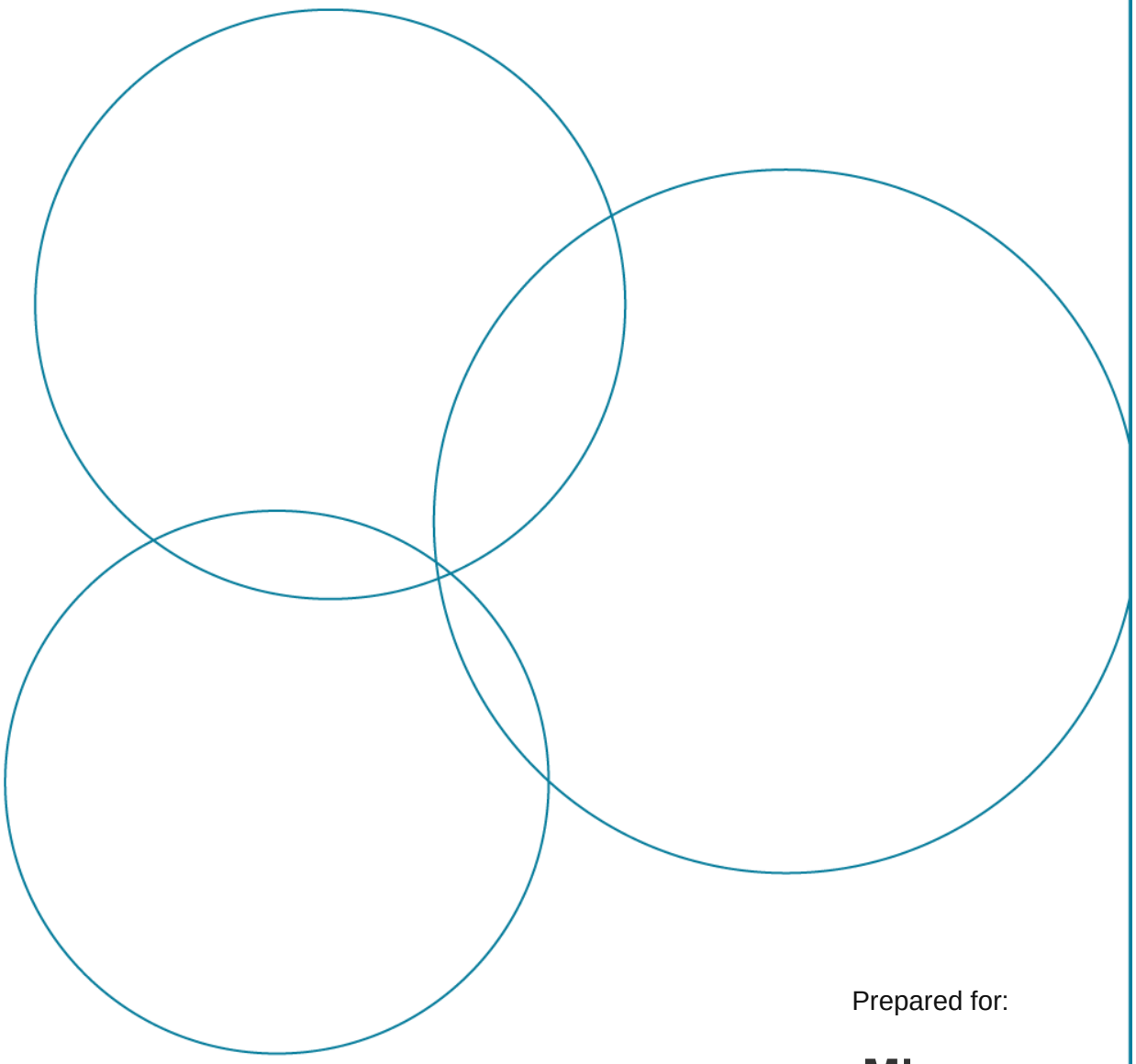
3-November 2016

Ecologically Sustainable Design Statement

1012736 – Harbourside



Prepared for:

Mirvac

By Cundall
Level 1, 48 Alfred Street
Milsons Point, NSW 2061
Ph (02) 8424 7000
Fax (02) 8424 7099

Please contact: Hannah Morton

Contents

Executive Summary

This report outlines how environmentally sustainable development (ESD) principles can be incorporated into the design, construction and ongoing operation of the Harbourside development at Darling Harbour, NSW. It supports the Stage 1 Development Application seeking approval for the land use and envelope and outlines strategies to be explore and investigated in the detailed design stages.

