartments based on the influence of the adjacent structures on the availability of natural light. An image from the study is shown below, depicting the daylight factor performance for a south-facing apartment living area.



The daylight study focused on the worst-performing apartments, considered to be the south-facing apartments located adjacent to the existing 12-storey building at 3 Bowen Crescent. It was found that satisfactory levels of daylight were able to be achieved down to level 8, with daylight performing dropping below Council recommendations from level 7. As a result, the development is providing non-residential spaces on level 7 below the south-facing apartments.

Daylight levels are sensitive to  glazing specification, with visible light transmittance varying widely between different glazing types. Therefore, the final glazing selection will aim to optimise daylight performance while maintaining a good thermal performance for the development.

## SOLAR PV PANELS

The development is also exploring design opportunities to include a photovoltaic (PV) solar array on the rooftop of the building. An array sized in the range of 5-8kW is currently proposed, subject to roof area availability and feasibility with regard to the height restriction. A solar array of 5kW would provide approximately 7,000 kWh of power to the building per annum to contribute to common area electricity demand and help offset the energy consumed on site.

# WATER

## WATER EFFICIENT FIXTURES & FITTINGS

Minimum water efficiency levels for all domestic water fixtures and fittings will be incorporated into this development in accordance with the Green Star benchmarking strategy.

The following benchmarks are being used for the development:

- WC – 3.5 l /flush average
  4 star WELS
- Showers – < 9 l/min
  3 star WELS
- Residential Basins – 4.5 l/min
  5 star WELS
- Kitchen sinks – 6.0 l/min
  4 star WELS



***WELS rating label***

## WATER EFFICIENT APPLIANCES

All dishwashers and clothes washers specified for the apartments will be within one star of the highest available rating under the Australian Government's WELS rating system as per the WELS Standard AS/NZS6400:2005 Water-efficient Products - Rating and Labelling.

## FIRE SYSTEM WATER

The development aims to meet the Green Star credit for fire testing water, Wat-5 Fire System Water. This credit aims to encourage and recognise building design which reduces consumption of potable water for the building's fire protection and essential water storage systems.

Credit Wat-5 requires there to be sufficient temporary storage for a minimum of 80% of the routine fire protection system test water and maintenance drain-downs, for reuse on-site. This will be achieved through a recirculation tank which allows the fire system testing water to be reused rather than being sent to stormwater.

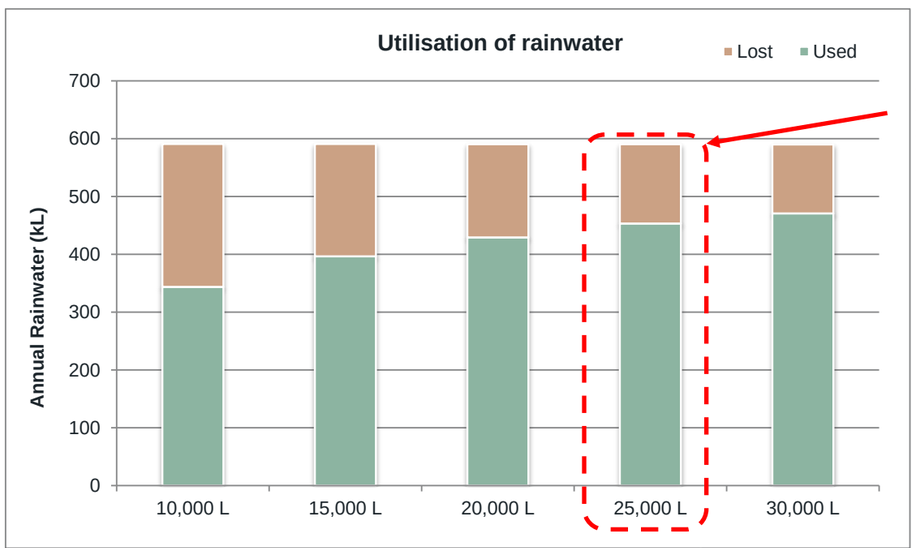
## WATER SENSITIVE URBAN DESIGN

A 25,000 litre rainwater tank will be provided in the basement to collect rainwater for toilet flushing of at least 80 apartments. Toilet flushing will be provided to WCs on the lower levels. Based on the water balance calculations performed, the proposed design is anticipated to allow the development to make effective use of its available rainwater.

