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Discovery Point, Wolli Creek
ESD Report

Prepared for

Australand Holdings Ltd

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A	Preliminary Issue – for comment	24/04/2010
B	Workshop and comments incorporated	02/06/2010
C	Amendments to incorporate AHL comments	17/06/2010
D	Final issue	23/06/2010

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.

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Contents

1 Executive Summary

The Discovery Point site, is located at Wolli Creek. The Discovery Point site currently contains two completed mixed use buildings and one residential apartment building under construction, two restored heritage buildings and the Discovery Point Park.

The Concept Plan excludes the existing buildings and the residential apartment building under construction and comprises 14 individual development sites with a total GFA of around 132,000m². The non residential component has a proposed minimum GFA of 9,000 m², with the remainder comprising residential GFA. The indicative design scheme envisages a future retail centre with a small supermarket and speciality retail tenancies surrounding a new neighbourhood park.

The report provides a sustainability strategy for the future development of the site in accordance with the proposal concept plan.

The report also responds to the relevant, Director General Requirements and addresses BCA Section J1 fabric and J2 Glazing, under the Deemed to satisfy Methodology.

Director General Requirements (DGR)

The Director General Requirements to be addressed in this report are as follows:

Planning provisions applying to the site, including permissibility and the provisions of

all plans and policies including, but not limited to:

- Objects of the EP&A Act 1979;
- SEPP (Building Sustainability Index: BASIX) 2004
- Rockdale Local Environmental Plan 2000 and relevant Development Control Plans and Policies.

The concept plan and this report addresses the following Director General Requirements:

Environmental and Residential Amenity

Environmental and residential amenity will be considered in detail in the future project applications and methods for gaining correct solar access and acoustic privacy will be incorporated into all new development. A wind study of the site has been carried out to understand and mitigate wind issues and initiatives to address environmental and residential amenity are to be included as per BateSmart's concept design documentation.

An acoustic consultant has been appointed to understand the requirements for mitigation of noise from the airport and railway on the future occupants of the development and the relevant guidelines will be followed.

Ecologically Sustainable Development (ESD)

ESD principles will be incorporated into the concept plan via the design team outlining the strategies best suited to provide the required environmental outcome. Utilising the BASIX frame work (discussed in section 4 of this report) the team will identify the strategies to deliver a development that is responsive to environmental requirements such as energy, water, thermal comfort and carbon emissions and meets best practise. The design will pay close attention to site wide strategies and investigate thoroughly initiatives that look to reduce water and energy consumption through site wide initiatives.

Drainage and Groundwater

Flooding issues are being investigated and measures provided by MPI Group to ensure regulatory requirements are to be met. Stormwater collection from the site is to be investigated for reuse together with the potential recycling of black water in order to provide for the demands of toilet flushing, laundry services and irrigation.

Statement of Commitments

Environmental management mitigation is to be addressed utilising the ISO 14001 framework for all head contractors involved in the development. This international framework ensures correct environmental management systems are in place for the development.

A draft statement of commitments can be found in Appendix A of this report.

BASIX Requirements

The Residential component of the development must comply with BASIX categories of thermal comfort, energy and water current at each stage of the development and where possible exceed the targets.

As a minimum the following will apply:

Energy target 20% reduction

Water target 40% reduction

Thermal comfort – 6 star NatHERS rating using Accurate software

BCA J1 & J2 Fabric and Glazing requirements for commercial and retail section of the development

The following standards will be adhered to in order to meet the minimum standards of BCA J1 and J2 Deemed to Satisfy Methodology.

- Walls to meet R2.8 and roof to meet R3.2 (BCA 2010)
- Glazing to meet the following standards as provided in the BCA 2010 Section J Glass calculator using DTS methodology.

Alternatively a JV3 methodology can be utilised to provide a compliant design.

NABERS Energy

The indicative design scheme envisages a commercial building of approximately 5,000m². In order to ensure construction of the building meets best practice for energy consumption and emissions of the building is to target a NABERS energy Base Building rating of 4.5 stars.

Rockdale Development Control Plan 45 (Railway Precinct)

The following items will be adhered to in order to meet the standards of Rockdale DCP:

- Maximise water conservation through BASIX and other controls strategies and mechanisms
- Encourage biodiversity conservation and remediation in the redevelopment of the site through careful selection of plantings
- Develop energy-efficient building plans, infrastructure, and road and parcel layouts.
- Maximise access to and incentives to use public transport.
- Create a mixed-use development with live/work/recreation opportunities.
- Plan the development of the Precinct to maximise its contribution to southern Sydney's riverfront public open space continuity for walking, cycling, and to accommodate possible ferry usage.
- Plan for the reduction of operation of air conditioning systems to buildings by the use of passive features such as natural ventilation, external and internal shading systems and thermal massing.

Rockdale Local Environment Plan 2000 (LEP)

The following items will be adhered to in order to meet the standards of Rockdale LEP:

- To encourage a mixture of land uses (such as office commercial, retail, residential, tourist and transport), to create a sustainable, vibrant high quality precinct that responds to the lands proximity to major transport infrastructure and the Sydney CBD.
- To optimise development of the area, while minimising adverse environmental impact on the river, open space areas and pedestrian plaza.
- To ensure that the future development of the land within the zone will meet other environmental requirements relating to stormwater management, waste disposal, noise and vibration, air and water quality and energy efficiency.

- To ensure sufficient solar access to all pedestrian plazas to encourage them to be pleasant and inviting public places with active street frontage.

Additional ESD initiatives

The additional ESD initiatives as outlined in section 8 will be investigated and implemented where practical and effective within the overall design. The detailed ESD initiatives will be identified for each building in the future project applications.

Draft Statement of Commitments

Appendix A comprises a list of all environmental initiatives that are currently included in the Concept Plan.

2 Introduction

The Discovery Point site is located at the northern end of Wolli Creek. The existing site is partially developed and comprises two completed mixed use buildings, a further residential building under construction and restored heritage buildings, Tempe House and St Magdalen's Chapel. The Discovery Point Park is located between the heritage buildings and Cooks River. Wolli Creek railway station is located in the middle of the site.

In addition to the City Rail network the site is in close proximity to Port Botany, Sydney Airport, the M5 Motorway, and the Sydney CBD, therefore making it highly accessible. The area forms part of a growing redevelopment zone extending along the Airport Rail Line linking Wolli Creek to Sydney Airport's international and domestic terminals, Mascot, Green Square, and the CBD.

Wolli Creek is identified as a "Village" in the NSW Department of Planning's Draft South Subregional Strategy which generally means there is one major retailer and other local retail outlets such as hairdressers and take-away food shops etc and contain between 2,100 to 5,500 dwellings. Wolli Creek also forms part of the "Global Economic Corridor" as identified in the NSW Department of Planning's Metropolitan Strategy, City of Cities – A Plan For Sydney's Future.

This co venture project between Landcom and Australand is to comprise a residential apartment component of fourteen buildings with a total GFA of 132,000m² with a minimum non residential component of 9,000 m² GFA will be provided. The indicative design scheme prepared by Bates Smart Architects accompanies the Concept Plans and shows a non-residential component comprising a mini major retail outlet and general and specialty retail and small commercial offices.

