CUNDALL

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Cronulla Sharks Redevelopment ESD DA Report

Prepared for

Bluestone Capital Ventures No. 1 Pty Ltd

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A	Initial report for comment	15/07/2011
B	Revised to incorporate project team feedback	20/07/2011
C	Included DGR clause et al.	29/07/2011

The success and realisation of the proposed initiatives will be dependent upon the commitment of the design team, the development of the initiatives through the life of the design and also the implementation into the operation of the building. Without this undertaking the proposed targets may not be achieved. The use of computer simulation is by its nature predictive with output based on historic weather data and standard assumptions. The results of any computer simulations within this report do not guarantee future performance.

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Executive Summary

This report outlines the ESD initiatives that will be adopted for the Cronulla Sharks redevelopment at Cronulla. A number of minimum regulatory requirements apply to the project, which is proposed to comprise a mixture of residential, retail and leisure space. The project team seeks to exceed these minimum requirements and provide best practice sustainability outcomes in design, construction and operation. The following table summarises the design principles and targets that will be further developed throughout detailed design and construction.

Category	Benchmark	Minimum Requirement	Project Target
Passive Design	**Residential:** BASIX heating/ cooling load target	Meet BASIX average and individual targets.	Improve on BASIX targets for heating and cooling loads.
	Leisure/Retail: NCC Section J for building fabric	Meet Section J requirements for building fabric.	Meet Section J requirements for building fabric.
Water	**Residential**		
	% reduction compared to NSW average	40%	40%
	Leisure/Retail:		
	To be developed based on average consumption.	n/a	Minimise water consumption in fittings/fixtures, cooling towers and irrigation.
GHG Emissions	**Residential:** % reduction compared to NSW average	20%	20%
	Leisure/Retail: NCC Section J for services	Meet Section J requirements for services efficiency.	Exceed Section J requirements.
Indoor Environmental Quality	Varies	SEPP65 requirements for amenity including solar access and cross-ventilation.	Improve indoor environmental quality including daylight, acoustics, thermal comfort, views, glare control and air quality.
Materials	Average data on embodied energy	None	Reduce embodied energy in construction materials by careful selection.
Waste	% diverted from landfill	None	Achieve at least 80% diversion rate from landfill.
Management	n/a	None	Implement best management practice in design, construction and operation.
Ecology	Varies	Preserve the site's high ecological value.	Please refer to report by Eco Logical Australia.
Transport	Varies	Minimum bicycle parking requirements.	Target minimum 5% of trips by bicycle, walking or public transport.

1 Introduction

At current rates of population growth and levels of resource consumption, by 2050 we will need the equivalent of two planets per annum to support the world's population[1]. A sustainable development is one that operates within the means of 'one planet', by minimising consumption of resources such as energy, water and materials, reducing harmful emissions and eliminating waste generation. It will incorporate building forms and infrastructure that have a positive contribution to the environment, and engage the community to live in a sustainable way in order to create real and lasting change.

The Director General's Requirements state:

> ***'9. Ecologically Sustainable Development (ESD)***
>
> *The EA shall detail how the development will incorporate ESD principles in the design, construction and ongoing phases of the development.'*

This report identifies the Ecologically Sustainable Design (ESD) initiatives for the Cronulla Sharks redevelopment Concept Application.

The site is subject to minimum regulatory requirements for sustainability, which include BASIX and the National Construction Code (NCC) Section J for Energy Efficiency.

Beyond these regulatory requirements, the development team seeks to exceed minimum requirements and deliver best practice sustainability outcomes in design, construction and operation. This report outlines the design principles and targets that will be further developed throughout detailed design and construction.

The proposed development comprises the following stages:

Stage 1 – New Neighbourhood Retail Centre, Medical and Leisure facilities on the eastern car park site and redevelopment of the Leagues Club facilities;

Stage 2 - Residential Masterplanned Estate on the western car park and field area; and

Stage 3 – Improvement of the Sharks playing field facilities including grandstand extensions.