The entire tower roof will be  including in the rainwater catchment system which feeds the collection tank, with captured roof area as shown in the below mark up:

In addition to reducing the potable water demand for the development, the rainwater collection system improves the water sensitive urban design aspect of the development, reducing stormwater flows from the building. The tower roof area, marked up on the plan above, is the area used in calculations to represent the area collected to the rainwater tank. To this end a STORM rating calculation was performed for the building and rainwater harvesting system, which achieves the 100% Storm rating requirement—refer Appendix B of this report for preliminary STORM rating.

A maintenance program will also be developed to ensure effective operational and maintenance measures are in place for the rainwater harvesting and re-use system.



# TRANSPORTATION

## PUBLIC TRANSPORT

The development is located on just off St Kilda Road on Bowen Cres in the City of Port Phillip. Therefore, it has excellent access to public transport, including:

- Tram Routes at Domain Interchange, including the 3/3a, 5, 6, 8, 16, 55, 64, 67, and 72
- Various bus routes including 216 219

Based on its location, the development achieves 2 points under the prescriptive Access by Public Transport Calculator.

## LOCAL AMENITIES

The Green Star Multi Unit Residential tool rewards sites which provide convenient, walkable access to local amenities. The purpose of this credit is to encourage and recognise residential developments that are integrated with or built adjacent to local amenities in order to reduce the overall number of car trips taken by residents.

The site is located near the heart of the city, which provides a large number of amenities for residents to use. Amenities located within an easy walking distance to the site include cafes and restaurants, convenience stores, post office and pharmacy.

## CAR PARKING PROVISION

Car parking provision for the site is less than the maximum allowable by the local planning provision. A reduced number of car parks leads occupants to consider reducing the number of cars per household, and to utilise the easily accessible, multiple public transport options available to the site.

## CYCLIST FACILITIES

### Residents

The development is ideally located for cycling both recreationally and for commuting. The close proximity to the Capital City Trail and various city cycle routes lends itself well to cyclists for both commuting and recreational purposes. Bicycle parking facilities will be provided for residential occupants via bicycle racks in the secure storage cages provided to each apartment to meet Green Star resident cycling facilities benchmarks.

### Visitors

Due to the ease of access to the site for cyclists it is reasonable to expect that visitors will frequently arrive by bicycle. Providing locking facilities close to the main entrances of the building will encourage this behaviour, resulting in a positive environmental outcome for the building. The development aims to provide visitor parking in line with Green Star visitor parking benchmarks.

# MATERIALS

## APPROACH

Materials are a key environmental consideration in any building project. Materials impact on the environment in manufacture, use and disposal. Careful material choice can improve environmental sustainability while relieving maintenance needs. Material selection can also have a significant impact on the indoor environmental quality of the building.

Principles:

- Reduce the environmental impact of the development and demand on natural resources;
- Reduce material waste, both in construction and in operation

## DOMESTIC WASTE RECYCLING

The building plans to incorporate best practice recycling collection practices, with dedicated recycling storage in the car park in an accessible location.

The dedicated storage area will provide storage for collection of the following recyclables:

- cardboard
- glass
- plastics - mixed containers
- plastics - soft plastics
- Metals


Waste chutes with recycling/general waste diverters will be provided to all apartments to ensure that recycling is as convenient as sending waste to landfill and therefore encourage recycling practice by residents.

## BUILDING MATERIALS

### PVC

Polyvinyl Chloride (PVC) is a material that has limited provision for recycling in Australia. Buildings currently account for approximately 60% of PVC usage so using PVC from manufacturers that implement environmental practices is a key component to improving the impact of this product. The project intends to specify carpets, cables and pipework to be used in the development from suppliers that use products from manufacturers that operation under accredited environmental management systems.