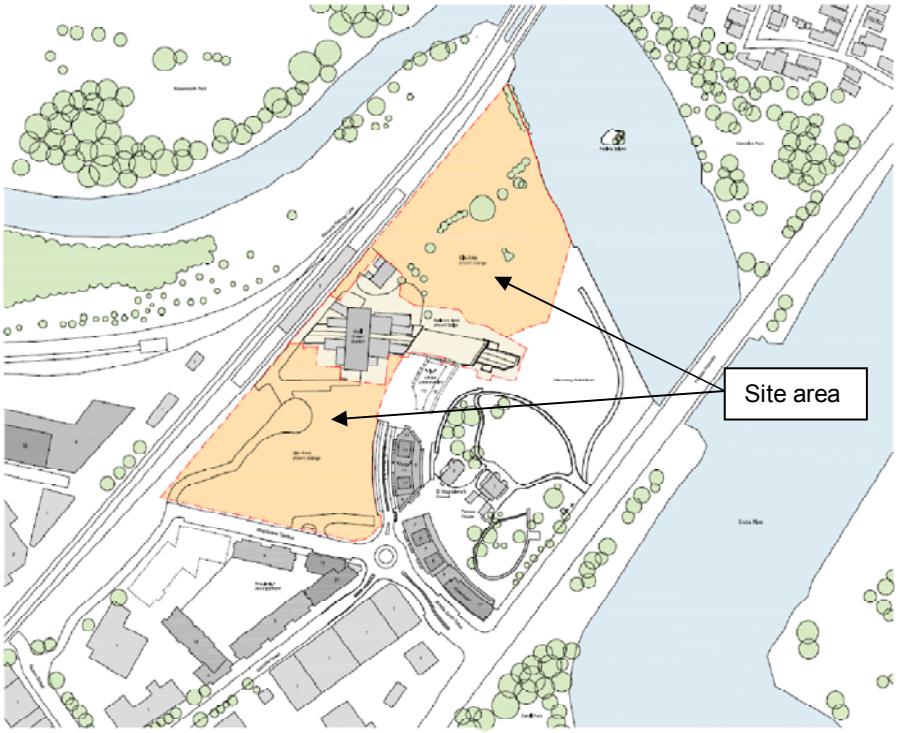


Figure 1 Proposed development site

This report provides a sustainability strategy to help guide the development. This is done as part of the response to the Director General Requirements; that is the BCA , LEP and DCP and specific requirements. The report also responds to relevant Director General Requirements for this site.

3 Director General Requirements

The relevant Director General Requirements addressed in this report are outlined as follows:

3.1 Relevant EPI's policies and Guidelines to be addressed

Planning provisions applying to the site, including permissibility and the provisions of

all plans and policies including, but not limited to:

- Objects of the EP&A Act 1979;
- SEPP (Building Sustainability Index: BASIX) 2004
- Rockdale Local Environmental Plan 2000 and relevant Development Control Plans and Policies.

The applicable planning provisions are addressed in detail in the environmental assessment report (EAR). Furthermore this report confirms that all subsequent applications will be designed to meet BASIX requirements.

3.2 Environmental and Residential Amenity

Requirement

The EA must address solar access, acoustic privacy, visual privacy, view loss and wind impacts and achieve a high level of environmental and residential amenity. In this regard, the EA should consider appropriate separation distances to any adjacent residential buildings.

The EA shall address the issue of noise from the airport and railway line and provide details of how this will be managed and ameliorated through the design of the building, in compliance with the relevant Australian Standards and the Departments *Development near Rail corridors and Busy Roads – Interim Guidelines.*

Response

Solar access and views have been addressed in detail in the indicative design scheme prepared by Bate Smart Architects. An assessment of these matters will be undertaken for all sub sequential applications once detailed design plans have been prepared. A wind study of the site has been carried out to understand and mitigate wind issues and initiatives to address environmental and residential amenity are to be included as per BateSmart's Design Report.

An acoustic consultant has been appointed to understand the requirements for mitigation of noise from the airport and railway on the future occupants of the development and the relevant guidelines will be addressed during preparation of the subsequent project applications.

3.3 Ecologically Sustainable Development (ESD)

Requirement

The EA shall detail how the development will incorporate ESD principles in the design, construction and ongoing operation phases of the development.

The EA must demonstrate that the development has been assessed against a suitably accredited rating scheme to meet industry best practice.

Response

ESD principles will be incorporated into the design via the design team outlining the strategies best suited to provide the required environmental outcome. Utilising the BASIX frame work (discussed in section 4 of this report) the team will identify the strategies to deliver a development that is responsive to environmental requirements such as energy, water, thermal comfort and carbon emissions. The design will pay close attention to site wide strategies such as black water recycling and storm water collection and reuse, and investigate thoroughly initiatives that look to reduce water and energy consumption through site wide initiatives.

A draft statement of commitments can be found in the appendices of this report. With the inclusion of the additional initiatives listed in Appendix A, the concept plan meets industry best practice.

3.4 Drainage and Groundwater

Requirement

The EA shall address drainage flooding issues associated with the development site, including: stormwater, drainage infrastructure and incorporation of Water Sensitive Urban Design measures.

The EA shall provide an assessment of any flood risk on site in consideration of any relevant provisions of the NSW Floodplain Development Manual (2005) including the potential effects of climate change, sea level rise and an increase in rainfall intensity.

The EA shall address any impacts upon groundwater resources, and when impacts are identified, provide contingency measures to remediate, reduce or manage potential impacts.

Response

Flooding issues are being investigated and measures provided by Coffey and Smart Civil to ensure regulatory requirements are to be met. Stormwater collection from the site is to be investigated for reuse together with the potential recycling of black water in order to provide for the demands of toilet flushing, laundry services and irrigation.

3.5 Statement of Commitments

Requirement

The EA must include a draft Statement of Commitments detailing measures for environmental management, mitigation measures and monitoring for the project.

Response

Environmental management mitigation is to be addressed utilising the ISO 14001 framework for all head contractors involved in the development. This international framework ensures correct environmental management systems are in place for the development.

Additionally a draft statement of commitments can be found in Appendix A of this report

4 BASIX for Residential Development

Requirement

The residential portion of the development will be subject to compliance under BASIX

The BASIX tool is a NSW Department of Planning initiative to facilitate the assessment of a new development in terms of environmental sustainability in comparison to existing dwellings. Since 1 October 2005, a BASIX certificate is mandatory for DA approval of a new development.

The sustainability targets the Concept Plan under the current BASIX scheme are:

- Water – 40% reduction in mains potable water consumption.
- Thermal Comfort – this is a Pass or Fail section as target varies according to building types and dwelling areas.
- Energy – 20% reduction in greenhouse gas emissions, as of July 1 2006. (buildings above 6 floors in height)

Response

This section of the report addresses the BASIX requirements which will apply to future development of the site for residential apartments.

4.1 Thermal Comfort

Thermal comfort for the residential apartments can typically be met with the following provisions in terms of insulation, pending final layouts of the apartments and glazing/ wall ratio:

Wall insulation R2.0

Roof insulation R3.5

Typically with a reasonable wall to window ratio, compliance with thermal comfort section of BASIX can be achieve with a comfort plus clear or green type of glass. Corner apartments may require further performance due to their exposure including shading and cross ventilation.

The above gives an indication of how compliance may be met, however final requirements for insulation and glazing performance and shading will be subject to detailed design within future project applications.

4.2 Energy and Water

The following section outlines a typical path for requirements for BCA (BASIX) compliance for the residential part of the development.

This example outlines cost-effective strategies for each building to achieve BASIX Energy and Water reduction targets. Additionally, strategies have been identified to reach stretch targets for energy and water. As the buildings are typically over 6 storeys, the energy target is 20% and the water target is 40%. These targets represent a reduction in comparison to the current state average for residential dwellings. Results are summarised below.

Over and above high efficiency tapware and irrigation minimisation, ***BASIX Water*** compliance can be achieved by either:

1. Using an air-cooled AC system and upgrading to a 200kL rain tank;

or

2. Specifying a closed loop fire water system with minimum 80% recycling rate; or
3. Providing 4 Star WELS rated clothes washers for every apartment

BASIX Energy compliance can be achieved by switching to an air-cooled AC system with COP ~3.5 and either:

a. Providing 5 Star energy rated fridges; or

b. Providing ~240m² of solar hot water heating and ~20kW of photovoltaic electricity generating panels

To achieve compliance with a water sourced packaged AC system, each of the fridges, solar hot water and PV panels would need to be included as above with an increase in performance.