Mirvac are committed to environmental and social sustainability through their 'This Changes Everything' strategy which will be implemented on this project.

The project will consequently be designed according to best practice ESD principles across a wide range of environmental impact categories including energy, water, materials, ecology, emission, transport, indoor environmental quality and innovation. Rigorous management and governance procedures will ensure that sustainability outcomes will be delivered in operation, and development will be certified in accordance with independent third-party rating systems in design, construction and operation.

The following environmental certifications will be investigated for the project:

- 4-Star Green Star Design & As Built v1.1 for residential
- 4-Star NABERS Energy for Shopping Centres
- 3-Star NABERS Water for Shopping Centres

Strategies to be considered in the design include:

- Selection of non-toxic finishes to improve Indoor Environmental Quality (IEQ).
- Efficient fittings, fixtures and appliances to minimise water demand.
- Use of recycled water to reduce mains water consumption.
- Load reduction, passive design, energy-efficient building services and smart controls to reduce energy consumption.
- Promotion of healthy and active living through design and education strategies, including recreational and end-of-trip facilities, design for pedestrians rather than cars, prominent placement of stairs and access to fresh food.
- Enhanced commissioning and tuning practices to translate design intent into actual performance.
- Environmental and waste management to ISO14001 standard during demolition and construction.
- Incorporation of crime prevention through environmental design (CPTED).
- Innovative marketing and education strategies to convey sustainability practices to wider audiences.
- Selective procurement to consider the supply chain impacts of materials used in construction in terms of environmental and social responsibility, and to reduce embodied carbon.

Throughout the project, appropriate documentation will be collected to demonstrate that the chosen sustainability initiatives are incorporated into the design and delivery of the building.

1 Introduction

1.1 General

This report supports a State Significant Development Application (SSDA) submitted to the Minister for Planning and Infrastructure pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Mirvac Projects Pty Ltd (Mirvac) is seeking to secure approval to establish concept proposal details for the redevelopment of the Harbourside Shopping Centre (Harbourside), including a new retail shopping centre, residential apartment tower and substantial public domain improvements.

The project supports the realisation of the NSW State Government's vision for an expanded 'cultural ribbon' spanning from Barangaroo, around to Darling Harbour and Pyrmont. The project importantly will add further renewed diversity in tourism and entertainment facilities to reinforce Sydney's CBD being Australia's pre-eminent tourist destination.