# EMISSIONS

## REFRIGERANT ODP

Ozone depletion potential (ODP) is a measure of the potential for damage that a chemical has relative to refrigerant CFC11. A higher ODP corresponds to a higher potential to cause long-term damage to the ozone layer. To encourage and recognise the selection of refrigerants that do not contribute to long-term damage to the Earth's stratospheric ozone layer.

All HVAC refrigerants in the project will be specified to have an ODP of zero.

## INSULANT ODP

Similar to the zero ODP refrigerant objective of the development, the project will also ensure all thermal insulation specified for use in the project will have zero use of ozone depleting substances. In particular, the manufacturing process for thermal insulation commonly uses blowing agents which are not zero ODP. Therefore, the insulation will be specified to stipulate zero use of ozone depleting substances in both composition and manufacture.

## LIGHT POLLUTION

Light pollution is harmful to the environment in various ways, including having a disorientating effect on migratory birds, and disrupting biological rhythms of animals and insects. The development is aiming to meet the criteria of Green Star credit Emi-7 Light Pollution, which aims to encourage and recognise developments that minimise light pollution into the night sky.

The development will minimise light pollution into the night sky and onto neighbouring properties by ensuring the following:

- No external luminaire has an upward light output ratio that exceeds 5%; and
- The lighting design complies with AS 4282 'Control of the Obtrusive Effects of Outdoor Lighting'.

# INNOVATION

## ENVIRONMENTAL MAGAEMENT—CONSTRUCTOIN INDOOR AIR QUALITY

The development aims to reduce indoor air quality problems arising from construction works, for the comfort and well-being of construction workers as well as building occupants. To achieve this, the EMP will include provisions for Construction Indoor Air Quality, compliant with the requirements of the credit Man-6 Environmental Management found in Green Star - Public Building v1. In particular, the EMP will reference Chapters 3 and 4 of the SMACNA Guidelines for Occupied Buildings Under Construction, 2008 from the beginning of construction works.

## MAINTAINABILITY

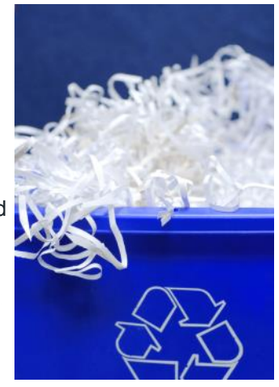
The development aims to be designed in a way that facilitates ongoing maintenance, and minimises the need for ongoing building maintenance throughout a building's lifecycle. To achieve this, the development will follow the criteria provided in the Green Star Maintainability innovation. This requires the following to be demonstrated:

1. A suitably qualified person with experience in maintenance and/or facilities management will per a design review at both the preliminary and final design stages
2. The reviews will consider the design with respect to access, ongoing maintenance and ongoing cleaning of building services and external building features
3. The reviews will contain recommendations for changes to improve maintainability and minimise ongoing maintenance requirements for the building

## CONTRACTOR EDUCTION

The development aims to provide on-site sustainability training for all persons and that encourage key contractors to become qualified in sustainable building practices. The following initiatives will be taken in line with the Green Star criteria:

- Deliver training on the core concepts of global warming, climate change and the health impacts of minimum building practices.
- Deliver site-specific training that highlights the sustainable solutions of project.
- Ensure that the training provides information on any certification that is being achieved by the project, and why the concept of certification is important, as well as the role they play in achieving it.
- Ensure that at least 80% of all contractors and subcontractors that were present for at least three days on site have received the training.
- Demonstrate that head personnel hold, or have received at some point during the design, construction or operational phase of the project, a qualification related to holistic sustainable practices.