Note: A combination washer/dryer could add up to 8% to the water score and 1% to the energy score. If well ventilated 5 Star fridges were provided additionally, no solar hot water or PV panels would be required to achieve BASIX compliance and a Green Star point would be awarded for specifying energy efficient appliances.

The above gives an indication of how compliance may be met, however final requirements for energy and water strategies will be subject to detailed design within future project applications.

4.3 Common Area Strategies

The following outlines a method to achieve BASIX compliance for the common areas in the residential part of the development where appropriate.

- Pool (heated) if provided
- Areas of native planting
- Minimum 4 Star WELS rating for any common area tapware
- Tanks for capturing rainwater for irrigation and toilet flushing (dependent on the storm water and black water strategies)
- Dual reticulation for recycled water for toilet flushing and laundry use from black water plant

4.4 Site wide strategies

Due to the number of buildings in the proposed Concept Plan, potential site wide strategies that could be investigated in further detail during detailed design project application stages are listed as follows:

Water

A Black water system could be installed as part of the overall development. This could provide recycled water to the development for use in toilet flushing, laundry and irrigation purpose. The exact size of the system would need to be determined during design stage.

Energy

A centralised chilled water system or condenser water system could be provided to the development to provide cooling to the residential component of the project. The apartments could be provided with spatial allocation for a fan coil unit and thermal metering system and reticulate chilled water piping by the apartment. The residents than have the ability to provide air conditioning if they see the need in a cost effective manner.

This strategy may save a significant amount of energy and unused plant. The central plant could be provided to address the anticipated load of the 'critical units' and expanded to suit should residents apply for air conditioning at a later stage. A detailed analysis will be required to ensure that energy savings from a centralised system can be realised and pumping strategies are optimised.

These site wide strategies could provide significant energy and water savings and increase the BASIX score significantly, however detailed analysis at future project application stages is required to ensure that they deliver the intended savings before they are implemented.

5 BCA Section J1 and J2

Requirements

All parts of the proposed development are to comply with the relevant version of the BCA at the time of design. Compliance with BCA Section J energy efficiency is a requirement for ESD.

Response

This section of the report outlines the requirements for BCA compliance for fabric and glazing of the future commercial and retail sections of the development. The residential section is addressed using BASIX

5.1 Section J Review – General Parameters

Climate Zone

The site is located at Discovery Point, St Wolli Creek NSW. This address correlates to BCA Climate Zone 5.

Building Classifications

The Concept Plan will include Class 6 – Retail and Class 5 - Commercial office development.

Class 5 and Class 6 are subject to BCA section J1 and J2 requirements outlined here

5.2 Section J1 – Building Fabric

J1.2 – Thermal Construction General

The requirements of J1.2 – Thermal Construction General will be complied to.

J1.3 – Roof and Ceiling Construction

For a Class 5 and 6 building in Climate Zone 5 the roof and ceiling construction is to have a minimum total R-Value of:

- R3.20 (downwards) for a roof or ceiling generally (according to BCA 2010 this value may increase for future versions of the BCA).

J1.4 – Roof Lights

Roof lights are required to meet the requirements set out in table J1.4 or a JV3 model will be required to achieve compliance for the respective buildings

Generally to comply with DTS requirements the skylight must be limited to no more than 10% of the area of the floor area it is serving and with a double Glazed Unit (DGU) of 0.2 – 0.4 Solar Heat Gain Coefficient (SHGC) and U-value of 2.5W/m²K.

J1.5 – Walls

For Class 5 and 6 building in Climate Zone 5 the external walls are to achieve a minimum Total R-Value of

- R2.80 for all external wall elements (BCA 2010).

J1.6 – Floors

For Class 5 and 6 building in Climate Zone 5 there are no requirements for floor insulation unless an under floor heating system is provided (BCA 2010).

5.3 Section J2 – External Glazing

J2.1 – Application of Part

The deemed-to-satisfy provisions apply to Class 5 and 6 buildings.

J2.2 – Applicable Glazing Provisions

Assessment process detailed in J2.4 is applicable for Class 5 and 6 buildings.

Alternatively a JV3 compliance model will be required to achieve compliance for the respective buildings.

Generally class 6 requires an up stand and down stand in the façade for ground level clear glazing.

Generally class 5 requires a combination of shading, spandrel panel and performance glazing for compliance.

BCA Section J1 and J2 Conclusion

Compliance with the BCA will be identified in detail in future project applications.

6 NABERS Energy

The Concept Plan indicative design scheme envisages a commercial building of approximately 5,000m². In order to ensure construction of a future commercial building meets best practice for energy consumption and emissions of the building is to target a NABERS energy Base Building rating of 4.5 stars.

7 Rockdale LEP

Requirements

The following outlines the requirements of the Rockdale LEP for land zoned 10(a1) Mixed Use (Railway Precinct) in Wolli Creek:

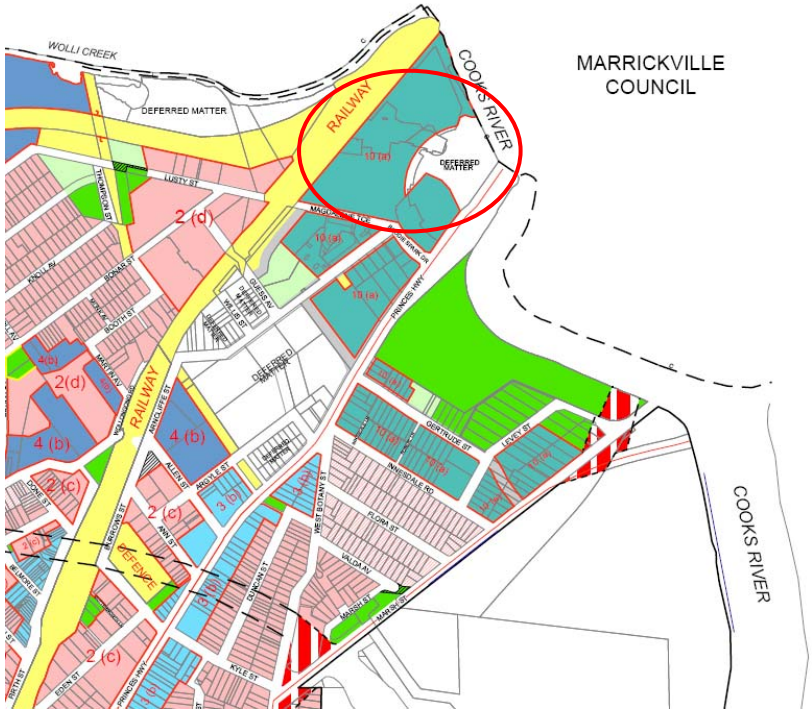


Figure 2 Mixed use zoning (10a1) by Rockdale Council

7.1 Objectives of the Mixed Use (Railway Precinct) Zone

The relevant objectives of the 10(a1) zone are stated as follows:

a) to encourage a mixture of land uses such as office commercial, retail, residential, tourist and transport), to create a sustainable, vibrant high quality precinct that responds to the lands proximity to major transport infrastructure and the Sydney CBD.

c) To optimise development of the area, while minimising adverse environmental impact on the river, open space areas and pedestrian plaza.

n) To ensure that the future development of the land within the zone will meet other environmental requirements relating to stormwater management, waste disposal, noise and vibration, air and water quality and energy efficiency.

o) To ensure sufficient solar access to all pedestrian plazas to encourage them to be pleasant and inviting public places with active street frontage.

Response

The mix of land uses as required by the LEP are specifically addressed within the Discovery Point Concept Plan. The concept is to integrate with the wider community and also address the needs of the local and regional context in terms of providing high density housing to accommodate the growing population of the city as outlined in the Department of Planning's Metropolitan Strategy. The location allows for connection to adjacent developments so

the residents here are within walking distance to a potential major supermarket. Local retail will also be provided within the site to cater for the daily needs of the residents and commuters.

