



Doncaster Hill
Sustainability Management Plan
Procedural Manual

FINAL DRAFT



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Introduction

The purpose of this manual is to assist Council Officers in assessing the level of compliance of a Sustainability Management Plan (SMP) against the requirements of 21.21 Doncaster Hill Activity Centre ESD policy. The aim of this policy is to incorporate ecologically sustainable development principles in every facet of design, demolition, construction and operation' with the introduction of eight key objectives;

- Building Energy Management
- Water Sensitive Urban Design
- Construction Materials
- Indoor Environment Quality
- Waste Management
- Quality of Private and Public Realm
- Transport
- Demolition and Construction

This manual is a guide only and any initiatives beyond those outlined as regulation cannot be enforced but rather encouraged.

To maintain the ultimate flexibility of the design solutions, Council Officers involved in the planning process need to be able to make qualitative judgements on the designs, with reference to this document.

The MSS states that the SMP must meet the following requirements-

- Identify how the development will achieve the sustainability objectives of the Municipal Strategic Statement, Clause 21.21 Doncaster Hill Activity Centre.
- Identify statutory obligations and documented sustainability performance standards from government and other authorities
- Specify key performance indicators, to an agreed level, to measure the achievement of objectives and initiatives identified in the SMP
- Demonstrate-
 - The application of current best practice principles
 - The use of emerging technologies
 - A commitment to 'beyond compliance' throughout the construction period and subsequent operation of the building
- Identify responsibilities and the schedule for implementation and monitoring
- Demonstrate that the design elements, technologies and operational practices that comprise the SMP can be maintained over time.

How to use this manual-

This manual has been designed to complement the SMP checklist and schedules for assessing and requesting further information from an applicant in regards to their SMP. It is to be read in conjunction with the Doncaster Hill Strategy Oct 2002 and the Sustainable Design Guidelines developed for the applicants and with reference to the documents referred to in each section of this manual if additional support information is required.

Where detail information or required plans have not been provided, a commitment to provide at a nominated time should be stated in the SMP. These should be listed in the Outstanding Information checklist and monitored. Where specific policy requirements are *not* being explored, written *reasonable* justification as to their exclusion, to the satisfaction of the council officer, must be included.

Updating-

This document is to be reviewed annually and updated based on changes in Industry standards and regulations, and on feedback regarding the effectiveness of the document to assist in assessing SMP's.

In each section BCA regulations have been mentioned where relevant. Note that these are a summary only, based on BCA 2004.

On 1 January 2003 energy efficiency measures for houses were introduced into Volume Two (Housing Provisions) of the Building Code of Australia (BCA). Victoria introduced a 5* requirement to meet these measures. Energy Efficiency measures for Class 2, 3, and 4 buildings will be included in BCA 2005 Volume One (class 2-9 buildings). A Regulation Document (RD) and Regulation Impact Statement (RIS) for energy efficiency measures to Class 5-9 buildings are out for public comment and following approval are due for inclusion in BCA 2006 Volume One.

Structure - each section is loosely broken into the following content structure:

- Section Title
- Objective (from Doncaster Hill Strategy)
- Brief Overview of the key issues
- BCA or other regulatory requirement
- Industry Standards and/or questions outlining information that should be provided in the SMP. Some of these will be qualitative and will need to be determined in reference to the objective and key issue overview included in the section.
- **Suggested Best Practice and Beyond Compliance solutions**
- References
- Case Studies

Assessment Requirement-

Number of weighting 3 elements to best practice standard or better

75%

Number of weighting 2 elements to best practice standard or better

75%

Number of weighting 1 elements to best practice standard or better

75%

Refer to the Checklist for the definition of weightings on elements. 75% of elements in weightings 1-3 in the checklist should meet the Best Practice standard. Bonus elements are those which have large environmental benefits, but which may incur a large capital cost and therefore are not compulsory but should be seen as meeting a Beyond Compliance standard if proposed. It is up to the discretion of the assigned planner to negotiate compliance in the various categories with the applicant and discuss trade off's between elements. It is not recommended to make trade off's between energy and water initiatives, but rather trade off between elements within categories only.

Recommended in-house reference material-

BDP Environment Design Guide, RAI A

Green Star Office Design Technical Manual, Green Building Council of Australia

BCA- Building Code of Australia, Building Commission

Energy Smart Housing Manual, SEAV

Training-

It is recommended that assessing planners undertake a FirstRate training course through the Building Commission, and that at least one planner, or the environmental officer has undertaken the Green Star Accredited Professional training session through the Green Building Council of Australia.

Policy Overview

General-

0.1 **Have the Environmental Project Values been clearly defined? Y/N**

These should be clearly stated in the SMP. By setting specific environmental goals for a project at an early stage, all stakeholders have an indication of the values the development will embody. As the design develops it can be checked back against the original values by both the design team and the responsible authority. Refer to pg 7 of the Doncaster Hill Sustainability Guidelines for more information.

0.2 **Has an Integrated Design Team been developed or an Environmental Consultant been engaged? Y/N**

The appointment of an ESD specialist or the use of an integrated design team with demonstrated ability to deliver genuine sustainable outcomes is a mandatory requirement and should be documented clearly in the SMP. If the applicant has failed to engage the relevant expertise, they should be requested to do so before they can proceed.

References-

Des 1 May 1995- A Participatory Approach to Energy Efficient Design; BDP Environment Design Guide

0.3 **Has the SMP made specific reference to the requirements of the Municipal Strategic Statement 21.21-2 Doncaster Hill Activity Centre? Y/N**

The SMP *must* directly refer to the key issues outlined in the MSS. The assessor may need to complete the rest of the document assessment and return to this question at the end.

Key Issue 1- Incorporating ecologically sustainable development principles in every facet of design, demolition, construction and operation.

Strategies to achieve these objectives include:

- *Address and incorporate ecologically sustainable design principles into development at the earliest opportunity as an important design and development consideration, rather than be incorporated once concepts and plans are well advanced*
- *Demonstrate the full potential of ecologically sustainable development, by incorporating current best practice, use of emerging design solutions and technologies and embracing a 'beyond compliance' approach to mandatory standards into proposals.*

0.4 **Has the SMP made specific reference to the requirements of 22.13-3 Doncaster Hill Activity Centre Sustainability Management Plan? Y/N**

The SMP *must* directly refer to the key issues of 22.13. The assessor may need to complete the rest of the document assessment and return to this question at the end.

Policy items which relate to specific environmental criteria are-

Policy-

The sustainability Management Plan should-

- Identify how the development will achieve the sustainability objectives of the Municipal Strategic Statement, Clause 21.21 Doncaster Hill Activity Centre.
- Identify Statutory Obligations and documented sustainability performance standards from government and other authorities.
- Specify key performance indicators, to an agreed level, to measure the achievement of objectives and initiatives identified in the Sustainability Management Plan.
- Demonstrate-
 - The application of best practice principles
 - The use of emerging technology
 - A commitment to 'beyond compliance' throughout the construction period and subsequent operation of the building.
- Identify responsibilities and the schedule for implementation and monitoring
- Demonstrate that the design elements, technologies and operational practices that comprise the Sustainability Management Plan can be maintained over time.

References-

Doncaster Hill Strategy Oct 2002

Gen 40, August 2001- Implementing Ecologically Sustainable Development; BDP Environment Design Guide



1.0 Energy Management

Objective-

To achieve new benchmarks in energy conservation and increased use of renewable energy

- The design of the building for energy efficiency (thermal envelope)
- The use of energy saving technologies to further reduce demand
- The use of alternative energy sources, whether provided on-site or through the purchase of 'green energy'

Summary of key issues-

The building sector accounts for around 25-40% of final energy consumption in OECD countries (OECD 2001). Energy production and use is one of the highest generators of Greenhouse Gas (GHG) emissions in Australia (56.8%), with over 90% of electricity consumed in Victoria generated by coal burning. To reduce GHG emissions from building energy consumption, buildings should be passively designed to reduce or remove heating/ cooling and lighting loads, with efficient use of mechanical systems and exploration of on site renewable technologies to supplement grid supply.

ASSESSMENT NOTE:

Items in the checklist marked with (FR) are covered in the First Rate or NatHERS report.

1.1 Have energy reduction targets been set or consumption figures been provided? Y/N

Refer questions 1.2 and 1.3 for further assessment detail.

1.2 Have energy reports been provided that prove compliance with the 5* rating, or beyond compliance (residential projects only)? Y/N

BCA requirement- For Class 2 buildings (multi unit residential development) an average 5 star rating over each separate building is required. Each sole occupancy dwelling is to achieve a rating of at least 3 stars. The average rating shall be determined by finding the average energy load in MJ/m² of each unit, or in the case of FirstRate the average point score (not the average of the stars). This average is required to be at least:

Climate Zone ¹	Average MJ/m ² ²	Average point score ³
Melbourne and southern coastal Victoria Climate	147	7

1. Note that climate selection in energy rating tools is derived through post code

2. For use with NatHERS and BERS

3. For use with FirstRate

Doncaster Hill requirement-

Best Practice	All units minimum 5* - 147 Mj/m ² (req. 1.1 of Doncaster Hill Strategy)
Beyond Compliance	Most units less than 100 Mj/m ²



Based on FirstRate energy benchmarks

3*	-28pts	200 Mj/m2
3 ½ *	-14 pts	180 Mj/m2
4*	-10	165 Mj/m2
4 ½ *	0 pts	155 Mj/m2
5*	7 pts	147 Mj/m2
	25pts	100 Mj/m2
	61pts	65 Mj/m2

1.3 Has a commitment been made to undertake an ABGR rating for a development (office development only)? Y/N

This is *not* a mandatory requirement but rather part of a voluntary scheme which rates and markets office buildings based on their production of greenhouse gases. The minimum rating required to achieve accreditation under the ABGR scheme is 3*.