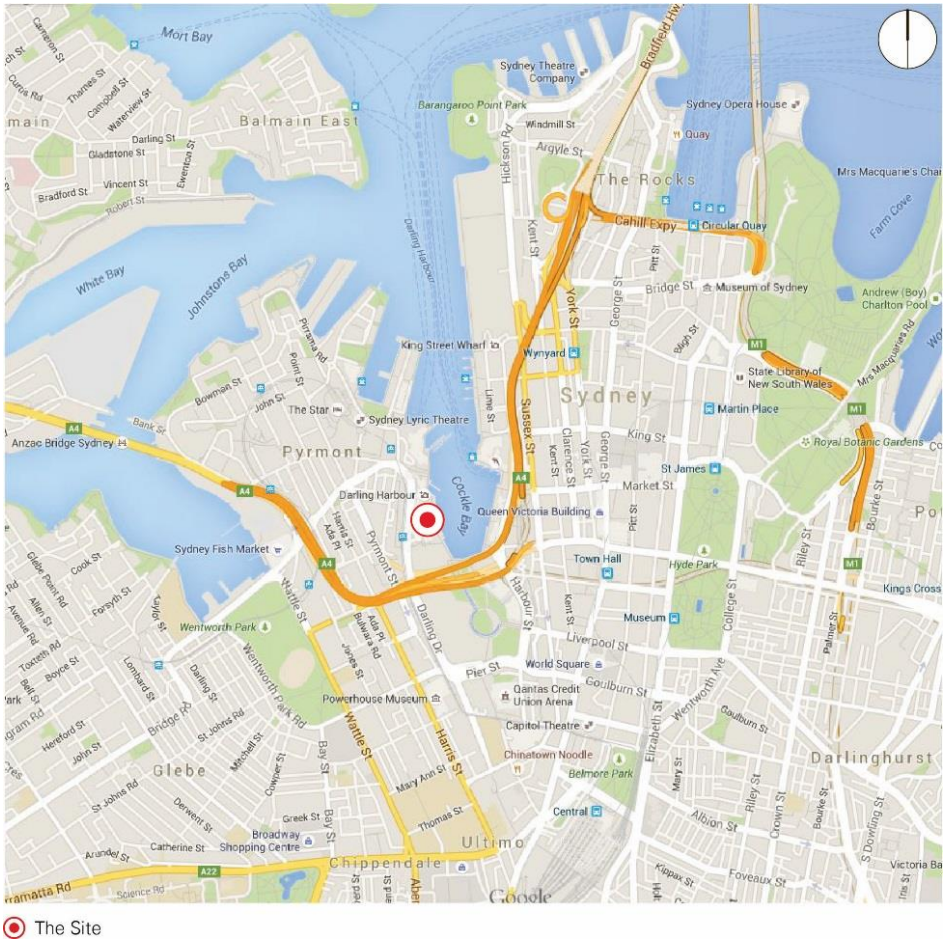
1.2 Site description

The Site is located within Darling Harbour. Darling Harbour is a 60 hectare waterfront precinct on the south-western edge of the Sydney Central Business District that provides a mix of functions including recreational, tourist, entertainment and business.

More generally the site is bound by Pyrmont Bridge to the north, the Sydney International Convention, Exhibition and Entertainment Centre Precinct (SICEEP) to the south, Darling Drive and the alignment of the Light Rail to the west and Cockle Bay to the east.

A locational context area plan and location plan are provided at Figures 1 and 2 below.

The Darling Harbour precinct is undergoing significant redevelopment as part of the SICEEP, Darling Square, and IMAX renewal projects. The urban, built form and public transport / pedestrian context for Harbourside will fundamentally change as these developments are progressively completed.



The Site

Figure 1 – Location Context Area Plan

1.3 Overview of proposed development

The proposal relates to a staged development application and seeks to establish concept proposal details for the renewal and re-imagining of Harbourside. The concept proposal establishes the vision and the planning and development framework which will be the basis for the consent authority to assess future detailed development proposals.

The Harbourside site is to be developed for a mix of non-residential and residential uses, including retail and restaurants, residential apartments, and open space.

The Concept Proposal seeks approval for the following key components and development parameters:

- Demolition of existing site improvements, including the Harbourside Shopping Centre, pedestrian bridge links across Darling Drive, obsolete monorail infrastructure, and associated tree removal;
- A network of open space areas and links generally as shown within the Public Domain Concept Proposal, to facilitate re-integration of the site into the wider urban context;
- Building envelopes;
- Land uses across the site, non-residential and residential uses;
- A maximum total Gross Floor Area (GFA) across the Harbourside site of 87,000m2 for mixed use development (non-residential and residential development);

- Basement car parking;
- Car parking rates to be utilised in subsequent detailed (Stage 2) Development Applications);
- Urban Design and Public Realm Guidelines to guide future development and the public domain; and
- Strategies for utilities and services provision, drainage and flooding, and ecological sustainable development.

A more detailed and comprehensive description of the proposal is contained in the Environmental Impact Statement (EIS) prepared by JBA.