A comprehensive environmental management plan will be provided at subsequent project applications to ensure minimal impact to the surrounding area and water courses during construction and operation of the development.

Requirements under n) above will be addressed as previously outlined in the other sections (DGRS BASIX BCA DCP etc).

Passive design not only equates to the indoor spaces within the Concept Plan but also the external spaces. Correct design of public plaza is a necessity in order to provide a space that will remain active and attract the use of the local residents. Care will be taken to ensure correct amount of solar access is provided to outdoor plazas whilst mitigating unwanted wind conditions that may render the spaces uncomfortable. Maximising pleasant summer breezes for café spaces and open landscape areas whilst minimising winter cold winds will be of particular concern and gain special attention.

8 Rockdale DCP

Requirements

The area is covered by Rockdale DCP45 (Railway Precinct) for the Wolli Creek area. Part 7.7 of the DCP stipulates the requirements for Environmentally sustainable development.

The main objectives of the DCP from an environmental standpoint are outlined in Section 7.7 of the DCP as below:

> ***'7.7 Environmentally Sustainable Development (ESD)***
>
> *The re-development of this key urban site within Wolli Creek allows the integration of ESD initiatives appropriate to high-density living and working environments combined with important cultural heritage presence and improved public access to waterfront open space for residents, workers, visitors, and tourists.*
>
> *The planning of the Railway Precinct addresses environmental challenges through the generation of an urban design plan in response to the existing context of Wolli Creek, the opportunities and constraints of transport opportunities, creation of an efficient infrastructure, and achieving energy efficiency through appropriate siting, orientation, and use of materials.*
>
> *Specific objectives for sustainable development relating to buildings are included in the relevant detailed sections of the "Built Form" chapter of the Master Plan. '*

DCP Objectives

The following are the objectives of the Rockdale DCP

- Maximise water conservation.
- Encourage biodiversity conservation and remediation in the redevelopment of the site.
- Develop energy-efficient building plans, infrastructure, and road and parcel layouts.
- Maximise access to and incentives to use public transport.
- Create a mixed-use development with live/work/recreation opportunities.
- Plan the development of the Precinct to maximise its contribution to southern Sydney's riverfront public open space continuity for walking, cycling, and to accommodate possible ferry usage.
- Plan for the reduction of operation of air conditioning systems to buildings by the use of passive features such as natural ventilation, external and internal shading systems and thermal massing.

DCP Provisions

The following are the provisions of the Rockdale DCP

Water/Landscape/Biodiversity

- Use native species landscaping where appropriate to minimise water use.

- Meet the specific Master Plan objectives and provisions with regard to flood/water management and contamination, including the remediation and replenishing of depleted soils as necessary.
- Plant appropriate vegetation to encourage and support local fauna.
- Link to open space networks to encourage the strengthening of "green" corridors.
- Include the support of native bird-life in the landscape planning, waterfront design, and the planning of water features.

Liveability/Social Planning

- Encourage a mix of uses which allow a good quality of life not wholly reliant on private car use.
- Create a diversity of places and public/private spaces which can be used in multiple ways and adapted to new uses over time.
- Make provision for community uses and services targeted at the community's needs.
- Enhance the unique cultural heritage presence within the Precinct in proximity to public transport for residents, visitors, and tourists.

Efficient Transport

- Provide permeability to the Precinct and ease of pedestrian access to public transport nodes and stops.
- Develop a street grid which permits appropriate public transport routes.
- Integrate cycle-ways with streets and pedestrian routes as well as with connections outside the Precinct.
- Provide "shortest route" links to public transport, local retail, and community facilities through safe pedestrian routes.

Building Performance

- Achieve average energy performance targets to a minimum of SEDA Energy Smart targets for high-density housing (3.5 star performance-based minimum over the development site).
- Orient blocks to maximise northern exposure and minimise western exposure.
- Built form to minimise overshadowing of living areas, north-facing openings, private and public accessible open space.
- Provide shading of building openings to north and west.
- Plan for the creation of thermal mass in all buildings within the development.
- Provide operable windows to residential, commercial and flexible use accommodation to permit the option of natural ventilation solutions.
- Plan for utilisation of centralised chilled water plants to maximise efficiency and cost of air conditioning services with pipe infrastructure installed for connection to air conditioning equipment by owners/ tenants.
- Where possible, given site conditions, extend the grid or spatial pattern of adjacent existing areas of Wolli Creek to maximise permeability and reinforce the urban form context.
- Maximise the diversity of residential types to reinforce the community mix and urban context.

Response

The Concept Plan aims to address all the relevant requirements contained in the DCP45 Section 7.7 through provision of sound initiatives to be investigated for all future project applications.

Water, landscape and biodiversity are to be addressed primarily within the BASIX tool by ensuring some native landscaping is provided that allows for correct water management on the site. There is also a landscape concept plan provided as part of the initial Concept Plan submission. The design of the water front will be of particular importance and care will be taken to ensure that this area utilises the correct solution in terms of sustainability.

Liveability and Social planning is to be addressed via the provision and integration of a 'village' type feel to the design allowing access to open spaces and local retail and cafes for resident to use. The integration with the wider community will be considered carefully to ensure correct sharing of amenities and resources are provided.

The proximity to Wolli Creek railway station allows for connection to the surrounding areas including the Sydney CBD for residents to reduce the reliance on the private vehicles for transport.

A designated cycleway will be provided through the site integrated with wider community bicycle paths to encourage travel using vehicles other than the private motor vehicle.

Passive design of the built environment will be a key focus for the development. All uses will focus on minimising energy use within the buildings through passive design strategies where appropriate, but maximising thermal comfort and amenity.

The future Commercial and Retail sections of the development should aim to provide performance above BCA compliance requirements.

The residential portion of the development will provide energy and water measures above the BASIX requirements. An Average 6 Star Accurate score is to be provided for the Thermal comfort section of the BASIX tool.

Site wide strategies for heating and cooling will be investigated and adopted if seen to provide suitable energy and CO2 emissions savings within the context of the overall development.

The detailed sustainability measures for each building will be identified in the future project applications.

9 General Additional ESD Initiatives

The following initiatives are provided as general guidance for the approach to be used when developing the Concept Plan through to detailed design and development.

9.1 Building Form, Fabric & Orientation

The building's form, fabric and orientation will influence the Concept Plan's thermal, comfort and environmental performance. A building with a carefully considered structure and orientation will perform far better than one where no consideration is given. The minimum requirements for retail commercial development in accordance with BCA Section J for fabric and glazing as per the section 5 of this report.

The following factors have been considered in the design of the Concept Plan:

- Orientation And Shading
- Structure and Insulation
- Glazing

9.2 Orientation & Shading

The optimum orientation for a building, in terms of solar gains, is within 20° east of north, and 10° west of north, however provision of optimum solar access for multi dwelling apartment units is challenging.

Effective shading on glazing in this range can be achieved with an overhang-to-glazing-height ratio of around 1:2 (i.e. A horizontal shade half as deep as the glazing height) and will be provided where appropriate. The Concept Plan aimed to achieve this with the buildings however due to constraints of the site, the buildings are slightly off this orientation. Nonetheless they are in a position to allow for reasonable solar access and with detailed design correct shading can be provided to ensure high levels of thermal comfort.

Beyond this orientation range shading of windows becomes more difficult due to the lower sun angles, especially in the early morning and late afternoon, and it may be necessary to introduce vertical fins or other operable shading elements (e.g. external blinds), depending on the orientation. These initiatives will be provided on merit in line with the overall design parameters of future project applications.