A commitment agreement between the SEAV and applicant needs to be provided with an ABGR rating. A qualified ABGR reviewer will carry out an energy review of the design to support the commitment agreement. A follow up review is required from an independent assessor to determine if the constructed development has honoured the original commitment agreement.

The cost to the applicant to undertake an ABGR rating will depend on the scale of the project. The commitment agreement could cost between \$5,500 and \$22,000 depending on the size of the building, with the initial energy review and follow up potentially costing between \$1,000 and 3,000.00

Star rating definitions-

3* Current market best practice

This building offers very good systems and management practices and reflects an awareness of the financial and environmental benefits of optimizing energy use.

4* Strong performance

This building demonstrates excellent energy performance due to design and management practices or high efficiency systems and equipment, or low greenhouse intensive fuel supply.

5* Best building performance

This building is exceptional due to integrated design, operation, management and fuel choice.

ABGR Rating	GHG emission (kg CO2/m2/yr)
4 stars	132
4.5 stars	116
5 stars	101

SEAV advises that for all new buildings, 4.5* is considered to be best market practice. Applicants proposing a new commercial building with an ABGR rating commitment should be aiming for 4.5*.



1.4 Has a commitment been made to undertake a Green Star rating for a development (office development only)? Y/N

This is *not* a mandatory requirement but rather part of a voluntary scheme developed by the Green Building Council of Australia as a means of rewarding market leaders and promoting market transformation. The Green Star rating tool has been developed for office buildings only at this stage, and looks at building environmental performance from a holistic view point, addressing energy efficiency of the building fabric and operational systems, water consumption, building and project management, land use and ecology (choice of site), pollution, choice of materials and what innovative ideas are being implemented. The Green Building Council of Australia (GBCA) is in the process of developing tools to rate a variety of other building typologies. The GBCA advise against using the Green Star rating system as a benchmark for any buildings other than offices until they finish developing the other tools, though will endorse compliance with applicable sections of the rating tool which relate to a variety of building types. The cost to the applicant to undertake a GreenStar Rating with an accredited assessor could be between \$10,000 and \$20,000.

The minimum rating required to achieve accreditation under the Green Star scheme is 4*. If 4* is achieved than **all** of the criteria listed in this process manual will automatically be addressed to a minimum of best practice compliance. The content of the Green Star report provided should be assessed to determine which elements have achieved an equivalent of excellent compliance

The Green Star tool is used to assist with the design process, and during the design stage a preliminary rating is provided. An 'as built' rating will need to be undertaken after construction completion to evaluate the initiatives of the original rating that are the responsibility of the contractor.

Rating definitions

4* Best Practice

5* Australian Excellence

6* World Leader



GUIDE TO THE APPLICATION OF GOOD THERMAL PRINCIPLES

References-

Gen 12 February 1997- *Residential Passive Solar Design*; BDP Environment Design Guide
Your Home Technical Manual, Australian Greenhouse Office

1.5 Building Envelope

1.5.1 Site Analysis (mandatory planning requirement)

The site analysis should highlight the physical attributes of the site including solar access, prevailing winds, local topography, vegetation, views, adjoining properties, opportunities and constraints. Does the design respond to this information? This will require the qualitative assessment of the planner assigned. Refer to the Sustainable Guidelines for further information. **Y/N**

Reference-

Des 9 November 1995- *Residential Site Development: for energy efficiency and sustainability*; BDP Environment Design Guide

1.5.2 Building Orientation/ Shape (FR)

Building orientation and shape can greatly effect energy consumption and should be designed to maximise the benefits of sun and wind to reduce the energy load. A rectilinear shape on an east/west axis maximises northern orientation of the building. Site constraints and certain opportunities (such as southern views to city) may restrict optimal building orientation, in which case other measures should be suggested to compensate- refer to content below.

Is the site located to promote an east/west axis? **Y/N**

If yes, refer best practice outline below. If no, then other elements will need to be maximised to compensate for this reduction in design efficiency.

Best Practice	Where possible, spaces most used should be grouped to the north (living rooms, work areas) to maximise winter sun and light opportunities, and spaces least used grouped to the south (bedrooms, service zones) or used as buffers to the west and east. The floor plate of an apartment should be no deeper than 12m to assist cross ventilation opportunities.
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1.5.3 Insulation (FR)

BCA Requirement for residential buildings- Previous requirements stated a minimum total R value for external wall construction R1.3, roof construction R2.2, floor construction R0.7 The 5* energy requirement has superseded the previous deemed to satisfy requirement.

Best Practice	R2.5 for walls, R 3.5 for roof (as a combination of bulk insulation at the ceiling line and reflective foil at the roof line)
Beyond Compliance	Increase in insulation to roof areas of high thermal mass and of darker colours, and an indication to detail to minimise thermal bridging.

References-

Pro 7 August 2001- *Thermal Insulation in Domestic Buildings for Temperate climates: an introduction*; BDP Environment Design guide
Energy Smart Housing Manual - Chapter 7, SEAV

1.5.4 Colour

Radiated heat transfer through the roofing materials can be reduced substantially (up to 25%) by using light colours over darker colours. If darker colours are used a higher level of bulk insulation and reflective insulation is a must.

Has colour been appropriately applied and addressed? **Y/N**



- 1.5.5 Infiltration (FR)
 Minimising air leakage through construction joints and openings in the building envelope can save up to 20% on heating and cooling costs.

Best Practice	In the FirstRate report the following should be checked- Seal gaps and cracks, recessed down lights in roof sealed, fans sealed, chimneys sealed, doors weather stripped.
Beyond Compliance	As per best practice, with no recessed lights into roof cavities and less than 50% operable windows.

1.6 Windows

- 1.6.1 Percentage to floor area for each orientation (FR)
 BCA Requirement- Natural lighting must be provided in class 2 buildings to *all* habitable rooms. Required natural lighting must be provided by windows that are not less than 10% of the floor area

Has window percentage and orientation been compensated for adequately with glazing type and shading? Refer to the FirstRate report.

Best Practice	Rule of thumb is that the window area should not exceed 20% of floor area for a space to optimise light amenity and solar heat gain while minimising heat loss through the window.
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- 1.6.2 Frame and glazing system (FR)
 Up to 40% of a home's energy for cooling or heating is lost or gained through windows therefore improving the thermal performance of a window reduces energy costs and Australia's Greenhouse Gas emissions.
 One of the weakest performing glazing systems is single glazed aluminium framed. In a temperate climate the best results for residential building are from windows that insulate well (high u-value) and admit plenty of solar energy during the winter. Double glazing improves thermal efficiency and noise amenity over single glazing. Timber window frames out perform aluminium for limiting heat loss through the frame, though maintenance need to be taken into consideration and sourcing of timber is important- refer section 3.0 construction materials. Improved performance aluminium frames are now available. For commercial buildings the best results are from windows that insulate well and limit solar heat gain (low solar heat gain coefficient). Durability and maintenance requirements should be considered with choice of frame.

Does the window system have a WERS rating?
 Check what is listed in the FirstRate report.

Best Practice	Double glazing with high u-value frame (timber or equivalent) Appropriate performance glazing (max. shading coefficient 0.6) should be specified to exposed north, west and east glazing to reduce heat gain in summer though shading is always a preference to performance glazing.
Beyond compliance	Timber framing double low-e or other performance glass with Shading Coefficient of not greater than 0.6 relative to orientation and exposure, though shading is always a preference to performance glazing to minimise heat gain in summer.

Reference-

Pilkington Home energy solution- a guide to glass and the BCA
www.pilkington.com.au/resources/pal5260homeenergy6ppfa.pdf
 Window Energy Rating Scheme- www.wers.com.au
 SEAV *Energy Smart Housing Manual* Chapter 5- Windows



- 1.6.3 Shading (FR)
Is there evidence of adequate shading of windows for different orientations? Have eaves depths with sun angles been shown on the drawings?

Best Practice	Horizontal shading provided for northern windows, with vertical shading to windows of east and west orientations. Where shading is not used, performance glazing should be specified. Shading is always a preference to performance glazing. There should be minimal if no sun penetration into habitable spaces between November and February.
Beyond Compliance	100% windows shaded against sun penetration between November and February

References-

Energy Smart Housing Manual, SEAV

1.7 Ventilation

1.7.1 Natural ventilation

BCA Requirement- a habitable room or other room occupied by a person must have natural ventilation with an opening size not less than 5% of the floor area of the room required to be ventilated, or a mechanical ventilation or air-conditioning system complying with AS 1668.2 and AS/NZS 3666.1

Adequate ventilation of a space and fresh air exchange is important to maintain health amenity, keeping general contaminants (VOC's etc) at safe levels, and to provide cooling opportunities during the warmer months.

For residential properties, do the FirstRate reports nominate 'good' ventilation? **Y/N**

First rate report- listed as poor, average or good.

Poor- Air is significantly blocked from flowing from one side of the house to the other (i.e. there may be few or no windows on either of the dwellings long sides).

Average There are some internal obstructions to air flowing through the house.

Good- There is a clear path for air to flow through the house. For this to occur, windows will generally be located on opposite long sides of the house.

Best Practice	Natural ventilation opportunities provided to all spaces. Where this is not possible, an energy efficient extraction system to induce air movement should be nominated.
Beyond compliance	Larger strategies nominated to promote air movement. Night purging opportunity explored. Refer 1.7.2 and 1.7.3 for more detail.