Figure 1 shows the proposed site Masterplan:

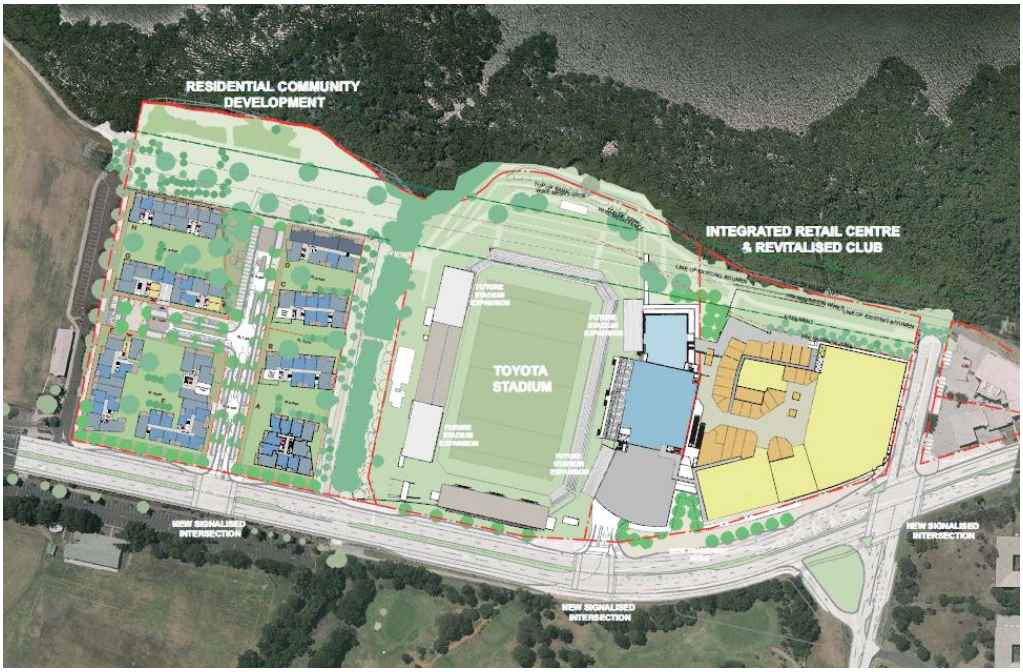

Figure 1: Proposed Cronulla Sharks Development

[1] According to the most recent 'Living Planet' Report - http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/2010_lpr/

1.1 Objectives

The following sustainability objectives will form the basis of evaluation and decision making:

- Reducing greenhouse gas emissions through energy efficiency of infrastructure, building services and building façades;
- Providing a high quality internal and external environments in terms of internal air quality, light and comfort;
- Reducing potable water use and flows to sewer;
- Improving quality of stormwater, minimising peak runoff quantities and preserving natural waterways;
- Minimising embodied energy and embodied water in construction;
- Minimise natural resource consumption, waste, pollution and toxicity during construction and operation;
- Preserving the high ecological value of the site and surrounds;
- Engaging and respecting the community and contributing where possible;
- Implementing ESD solutions that reduce operating costs for residents and patrons.

1.2 Evaluation Principles

Sustainability initiatives will be evaluated in accordance with the following principles.

- **Future-proofing & adaptability** - Design into the future 2015+, Maximise design flexibility to enable adaption to future technology;
- **Operational Certainty –** Ensure operational performance certainty and verify sustainability outcomes over the long-term;
- **Design Quality** - Maximise connection and passive use of the natural environment to enhance the quality of facilities that support the development of building social and community networks (e.g. daylight to change rooms; mid-level green/social café);
- **Visible/communicable strategies** - Provide key or iconic visual sustainability elements that engage visitors, staff and residents;
- **Cost-benefit assessment** methodology will be the overarching framework for assessment, taking into account a “shadow carbon tax” will be incorporated to inform investment decisions. Place an emphasis on opportunities which lower total occupancy costs over the long-term;
- **Community Contribution** – proposed initiatives will be considered in the context of the surrounding community.

1.3 Minimum Requirements

Minimum regulatory ESD requirements applying to this site include the following:

- BCA Section J for Energy Efficiency;
- Building &Sustainability Index.

1.3.1 BASIX

New residential developments in NSW must reduce their energy and water use, according to BASIX requirements developed by the Department of Planning. The objectives of the BASIX scheme are relative to an average development in NSW.

- 40% reduction in water consumption;
- 20% reduction in greenhouse gas emissions for 5 stories & over;
- Minimum thermal performance requirements for heating and cooling loads.

A detailed BASIX assessment will be carried out for the project applications.

1.3.2 National Construction Code Section J

The National Construction Code (NCC) Section J sets minimum energy performance requirements for all new development, 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 NCC energy efficiency requirements.

1.4 Exceeding Minimum Requirements

Minimum performance requirements will be exceeded for the Cronulla Sharks Redevelopment, as outlined in the table overleaf.