9.3 Structure & Insulation

While the minimum BCA insulation requirements for retail and commercial development in Sydney are R3.2 for ceilings, R2.8 for walls, increasing these values will provide better comfort control and energy performance. This is to be investigated in the detailed design stages of the development. Higher levels of insulation for the residential component will also be considered where appropriate. It should noted that provision of too much insulation can in some cases be detrimental to energy consumption due to the trapping of heat in the occupied space and therefore increasing the cooling load for that space. Each functional space shall be considered based on its individual merit.

Options for insulation that could be considered in future project applications include:

1. Hybrid roof insulation
2. Styrofoam insulation
3. Bulk insulation

Hybrid roof insulation technology such as Air Cell is typically less than 10mm thick and can be installed beneath the roof material as per the roof diagram below. The two layers will give a combined R-value of approximately R3.5 provided there is a suitable air gap between the layers (~ 50mm).

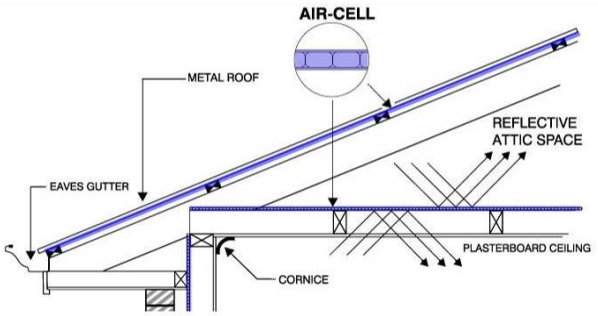


Figure 3 Typical section showing hybrid roof insulation for a pitch roof arrangement

1. Hybrid roof insulation technology is typically a low volume, high performance insulation medium that combines reflective foil with low emittance, enclosed air and a thermal conduction barrier.
2. Styrofoam insulation is an extruded polystyrene product which offers excellent insulation for low weight and thickness.

Figure 4 Installation of Styrofoam Insulation System

Styrofoam is also ideal for "green roofs", protecting both the waterproof layer and the roof from moisture. It can be used with membranes such as *Proctor Sisalkraft714 Vapour Barrie*r (or equivalent products) to reduce condensation within a roof or floor cavity, which may need to be considered given the exposed nature of the pods.

3. Bulk insulation includes standard batts used commonly in residential applications. Polystyrene batts are thicker and also low-irritant. There are bulk insulation batts containing recycled content which may be considered for this project.

9.4 Glazing

Choice of glazing appropriate to the orientation and local climate conditions will be vital in reducing heating and cooling energy consumption and maintaining occupant comfort for commercial retail and residential component of the development. As a basis BCA section J2 and BASIC will be adhered to for the relevant components of the development.

Glazing may be described by the following properties:

- Visible Light Transmission (VLT) – the percentage of visible light transmitted by the glass. The higher the VLT, the more daylight will enter the space.
- Shading Coefficient (SC) – the percentage of solar radiation that is transmitted through the glass. The lower the value, the less solar heat gain into the space.
- U-Value (U) – a measure of how much heat is passed through the glass. The lower the U-Value, the less heat is transmitted and the higher the thermal performance of the glass.

The use of glazing with a low SC will help to avoid heat gains in the summer, while glazing with a low U-value will reduce losses in the winter through the glass. Incorporating effective shading features into the design can avoid the necessity for low shading coefficients in the glass, which usually also decrease the VLT of the glass. To maximise the natural daylight within the indoor spaces, VLT should be as high as possible.

The glass to be considered on vertical glazing will have as high a VLT, as low a shading coefficient and as low a U-value as practically possible within the context of the design and functional space.

Double glazing will reduce heat loss through the glass, correspondingly reducing the heating/cooling energy required. Occupant comfort will also be improved, by reducing the internal surface temperature of the glass and helping to avoid the “cold zone” often experienced near glazing in cold weather. Care should be taken when specifying double glazing as within the Sydney environment improper use can result in increased energy consumption due to trapping heat within buildings and increasing the cooling load for that space. The use of double glazing will be investigated during detailed design stages to determine where its use is practical and beneficial.

Glazing is available with various “Low-E” coatings, which can help reduce the shading coefficient. However, when exposed, these coatings must be cleaned with specific chemicals and are not particularly durable. This may render low-E coated glass as impractical due to maintenance and longevity concerns.

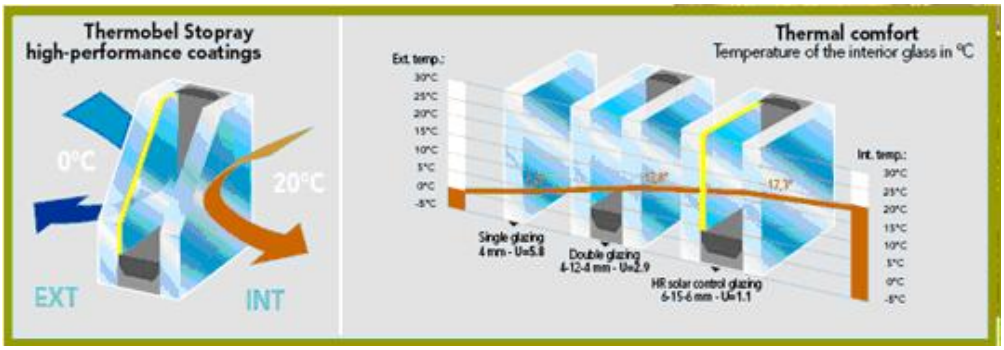


Figure 5 How performance double glazing works (image courtesy of Glaverbel)

The thermal performance of the window frame itself is an important consideration and the option of glazing with thermally improved frames will be studied. A further improvement being investigated is the use of thermally broken frames, particularly if a large amount of framing is likely, to increase overall U-value performance.

Investigation of higher performance glazing will take place during future project applications.

9.5 Indoor Environmental Quality

Daylight, Glare & External Views

Good daylight in combination with views to the external environment can greatly enhance the ambience of a space and provide better environments for residential homes and commercial offices. In addition, high levels of natural light reduce the need for artificial lighting, thereby reducing artificial lighting energy consumption. The use of natural light should be considered carefully as negative impacts from disability glare, increased heating and cooling and thermal comfort issues could arise .

To maximise daylight distribution within the buildings, there are several options which should be considered:

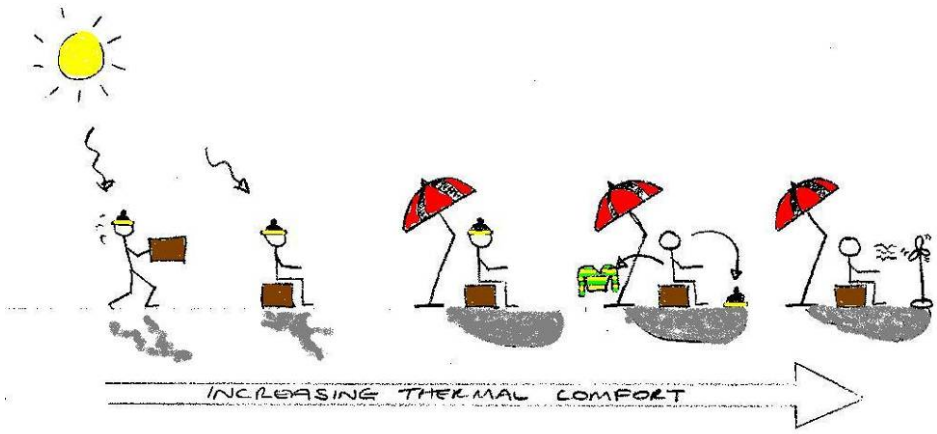
- Use glass with a high light transmission (see Section 8.4).
- Use light coloured, reflective finishes on internal surfaces.
- For retail where retail tenancies have external shopfronts with shading, paint the underside of overhangs in a light colour to increase reflection into the interior and therefore the level of daylight entering each space.