# Appendix A—Preliminary Green Star Pathway

| | |
|---|---|
| Project Name: | **2 Bowen Crescent** |
| Project Number: | MEL1512500 |
| Date: | 7/10/2015 |
| Registration Date: | Preliminary Pathway |
| Building Name | **2 Bowen Crescent** |

WSP | Built Ecology

| | Green Star Design & As-Built v1 | | | Proposed Targeted Points | To be confirmed | |
|---|---|---|---|---|---|---|
| Credits | Title | Credit No. | Points Available | Points Target | Points Target | Comments |
| **Management** | **Total Points Available** | | 14 | 6 | 3 | |
| Green Star Accredited Professional | Accredited Professional | 1.1 | 1 | 1 | | WSP to be project's GSAPs |
| Commissioning and Tuning | Environmental Modelled Targets | 2.0 | conditional for credit | - | | Design Intent Report (DIR) or Owner's Performance Requirements (OPR) to be developed during the design phase by design team. Has to include environmental performance targets for all systems, basic description of all systems and metering and monitoring strategies. |
| | Services and Maintainability Review | 2.1 | 1 | | 1 | Requires services and maintainability review carried out prior to construction. Maintainability review scope and fee could be provided by WSP. |
| | Building Commissioning | 2.2 | 1 | 1 | | Comprehensive commissioning of all building systems in accordance with CIBSE, ASHRAE, AIRAH or BSRIA commissioning guidelines. Requires detailed Commissioning Specifications for all disciplines (Mech, Elec, BMS,…) and a Commissioning Plan. |
| | Independent Commissioning Agent | 2.4 | 1 | | - | Independent Commissioning Agent (ICA) to be engaged to oversee commissioning and tuning of all building services throughout all the project's phases. |
| Building Information | Building Operations and Maintenance Information | 4.1 | 1 | 1 | | Operating and Maintenance information, and building log book to be made available to FM. The building log book should both be a simple, easily accessible summary of a building and its intended operation, and provide a means to record energy use and maintenance of the building services. |
| | Building User Information | 4.2 | 1 | 1 | | Building user information to be made available to tenants and regular users in a digital format, with possibility for FMs to keep it up to date . |
| Commitment to Performance | Environmental Building Performance | 5.1 | 1 | 1 | | At least two types of environmental targets (GHG emissions/Energy, Operational Waste, Water, IEQ) to be set for 80% of GFA. Needs targets and measuring and reporting procedures for the strata mgt. |
| | End of Life Waste Performance | 5.2 | 1 | | 1 | To achieve this in resi the strata mgt must commit to extending the life of the finishes to all common areas to at least 10 years, barring minor wear and tear or minor repairs. |
| Metering and Monitoring | Metering Strategy | 6.0 | conditional for credit | - | | Energy and water metering to be provided for all common uses (per floor/ usage) and major users (i.e. 100 kW for electricity) |
| Construction Environmental Management | Environmental Management Plan | 7.0 | conditional for credit | - | | A project-specific Environmental Management Plan (EMP) must be developed and implemented for head contractor in accordance with NSW EMS guidelines. |
| | Formalised Environmental Management System | 7.1 | 1 | | 1 | Formalised Environmental Managements System (EMS) must be implemented by head contractor. Must be verified by independent party against relevant standards. Can be demonstrated by ISO14001 accreditation. |
| Operational Waste | Waste in operations | 8.1B | 1 | 1 | | Separate bins/containers for general waste, paper and cardboard, glass, plastic, one more waste stream; in an easily accessible, sufficiently sized dedicated waste storage area. |
| Management | Max Points Available based on selected Compliance Path | | 10 | 6.0 | 3.0 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Indoor Environment Quality** | **Total Points Available** | | 17 | 10 | 4 | |
| Quality of Indoor Air | Ventilation System Attributes | 9.1 | 1 | 1 | | Minimum distances between pollution sources and outdoor air intakes as per ASHRAE standards. The mechanical ventilation system must be easy to access for maintenance and ductwork must be cleaned prior to occupation. |