Table: Environmental Performance Targets for Cronulla Sharks

Category	Benchmark	Minimum Requirement	Project Target
Passive Design	**Residential:** BASIX heating/ cooling load target	Meet BASIX average and individual targets.	Improve on BASIX targets for heating and cooling loads.
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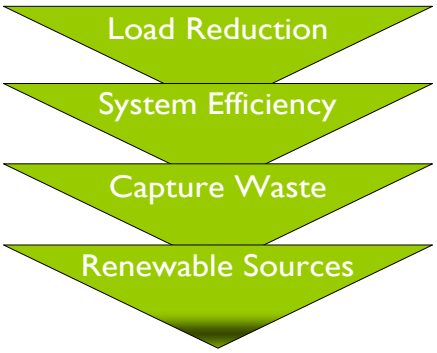
Ecology	Varies	Preserve the site's high ecological value.	Please refer to report by Eco Logical Australia.
Transport	Varies	Minimum bicycle parking requirements.	Target minimum 5% of trips by bicycle, walking or public transport.

2 Energy & Emissions

The Cronulla Sharks Redevelopment is targeting a 30% reduction in operating emissions, compared to standard development benchmark. A staged approach will be taken which first minimises demand and maximises efficiency of building form and systems. Once loads have been reduced as far as possible, alternate sources of energy will be investigated, such as waste heat and low-carbon or renewable energy technologies.



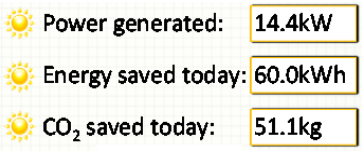
2.1 Passive Design

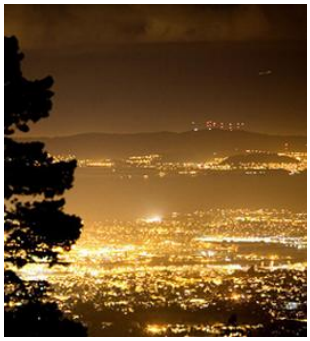
Effective passive design reduces the amount of air-conditioning required and improves internal comfort and amenity. A building's form, fabric and orientation will have the biggest influence on its thermal comfort and environmental performance. Passive design will be further developed during the Project Applications.

Element	*Passive Design Strategies*
Orientation	Windows and ventilation openings will be located to take advantage of prevailing winds for cooling while providing protection from the wind during cold winter periods.
Shading	Building facades with large areas of glazing will have a combination of external shading and high-performance glass to reduce heat transfer and radiant temperatures in proximity to the windows. Shading will be developed to minimise excessive solar gains in summer yet allow passive solar heating in winter.
Insulation	Heating and cooling loads will be reduced by the incorporation of appropriate levels of insulation for the Cronulla climate zone, moderating radiant temperatures from internal surfaces to improve comfort and reducing ongoing operating costs.
Glazing	Selecting glazing with a low shading co-efficient will help to avoid heat gains in the summer, while glazing with a low U-value will reduce losses in the winter. To maximise daylight levels within the buildings, glazing will be selected with a high Visual Light Transmission (VLT).
Thermal Mass	Thermally massive construction and exposed internal finishes will assist with stabilising temperatures by absorbing heat slowly throughout the day, and releasing it gradually throughout the night
Finishes	Light-coloured reflective external finishes will keep buildings cool and minimise the heat island effect of the development. Light-coloured internal finishes will improve light levels within the building.

2.2 Energy Efficient Systems and Services

Energy consumption can be reduced through the efficient design of lighting, air-conditioning and ventilation systems, as well as water heating and other services. The following table outlines the specific initiatives that will reduce services energy consumption at Cronulla Sharks.