1.4 Planning Approvals Strategy

The Site is located within the Darling Harbour precinct, which is identified as a State Significant Site in Schedule 2 of State Environmental Planning Policy (State and Regional Development) 2011. As the proposed development will have a capital investment exceeding $10 million, it is declared to be State Significant Development (SSD) for the purposes of the Environmental Planning and Assessment Act 1979 (EP&A Act), with the Minister for Planning the consent authority for the project.

This State Significant Development Application (DA) is a staged development application made under section 83B of the EP&A Act. It seeks approval for the concept proposal for the entire site and its surrounds.

More specifically this staged DA includes establishing land uses, gross floor area, building envelopes, public domain concept, pedestrian and vehicle access and circulation arrangements and associated car parking provision.

Detailed development application/s (Stage 2 DAs) will accordingly follow seeking approval for the detailed design and construction of all or specific aspects of the proposal in accordance with the approved staged development application.

The Department of Planning and Environment provided the Secretary's Environmental Assessment Requirements (SEARs) to the applicant for the preparation of an Environmental Impact Statement for the proposed development on 30 August 2016. This report has been prepared having regard to the SEARs as relevant.

2 Environmentally Sustainable Design (ESD) Approach

The project will be designed according to best practice principles of environmentally sustainable development (ESD). Further detail is provided in the following sections.

2.1 Governance

The proposed development will establish and maintain strong governance practices, promoting engagement, transparency, and community and resilience to a changing climate.

Good environmental management practices will be adopted, including enhanced commissioning, ongoing tuning processes, building user information and environmental performance targets. Best practice construction environmental management processes will be implemented, as well as waste diversion targets from landfill. Metering and monitoring strategies will ensure operational performance can be tracked and optimised.

Performance will be measured in operation and the satisfaction of the building's occupants used as an indicator of the project's success.

The environmental credentials of the building will be verified by independent review. The following environmental certifications will be investigated for the project:

- 4-Star Green Star Design & As Built v1.1 for residential
- 4-Star NABERS Energy for Shopping Centres
- 3-Star NABERS Water for Shopping Centres

Governance and management strategies are outlined in further detail in this section.

2.1.1 Green Star Accredited Professional

A Green Star Accredited Professional will be appointed to provide sustainability advice from schematic design through to practical completion of the project.

2.1.2 Commissioning and Tuning

The project team and all relevant contractors will undertake commissioning process activities for all nominated building systems that serve the project, including the following:

- Environmental performance targets will be set and documented;
- A comprehensive services and maintainability review will be conducted to address commissionability, controllability, maintainability, operability and safety;
- Best practice commissioning will be undertaken in accordance with CIBSE or ASHRAE standards;
- Tuning will be completed for all building systems, and at a minimum, quarterly adjustments and measurement must be undertaken for the first 12 months after occupation.

2.1.3 Adaptation and Resilience

Climate change adaptation and resilience will be considered to enable the building design to adapt to potential climate changes and extreme weather events with the intention of minimising risk and disruption to the occupants, the building and the community.

2.1.4 Building Information

Comprehensive building operation and maintenance information will be provided for all building systems, as well as building user information to educate building occupants and visitors on the sustainability features of the buildings and how to use these to reduce environmental impact.

2.1.5 Metering and Monitoring

A best practice metering and monitoring strategy will be implemented to track and monitor energy and water use in the buildings. This will ensure that they are on track to achieving the performance targets, and promptly identify any leaks, faults or excessive consumption. Sub-metering will be provided for all major energy and water uses, supplying data to the Building Management System (BMS).

2.1.6 Construction Environmental Management

A best practice Environmental Management Plan (EMP) will be developed and implemented by the head contractor, to assist in managing environmental performance, conditions, and impacts arising from excavation, demolition and construction.

2.1.7 Operational Waste

A Waste Management Plan (WMP) will be provided for building operations. This will provide building management and occupants with guidance on how to manage waste in order to divert it from landfill.

Facilities will be provided for collection and separation of major waste streams for collection by the relevant waste contractor in operation.

Dedicated storage space will be clearly labelled for recycling and easily accessible by waste collection services.

2.2 Indoor Environmental Quality

Indoor Environmental Quality (IEQ) will be improved through consideration of indoor air quality, acoustic, thermal and visual comfort, as well as daylight and views. IEQ strategies are outlined in further detail below.