| | Provision of Outside Air | 9.2 | 2 | | 1 | 1 or 2 points available for 50/100% increase in outdoor air intake (i.e. 11.25 or 15 l/s per person) or by limiting CO2 concentration in each enclosed space. Requirements vary for mechanically ventilated / mixed mode / naturally ventilated spaces - will need to be analysed based on selected systems, but likely achievable |
| | Exhaust or Elimination of Pollutants | 9.3 | 1 | 1 | | Pollutants from printing and photocopying equipment, cooking and vehicles must be exhausted directly to the outside. Kitchens must be exhausted to outside |
| Acoustic Comfort | Internal Noise Levels | 10.1 | 1 | | 1 | Acoustic consultant (not currently on the project team) will need to provide noise measurement and documentation in accordance with AS/NZ 2107:2000, with internal ambient noise levels less than 5dB(A) above "satisfactory" sound levels. Façade will need to be analysed and designed accordingly. |
| | Reverberation | 10.2 | 1 | 1 | | Reverberation time must be below the maximum stated in "Recommended Reverberation Time" in table 1 of AS/NZ 2107:2000. |
| | Acoustic Separation | 10.3 | 1 | 1 | | All partition walls between nominated enclosed spaces, and to open areas must have a weighted sound reduction index (Rw) of at least 45, or equivalent calculated sound insulation. |
| Lighting Comfort | Minimum Lighting Comfort | 11.0 | conditional for credit | - | | Lights must be flicker free and have a Colour Rendering Index (CRI) of 80 or more, unless the activity does not require a high CRI. |
| | General Illuminance and Glare Reduction | 11.1 | 1 | 1 | | Maintained illuminance levels must meet recommended values for each activity, with high uniformity and limited glare from lamps. Depends on lighting design |
| | Surface Illuminance | 11.2 | 1 | | 1 | For resi at least one wall in each living space, kitchen and bedrooms are provided with specific wall-washing or a wall mounted fitting. |
| | Localised control | 11.3 | 1 | 1 | | Occupants must have control of the lighting in their immediate environment. Areas where lighting requirements differ from those in the credit, the areas may be excluded. For resi sufficient power outlets for future task lights by occupants. |
| Visual Comfort | Glare Reduction | 12.0 | conditional for credit | - | | Glare through all viewing must be limited, through a combination of blinds, screens, fixed devices or other means. If it is expected that the occupier will install blinds then the area is excluded from this criterion. |
| | Daylight | 12.1 | 2 | 1 | | High levels of daylight (e.g. Daylight Factor >2% across 40%/60% of Living/kitchen areas) for 80% of nominated hours. Potential compliance with 40% (1 point) depending on façade design and layout. Daylight analysis shows 1 point is feasible. |
| | Views | 12.2 | 1 | 1 | | 60% of nominated area to have line of sight to outdoors. Achievable with current layouts |
| Reduced Exposure to Pollutants | Paints, adhesives, sealants and carpets | 13.1 | 1 | 1 | | Paints, adhesives, sealants and carpets meet Total VOC limits stipulated in Green Star. |
| | Engineered wood products | 13.2 | 1 | 1 | | Engineered wood products to have low formaldehyde emissions as stipulated in the Green Star credit. |
| Thermal Comfort | Thermal Comfort | 14.1 | 1 | | 1 | For the residential an average NatHERS of 7 or greater is required to be achieved for 1 point - TBC. |
| | Advanced Thermal Comfort | 14.2 | 1 | 0 | | For the residential an average NatHERS of 8 or greater is required to be achieved - not targeted. |
| Indoor Environment Quality | Max Points Available based on selected Compliance Path | | 17 | 10.0 | 4.0 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Energy** | **Total Points Available** | | 22 | 8 | 6 | |
| Greenhouse Gas Emissions | Performance Pathway: Comparison to a Reference Building | 15.D.1 | 20 | 6 | 4 | Up to 10 points awarded for reduction in energy consumption via improved building envelope and services design. 6 points based on current modelling, with additional points subject to finalisation of façade and services design. |
| Peak Electricity Demand Reduction | Reference Building Pathway | 16.1 | 2 | 2 | 2 | Project's peak electricity demand to be reduced below that of a reference building by 20/30% for 1/2 points, according to Green Star Calculations guidelines. Uses a sliding scale from 10% onwards. WSP to confirm via energy modelling. |
| Energy | Max Points Available based on selected Compliance Path | | 22 | 8.0 | 6.0 | |