Thermal Comfort

Thermal comfort is a highly subjective thing; one person’s ‘comfort’ is another’s ‘too hot’ or ‘too cold’. A typical person’s perception of comfort is influenced by six factors:

- Radiant temperature – the temperature of the surfaces around you, or radiant heat from the sun etc (45% of net comfort effect)
- Air temperature and humidity (35% of net comfort effect)
- Air movement, clothing & activity (20% of net comfort effect).

Most buildings in Australia have design criteria for comfort specified only in terms of air temperature and humidity.



Activity:	Strenuous	Sitting
Radiant Temp:	Direct Sun	Shade
Clothing:	Warm clothing	Light Clothing
Air Speed:	Still Air	Pleasant breeze
Air Temp.	Constant (28˚C)	
Humidity	Constant (say 50%)	

Figure 6 Changing perception of comfort for constant temperature and humidity.

It is impossible to control what occupants wear although it is reasonable to assume that they will wear warmer clothes in winter and lighter clothes in summer. The level of activity will also vary from person to person – from sitting or standing to window-shopping or brisk walking.

Thermal comfort can either be provided by passive or mechanical means. Passive means should be optimised before mechanical systems are designed, reducing operational energy costs, with potential plant reductions and reduced ongoing maintenance.

Passive heating and cooling begins with the building form. Sections 9.1-9.4 describes the issues to consider when selecting building materials, insulation and glazing. Good insulation and glazing will not only reduce heat gain and loss, but will also moderate radiant temperatures from the walls, floor and ceiling.

The Concept Plan shall carry out thermal comfort reviews of the design at future project applications to allow for comfort to influence the detailed design.

9.6 Energy Savings

Greenhouse gas emissions are directly related to energy consumption. In Sydney, for every 1.1kWh of mains electricity consumed approximately1kg of CO_2 is released into the atmosphere.

Energy Efficiency Targets

The Building Code of Australia Section J sets minimum energy performance requirements for retail and commercial 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. BASIX covers the requirements for the residential component of the Concept Plan and future project applications. The proposed design will be developed to meet or where possible exceed the BCA and BASIX energy efficiency requirements.

Consideration will be given to further improvement in energy efficiency. The development will consider the following strategies to reduce its component of energy consumption.

Greenhouse reductions are achieved in a staged approach:

- Firstly a reduction in overall energy consumption through demand reduction and energy efficiency, then;
- A reduction in electricity and gas utility consumption through the use of onsite generation. This is to be considered during subsequent stages of the development where load profiles are more suited to this type of initiative.

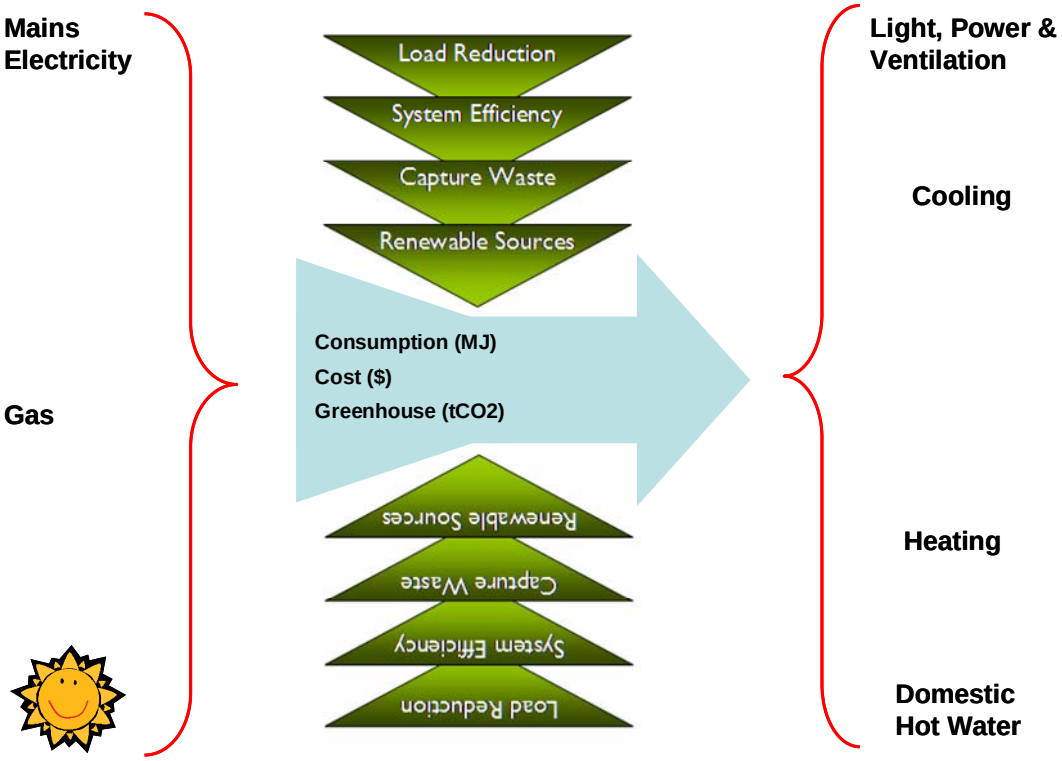


Figure 7 Approach to Greenhouse reduction

Passive Design

Passive design reduces the amount of air-conditioning required and can have a marked impact on the building's energy consumption and greenhouse performance.

Please refer to Sections 9.1-9.4 for details on passive design.

Energy Efficiency

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 development should be energy efficient in design and ongoing operation. The following initiatives will improve the energy performance of the building:

Lighting

The proposed artificial lighting strategy for the development will consider where appropriate highly efficient T5 fluorescent lighting Compact Fluorescents or metal halides where appropriate. Low-power LED lamps should also be considered in feature lighting and are now available with excellent temperature control. Lighting power density will be required to meet BCA requirements.

Focus should also be placed on lighting controls including consideration of:

- Daylight dimming or extinguishing of external and streetscape perimeter lighting, as well as internal lighting adjacent to the skylights;

- Motion detectors in infrequently used spaces such as plant rooms, along with timer switches where appropriate;
- Localised light switching, with lighting zones to be ≤250m^2 for the commercial and retail tenancies
- Central automatic timed control of lighting throughout the commercial and retail tenancies;

Heating, Ventilation & Cooling (HVAC)

Once building fabric has been optimised to reduced cooling loads, mechanical air-conditioning energy can be reduced by selecting efficient systems and plant equipment and by minimising the number of operating hours. The following energy initiatives will be considered to reduce air-conditioning energy:

- Each A/C unit to be within the top 10% of energy efficiency, with a high Coefficient of Performance (COP), particularly at part load (and use a zero ODP refrigerant).
- Install high-efficiency chillers;
- Variable Air Volume (VAV) air conditioning systems may be considered and adopted if deemed suitable for retail centre use;
- Outside Air supply can be controlled by CO_2 sensors to reduce energy consumption at part occupancy;
- Be zoned so that only occupied areas are cooled and so that spaces with different occupancy patterns or drastically 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).
- A/C should have a simple control and be linked to a timer to turn off. The control strategy is "Absence Off": manual on, manual off, auto off.
- A wider, internal temperature range will be considered. For example, when it is 36°C outside, an internal temperature of 24 - 26°C is considered quite comfortable by most people provided radiant temperature is reduced (e.g. no direct solar gain) and air movement is provided (e.g. natural ventilation or ceiling fans). This could use significantly less energy than trying to cool to a standard 22 - 24°C throughout the year and lower in winter e.g. 19-21°C.

Domestic Hot Water

Domestic Hot Water energy provision from a gas instantaneous heating unit should be considered. Alternatively, around 70% of heating energy can be provided by solar hot water panels, using a gas-back-up. These initiatives are to be investigated in line with site wide initiatives during future project application stages

Retail Power

To help minimise and limit the retail power loads it is suggested that all retail premises be encouraged to comply with specific power load requirements depending on retail type.