1.7.2 Other Strategies

Stack Effect-	Thermal chimneys, clerestory or ventilated atria
Natural Displacement ventilation-	Supply air delivered at floor level (typically commercial application)
Passive Assisted-	Roof mounted ventilators, wind foils, turbines or cowls

1.7.3 Night Purging

Cool air is drawn into a building at night to expel and replace the heat build from the day. Air movement can be induced by natural means through strategically sized and located fixed openings or mechanically with automatically operated purge windows.

References-

Tec 2 May 1996- Natural Ventilation in Passive Design; BDP Environment Design Guide

Tec 12 November 2002- Emerging Technologies in Ventilation; BDP Environment Design Guide

Des 59 May 2004- Passive Cooling Building Systems; BDP Environment Design Guide



Case Studies-

CH2

60L

RAS Horse and Cattle Pavilions- Olympic Showgrounds NSW

Federation Square- labyrinth

1.8 Internal thermal mass

Is thermal mass provided to the interior? **Y/N**

This can be by exposed brick/ concrete/ block work wall. Check the FirstRate report if internal block work/brick work is nominated.

Internal thermal mass should be adequately shaded from summer sun and insulated from the exterior to prevent heat from transferring straight through the mass. Night purging could be considered to 'recharge' thermal mass on summer evenings.

Has thermal modelling been proposed to adequately size the amount of thermal mass?

Best Practice	Elements of exposed internal thermal mass proposed in project, adequately insulated to exterior and shaded from summer sun.
Beyond Compliance	Thermal mass opportunities maximised, with modelling proposed or provided.

References-

Des 5 August 1995- Thermal Mass in Building Design; BDP Environment Design Guide

Case Studies-

K2 Sustainable Housing

CH2

CottonTree Housing, QLD

30 The Bond

1.9 Zoning

Key habitable spaces should be able to be closed off from other areas to reduce the heating and cooling energy requirement.

Refer to FirstRate report regarding the inclusion of airlocks and separated stairs to residential projects. A fully enclosed lobby to an apartment is considered an airlock.

Best Practice	Key habitable spaces can be zoned to minimise conditioning requirement. Airlocks provided at entrances. Stairs separated from main conditioned spaces where possible.
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GUIDE TO THE APPLICATION OF ENERGY EFFICIENT ACTIVE SYSTEMS

References-

Tec 7 February 1999- An Overview of Operational Energy Minimisation Technologies from Green Building Challenge 98;
BDP Environment Design Guide

Des 34 May 2000- Building energy Brief for Commercial and Public Buildings; BDP Environment Design Guide

1.10 Vertical Transport

BCA Requirement- A lift must be provided to a building with an effective height of more than 12m (approx 4 stories).

Is a lift required? **Y/N**

If required, has the SMP stated the use of an energy efficient model?

Is regenerative power (power generated by the lift movement) being fed back into the grid or nominated for re-use?

Best Practice	Lift (if required) is an energy efficient model within the top 20% available. Accessible stair located within close proximity to encourage walking.
Beyond Compliance	Regenerative power generated by lift fed back into grid, stored or nominated for reuse elsewhere on site.

1.11 Mechanical

Regulatory Requirement- AS1668.2- Mechanical ventilation shall be provided where it is required for a specific process, where the rate of air provided by natural ventilation cannot achieve the required ventilation rate or where needed for fire and smoke control.

Flow rates:

Use of enclosure	L/s per occupant (<27 degrees C)	
	Supplying 100% outside air or a single enclosure	Multiple enclosure system
Low activity	5	5
Medium activity	5	7.5
High activity	10	15
Very high activity	15	22.5

From table 4.2 AS1668.2-2002

References-

Tec 12 November 2002- Emerging Technologies in Ventilation; BDP Environment Design Guide

1.11.1 Is a mechanical ventilation system required? **Y/N**

If a system has been proposed, does the SMP clarify its inclusion over passive or passive assisted methods alone?

1.11.2 BMS

A Building Management System (or Building Automation System) acts to eliminate possible inefficiencies by controlling the various building systems, namely mechanical and electrical, so as to limit operation to when required only and to enhance the functionality of the design.



Best Practice	The BMS controls automated daylight sensors and CO2 monitors in public areas (circulation, external areas, carparking)
Beyond Compliance	Mixed mode operation or other proposed alternatives for improved energy reduction nominated

Case Studies-

Deakin Building T
 CH2
 Charles Sturt University Staff Offices
 Monash Science Centre

1.11.3 HVAC overview

Relevant Australian Standard- AS1668

BCA Requirement- Energy efficiency requirements will potentially be introduced into the BCA in May 2006.

Heating, cooling and ventilation account for 2/3 of energy consumption in commercial buildings, so effort should be made to design an efficient HVAC system.

One way to reduce operational energy is to provide supplementary air tempering by passive or efficient active means to reduce the heating/cooling load. This can be by the following various options-

- Heat exchangers, air vented from wintergarden/gabion rock store/ labyrinth/ alternative thermal mass zone, berm walls, shower towers, geothermal field and chilled beams.
- Air delivery methods including displacement ventilation and mixed mode operation

Can air extraction be facilitated by individual units to apartments/spaces or is a central system required? **Y/N**

Best Practice	Conditioned areas are zoned, variable air speed allowance, automatic control with manual override.
Beyond Compliance	Includes mixed mode operation and/or supplementary air tempering

References-

PIC- A Good Guide to Good Practice; for the installation of residential heating, cooling and air conditioning plant and equipment

Case Studies-

Deakin University Building T
 Charles Sturt University Staff Offices

1.11.4 Heating

Is ancillary heating required? **Y/N**

Residential –

Refer to FirstRate report- if the units exceed the 5 star requirements then additional heating should not be necessary. What demographic of tenant is being catered for? Elderly and disabled tenants may require a smaller comfort zone temperature band.



Area	Heating
Only living zones (including kitchen, family room, lounge, etc.)	Use one or more high efficiency space heaters
Living areas for long periods, sleeping areas for short periods	Use high efficiency space heaters for living zones and electric 'spot' heaters for sleeping areas; or a high efficiency zoned central heating system
Living and sleeping areas for long periods at different times	Use a high efficiency zoned central heating system
Living and sleeping areas for long periods at the same time	Use a high efficiency zoned central heating system
Bathrooms/ensuites	Use radiant heaters, e.g. electric strip heaters, infra-red lamps

From *Energy Smart Housing Manual*. SEAV

Efficient Space Heating options include-

- Gas Heater
- Reverse cycle
- Pellet Heater technology

Central Heating options-

- Hydronic/ solar hot water boosted heating
- Gas ducted heating
- In-slab heating
- Ducted reverse cycle

Best Practice	Heating selected, sized and zoned appropriately (refer chart above). Gas heating nominated over electric heating if gas is available. 5* or equivalent rating.
Beyond compliance	<i>No supplementary mechanical heating required (provided by passive means- winter garden, passive design etc)</i>

Reference-

Refer to the SEAV *Energy Smart Housing Manual* chapter 9- services, lighting and appliances for comprehensive detail of systems

Commercial-

Typically the heating requirement for commercial buildings is minimal due to the heat load from equipment and lighting. This will usually be by means of the central HVAC system.

Best Practice	Efficient HVAC system nominated as per 1.11.3, or appropriately selected individual space heating
Beyond Compliance	Evidence provided to support no supplementary heating requirement

1.11.5 Cooling

Residential-

If passive principals are applied correctly, additional cooling should not be required for residential developments. The applicant may still intend to install cooling for supplementary purposes. In order of efficiency, the key options are:

Fans- portable and ceiling fans

Evaporative Coolers- portable and ducted. *Star rating available*

Refrigerative Air Conditioners- portable, window/wall split systems, multi split systems and ducted systems. *Star rating available* except for ducted system.



Best Practice	Highest star rated appliance nominated. Adequate justification provided as to the need for additional cooling, <i>especially</i> if a refrigerative air conditioning (more specifically ducted) system is proposed.
Beyond Compliance	Ceiling fans provided to main habitable spaces only or no additional cooling required.

References-

Energy Smart Housing Manual chapter 9, SEAV

Commercial-

In the commercial sector the largest energy requirement will be for cooling (PCA Energy Guidelines). In most office and retail designs, this will be predominantly proposed by means of a ducted HVAC system. Use of appropriate window shading, glazing, insulation and thermal mass will help to reduce the air cooling requirement.

Best Practice	Efficient HVAC system to minimum requirement as per section 1.11.3
Beyond Compliance	Mixed mode option and/or additional active features such as chilled beams and evaporative techniques.

References-

Energy Smart Housing Manual, SEAV
Sustainable Energy Authority of Victoria
Energy Guidelines Property Council of Australia

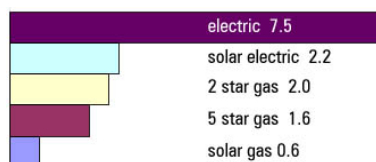
Case Studies-

CH2
NAB headquarters Docklands
SECV headquarters

1.12 Appliances/ Equipment

1.12.1 Hot Water System

There is no regulation to provide a solar hot water system for class 2 or commercial buildings. The 5* regulation applies to class 1 buildings only.



CO2 emissions for Water Heating Fuels (tonnes/annum)

Source: Seav

Best Practice	Gas boosted Solar hot water, solar electric where gas not available. 5* gas where solar not an option.
Beyond Compliance	Gas boosted with minimum 60% solar contribution pa, ring main set up

Government rebates are available for solar hot water systems



References-

Going Solar- www.goingsolar.com.au
 Sustainable Energy Authority of Victoria- www.seav.vic.gov.au
 Alternative Technology Association- www.ata.com.au
Tec 5 February 2004- Solar Hot Water; BDP Environment Design Guide

1.12.2

Lighting

Regulatory requirement- Requirements vary depending on application, refer AS1680.0 for more detail.