System	*GHG Emissions Reduction Strategies*
Lighting 	Daylight dimming will be provided for external and streetscape lighting, as well as internal lighting adjacent to windows; Efficiency controls will be provided including timers and motions sensors in car parks, common areas and infrequently used areas such as plant rooms; Efficient light fittings will be preferred, such as fluorescent or LED lamps. Feature lighting should demonstrate how energy-efficiency has been considered.
Heating, Cooling & Ventilation 	Where AC is required to apartments, energy-efficient systems will be specified. Comfort conditions will be challenged and AC avoided where possible. Natural or mixed-mode ventilation will be investigated; Residential bathrooms and laundries will be individually ducted to the façade, with efficiency controls; For retail and leisure areas, best practice air conditioning will be selected, such as Variable Air Volume (VAV) air conditioning with economy cycle, high efficiency pumps and fans with VSD. Install higher-efficiency chillers; Air conditioning should be zoned so that only occupied areas are cooled, and spaces with different occupancy patterns or different cooling loads are zoned separately. To achieve this, motion sensors and timers should be used to automatically switch off when parts of the centre will be unoccupied (Absence-off control). Switches should be incorporated to shut-down any non-essential power and lighting to apartments when they are unoccupied; Car parks will have passive supply and/or exhaust (depending on floorplate and location). Any mechanical ventilation will incorporate CO monitoring and Variable Speed Drives (VSD);
Hot Water 	Renewable or low-carbon water heating will be investigated for domestic hot water and pool heating (such as solar hot water (SHW). SHW systems typically deliver approximately 60% of yearly water heating energy, with a gas back-up for security of supply during night-time or cloudy periods.
Metering 	Smart-meters will be provided to apartments so that residents can monitor and track their energy and water consumption, increasing awareness of consumption patterns and savings; Sub-metering will be provided for major energy uses (greater than 100kVa), to help identify areas of inefficiency with potential for improvement;

System	GHG Emissions Reduction Strategies
Vertical Transportation	Vertical transport will demonstrate operational efficiency in both stand-by and travel mode. Lift shaft and motor room lighting best-in-class efficient AND on motion control/PIR sensors and off after hours; Lift car lighting will be LED or better and on occupancy sensor 100% of the time to ensure they are off when standing-by, fans should have occupancy control;
Low carbon/renewable energy technologies 	Technologies such as trigeneration, geothermal heat pumps, fuel cells and photovoltaics (PV) will be considered for adoption to achieve the project emissions reduction targets; Recovery of waste will be explored where feasible, for use in adjacent buildings.
Light Pollution 	For the residential development, external lighting designed with a light source efficacy of at least 50 lumens/watt, and light pollution minimised in line with Australian Standards. External lighting will be connected to daylight sensors (daylight sensors can be combined with a time switch).
Education 	Promotion of sustainability through education and information enables tenants of buildings and consumers to make more informed decisions The project will investigate “building dashboard” reporting on Interlink style electronic information boards, for building and sustainability real-time information; Consider integrating sustainability and community interpretation into lift car finish design; Incorporate sustainability, cultural and community interpretation into finishes, design, features, art and furniture; Way-finding which incorporates green travel, community and services signage and information;
Future-proofing	Buildings will be designed to be adaptable and flexible, allowing change of use, future efficiency upgrades and ease of refurbishment. Plant rooms and risers should allow for future low-carbon technology upgrades.

3 Water Conservation & Management

Mains/potable water consumption will be minimised as much as possible on-site, initially through demand management, then using alternative sources such as rainwater or treated wastewater.

The project is targeting a reduction of at least 30% in potable water use across the site.

System	*Water-saving Strategies*
Fittings & Fixtures 	Ensure that all fittings are best-practice water rated with options on control to minimise total consumption (all areas tenants; common areas, landscaping, cooling towers, retail areas, basement, garbage rooms). Where appropriate, the following minimum efficiency ratings should be applied: • Wash hand basin and kitchen taps - 4-Star or better; • WC's – 3-Star or better; • Showerheads – 3-Star or better; • Efficient cleaners taps; • Low-flush urinals (0.8L/flush).
Appliances & Equipment	Where installed, water-efficient appliances will be selected: • 4 star water-efficient dishwashers; • Select equipment and size pipe-work to maximise efficiency.
Landscape 	The use of native, drought-resistant planting will be encouraged to reduce water consumption used in irrigation. Sub-soil irrigation systems with moisture sensors should be considered where non-native species are selected.
Cooling Towers	Cooling towers should be designed to have 6 cycles of concentration or greater, reducing water consumed in air-conditioning by up to 50%, as well as reducing chemical use in treatment; Cooling towers will be maintained to minimise water loss through leaks, overflow, evaporation, bleed, drift and splash. Refer to the Best Practice Guidelines for Cooling Towers (Sydney Water, 2007) and Water Efficiency Guidelines (DEH 2006) for further guidance.
Fire System Test Water	Fire test & maintenance drain-down water will be captured and stored for reuse on-site; Isolation valves or shut-off points will be provided to each floor for floor-by-floor testing.