2.2.1 Indoor Air Quality

The ventilation systems will be designed to with consideration of maintenance access and minimum separation distances between pollution sources and outdoor air intakes.

Ductwork will be protected during construction to minimise contamination with debris and moisture prior to occupation.

Kitchens and other sources of significant contamination will be separately exhausted without recirculation to minimise contamination at the source.

In order to minimise indoor air contamination and promote occupant health, preference will be given to paints, adhesives, sealants and floor coverings which have low Volatile Organic Compound (VOC) emissions, and engineered wood products with low formaldehyde emissions.

2.2.2 Acoustic Comfort

Acoustic comfort will be improved through the following strategies:

- Design of internal ambient noise levels to be no more than 5dB(A) above the "satisfactory" sound levels in Table 1 of AS/NZS 2107:2000 in key spaces.
- Target acceptable reverberation levels and consider providing acoustic noise separation between sensitive enclosed spaces.

2.2.4 Visual Comfort

Glare control mechanisms such as internal blinds or curtains will help maximise visual comfort. Design will consider availability of daylight and maintain excellent connections to external views.

Artificial lighting will consider appropriate colour perception and lighting levels, reduced glare from lamps and uniformity.

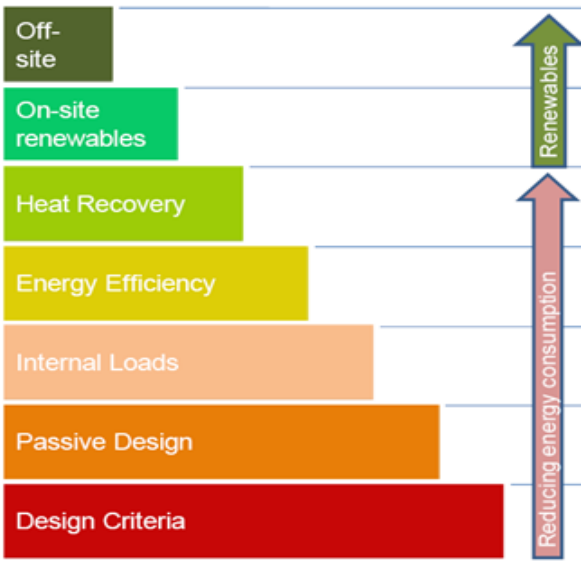
2.2.6 Thermal Comfort

Occupant thermal comfort will be improved through solar control glass, shading and careful design of air-conditioning systems.

2.3 Energy

The design will seek to reduce energy consumption, and thereby greenhouse gas (GHG) emissions, by combining a well-designed facade with high-efficiency systems, services and appliances as well as smart controls to ensure key services are only operating when required by occupants.

Before services are designed however, the first step will be to interrogate the design criteria to ensure the conditions being designed for match what occupants actually want for the building. Passive design principles will be applied to reduce the demand on active systems (e.g. HVAC and lighting).



2.3.1 National Construction Code (formerly Building Code of Australia) Section J

The National Construction Code/Building Code of Australia (BCA) Section J sets minimum energy performance requirements for all new developments, which cover air-conditioning, ventilation, lighting, power and hot water, as well as building fabric considerations including thermal construction and insulation, building sealing, glazing and shading. The proposed design will be developed to meet the BCA energy efficiency requirements. JV3 modelling will be undertaken to inform the design development.

2.3.2 NABERS

The shopping centre will target the following NABERS ratings:

- 4-Star NABERS Energy for Shopping Centres
- 3-Star NABERS Water for Shopping Centres

This includes all base building energy and all water consumption.

2.3.3 BASIX

All new residential development in NSW is required to demonstrate a reduction in GHG emissions compared to an average benchmark. This project is required to demonstrate a 20% saving in GHG emissions. A preliminary BASIX assessment has been undertaken which shows that the proposed energy strategies are capable of achieving compliance with BASIX energy targets. These strategies will further developed during detailed design.