Residential-

Avoid use of recessed down lights in areas with insulated roof cavity over.

Best Practice	No incandescent lighting, halogen down lights to be 35W low voltage instead of dichroic 50W lights. Preference is for a majority of fittings to be fluorescent fittings. Surface mounted fittings preferred in areas with roof over, or detail provided of sufficient insulation and treatment of thermal bridging if recessed down lights proposed.
Beyond compliance	100% fluorescent lighting with electronic ballasts.

Commercial-

Office lighting power densities (Green star and docklands guides)
 T5 fluorescent lamps with electronic ballasts should be nominated.

Best Practice	3.0 W/m2 per 100 lux, zoning of switching
Beyond compliance	1.5 W/m2 per 100 lux- ambient levels with task lighting. Daylight sensors to perimeter of commercial buildings, includes zoning of switching.

References-

Power Density of Illumination chart from *Property Council of Australia Energy Guidelines*
 Green Star Office Design Technical Manual
Tec 3 May 2002- Energy Management – Lighting; BDP Environment Design Guide
Tec 9 August 2001- Emerging Technologies in Lighting Outcomes; BDP Environment Design Guide
Gen 61 August 2004- Best Practice in Lighting- quality and sustainability; BDP Environment Design Guide
 AS1680.0
Energy Guidelines Property Council of Australia

Casestudies-

CH2

1.12.3

Appliances

Has a commitment to use energy efficient appliances been provided?
 A Star rating scheme is in place for appliances, and an Energy Star scheme for office equipment- have target ratings been proposed?
 Have strategies been proposed to reduce the requirement of appliances? eg. no provision for dryers to avoid use but provision for communal or individual clothes lines.
 Have education strategies to tenants been proposed?

Best Practice	Commitment to specify gas appliances over electric if gas is available. Minimum 4* rating.
Beyond Compliance	Includes strategies to minimise requirement needs for appliances and/or intention to undertake tenant education programs



References-

Energy Rating <http://www.energyrating.gov.au>
 Sustainable Energy Authority of Victoria www.seav.vic.gov.au

1.13 Renewable Energy

Clause 22.13 states ‘the individual components of the sustainability management plan should address: Building Energy Management; The use of alternative energy sources, whether provided on-site or through the purchase of “green energy”’. The inclusion of renewable technologies in the project can have large environmental benefits, but it is recognized that there may be a considerable capital cost involved and therefore it is not a mandatory requirement, but rather a bonus initiative. Government rebates are available for on-site renewable energy systems.

1.13.1 Alternative Technologies

Have any alternative technologies (apart from solar hot water) been explored? **Y/N**

The amount of power to be generated should be noted in the SMP. This can be expressed as a % of the total power requirement of the development.

Is this provision for ancillary power, or for demonstration/ educational purposes? This will help determine if the renewable technologies proposed are in danger of removal from the proposal at a later date.

Beyond Compliance	Production of a minimum of 10% of building’s energy demand from renewable sources (excluding greenpower)
-------------------	----------------------------------------------------------------------------------------------------------

Options include but are not limited to-

- Photovoltaic
- Solarthermal
- Wind
- Cogeneration

References-

Going Solar- www.goingsolar.com.au
 Sustainable Energy Authority of Victoria- www.seav.vic.gov.au
Des 10 February 1996- Renewable Resources: energy generation; BDP Environment Design Guide
Tec 4 August 2003- Photovoltaic Cells- how they work; BDP Environment Design Guide

1.13.2 Green Power

Is there consideration towards supplying Greenpower during the construction period? **Y/N**

Is there an indication to explore leasing agreements with Tenants to promote Green Power? **Y/N**

Is there consideration towards supplying Greenpower for base building loads? **Y/N**

Best Practice	Greenpower proposed for communal areas (expressed as a percentage of total energy consumption)
Beyond Compliance	As per satisfactory requirement, but Greenpower proposed to <i>all</i> building areas- proof of leasing/ body corporate agreements to facilitate required. Greenpower proposed for construction period

References-

OECD *Environmentally Sustainable Buildings: Challenges and Policies*, 2003.
 SEAV, *Energy Smart Housing Manual*, 2002. http://www.seav.vic.gov.au/buildings/housing_manual.html
 Green Power www.greenpower.com.au

1.14 Collaborative solutions approach

Has the project attempted to explore options that look at sharing resources or encouraging collaborative solutions with adjoining properties, local organisations etc?

eg. Use of cogeneration on site, with excess heat and or energy used on adjoining properties?



1.15 Alternative Solutions

Has the project explored other solutions which demonstrate environmental benefits other than those listed previously?
Contribution of this initiative towards overall compliance will depend on the qualitative assessment by the assessors.
Comment from the Environmental Officer and/or other ESD advisors (Sustainable Design Task Force) should be sought.

Case Studies-
CH2



2.0 Water Conservation and Re-Use Plan

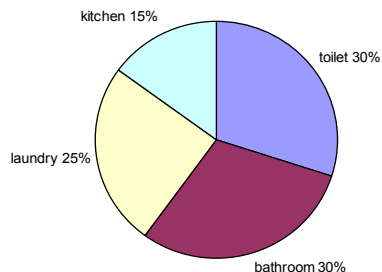
Objective-

To achieve best practice water sensitive urban design that offers an alternative to the traditional approach to water management.

- Reduce demand for potable water through use of water conservation features and identify alternative sources of supply such as wastewater and stormwater
- Reduce wastewater (through water conservation) and identify opportunities for reuse
- Improve stormwater quality and reduce peak flows through appropriate treatment and stormwater reuse

Summary of key issues-

Australia is the driest continent on earth (excluding Antarctica), but we are the greatest consumers of water per capita in the world. The average annual rainfall in Australia is 469 mm/yr, well below the global average of 746mm/yr. 70% of our continent is classified as desert or semi-desert, with little or no precipitation (Savewater). As we enter into our 8th year of below average rainfall, the Government will require all urban water authorities to prepare Water Supply-Demand Strategies that identify the best mix of demand measures and supply options. Seventeen per cent of Victoria's water is used in urban areas. Almost half of this is used by households and industry in Melbourne, with the rest used in regional cities and towns. Targets aim to reduce per capita drinking water consumption in Melbourne by 15 per cent by 2010 compared to the 1990s average. Increasing the use of alternative water supplies, such as recycled water, stormwater, rainwater and greywater, can have numerous benefits – improving the reliability of our water supplies, freeing up water for the environment or growth and reducing the amount of treated effluent discharged into our rivers, bays and oceans. (White Paper, DSE 2003)



Typical Unit Water Consumption

References-

Des 13 November 1996- *An Introduction to Water Sensitive Design*; BDP Environment Design Guide

Gen 41 November 2001- *Sustainable Urban Water Use- an Update*; BDP Environment Design Guide

www.savewater.com.au

www.dse.vic.gov.au

2.1 Stormwater

BCA - As of the first of July 2004, class 1 developments that only achieve a 4* energy efficiency rating must install a solar hot water heater or rainwater tank. **There is no regulatory water collection requirement for class 2 or commercial buildings.**



Manningham City Council has adopted the use of On-site Stormwater Detention stormwater systems to mitigate some of the effects of higher density development, namely increases in peak flow rates and extra pollutants washing into drains, waterways and to the bay. Council generally require any site with an impervious area of greater than 35% to have an OSD. This involves the calculation of the Permissible Site Discharge (PSD) and the Site Storage Requirement (SSR) with the design of a system including a flow control outlet. Site storage can be provided in a number of forms including-

- Below ground pipes
- Below ground culverts
- Below ground tank
- Above ground tank (rainwater tank- runoff from paved area will need to be stored separately)
- Above ground paving

References-

Manningham Drainage Strategy 2004 and On-Site Stormwater Detention Guide.

Mandatory minimum	Tank installed for temporary retention of stormwater as per Councils <i>On-site Stormwater Detention Guide</i>
Best Practice	Tank installed for stormwater collection and re-use for irrigation. Flow control outlet for overflow.
Beyond Compliance	Tank installed for stormwater collection and re-use for toilet flushing and other nominated uses.

Some stormwater reuse options include landscape irrigation, toilet flushing, clothes washing, cooling towers, potable supply (treatment required), carwash and various other cleaning purposes.

The Council requires that multi unit dwellings need to comply with Department of Health regulations on drinking water standards if stormwater is to be re-used to supplement potable supply.

Tank sizing

The SMP should indicate the total tank size (in litres), the total annual volume being collected (including collection area), as well as the annual volume required for re-use.

Council OSD requirement- The owner must provide on-site stormwater detention storage, to limit the Permissible Site Discharge (PSD) to that applicable to the site coverage of 35 percent of hard surface area or to the pre-existing hard surface area if the pre-existing hard surface area is greater than 35 percent. The PSD must be designed for a 1 in 5 year storm and the storage must be designed for a 1 in 10 year storm.

For separate roof water collection tanks consider the following-

Rule of thumb- for every m2 of collection area, 1mm rainfall equals 1 litre of water. (SEW) Allow 10% wastage due to evaporation and filtering.

- For Melbourne conditions collection per m2 per month is between 45 and 58L, with an average annual rainfall of 660L/m2
- Average toilet flushing requirement per 2 bedroom unit- 50L/day
- Average toilet flushing requirement per *occupant* of office building- 10 L/day
- Average irrigation requirement per m2 of water smart landscaping – 0.7L/day

Tank sizes available- A typical 2000L tank will start at about \$500, with a 4500L domestic size plastic or steel tank costing approximately \$1000-2000. Precast concrete tanks can be stored underground if space and look are an issue and range up to 3.6m dia by 2.9 high (25,000L) with an upper end cost of \$3500 for the tank alone. Larger tanks than this generally need to be cast insitu. For tanks between 50,000 and 100,000L, the cost will range between \$8,000 and \$10,000.