| **Transport** | | **Total Points Available** | 10 | 5 | 5 | |
|---|---|---|---|---|---|---|
| Sustainable Transport | Modelled Pathway | 17.A.1 | 10 | 5 | 1 | Points achieved using Green Star Sustainable Transport Calculator - based on reduction in car parking (less than Council maximum) and building location. To be eligible for up to 10 points, travel plan will need to be provided (prepared by transport professional). If prescriptive pathway is taken (up to 7 points), additional points via low emissions vehicle infrastructure or dedicated parking spaces (1 pt), and bike parking for residents and visitors (1 pt). For electric vehicle charging, a single charging point with fast charge capability cost estimate is approx $3k-$5k per point (nb. rapidly changing technology). |
| Transport | Max Points Available based on selected Compliance Path | | 10 | 5.0 | 1.0 | |

| **Water** | | **Total Points Available** | 12 | 5 | 6 | |
|---|---|---|---|---|---|---|
| Potable Water | Potable Water - Modelled Pathway | 18-A.1 | 12 | 4 | | Efficient fixtures/fittings (1-3 points). 1 point for recycling fire test system water. 1 point for rainwater reused for toilet flushing allows the WSUD requirements to be met and points under credit 26 and innovation. Greywater provides 2-3 points - will need to be confirmed through detailed calculations at later stage. |
| Water | Max Points Available based on selected Compliance Path | | 12 | 4.0 | 0.0 | |

| **Materials** | | **Total Points Available** | 14 | 2 | 4 | |
|---|---|---|---|---|---|---|
| Responsible Building Materials | Responsible steel maker and fabricator | 20.1 | 1 | | 1 | 95% of steel by cost from a responsible steel maker AND 60% by mass for all reinforcing bar and mesh is produced using energy-reducing processes in its manufacture |
| | Timber | 20.2 | 1 | | 1 | 95% by cost re-used / recycled timber |
| | Cables, pipes, floors and blinds | 20.3 | 1 | 1 | | 90% of cables, pipes, floors and blinds costs either do not contain PVC or have an Environmental Product Declaration (EPD) OR meet best practice guidelines for PVC |
| Sustainable Products | Sustainable Products | 21.1 | 3 | | 1 | 3/6/9% of contract value (for 1/2/3 points) is one of the following (different weighting for different categories). Depends on specifications. 1 pt potentially achievable with use of recycled plasterboard.<br>A. Reused products<br>B. Recycled Content Products - insulation<br>C. Environmental Product Declarations<br>D. Third-Party Certification; or<br>E. Stewardship Programs - Timber<br>Credit includes loose furniture, partitions, etc. |
| Construction and Demolition Waste | Reduction of Construction and Demolition Waste | 22.1 | 1 | | 1 | 90% of waste generated during construction and demolition diverted from landfill or below 10kg/m2 GFA. Additional innovation point possible if below 5kg/m2 GFA (see innovation credits). |
| Materials | Max Points Available based on selected Compliance Path | | 14 | 1.0 | 4.0 | |

| **Land Use & Ecology** | | **Total Points Available** | 6 | 2 | 2 | |
|---|---|---|---|---|---|---|
| Ecological Value | Endangered, Threatened or Vulnerable Species | 23.0 | conditional for credit | - | | Conditional requirement. Site meets criteria. |
| | Ecological Value | 23.1 | 3 | 0 | 1 | Requires ecological value of site to be increased post-development. 20% increase required per point. 1 pt may be achievable with planters, living wall or green roof. |
| Sustainable Sites | Conditional Requirement | 24.0 | conditional for rating | - | | Conditional requirement. Site meets criteria. |
| | Reuse of Land | 24.1 | 1 | 1 | | Credit achieved if more than 75% of site was previously developed at time of site purchase. |
| | Best Practice Site Remediation | 24.2 | 1 | | 1 | Credit achieved if existing building/site is contaminated and this has been remediated according to best practice. A site test will need to be conducted prior to foundation work. |
| Heat Island Effect | Heat Island Effect Reduction | 25.1 | 1 | 1 | | 75% of total project site to comprise one of:<br>- Vegetation; or<br>- roof has a SRI > 82 (light colour): Could be investigated, will depend on roof design / plant / etc. Can be achieved with white coloured membrane system. |
| Land Use & Ecology | Max Points Available based on selected Compliance Path | | 6 | 2.0 | 2.0 | |