BASIX requires that each unit achieve a minimum thermal performance target. This is calculated using software approved by the National House Energy Rating Scheme (NatHERS), which predicts annual heating and cooling loads for each apartment. In order to pass BASIX requirements, the project must comply with individual heating and cooling load limits as well as average limits over the entire site.

2.3.4 Energy strategies

The following strategies could be used to achieve the project's energy saving and GHG emissions targets. These are subject to change as the design develops.

- High-performance façade incorporating low-e solar control glazing with appropriate shading;
- Efficient heating, ventilation and cooling (HVAC) systems including:
    - High efficiency chillers (potentially connected to the harbour for heat rejection);
    - Variable speed pumps;
    - Variable speed ventilation fans (including EC motors);
    - CO_2 demand control ventilation for high occupancy areas (retail only);
    - Sensible heat recovery for high occupancy areas;
    - Car park with Variable Speed Drive (VSD) ventilation and Carbon Monoxide (CO) controls;
    - Common area ventilation to include efficiency controls such as zoning, motion sensors, and time clock control;
    - Comprehensive BMS systems to monitor and control HVAC systems.
- Efficient lighting systems including LED lighting throughout, with efficiency controls such as zoning, motion sensors, daylight dimming and time clock control.
- Gas-fired hot water or heat pumps;
- High-efficiency appliances (where installed) including gas cooktops, well-ventilated refrigerators, dishwashers, clothes washing machines and clothes dryers.
- Renewable energy generation will be evaluated, and installed where financially and technically viable. This is most likely to comprise photovoltaic panels on the roof.

The above mentioned strategies could also contribute to reducing peak electrical demand from the development.

2.4 Transport

Low-impact transport will be addressed by the design as well as the site. Bicycle facilities will be provided for staff and retail visitors, while access to existing public transport networks, cycling paths and pedestrian walkways is facilitated and encouraged. The following alternative transport initiatives are being proposed to improve amenity, promote health and reduce transport related GHG emissions:

2.4.1 Active Transport Facilities

Bicycle parking and associated facilities will be provided to staff and retail visitors, including end of trip facilities for staff (showers, changing amenities with appropriate drying space, and lockers).

2.4.2 Walkable Neighbourhood & Public Transport

The site is located close to numerous amenities, with a 'walk score' of 98% and a 'transit score' of 100%, according to www.walkscore.com. A score above 90% is considered a 'walker's/rider's paradise'.

The project is being designed to optimise pedestrian links for enhanced walkability and access to abundant public transport.

2.5 Water

Mains water use will be minimised for the project by selecting efficient fittings, fixtures and appliances to reduce demand, and by utilising recycled water for non-potable uses.

2.5.1 BASIX

All new residential development in NSW is required to demonstrate a reduction in mains potable water consumption compared to an average benchmark. This project is required to demonstrate a 40% saving in mains potable water consumption.

A preliminary BASIX assessment has been undertaken which shows that the proposed water strategies are capable of achieving compliance with BASIX water targets. These strategies will further developed during detailed design.

2.5.2 Water strategies

The following strategies could be used to achieve the project's water saving targets. These are subject to change as the design develops.

- Water efficient fittings, fixtures and appliances
- Fire test water system contained in a closed loop;
- Drip irrigation with moisture sensor override will be used for all landscaping;
- Cooling tower cycles of concentration will be limited to 6 to reduce cooling tower make-up water (or no cooling towers).

The most efficient use for an alternative water source will be determined during detailed design, based on water quality, availability and reliability of water supply, and the minimisation of energy required for treatment and pumping.