Example-

It is intended in a proposed development that rainwater be collected for irrigation. Using the figures above, annual irrigation needs for 100m2 of water smart landscaped areas is approximately 25,500L. The collection area is 400m2 which means the annual amount of collectable rainwater is about 240,000L, which far exceeds the irrigation requirement. The size of the tank will depend on the storage time required, so to allow for 2 months storage for irrigation alone, a 4500L tank should be proposed. To collect all of the permissible rainwater for temporary retention or other reuse opportunities, and allow for potentially 2 months storage, a 40,000L tank (or series of tanks that added to that amount) would be required. If water was to be collected for toilet flushing or for supplementing hot water, then it would be used on a daily basis. Taking into consideration the size of the collection area, around 800L of water can be collected daily. A 2000L tank (the minimum requirement) would then be proposed.

2.2 Treatment

Workshops are currently in progress with the water authority, Yarra Valley Water, to determine the future infrastructure requirements for the Doncaster Hill Activity Centre given the intended increase in density, and the best means of both servicing the area and satisfying the environmental requirements of the new policy. This section will be updated based on the findings of the workshops and recommendation from Yarra Valley Water regarding wastewater treatment and reuse.

EPA Requirement- Systems larger than 5000L that collect, treat and reuse household wastewater from individual households and discharge to the environment (eg. use the water for irrigation) must be approved by EPA for use in Victoria (following application by the system manufacturer) and be issued with a council 'septic tank permit' for each installation. Systems that are less than 5000L and discharge to the environment require a council 'septic tank permit' only. A simple household diversion system is not subject to these approvals as long as the grey water is not treated in anyway or stored for longer than 24 hours.

Has detail of the proposed system been provided? Y/N

This should include an overview of what percentage of the wastewater being generated is being treated, approximate volumes of water where reuse in an option and what percentage is being provided.

Proof of a monitoring program and ongoing maintenance over time is required. Comment from Yarra Valley Water representative on the Sustainable Design Task Force required.

Beyond Compliance	Grey water collected, treated (if required) and re-used for irrigation and toilet flushing or other nominated purpose
Beyond compliance +	Black water collected, treated and reused for irrigation and or toilet flushing, or other nominated purpose. More stringent EPA approvals will most probably be required.

References-

EPA- Reuse options for household wastewater, publication 812 www.epa.vic.gov.au
Tec 11 November 2001- Greywater and Blackwater Treatment Strategies; BDP Environment Design Guide

Case Studies-

- CH2
- Inkerman Oasis
- K2 Apartments
- Aurora Development



2.3 Water Saving Fittings

2.3.1 Fittings

BCA Requirement- 5* requirement as of 1 July 2004 asks for flow rates for shower heads to be between 7.5 - 9 L/min. Maximum outlet pressures within a new building where reticulated water supply is installed must not exceed 500 kPa static pressure. 5* requirement as of 1 July 2005 extends this to basin taps, kitchen sink and laundry troughs.

Best Practice	Commitment provided to push for highest rated fittings within the required performance standard, with detail of compliance provided during design development.- minimum 4A equivalent unless proven inappropriate regarding performance standard
Beyond Compliance	As per minimum, with use of waterless urinals in commercial application.

Product Type	Rating Unit	3A	4A	5A	
Shower Heads	L/min	7.5-9	6.0-7.5*	<6.5*	
Dishwashers	L/place setting	1.0-1.5	0.8-1.0	<0.8	
Clothes Washers	L/kg of bone dry load	15.0-22.0	9.0-15.0	<9.0	
Urinal Flushing Control Devices	L/ single stall or L/ 600mm width between stalls	<2.0 (smart-demand operation serving a single stall)	< 2.0 (smart-demand operation having an adjustable activation device)	<1.5 (smart-demand operation having a programmable time delay to identify a user)	
Taps	Basins, ablution troughs	L/min	3.0-4.5	2.0-3.0	2.0 with automatic turn off
	Kitchen sinks, laundry sinks	L/min	7.5-9.0	6.0-7.5	<6.0
Toilet Suites	L (average flush volume)	3.5-4.0 (6/3)	2.5-3.5 (4.5/3)	<2.5 (4/2)	
Flow regulators	Basins, ablution troughs	L/min	3.0-4.5	2.0-3.0	<2.0
	Kitchen sinks, laundry sinks	L/min	7.5-9.0	6.0-7.5	<6.0

From AS6400 table 7.1 Rating Specifications

* Some products are currently not available on the market as performance standards on which the products are assessed need to be revised to ensure that these products would perform satisfactorily at the reduced flow rate.

Note-

Contrary to the flow rates stated in the above chart, the PIC recommend against using flowrates less than 7.5L/min at shower outlets based on negative impact on the performance of the fixtures.

Due to concentrations of urine it is not recommended to treat waste from waterless urinals in on-site wastewater treatment systems.

2.3.2 Appliances

Best Practice	AAAA rated appliances (dishwasher, washing machine) selected or commitment to specify indicated
Beyond Compliance	AAAA+ rated appliances or commitment to specify indicated



References-

- Plumbing Industry Commission- www.pic.gov.au
- Yarra Valley Water- www.yvw.com.au
- Melbourne Water www.melbournewater.com.au
- Savewater- www.savewater.com.au
- WSAA- www.ratings.wsaa.asn.au
- Capture and on-site use of rainwater- City of Manningham
- Sydney Water- www.sydneywater.com.au

Case Studies-

- K2 Sustainable Housing
- Gore St Redevelopment
- CH2

2.4 Alternative Solutions

Has the project explored solutions which demonstrate environmental benefits other than those listed previously? **Y/N**

Contribution of this initiative towards overall compliance will depend on the qualitative assessment by the assessors. Comment from the Environmental Officer and/or other ESD advisors (Sustainable Design Task Force) should be sought.

Alternative solutions may include-

Sewer mining- Raw sewerage is extracted directly out of the main sewer line, treated to a potable or near potable standard for reuse, with the solid waste returned to the main sewer line. This is useful where large water consumption is required (eg parklands) but minimal wastewater is generated on site for treatment and reuse. Projects- Flemington Race Course, CH2.

Fire services system water- Fire test water collected and reused.

Collaborative solutions to use of excess water- eg. The project intends to collect rainwater and treat wastewater, generating more than required. May enter into an agreement with adjoining property to supply excess water for reuse. This would be a costly exercise, but may potentially be explored.

2.5 Landscape Design

Best Practice	Xeriscape principles nominated which include low water use plants, mulching, drip irrigation to bushes and trees. <i>Minimise lawn</i>
Beyond Compliance	Xeriscape landscaping, NO LAWN, minimal hard paving, mostly indigenous plants and integrated storm water filtering techniques

2.5.1 Planning

Landscape planning takes into consideration natural contours of the site, or develops contours to control ground water direction to prevent erosion and polluted site run off. Plants located to promote natural filtration of water, and types relative to water needs.

2.5.2 Plants

Plants selected based on water needs and location relative to sun availability

2.5.3 Irrigation

Irrigation strategies selected to promote reduced water consumption and evaporation
These include drip irrigation and mulching



2.5.4 Pollution Control

Filtration techniques adopted to reduce pollution runoff- grate locations, gross pollution traps, wetland filtration, bioswales etc.

References-

Water Sensitive Urban Design- Melbourne Water <http://www.wsud.melbournewater.com.au>

Savewater- www.savewater.com.au

Sustainability Guidelines- Manningham City Council <http://www.doncasterhill.com>

Des 43 November 2001- Minimising Water Use in the landscape; BDP Environment Design Guide

Case studies-

K2 Sustainable Housing, Windsor

Inkerman Oasis, St Kilda

Gore St Development, Fitzroy

Eco Centre, St Kilda

Botanical Garden of Australia- Dry section



3.0 Construction Materials

Objective-

To minimise the environmental impacts of input and output materials as well as any materials used in the external construction and development of buildings and works.

- Use building materials that minimise ecological or health impacts and greenhouse gases based on the type and volume of raw materials, water and energy consumed in their production
- Use materials that can be expected to endure for the life of the development with minimal maintenance and/or be recycled at the end of their useful life.
- Reuse recycled materials or use materials with recycled components
- Use materials produced in Victoria or Australia
- Use pre-fabricated, pre-cut and standardised components to reduce waste

Summary of key issues-

Buildings consume between 1/3 and 1/2 of natural resources used by the developed world, with about 40% of all waste disposed of in landfill provided by the Construction and Demolition process (EcoRecycle Victoria). The input materials we specify, both in raw and composite form, can have a large detrimental impact on the natural and built environment in terms of habitat and land destruction, resource depletion, pollution in manufacture, use and disposal, as well as to human health due to reduced indoor air quality.

Input Materials Plan- mandatory

Has an input materials plan been provided Y/N

Greenlist- A proposal is under development with Centre for Design RMIT for a comprehensive materials Greenlist which will provide options on composite material systems and score ratings against them. When this list is further detailed, this section will be updated to reflect the process required by both the applicant and the assessing planner. In the interim, the following may be used to assess compliance.

At a planning level, it is more likely than not that a comprehensive input materials plan will not be provided, but rather reference to initiatives as outlined in the strategy will be made. This should then be seen as the first half of a two stage process, the first an informal commitment agreement to the material selection criteria, the second substantiating the original claims. If an Input Management Plan has been provided, go to section 3.2, with reference to the key criteria listed in 3.1.

- 3.1 Stage 1-** Commitment to produce a Materials Input Plan provided, with description of responses to the key criteria requirement listed in the policy and Doncaster Hill Strategy. This will provide the assessment framework for the plan when submitted.