Energy Management

There is little benefit in designing an energy efficient building if the energy consumption is not metered, monitored and managed over time.

To enable the effective monitoring and tracking of energy consumption, sub-metering will be considered to retail tenancies and commercial spaces, as well as considered for sub-metering energy uses in the buildings greater than 100kVA. This will help identify areas of inefficiency with potential for improvement. Additionally, such an energy monitoring system may include the following:

- The power loads of each separate area of the development ;
- The lighting loads of each separate area of the development;
- Any piece of equipment using over 100kVA;

- Condenser water temperatures (if applicable) to enable monitoring of the chillers/cooling tower interface.

9.7 Water Conservation

With many parts of Australia still in drought after 10 years, water conservation is a crucial aspect of sustainable design. Potable water use can be reduced by promoting a reduction in water consumption, installing highly efficient fittings and fixtures, and supplementing mains water use with alternative water sources.

Water conservation is achieved in a two-staged approach:

- First reducing the inherent amount of mains or potable water consumed within the development through demand management, then;
- Substituting mains water required to meet this demand by harvesting and reusing rain, storm or black water.

Demand Reduction

In order to reduce the overall water consumption, the following initiatives will be investigated:

- High efficiency fittings and appliances to reduce mains potable water consumption. Note that the WELS Star rating scheme replaced the AAAAA scheme as of July 2006. A list of rated products can be found at http://www.waterrating.gov.au/

WELS Water rating label sample

- Use of 3 / 4.5L dual flush toilets;
- Use of 0.8L low flush urinals or waterless urinals;
- Showers with a maximum flow rate of 7.5 L/min (e.g. *Ecoshower*);
- Wash hand basin faucets with a maximum flow rate of 4 L/min;
- Cleaners and kitchen taps with a maximum flow rate of 6L/min;
- Drought resistant (xeriscape) plants and grass for gardens and landscaping where appropriate;
- The following practices for all sprinkler, micro spray, sub-soil drip system or any other watering system:
    - On-site rain or storm water storage tank supply; and/or
    - Usage on alternate days between the hours of 10.00am and 5.00pm;
- Installing watering systems with either a rain sensor or soil moisture sensor as part of the control system;
- Cleaning of paved areas with an alternative to water unless cleaning is required as a result of an accident, fire, health or safety hazard, or other emergency;
- Consideration of flow shut-off device for all hoses;
- Consideration of water-efficient cooling towers (where applicable) that achieve 6 cycles of concentration or more.
- Non potable water for cooling tower make up.

Rainwater & Stormwater Recycling

Water can be divided into two main uses – potable (drinking standard) and non-potable. Of the water usage predicted for the shopping centre, only the kitchen and bathroom basins require a potable water supply. The remaining consumption may be supplied via non-potable sources, such as rainwater tanks.

Rainwater could be harvested from suitable roof areas to supply toilet-flushing and landscape irrigation for the development, reducing the quantity of high quality drinking water that is used for these functions.

The Discovery Point Concept Plan will investigate the use of rain and storm water in conjunction with the feasibility of an onsite black water plant to ensure the correct integrated design approach is implemented.

Tracking and Monitoring

Sub-metering on major water uses can reduce the considerable water losses that occur in developments through leakage. In addition, they will allow water efficiency measures to be monitored and tracked. Sub-metering all major water uses, including major commercial and retail tenants, food preparation facilities, car wash facilities, bathrooms, cooling towers, washdown facilities, and irrigation systems will be investigated. Meters should be connected to the BMS for leak detection purposes. Base Building water use metering for the residential component will also be investigated.

The overall water strategy for the buildings should be developed during future project application stages, based on available roof area for rainwater harvesting, storm water collection and black water plant and detailed calculations of demand for irrigation, toilet-flushing and wash-down.

Groundwater & Stormwater management

Stormwater run-off can have a major impact on the environment. Untreated stormwater from roads and other paved surfaces runs directly into the local stormwater drainage system, taking with it harsh chemicals and increasing the demand on an often already struggling system.

Reducing the amount of stormwater leaving the site can be quite easily accomplished through careful design of surface and run-off systems.

The use of pervious surfaces (in new landscaped areas) can allow stormwater to seep directly into the earth and help to recharge and dilute the saline watertable. The ground acts as a natural filter for any excess water before it enters the water table. Pervious surfaces could include carparks, walkways and traffic thoroughfares.

Roadside curbs can be made from pervious swales rather than the standard concrete drainage system. This allows water to seep directly into the earth, again reducing stormwater run-off from the site. Careful selection of plants and soils will filter the water from harmful chemicals and oils prior to the water dispersing into the surrounding earth.

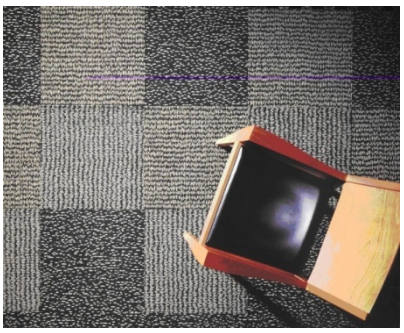
These types of swales for roads on the development will be investigated as part of the overall water strategy

It is understood that there may be high amounts of contaminants on major roadways due to vehicular fluids, and this will be a factor of consideration when investigating such systems as the water drains into the ground water table.

9.8 Sustainable Building Materials

In addition to fitness for purpose, economy, aesthetics and availability, the selection of construction materials should reflect upon the issues of the material's environmental credibility and impact on Indoor Environmental Quality (IEQ), including:

Resource Extraction	(e.g. ecological sensitivity? old-growth forest, scarce minerals?)
Future Recyclability	(e.g. Can it be dismantled, recycled, and survive churn?)
Recycled Content	(e.g. is primary resource consumption thereby reduced?)
Durability	(e.g. Will it last?)
Toxicity	(e.g. PVC use, VOC's, cleaning products & off-gassing)
Waste	(e.g. Standard dimensions used to minimise off-cuts?)
Cost	(e.g. capital, maintenance & life-cycle cost impacts?)
Emissions	(e.g. Greenhouse & Ozone impacting gases)
Embodied Energy	(e.g. energy consumed in manufacture and distribution)



It is recommended that as much construction as possible be prefabricated and installed completed to minimise construction work and material waste on site.

Specific construction materials are discussed in the following sections.

Sustainable Timber

All timber should 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. Tropical rainforest timbers, including species Meranti, Merbau, Philippine Mahogany and Chengel should not be used for construction or second fix purposes. The following are accepted plantation timber species and will be investigated:

- Pinus radiata (exotic)
- Pinus elliotii (slash pine, exotic)
- Arakaria cunninhamii (hoop pine, native)
- Cypressus macrocarpa (Monterey Pine, exotic)
- Sydney Blue Gum (NZ grown only)
- Eucalyptus Cladocalyx (Sugar Gum, native, available through Smart Timber, Colac)
- Eucalyptus Globulus (Tasmanian Blue Gum when sourced from mainland plantation)

If the species of timber used is not on this list, the following evidence should be sought:

- Certification from the supplier that the timber is post-consumer recycled, with the source identified, preferably certified by the Forest Stewardship Council
- If the timber is native to and grown in Australia, chain-of-custody certification shall be provided from the place of harvesting to the point of sale.
- Certification as to the plantation status of the timber.

Additionally, the utilisation of reconstituted timber veneer products should be considered.

Plasterboard

Products containing high-recycled content will be considered for all plasterboard installations.

MDF

Products containing little or no formaldehyde (i.e. E1 or E0 board) will be considered for all MDF installations.

Paints and Adhesives

Use of low VOC and water-based products is preferred to oil based paints, stains or sealants, to reduce the need for the use of mineral based solvents and unwanted off-gassing.