2.6 Materials

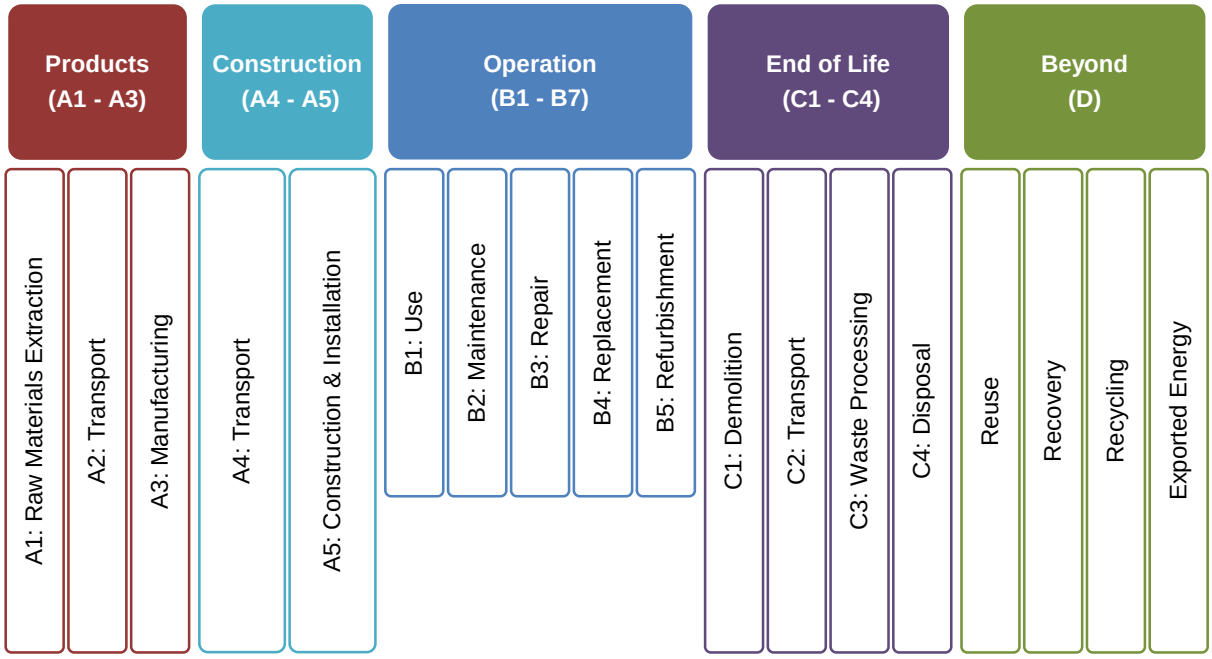
2.6.1 Material Selection

Materials used in construction are responsible for waste generation, resource depletion, GHG emissions and water consumption. In order to minimise these impacts compared to a standard development, the following principles could be applied to material selection on the site:

- Portland cement reduction in concrete mixes by using industrial waste product such as fly ash;
- Use of reclaimed water in cement mixes;
- Use of manufactured sand in cement mixes;
- Selection of responsible steel products sourced from accredited steel makers and fabricators;
- Selection of FSC or AFS certified timbers;
- Selection of Best Practice Certified PVC products;
- Specification of sustainable products where appropriate, such as those containing recycled content, third-party environmentally certified products, and those with product stewardship agreements in place;
- Local procurement to support the local economy and reduce transport emissions.

2.6.2 Life Cycle Impacts

Life cycle impacts will be considered in order to inform the design and specification of materials. In particular, the following major items could be targeted throughout the design development to determine options to reduce life cycle impacts: sub-structure; super-structure; envelope; internal walls; internal finishes and services.



2.6.3 Waste minimisation

A Waste Minimisation Plan may be implemented to deliver best practice waste management during the design, construction and operation of the project. A proposed waste strategy is:

- Establish waste targets (including a minimum of 80% construction and demolition waste diversion from landfill).
- 'Design out' waste.
- Implement best practice construction waste management plans and engage with the supply chain.
- Provide infrastructure and guidance to maximise waste recycling during operation.
- Set up an operational waste agreements.

The project team will forecast waste quantities and reused / recycled content and set targets for waste reduction.

Before starting on site, the contractor will submit a copy of the plan identifying the actions to be taken to reduce waste in construction, increase the level of recovery, increase reused and recycled content, and quantify the resulting changes. The Construction Waste Management Plan will:

- Define responsibilities and actions to prevent, reduce and recover waste;
- Identify waste arising, reuse and recycling routes;
- Record waste movements and benchmark against best practice.