The key criteria and strategies for consideration include-

3.1.1 Embodied Energy

Have efforts been made to reduce the embodied energy of the materials chosen?

Has a commitment to substitute some cementitious content of concrete with fly ash or slag been outlined? Note that there are construction program implications to this strategy due to increased curing time of the concrete.

Limited or no use of aluminium, zinc, titanium and other high embodied energy metals and materials in general, especially in a design with intended high churn (eg retail)

3.1.2 Embodied Water

Have efforts been made to select materials with low or no embodied water?



- 3.1.3 **Habitat Destruction**
 Have efforts been made to avoid materials that result in land degradation and habitat destruction from raw materials extraction?
 Has a commitment to source timber from sustainably managed source, with proof of audit trail been provided?
- 3.1.4 **Recyclability/ reusability**
 Can the materials selected be recycled or re-used? In Australia?
- 3.1.5 **Toxicity**
 Have efforts been made to avoid materials which are toxic in manufacture and use?
 Eg. PVC, Chrome, MDF
- 3.1.6 **Transport**
 A commitment should be made to give preference to locally made materials first, then Australian made, then internationally made. Where possible, specify materials that are shipped by sea rather than air.
- 3.1.7 **Suitability**
 Are the materials selected suitable for the intended application? **Y/N**
 Consider the technical requirements for the application in question. Constraints for selection should be detailed in the Input Materials Plan.
- 3.1.8 **Maintenance/ Durability**
 Are the materials selected low in maintenance requirements and high in durability, relative to the chosen application and life expectancy of the development? **Y/N**
 Are low toxicity/pollution/energy use cleaning agents required for ongoing maintenance?
 The Input Materials plan should detail the maintenance requirements of materials listed.
 Itemise materials which are considered inappropriate and require extensive maintenance for discussion with applicant.

Issues relating to cost and aesthetics alone are not appropriate considerations for material selection.

3.2 **Stage 2**

The Input Materials Plan should be provided during the Design Development stage of the project at the latest. It should list the materials selected, the key reason for the selection (social, economic/ environmental) and the key environmental benefits of the material- refer to the sample materials schedule in the checklist.

Mandatory Minimum	Input plan provided or commitment to provide indicated, with reference to assessment of materials against objectives and preselection requirements of RMIT EcoSpecifier Website
Best Practice	Input plan provided , with key materials listed with description of selection criteria as measured against objectives and preselection requirements of RMIT EcoSpecifier Website. Cementitious content replacement nominated- 20% precast, 30% insitu.
Beyond Compliance	As per best practice requirement. Not less than 20% fly ash substitute for cement in precast concrete, not less than 50% in insitu concrete. All timber used is recycled or from proven sustainably managed sources, minimal use of PVC, minimal use of aluminium, use of recycled structural steel. Majority of materials selected listed on EcoSpecifier database where applicable.

The RMIT EcoSpecifier tool stipulates what are considered 'red light issues' when selecting materials. Materials that have properties that fall under these criteria should not be selected. These issues include-

Biodiversity

- Products and production processes closely correlated with large-scale clearing of indigenous vegetation or contamination of land and water
- Wood products where timber may be sourced from areas of 'high-conservation value' as defined by the Forest Stewardship Council.



Toxins-

Materials should be selected that have no traces of toxic elements as listed on the web site under red light issues

The EcoSpecifier website does list circumstances under which inclusion of materials that fall under these categories may be considered. Refer to the red-light issues section of the website for more detail.

3.3 Are systems in place to ensure the schedule of materials is delivered in full? Y/N

Best Practice	A materials schedule has been prepared and a clear system for material variance has been developed
Beyond Compliance	A materials schedule has been prepared, a clear system for material variance has been developed and is included in the project specifications, material audits are scheduled

References-

EcoSpecifier- www.ecospecifier.org

EcoRecycle Victoria- www.ecorecycle.vic.gov.au

Good Wood Guide

Des 35 August 2000- Building Material Selection: Greenhouse Strategies; BDP Environment Design Guide

Pro 1 November 2000- Assessing the Environmental Impact of building Materials; BDP Environment Design Guide

Pro 31 November 2003- Concrete and Sustainability- supporting Environmentally Responsible Decision Making; BDP Environment Design Guide

Pro 33 November 2004- Environmental Certification of Timber and Wood Products; BDP Environment Design Guide

Case Studies-

60L

CH2

ACF Headquarters fit out

SES Headquarters, South Melbourne



4.0 Indoor Environment Quality

Objective-

To achieve healthy internal building environments.

- Provide airflow, cross-ventilation, daylight, appropriate levels of lighting, views and direct access to outdoor areas
- Use materials with low levels of chemicals and minimal production of allergens and other irritants
- Exclude external pollutants and safely dispose of internally-generated pollutants
- Reduce reliance on mechanical heating, cooling and lighting systems
- Use flexible internal controls for these systems
- Minimise internal noise levels

Summary of key issues-

Australians today spend over 90% of their time indoors, with much of Australia's GDP generated in closed offices. Indoor Environment Quality is critical to productivity, workplace and living environment satisfaction and general wellbeing. Employers, building owners, product manufacturers, engineers, architects and builders are all at risk of litigation arising from claims based on indoor air pollution and poor IEQ. (Green Star Technical Manual).

4.1 Ventilation

Has provision been made for ventilation of all spaces? **Y/N** - order of preference is for natural/passive means, then passive assisted, then mechanical

Has a CO2 monitor been provided in the car park? **Y/N**

Have improvement targets on AS1668.2 for ventilation rates been set? **Y/N**

Refer to section 1.7 Ventilation

Best Practice	Meets with minimum requirement as per section 1.7, with CO2 monitoring proposed
Beyond Compliance	As above, with commitment to achieve a large improvement on AS 1668.2.

References-

Tec 2 May 1996- Natural Ventilation in Passive Design; BDP Environment Design Guide

4.2 Day Lighting

BCA Requirement- Natural lighting must be provided in class 2 buildings to *all* habitable rooms. Required natural lighting must be provided by windows that are not less than 10% of the floor area

Strategies should look to introduce natural light into all areas including circulation zones of buildings and may include skylights, light wells, atriums, clerestory windows and light scoops.

Has provision been made for maximising day lighting strategies? **Y/N**

Consider the relationship of spaces to perimeter windows. Has the design of the internal planning and location size of openings optimised site lines to the exterior?

Best Practice	Habitable rooms to have direct access to daylight with 80% of areas within 7m of a daylight source.
Beyond compliance	80% of <i>most</i> rooms should be able to see sky from a sitting and/or standing position



References-

Standards Australia AS 1680.1-1990 : Interior Lighting – General Principles and recommendations
 Day Lighting in Buildings, IEA 2000 <http://www.iea.org/>
 Des 6 August 2001- *Daylighting of Buildings*; BDP Environment Design Guide
 Des 63 November 2004- *A Basic Guide to the Daylighting of Buildings*; BDP Environment Design Guide

4.3

Noise

BCA Requirement- Requirements vary depending on application; refer part F5 of BCA volume 1 for more detail

Have noise sensitive areas been identified and separated from noise development zones, or an indication to provide adequate details to minimise noise transfer been provided? **Y/N**

Best Practice	Noise generating sources identified, with design strategies nominated to protect amenity to adjoining spaces. Double glazing proposed.
Beyond Compliance	As per above, with noise sensitive spaces located a reasonable distance away from key noise sources to reduce potential impact

4.4

Emissions

BCA Requirement- Pollutant levels of spaces must comply with air requirements set out in AS1668.2.

Best Practice	All internal paints are low VOC, MDF is EO or no MDF proposed.
Beyond Compliance	Indication of intent to meet VOC limits outlined in Green Star technical manual for <i>all</i> applicable materials

References-

Pro 6 February 1996- Reducing Chemical Risks in the Built Environment; BDP Environment Design Guide

4.4.1

Input Materials Plan

Does the Input Materials plan provide commitment to select materials and finishes with the VOC limits as set out in 4.4.2? **Y/N**

4.4.2

VOC Limits

Has evidence been provided that materials meet the VOC limits or intend to meet VOC limits outlined in the Green Star Training manual- **Y/N**

Materials for consideration include paints, carpet, adhesives and composite wood products.

4.4.3

Facilitation Strategy

Has evidence been provided to ensure material substrate substitution during construction will not compromise Indoor Environment Quality objectives in regards to VOC's? **Y/N**

The specification should identify the maximum VOC limit for various materials which the builder must comply with under their contract. Typically this is introduced in a preliminary Environmental Management section of the specification. Refer to NSW Government Construction Management Plan for framework advice.

Reference-

Green Star Office Design Technical Manual, Green Building Council of Australia
Environmental Management Systems Guidelines NSW Government
 APAS website- www.apas.com.au
Gen 15 Introduction to Indoor Environment and Health; BDP Environment Design Guide

Case Studies-

CH2
 60L



5.0 Waste Minimisation and Avoidance Plan

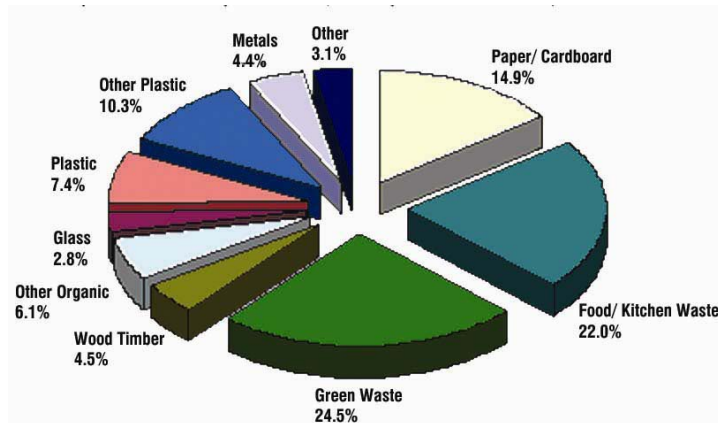
Objective-

To achieve a reduction in waste generated by building occupants that is collected, hauled to and disposed of in landfills.