System	*Water-saving Strategies*
Alternative Sources: **Rainwater** 	Alternative water sources will be used where necessary to meet the project water reduction targets. This could include storage and reuse of rainwater in applications such as: • Common area landscape irrigation; • Private landscape irrigation; • Toilet-flushing; • Laundry-washing; • Car-washing & wash-down.
Flows to Sewer	Estimated wastewater discharge to sewer will be significantly reduced relative to a standard building through the implementation of water efficiency measures;
Stormwater Management 	Rainwater collection on-site will minimise peak- runoff quantities. Pervious areas will be maximised to ensure that pre-development water balances on-site are maintained as much as possible. Gross Pollutant Traps will improve the quality of stormwater runoff. Bio-retention swales in the streetscape will assist with filtration and biological treatment of stormwater runoff to improve water quality. Please refer to the Concept Stormwater report by AT& L for detailed information regarding the stormwater strategy for the site.
Metering	Sub-metering will be provided for major water uses, to identify abnormal usage patterns usually associated with leaks, helping to reduce the considerable water lost in this way. In addition, they will allow water efficiency measures to be monitored and tracked;
Education	Publicise water-saving initiatives and provide education for tenants.

4 Indoor Environmental Quality

Indoor Environmental Quality (IEQ) affects occupant amenity and comprises thermal comfort, indoor air quality, views, daylight, visual and acoustic quality. These factors are outlined below with respect to the Concept Plan, and will be developed further during detailed design.

Item	*Strategies to improve IEQ*
Daylight, glare and views 	The extent of glazing will be optimised to allow maximum daylight, views, and winter sun, while minimising uncomfortable glare and excessive solar heat gains in summer. Glazing should be selected with a high Visual Light Transmission to maximise daylight penetration and views, while mitigating glare and excessive solar heat gains;
Air quality 	Careful consideration of significant ventilation openings to maximise natural cross-ventilation and reduce AC energy; Contamination of indoor air will be removed at source through: - Specification of appropriate finishes such as low-VOC carpets, paints, adhesives and sealants; - Non-toxic internal material selections; - Low-formaldehyde joinery and engineered wood products; - Kitchens, bathrooms and other high-contamination areas will be separately exhausted without recirculation. Fresh air intakes will be located to minimise external contamination;
Acoustic Quality	Internal noise will be restricted to acceptable levels in accordance with Australian Standard AS/NZS 2107:2000, including general building and services noise;
Thermal Comfort	Comfort within the buildings will be improved by well-considered passive design including insulation, shading, natural ventilation and adequate ventilation openings, in order to minimise heat losses/gains and improve thermal performance over BASIX minimum requirements.

5 Transport

Item	*Strategies*
Cycling Facilities 	Bicycle parking facilities will be provided at the following rates: - Residential - 1 per 5 dwelling units plus 1 visitor space per 10 units (residential); - Retail/leisure - 1 per 10 car parking spaces for first 200 car spaces, then 1 space per 20 parking spaces thereafter. 1 unisex shower per 10 employees. Clearly signposted, secure bicycle facilities with good access and path networks will encourage residents and visitors to cycle, improving health and reducing greenhouse gas emissions from transport.
Public Transport	Public transport in the vicinity is currently limited, however there are a number of proposed improvements to bus services. A courtesy bus is currently run by the Sharks club for visitors in close proximity, and there is a train station within walking distance (Woolaware Station). Please refer to the transport report by McLaren Transport Engineering for full details of current and future transport networks.
Car-sharing Scheme	The project team will explore the potential to implement a formal car-sharing scheme on the site to minimise emissions-intensive private vehicle use.
Future-proofing 	Provision will be made for future incorporation of electric charging points, potentially allowing for connection to future solar electricity system for zero-emissions charging.
Education	A comprehensive Transport plan will be made available to all residents, staff and visitors, outlining alternative forms of transport to private vehicle use.