Initiatives to design out waste will be developed in the design and could include:

- Eliminating unnecessary elements.
- Standardising sizes and details to reduce offcuts.
- Reducing complexity to simplify construction process.
- Evaluating the reuse and recycling opportunities of materials before specifying.
- Maximising off-site fabrication of elements to reduce waste.

Initiatives to reduce waste during construction will be agreed with the contractor and could include:

- Setting up a logistics plan and utilising just-in-time delivery.
- Reducing the amount of surplus materials by ordering the correct amount at the right time.
- Providing safe, secure and weatherproof materials storage areas to prevent damage and theft.
- Establishing take-back schemes with suppliers to collect surplus materials.
- Engaging with the supply chain to supply products and materials using minimal packaging and segregate packaging for reuse.

2.7 Land Use & Ecology

The project will enhance existing ecological value by reusing a previously developed site with the addition of landscaping. The site is not currently ecologically valuable and does not contain any threatened species.

Heat island effect will be reduced through the selection of less absorbent roofing materials and increased landscaping.

2.8 Emissions

Emissions to water, soil and the sky will be minimised during construction and operation.

2.8.1 Reduced Peak Discharge to Stormwater

Stormwater discharged from the site will meet pollution reduction targets for total suspended solids, gross pollutants, total nitrogen, total phosphorus, petroleum hydrocarbons and free oils.

2.8.2 Light Pollution

Outdoor lighting on the project will generally be designed in accordance with AS 4282:1997 and external light pollution will be minimised.

2.8.3 Refrigerant impacts

Refrigerants will be selected with an low Ozone Depletion Potential (ODP) of zero.

2.9 Community & connectivity

The project will be designed to maximise community benefit, encourage active, healthy lifestyles, maintain good pedestrian and cyclist linkages and facilitate safe social interaction, exercise, community groups and events.

The following strategies will be considered in creating a successful public space which attracts visitors and maximises opportunities for interaction and integration with the rest of the Darling Harbour.

- Promotion of healthy and active living through design and education strategies, including recreational and end-of-trip facilities, design for pedestrians rather than cars, prominent placement of stairs and access to fresh food.
- Incorporation of crime prevention through environmental design (CPTED).
- Incorporation of elements which facilitate business diversity, innovation, economic development and resilience.
- Innovative marketing and education strategies to convey sustainability practices to wider audiences.
- Practices which encourage community ownership and leadership.
- Potential community carbon fund to place photovoltaic systems on the shopping centre rooftop.

2.9 Innovation

A range of innovations could be investigated by the project team during detailed design to determine whether they can be adopted for the project, including:

- Integrating Healthy Environments.
- Contributing to industry benchmarking.
- Energy metering integrity.
- Financial transparency: Declaration of the cost of environmentally sustainable design initiatives for the project, to promote transparency and the update of such initiatives on other projects;
- Occupant engagement & marketing excellence.
- Contractor education: Sustainably training for all contractors on-site.
- Soft landings: The building is designed, built, commissioned, and tuned by adopting a ‘Soft Landings’ approach.
- Green cleaning & groundskeeping practices.
- Design for Robustness: Reviewing the design and materials to ensure durability for high-traffic surfaces and high-use fittings.

3 Conclusion

The initiatives outlined in this report demonstrate how the Harbourside development can incorporate best practice ESD initiatives into its design, construction and ongoing operation. Through a combination of energy, water and other strategies, the project will exceed minimum requirements for sustainable development in Australia.

Strategies to be explored and investigated in later design stages include:

- Careful lighting design and selection of non-toxic finishes to improve Indoor Environmental Quality (IEQ).
- Efficient fittings, fixtures and appliances combined with rainwater capture and reuse.
- Efficient building fabric and services to deliver operational energy saving.
- Active transport facilities to encourage healthier living while reducing carbon emissions from transport.
- Selective procurement of materials used in construction in terms of environmental and social responsibility.
- Innovative marketing and education strategies to explain sustainability practices to the public.

Rigorous management and governance procedures will ensure that sustainability outcomes will be delivered in operation.