| **Emissions** | | **Total Points Available** | 5 | 4 | | |
|---|---|---|---|---|---|---|
| Stormwater | Peak Discharge To Stormwater | 26.1 | 1 | 1 | | Post development peak event discharge does not exceed pre-development discharge |
| | Pollution Targets | 26.2 | 1 | 1 | | May be difficult to achieve - water must be treated or diverted before discharging to stormwater - toilet flushing with rainwater may achieve this. |
| Light Pollution | Light Pollution to Neighbouring Properties | 27.0 | conditional for credit | - | | All outdoor lighting complies with AS4282:1997 |
| | Light Pollution to Night Sky | 27.1 | 1 | 1 | | either of the following:<br>- Control of upward light output ratio (ULOR) or<br>- Control of direct luminance |
| Microbial Control | Microbial Control | 28.1 | 1 | 1 | | Achievable with air-cooled system. |
| Refrigerant Impacts | Refrigerant Impacts | 29.1 | 1 | | | Total System Direct Environmental Impacts (TSDEI) is less than 15 or less than 35 with a leak detection system or all refrigerants have zero Ozone Depletion Potential and a Global Warming Potential of less than 10. |
| Emissions | Max Points Available based on selected Compliance Path | | 5 | 4.0 | 0.0 | |

| **Innovation** | | **Total Points Available** | 10 | 6 | 1 | |
|---|---|---|---|---|---|---|
| Market Transformation | | 30.B | | | 1 | Implementation of an initiative that contributes to broader market change. Potential for green wall to meet this category. |
| Improving on Green Star Benchmarks | | 30.C | | 1 | | **Credit 26 -** point for achieving Category B pollutant targets (stormwater) - achieved by virtue of council town planning requirements. |
| Innovation Challenge | | 30.D | | 3 | | **Contractor Education** (1 pt available) - training posters re ESD will be displayed (targeted)<br>**Design for Active living** (1 point available) - would need to include gym / attractive stairs / features to encourage active living (targeted)<br>**Energy Metering Integrity** (1 point available) - good practice validation process for all non-utility meters (targeted) |
| Global Sustainability | | 30.E | | 2 | | Construction Air Quality (potentially 1 pt available) - provisions to be included in the OPR and Contractors CMP<br>- During construction, meet or exceed the recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3).<br>- If the building undergoes a tenant improvement, develop and implement an IAQ management plan for the preoccupancy phases. Perform a flush-out procedure.<br>- Protect stored on-site or installed absorptive materials from moisture damage.<br>- If permanently installed air-handlers must be used during construction, approved filtration media must be used at each return air grille. All filtration media to be replaced immediately prior to occupancy.<br>- Upon the completion of construction, HVAC and lighting systems must be returned to the designed or modified sequence of operations.<br>Learning Resources (1 pt available) |
| Innovation | Max Points Available based on selected Compliance Path | | 0 | 6.0 | 1.0 | |

| | | |
|---|---|---|
| **TOTAL POINTS** | **46.0** | **21.0** |
| Min points Req 5 Stars | 60 | |

# Appendix B—STORM Rating

# STORM Rating Report

| | | |
|---|---|---|
| TransactionID: | 272405 | |
| Municipality: | PORT PHILLIP | |
| Rainfall Station: | PORT PHILLIP | |
| Address: | 2 Bowen Cres | |
| | Port Phillip | |
| | VIC | 3004 |
| Assessor: | Zach Stevens | |
| Development Type: | Residential - Multiunit | |
| Allotment Site (m2): | 1,935.00 | |
| STORM Rating %: | 107 | |

| Description | Impervious Area (m2) | Treatment Type | Treatment Area/Volume (m2 or L) | Occupants / Number Of Bedrooms | Treatment % | Tank Water Supply Reliability (%) |
|---|---|---|---|---|---|---|
| Top Roof | 1,252.00 | Rainwater Tank | 25,000.00 | 80 | 159.40 | 76.00 |
| Other | 610.00 | None | 0.00 | 0 | 0.00 | 0.00 |

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