- Reduce the amount of waste delivered
- Reduce the amount of waste to landfill
- Maximise recycling and composting opportunities
- Appropriately deal with hazardous materials

Summary of key issues-

34% of waste going to landfill is from the municipal sector. (EcoRecycle Victoria, *Understanding the Waste Stream*, 1999)



Municipal Waste % by Volume

Source: EPA Waste Profile Study of Victorian Landfills, 1999

Council is currently developing Waste Management Guidelines for multi unit developments. All developments must adhere to these guidelines and be approved by Council Waste Management Department. When these guidelines are available benchmarks and targets set will be included in this section.

5.1 Has a target for diversion of waste from landfill been proposed? **Y/N**

EcoRecycle Victoria has established waste reduction targets for 2013, expressed a diversion of waste from landfill

Commercial and industry	80%
Municipal	65%

EcoRecycle has established a Waste Wise Business Program to help businesses that produce over 100 tonnes of waste per annum put in place systems to promote and monitor recycling and the reduction of waste production. Businesses creating less waste than this are eligible for assistance under the waste wise community program.

The SMP should outline initiatives that include *facilities* and *processes* that work towards meeting a reduction target.

5.2 **Tenancy Recycling Facilities**

Have facilities been provided in units/ tenancies (commercial included) to encourage separating of recyclables? Eg. bins with separate compartments. **Y/N**



5.3 Site Recycling Facilities

Have facilities been provided for recycling? **Y/N** These can include areas on each floor, in a communal zone and chutes. Has adequate access been provided for collection vehicles or has a management plan been nominated for weekly removal of garbage for kerbside pickup? **Y/N**

78% of food waste going to landfill is from the municipal stream. Have composting facilities been proposed for both residential and commercial projects?

Best Practice	Recycling areas nominated on plan, with details of types of recyclables and requirements outlined.
Beyond Compliance	As above, with built in sorting bins in units, site recycling facilities (common areas), site recycling storage facilities, tenancy guidelines to educate and manage ongoing recycling. Composting facilities included.

References-

Manningham Waste Management Strategy

EcoRecycle Victoria- www.ecorecycle.vic.gov.au

Towards Zero Waste <http://www.ecorecycle.vic.gov.au/www/default.asp?casid=3002>

Understanding the Waste Stream Part 1- Statistical Overview

<http://www.ecorecycle.vic.gov.au/www/default.asp?casid=3002>

Planning Guide for Best Practice in Public Place Recycling -

<http://www.ecorecycle.vic.gov.au/www/default.asp?casid=3567>

Case Studies-

Reservoir Civic Centre

5.4 Waste Education Strategies

This is more applicable to commercial projects, and looks to ensure an ongoing commitment to identifying and facilitating improvements.

Has a Waste Management Plan that outlines education processes in commercial tenancies and strategies for implementation been proposed? **Y/N**



6. Quality of Private and Public Realm

Objective-

To achieve design excellence in the built, natural and cultural environments.

Best Practice	Disabled access compliant with AS1428.2, private communal landscaped areas and facilities provided (eg. Playground, BBQ, seating areas, etc) with dedicated public spaces also provided
Beyond Compliance	As per above with linkages to adjoining public areas

6.1 Is a DDA consultant onboard? **Y/N**

6.2 Access Requirements

BCA Requirement- A building is to provide, as far as is reasonable safe, equitable and dignified access for people to the services and facilities within.

The MSS requires the provision of an independent access audit report detailing measures to conform with AS1428.2.

Does the design comply or partly comply with AS1428.2 Design for Access and Mobility? **Y/N**

Has an access audit report been provided to confirm this? **Y/N**

6.3 Landscaping Integration

Have landscaping strategies been addressed within external spaces? **Y/N**

Have they been designed to compliment the spaces, provide shelter, and facilitate stormwater filtering? **Y/N**

Have appropriate plants been nominated? **Y/N**

6.4 External Spaces

The design guidelines of DD06 require the responsible authority to consider that the development–

- Provides safe, attractive and active street frontages to buildings that are situated along boulevards, public urban areas and pedestrian linkages
- Provides sunlight penetration to the south side of Doncaster Hill at all times
- Provides permeable, safe and comfortable pedestrian and bicycle access and connections that integrate with adjoining or nearby precincts within Doncaster Hill
- Provides overhead weather protection features adjoining key pedestrian walkways and nodal points
- Provides usable, comfortable and well landscaped private and public open space areas designed to maximise solar access
- Facilitate the enjoyment of public urban spaces, streetscapes, pedestrian and bicycle paths by ensuring that these area are not excessively overshadowed or affected by wind tunnelling from new buildings or works.
- Provides high quality public art which significantly contributes to the development of a contemporary and distinctive sense of place.

Have these points been successfully addressed? **Y/N**

References-

Australian Standard- Design for access and mobility AS1428.1 and AS1428.2

Local Planning Policy Clause 22.09 Access for Disabled People Policy

DD06- Manningham Design Development Overlay 6

Caroma, M. *Public Spaces Urban Spaces*, Architectural Press, MA. 2003.

Gen 55 November 2003- *Mental Landscape- The forgotten element In sustainable Design*; BDP Environment Design Guide

Case Studies-

Koogarah City Centre

K2 Sustainable Housing, Windsor



7.0 Integrated Traffic and Transport Management Plan

Objective-

Minimise overall environmental impacts due to movement and transportation of people, materials, equipment and systems.

Summary of key issues-

34% of household greenhouse gas emissions is generated from transport related causes (AGO). This is 21% of total energy sector emissions, of which 55% are related to passenger cars. By encouraging use of alternative modes of transport, this can be greatly reduced.

7.1 Bicycle Parking Facilities

Regulatory Requirement- *Draft state regularity requirements – Clause 52.34- are currently undergoing approval.* These require 1 space to each 5 dwellings in residential developments of four or more storeys, with one visitor space to each 10 dwellings. Commercial requirements vary, with 1 space to every 25m² of convenience restaurant, 1 space to each 300 sqm of net office floor area (if over 1000 sqm), and 1 to each 300 sqm of leasable shop floor area between 1000 and 5000 sqm.

Have sufficient bicycle parking facilities been provided for tenants and visitors? **Y/N**

Does the location of these facilities encourage use? **Y/N**

Bicycle parking facilities should be located to provide convenient access from surrounding bicycle routes and main building entrances.

Suggested Doncaster Hill requirement-

Residential

Best Practice	1.5 spaces per 100m ² , 0.25 visitor spaces per 100m ²
Beyond Compliance	>1.5 spaces per 100m ² , >0.25 visitor spaces per 100m ²

Commercial

Best Practice	1.5 spaces per 200m ²
Beyond Compliance	>1.5 spaces per 200m ²

7.2 After Trip Facilities

Regulatory requirement- *Draft state regularity requirements are currently undergoing approval.* These require 1 shower for the first 5 employee bicycle spaces plus 1 to each 10 thereafter. 1 change space or direct access to a communal change space to each shower must be provided.

Have common change room and shower facilities been provided for a commercial development in line with the proposed regulatory requirement? Do tenants have access to alternative facilities? **Y/N**

7.3 Car parking design

BCA requirement- Generally floor to ceiling height must not be less than 2.4m except in a passageway, corridor or the like where a minimum of 2.1m is permissible. Every storey of a carpark must have a system of ventilation complying with 1668.2 or an adequate system of permanent ventilation.



Best Practice	CO2 monitoring linked to mechanical extraction, motion detectors on lighting. Preferably there are natural ventilation and daylighting opportunities
Beyond Compliance	As above, with sufficient floor to ceiling height proposed for possible future conversion for alternative use.

7.4 Promotion of alternative modes of transport

Have other strategies been explored to promote alternative modes of transport and discourage car use? **Y/N**
These could include walking buses, carpooling and providing shuttle services to key transport nodes.

References-

VicRoads- Bicycle Parking and end of trip facilities-

[http://www.vicroads.vic.gov.au/vme/vminte.nsf/alldocs/F32CBA2F655CD129CA256E6800034BD2?OpenDocument&Area=\[Cyclists\]](http://www.vicroads.vic.gov.au/vme/vminte.nsf/alldocs/F32CBA2F655CD129CA256E6800034BD2?OpenDocument&Area=[Cyclists])

Bicycle Victoria- The cycle friendly workplace booklet

http://www.bv.com.au/Content/NavigationMenu/Campaigns/Major_campaigns/The_Cycle-Friendly_Workplace.pdf

Case studies-

60L Green Building, Carlton;

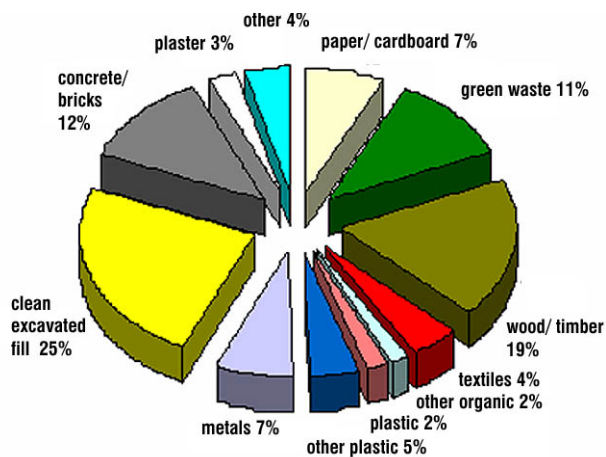
Newington Olympic Village



8.0 Construction and Demolition Plan

Objective-

To minimise environmental impacts associated with site construction practices.