6 Materials & Waste

Preference will be given to environmentally responsible materials during the selection process, according to the following principles:

Item	*Materials Strategies*
Preferred Eco-content	Ecologically sensitive products (such as scarce minerals and old-growth forest) will be avoided; Preference will be given to materials with a high recycled content and preferred source, including: • Steel products that are reused, recycled or certified Best Practice; • Timber will be supplied from sustainable sources including Forestry Stewardship Council (FCS) certified plantation timbers and recycled products. No timber (either solid or veneer form) should be sourced from rainforests or old-growth forests; • Concrete with a proportion of cement replacement (with industrial waste product) and recycled aggregate be will specified.
Durability & Product Stewardship	Material selections should be durable, flexible and recyclable. Selected manufacturers should implement comprehensive Environmental Management Plans to minimise the impact of their operations;
Emissions & Toxicity 	Specify materials with a low emissions content including low-VOC and low formaldehyde content, in order to avoid contaminating the indoor air. Where alternative materials are available at comparable quality, performance and cost, the following materials should be avoided in construction: • Asbestos; • Cadmium; • Chlorinated Polyethylene and Chlorosulfonated Polyethlene; • Chlorofluorocarbons (CFCs); • Chloroprene (Neoprene); • Formaldehyde (added); • Halogenated Flame Retardants; • Hydrochlorofluorocarbons (HCFCs); • Lead (added); • Mercury; • Petrochemical Fertilizers and Pesticides; • Phthalates; • Polyvinyl Chloride (PVC) and • Wood treatments containing Creosote, Arsenic or Pentachlorophenol.

Item	*Materials Strategies*
Ozone Depleting Materials 	Thermal insulation products will be preferred which have a zero Ozone Depletion Potential in their manufacture and composition, reducing the impacts of insulation on the atmosphere (at least 90%); At least 95% of refrigerants by volume will have an Ozone Depletion Potential of zero; and integrated refrigerant leak detection will ensure early identification of leaks.
Material Sourcing	Localised manufacturing will be supported, reducing transport emissions and providing greater security of supply;
Waste Management 	A dedicated storage area will be provided on-site for the separation and storage of recyclable waste during operation, allowing for the following waste streams to be separated: - Glass; - Paper; - Plastics, - Cardboard; - Organics. - Metals. Throughout project design, operation and construction, principles of resource recovery will be applied, so that materials and products are recovered and reused where possible, reducing landfill and saving money. Some strategies that could be adopted include: • Innovative waste separation and collection strategies to allow materials to be isolated for reuse; • Constructing buildings to allow for easy disassembly, so that components can continue to be used at the end of a building's lifetime; • Waste reduction – utilising prefabricated construction minimises construction work and waste on site. Manufacturers and suppliers will be encouraged to take full responsibility for the life cycle impact of products including ownership at end of life. A minimum of 80% construction waste will be diverted from landfill.

7 Environmental Management

Effective environmental and waste management should be implemented throughout the demolition, construction and operational stages of development.

Item	*Management Strategies*
Environmental Management Plan	Prior to construction, an Environmental Management Plan (EMP) will be developed to regulate the environmental impacts of the development during construction. This will identify potential environmental impacts and strategies to mitigate these impacts, as well as outlining methods for auditing and tracking the impacts and responsible parties. The EMP would be used to set out guidelines and polices in the environmentally responsive operation of the various different facilities, providing: • Statement on the development's Environment Policy and its objectives; • A series of key environmental performance indicators and targets for improvements, as well as the tracking of on-going performance based on predicted environmental performance benchmarks (i.e. waste, energy, water, etc).
Waste Management Plan	The EMP will include a Waste Management Plan, specifying recycling targets for demolition and construction waste. Purchasing policy should minimise waste from products and packaging and encourage the use of products which have minimum environmental impact. Preference should be given to prefabricated materials, in order to reduce the amount of on-site construction waste. The construction contract could include commitments for the following: • Establishment of a waste management area on site for the sorting and segregation of waste. • Identification of appropriate waste sub-contractors for recycling, costs of collection and timing of collection service; • Participation in waste minimisation training for contractors and sub-contractors; • Published waste minimisation plan to reduce site waste to landfill; Provision of separate waste skips for cardboard, timber, metal, soft plastic, polystyrene, insulation, concrete, glass and bricks.
Handover & Education	In recognition of effective handover being critical to the success of a building in achieving its environmental aspirations, a simple and concise building users' guide will be developed to inform and educate building users, residents and tenants on how to capture and promote strong on-going environmental performance. A tenant 'Sustainability features and operations' plan is to be provided for guidance to the retail tenants, encouraging them to consider ESD principles in tenancy design, fitout and operations.

Item	*Management Strategies*
Operational Reviews/Programs	An operational review strategy and training program to ensure continuous performance post final completion; Operational budget and program for resident, community and tenant sustainability engagement. This includes programs such as Green-travel; environmental performance; social and community activities as well as reporting. Implementation and monitoring of program. A sustainability project management plan and green-risk plan will be used to embed critical performance requirements into contractual deliverables.