VOC's should be limited wherever possible to the values specified in the Green Star rating framework, shown below:

Paints (Maximum Volatile Organic Compound (TVOC) g/litre of ready-to-use-product)
Walls and ceilings - interior semi gloss: 16
Walls and ceilings - interior low sheen: 16
Walls and ceilings - interior flat washable: 16
Ceilings - interior flat: 14
Trim - gloss, semi gloss, satin, varnishes and wood stains: 75
Timber and binding primers *30
Latex primer for galvanized iron and zincalume: 60
Interior latex undercoat: 65
Interior sealer: 65
One and two pack performance coatings for floors: *140
Any solvent-based coatings whose purpose is not covered in table: 200
* EU directive

Sealants/Adhesives (Maximum Volatile Organic Compound (TVOC) g/litre of ready-to-use-product)
Indoor Carpet Adhesive: 50
Carpet Pad Adhesive: 50

Outdoor Carpet Adhesive: 150
Wood Flooring Adhesive: 100
Rubber Flooring Adhesive: 60
Subfloor Adhesive: 50
Ceramic Tile Adhesive: 65
Cove Base Adhesive: 50
Dry Wall & Panel Adhesive: 50
Multipurpose Construction Adhesive: 70
Structural Glazing Adhesive: 100
Architectural Sealants: 250

Steel

Steel used in the project will be considered to be sourced from recycled suppliers according to the following criteria:

- 60% of all steel used (by mass) to have a recycled component of 50% or more.

Concrete

Concrete used in the project will be considered to be sourced from recycled suppliers according to the following criteria:

- 20% of cement used for in-situ concrete and 15% of cement used for pre-cast concrete is replaced with industrial waste product; and
- 20% of aggregate to be used is recycled aggregate (classified as Class RCA in accordance with HB 155-2002).

Tenancies

While difficult if not impossible to control individual tenancies, efforts will be made to educate and encourage tenancies to adopt the above principles in the commercial and retail fitouts through an leasing education programme and lease conditions.

9.9 Conclusions

The Concept Plan proposal and this ESD report comprehensively addresses the relevant requirements in terms of sustainability for the development. Care shall be taken by the design team to ensure that the initiatives documented within this report are investigated thoroughly and utilised where practical to provide a solution that addresses environmental concerns, occupant amenity and comfort and energy, water and carbon emissions.

The report responds to the relevant, Director General Requirements, local DCP, LEP, guidelines and regulations BCA and BASIX compliance requirements and will exceed them where possible. All later project development applications will be subject to the basis of this concept plan and current regulations at the time of application.

The residential portion of the development will provide energy and water measures above the BASIX requirements. An Average 6 Star Accurate score is to be provided for the Thermal comfort section of the BASIX tool.

The Commercial and Retail sections of the development will provide performance above BCA compliance requirements.

The future Commercial Building will be targeting a 4.5 Star NABERS base building rating.

The draft Statement of Commitments Attached in Appendix A lists the environmental initiatives that are currently included in the Concept Plan.

Appendix A: Draft Environmental Statement of Commitments

Discovery Point Concept Plan - Statement of Commitments		
Initiative	**Extent of Initiative**	**Key Environmental benefit**
BASIX compliance with a stretch target to meet best practice	Residential Portion of the Development	Benchmarking
NABERS 4.5 star Base Building energy rating	For the commercial Building	Benchmarking
BCA Section J Energy Efficiency	For the Commercial and retail sections of the development	Benchmarking
Small car parking	For portion of car spaces	Energy consumption reduction
Moped parking	Within site	Energy consumption reduction
Car sharing initiatives	To be encouraged within the site	Energy consumption reduction
Insulation	to be of a high level to improve thermal comfort of the residential development	Energy consumption reduction
Energy efficient fixtures and fittings	To be incorporated where applicable	Energy consumption reduction
Performance glazing / double glazing	Where necessary	Energy consumption reduction
Louvres / shutters (esp. adjustable)	Where necessary	Energy consumption reduction
Draught sealing around windows, doors and any other gaps	On all Residential apartments	Energy consumption reduction
Pool blankets	For all pools	Energy consumption reduction
Motion sensors in carpark and common areas to minimise the number of lights on	Across the development	Energy consumption reduction
Minimise light numbers	Through sensible design	Energy consumption reduction
Openable windows to provide natural ventilation	Where appropriate	Energy consumption reduction
Carbon monoxide monitors to limit car park fan usage	In enclosed carparks	Energy consumption reduction
Natural car park ventilation	Where appropriate	Energy consumption reduction
Natural ventilation for common areas	Where practical	Energy consumption reduction
Water efficient appliances	Throughout all sectors of the development	Potable Water consumption reduction
Water efficient tapware	As above	Potable Water consumption reduction
Black water treatment plant for the site	Collection of sewerage for reuse	Potable Water consumption reduction
Low water use landscaping	For a portion of landscaping	Potable Water consumption reduction
Export of recycled water to neighbouring sites and parklands	where possible and practical	Potable Water consumption reduction
Low-water use appliances	In the residential parts of the development if supplied by the developer	Potable Water consumption reduction
Dual flush toilets	To be provided throughout	Potable Water consumption reduction
Gross pollutant traps	Where necessary	Potable Water consumption reduction
Water Meters	To be provided for major water uses	Potable Water consumption reduction
Residential composting strategy	For each residential podium landscaped area	Waste reduction
Communal gardens	For portion of residential podium landscaped area	Materials use reduction
Behaviour for recycling	Education process for users	Waste reduction
recycling facilities	Provided on every residential level	Waste reduction
Low VOC materials	Shall be incorporated wherever practically possible	Indoor environment Quality
Low formaldehyde products	Shall be incorporated wherever practically possible	Indoor environment Quality
Recycling chutes	For each building	Waste reduction
Use of recycled materials	where practical throughout the development	Waste reduction
Low wastage in construction	Through correct EMP strategies and recycling of construction waste	Waste reduction
Industrial waste products used in construction	Where appropriate	Waste reduction
Prefabricated building components	Where appropriate	Waste reduction
Compaction of waste	For residential, retail and commercial waste where appropriate	Waste reduction
Cycle paths incorporated	Within site	Energy consumption reduction
Roof gardens / green roofs	For applicable portions of the residential development	Ecology
Edible plants	For applicable portions of the residential development	Ecology and Amenity
Dense planting	To be incorporated where applicable	Ecology and Amenity
Break up large paved areas with planting	Where practical	Ecology and Amenity
Reuse of existing plants	Where Applicable	Ecology
Cool' coloured paving	For reduction of Heat island effect in applicable areas	Ecology
Grass strips along kerb & gutters	As party of the landscaping plan	Ecology
Acoustic rated materials	To ensure correct treatment of noise from traffic and rail	Amenity
Orientation of building. Place living areas, such as the family room, kitchen, lounge and dining room on the northern side	Where practical	Energy consumption reduction and amenity
Public transport accessibility	inherent in location	Energy consumption reduction
Communal Amenities	The Concept Plan will provide playgrounds, picnic benches composting facilities and communal gardens for the residences	Amenity
Sediment control	On the construction site	Ecology
Dust control	On the construction site	Ecology
Wheel wash	On the construction site	Ecology
Minimise site cut and soil exposure time to climatic elements	On the construction site	Ecology
Incorporate clean site construction practices to reduce soil erosion	On the construction site	Ecology
Allow builder to propose sustainable alternatives	Where appropriate	Materials use reduction
Plaques and maps for educational purposes for the development	Each building or facility includes environmental education plaques to educate the public of sustainable initiatives	Education
Visible marketing	Ensuring sustainable initiatives are transparent	Education
Interpretive strategies interlinked and harmonising with the sales and marketing material	Including a budget for interpretive strategies for education of sustainability	Education
Educate tenants/BM/Employees	Through provision of Building users Guides	Education