C&D Waste % by Volume

Source: EPA Waste Profile Study of Victorian Landfills, 1999

Summary of key issues-

The construction sector accounts for between one-third and one-half of the commodity flow in selected OECD countries (OECD, 2001), with approximately 31% of wasted materials from construction and demolition ending up in landfill.

EcoRecycle Victoria provide an advisory service to assist applicants in developing and implementing strategies for minimising construction and demolition waste

8.1 Construction Management Plan

Has a comprehensive Construction Management Plan been provided, or commitment to provide been indicated which addresses the points listed below and provides a framework for the ongoing monitoring of initiatives?

Best Practice	Items listed in Doncaster Hill Strategy addressed with commitment to produce a plan indicated. Key strategies listed with reference to facilitation plans
Beyond Compliance	In accordance with 'Environment Guidelines for Major Construction Sites ' by EPA

8.2 Environmental Assessment

Has an environmental assessment been provided or proposed? **Y/N** This will be required in order to undertake a risk assessment.

An environmental assessment should identify information on any relevant impact that the construction project may cause, including-

Areas surrounding that may be environmentally sensitive, residents adjacent who may suffer reduced amenity including pollution and noise and establish baseline air, water quality and ambient noise levels in the area.



8.3 Risk Assessment

Does the Construction Management Plan identify or make a commitment to identify risks that may arise from the construction process? **Y/N**

Risk assessment is defined as the identification and characterisation of the nature of existing and potential adverse effects to humans and the environment resulting from exposure to environmental hazards. (EPA Environmental Guidelines for Major Construction Sites)

8.4 Material salvage

Has a commitment to recycling of demolition materials been made, with reference to forms and induction processes to facilitate use?

Has a Waste Minimisation Plan been proposed to facilitate recycling?

EcoRecycle Victoria has established a Construction and Demolition waste reduction target of 80% by 2013, expressed as a diversion of waste from landfill. It is expected that this target is cost competitive to the builder as opposed to disposing direct to landfill. The percentage achieved is measured by weight of waste generated.

Best Practice	80% diversion of waste from landfill target, preparation of Waste Minimisation Plan indicated
Beyond Compliance	90%+ diversion of waste from landfill target, Waste Minimisation Plan provided

8.5 Noise

Have strategies been developed to reduce noise to acceptable levels, control vibration offsite, or a commitment to develop strategies prior to commencement onsite indicated? **Y/N**

8.6 Site run off

Have strategies been developed to minimise land disturbance including erosion, stormwater management, de-watering and dust control, or a commitment to develop strategies prior to commencement onsite indicated? **Y/N**

8.7 Traffic

Strategies have been proposed to provide space for contractor parking on site to minimise impact on adjoining streets, or a commitment to develop strategies prior to commencement onsite indicated? **Y/N**

8.8 Contractor Education

Have strategies been proposed to educate staff and contractors on site as to the objectives and initiatives of the AMP? **Y/N**
This can be through training/ induction sessions and support literature.

8.9 Facilitation strategy

The Construction Management Plan should include or indicate the intention to develop processes to monitor and audit the construction process in regard to application of the SMP objectives and initiatives. This may be in the form of checklists.

References-

'Environment Guidelines for Major Construction Sites' EPA;

EcoRecycle Victoria – www.ecorecycle.vic.gov.au

OnSite- Minimising Construction Waste

Environmental Management Systems Guidelines NSW Government

Gen 21 August 1998- Waste Minimisation and Resource Recovery; BDP Environment Design Guide

Tec 1 November 2002- Waste Minimisation- source reduction; BDP Environment Design Guide

Case Studies-

CH2

60L

K2 Apartments

Overview Weightings

Element	Residential Requirement	Weighting %	Commercial Requirement	Weighting %
1.0 Energy Management		25		25
1.5 Building Envelope	Beyond compliance		Beyond compliance	
1.6 Windows	Best Practice		Beyond compliance	
1.7 Day lighting	Best Practice		Best Practice	
1.8 Ventilation	Best Practice		Best Practice	
1.9 Level of exposed internal thermal mass	Best Practice		Best Practice	
1.10 Zoning	Best Practice		Best Practice	
1.11 Vertical Transport	Best Practice		Beyond Compliance	
1.12 Mechanical	Best Practice		Best Practice	
1.13 Appliances/ Equipment	Beyond Compliance		Beyond Compliance	
1.14 Renewable Energy	Bonus		Bonus	
1.15 Collaborative Solutions approach	Bonus		Bonus	
1.16 Alternative Solutions	Bonus		Bonus	
2.0 Water Conservation and Reuse Plan		15		10
2.1 Rain Water	Best Practice		Best Practice	
2.2 Treatment	Bonus		Bonus	
2.3 Water Saving Fittings	Best Practice		Best Practice	
2.4 Alternative Solutions	Bonus		Bonus	
2.5 Landscape Design	Beyond Compliance		Best Practice	
3.0 Construction Materials		10		10
3.2 Stage 1 Input Materials Plan				
3.3 Stage 2 Input Materials Plan	Best Practice		Best Practice	
3.4 Facilitation Strategy				
4.0 Indoor Environment Quality		15		20
4.1 Ventilation	Best Practice		Best Practice	
4.2 Daylighting	Best Practice		Best Practice	
4.3 Noise	Best Practice		Best Practice	
4.4 Emissions	Best Practice		Beyond Compliance	
5.0 Waste Minimisation and Avoidance Plan		15		15
5.2 Unit Recycling Facilities	Best Practice		Best Practice	
5.3 Site Recycling Facilities	Mandatory- Beyond Compliance		Mandatory- Beyond Compliance	
5.4 Education Strategy				
6.0 Quality of Private and Public Realm		5		5
6.1 DDA Consultant Onboard	Mandatory		Mandatory	
6.2 Access Requirements	Mandatory- Best Practice		Mandatory- Best Practice	
6.3 Landscaping Integration				
6.4 External Spaces	Best Practice		Best Practice	
7.0 Integrated Traffic and Transport Management		5		5
7.1 Bicycle Parking Facilities	Mandatory- Best Practice		Mandatory- Best Practice	
7.2 After Trip Facilities			Best Practice	
7.3 Car parking design	Best Practice		Best Practice	
7.4 Promotion of alternative modes of transport	Best Practice		Best Practice	
8.0 Construction and Demolition		10		10
Construction Management Plan	Best Practice		Best Practice	
Material salvage	Beyond compliance		Beyond compliance	
Noise	Best Practice		Best Practice	
Site run off	Beyond Compliance		Beyond Compliance	
Traffic	Best Practice		Best Practice	
Facilitation strategy	Best Practice		Best Practice	

Items highlighted in light grey are considered important elements to achieve above the minimum requirement. The two dark grey elements are considered bonus initiatives due to the large capital cost to the developer

GLOSSARY OF TERMS

ABGR	Australian Building Greenhouse Rating- Operational energy rating tool for office buildings
Berm wall	Soil piled against the length of a wall to limit the exposure of the wall to solar radiation and to use the mass of the earth to moderate internal temperatures.
Black water	The waste from toilet systems
BMS/ BAS	Building Management System- Automated system that monitors the buildings engineering services, security and other building systems for improved efficiency.
Cogeneration	Production of two forms of power simultaneously from a single fuel source, typically electricity and heat
Displacement ventilation	Warm contaminants rise to the ceiling, contaminated air is extracted, and fresh, cool air is supplied at floor level.
Embodied energy	The energy expended directly and indirectly to produce a product- from production to transportation, maintenance and disposal
Embodied water	The water expended directly and indirectly to produce a product- from production to transportation, maintenance and disposal
Green House Gases	Gases that contribute the Greenhouse effect
Grey water	Waste water from all internal sources eg. shower, <i>except</i> the toilet and the kitchen sink
Habitable room -	(BCA) a room used for normal domestic activities, and- <ul style="list-style-type: none"> (a) includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room and sunroom; but (b) excludes a bathroom, laundry, water closet, pantry, walk-in robe, corridor, hallway, lobby, photographic darkroom, clothes drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.
HVAC	Heating, Ventilation and Air-Conditioning system
Hydronic heating	Hydronic Heating is the heating of a building by radiation from panels containing hot water.
Low-E coating	A thin metal oxide or multi layer coating applied to glass to reduce radiative heat transfer
Mixed mode	Natural ventilation involving operable windows, combined with mechanical air exchange
Night Purging	Extracting the heat out of a building at night by exhausting the air from mechanical or passive assisted techniques
OECD	Organisation for Economic Co-operation and Development- International organisation helping governments tackle the economic, social and governance challenges of a globalised economy
R-Value	A measure of the thermal resistance of a building material
Sewer mining	Extraction and treatment of effluent from the sewer main at the site to near or potable standard for reuse
Shading Coefficient	Measures how well a product blocks heat caused by sunlight. Expressed as a number between 0 and 1. The lower a window's SC, the less solar heat it transmits.
Stack effect	Air movement that is created by warm buoyant air as it rises in a tall confined space such as an atrium or stair well
Solar thermal	Energy that is produced by using the sun rays to heat a gas or liquid which can then be used to generate electricity eg. steam turning a turbine
Sustainability	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Thermal mass	Ability of a material to store heat
U-value-	U-value measures how well a product prevents heat from escaping
VOC	Volatile Organic Compound
Xeriscape	Landscape design using native and low water use plants and an efficient water management system

Also refer to BDP Environment Design Guide Not 11 May 2001- Ecological Sustainable Development: Glossary of Terms