Meadowbank Precinct Master Plan
Shepherd's Bay

ESD Guidelines and Report

Prepared on behalf of
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Prepared by
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INTRODUCTION

This report summarises the proposed ESD strategies and targets for the Meadowbank Precinct Masterplan. The report has been prepared by Ecospecifier Consulting on behalf of Robertson + Marks.

Ecospecifier Consulting and Robertson + Marks have worked closely with the other members of the consultant team to propose a high level of sustainability outcomes. In particular, a strong emphasis has been placed on the passive efficiency of the buildings.

The following categories will be analysed for the Masterplan, in the quest to strive towards the EnviroDevelopment definition of "industry best practice" (courtesy of the Urban Development Institute of Australia or UDIA which specializes in assessing sustainable communities and precincts).

1. Community
2. Water
3. Energy
4. Materials
5. Waste
6. Ecosystems
7. Management
8. Emissions
9. Innovation

Within this report, each of these nine ESD categories has a roadmap to achieving "industry best practice" and beyond. The "base targets" provided (sourced from EnviroDevelopment) are designed to reflect industry best practice in Australia while the "stretch targets" (sourced from Green Star tools and/or an extension of EnviroDevelopment Targets) are designed to provide additional initiatives which will help the development exceed industry best practice and approach the realms of "world's best practice".

This ESD road-map acknowledges the importance of sustainability initiatives in lessening the impact on the environment and also in helping to create an efficient, healthy and enjoyable living and working environment. Furthermore, the addition of stretch targets was envisioned to challenge the whole design team to create a highly sustainable built environments.

Importantly, EnviroDevelopment's rough interpretation of "industry best practice" involves targeting four or more of their six categories. These six categories are presented as the first six categories listed above (Community, Water, Energy, Materials, Waste and Ecosystems). The Shepherd's Bay Masterplan will strive towards these EnviroDevelopment strategies and targets. Furthermore, the BASIX scores (for water and energy) will be used as a guide to performance in water, energy and thermal comfort (and as a benchmark for exceeding mere compliance targets).

1. COMMUNITY - ESD Initiatives and Targets

OBJECTIVE: Vibrant, cohesive, healthy, happy, adaptable, sustainable communities

TARGET: Development that encourages community spirit, sustainable local facilities, reduced use of private motor vehicles and accessible and flexible design that welcomes a diversity of people and adapts to their changing needs.

PRINCIPLES

- Consult with surrounding community and traditional owners
- Encourage community cohesiveness through facilities, networks and sub-division layout design/masterplan
- Encourage use of public transport or walking and cycling etc.
- Accessible local employment, education and services to encourage cohesive community and reduce the need for regular travel beyond the local area
- Encourage safe, accessible, comfortable housing and facilities
- Protect heritage where appropriate
- Maintain community assets

Community - Initiative	Development	Base Target	Stretch Target
1. Community Issues	**Masterplan and Buildings**	Achieve the requirements for at least 5 out of 6 of the following: • Consultation • Transport • Community design • Local facilities • Safe, accessible housing • Indoor environment quality	Achieve the requirements for ALL six of the sections. Also incorporate some or all of the additional initiatives in this chapter (Community) such as the many stretch targets below.
2. Consultation	**Masterplan only**	Must meet all requirements for this section: • Preparation of a concise community consultation plan. • Evidence of efforts to understand and consider the wishes of the local community including traditional owners. (where traditional owners group/s exists)	NA

		• Measures to raise awareness of relevant parties, beyond regulatory requirements. This could be simply through an appropriate on-site billboard, an appropriately targeted letter drop or an open meeting for example. • Evidence that community feedback has been considered and incorporated where feasible and appropriate. • Consideration and appropriate preservation and / or recognition of indigenous and post-European cultural heritage.	
3. Transport	**Masterplan and Buildings**	Must achieve at least two of the following options: **1. Bicycle Parking** • Bicycle parking is provided for residents and visitors. For multi-unit dwellings, there should be the provision of at least 1 bicycle space per dwelling provided for residents and 1 space per 5 units provided for visitor parking. Detached houses would require at least 2 bicycle parks per dwelling. Commercial developments should provide adequate secure bicycle parking for employees. • Bicycle parking for residents is provided within a secure part of the building or in a secure part of the yard, where they can be locked securely and protected from the elements, such as lock up carpark areas or the basement of multiunit residential or office buildings. Bicycle parks must also be arranged so that parking and unparking manoeuvres will not damage adjacent cars and bicycles. • Visitor bicycle parking is placed in public view, easily accessible from the road and arranged so that parking and unparking manoeuvres will not damage adjacent cars and bicycles. **2. Pathways** Provide connecting, safe, attractive and efficient walking and cycling pathways running wholly in public spaces (including streets and open spaces), linking all residential areas to local facilities and	Achieve three of the options to the left. Also incorporate some or all of the following strategies: **1. Bicycle Parking** Optimise security for bikes: one dedicated, enclosed bicycle locker or cage is provided per dwelling. Optimise visitor spaces (1 per 4 per dwellings) in an accessible on-grade location, signposted and near a major public entrance. **(New Item) Fuel-Efficient Transport** Of the total parking spaces on the site: - A minimum of 10% of the parking spaces (rounded up) are designed and labeled for small vehicles, in accordance with AS/NZS 2890.1:2004 (i.e. maximum 2.3m wide x 5.0m long); and - A minimum of 5% or five parking spaces (whichever is the greater) are designed and labeled for mopeds and/or motorbikes, in accordance with AS/NZS 2890.1:2004. Ideally: • The above requirements are met; and • A formal car sharing scheme is integrated into the development and at least 5% or 1 parking space (whichever is the greater) is dedicated for use by registered car share vehicles only.

		providing links between residential areas. Also connect with paths in neighbouring areas and provide appropriate bike parking at public transport stops and community facilities. Paths should have some areas of shade and shelter and seating. **3. Public Transport** Locate development such that it will have good access to public transport. This could be shown through: • Density greater than 60 dwellings/ha or 1.5 times the average density of the development within 500 metres of a transport stop with at least 5 services per weekday (by the time the development is 50% occupied) to local facilities or other service centres or connecting transport systems. Direction signage to public transport stops is provided at key locations. • 75% of dwellings within 500 metres, of a transport stop (bus, railway, ferry etc) with at least 5 services per weekday (by the time the development is 50% occupied) to local facilities or other service centres or connecting transport systems. Direction signage to public transport stops is provided at key locations. • Provision of community transport network such as car pool, community minibus to facilities. [See "Local Facilities" for ideas of facilities]. • Public transport subsidy or vouchers or similar **4. Working from home** Facilities to encourage working from home could include: • Communication technology and wiring e.g. fast internet facilities. • Floor plate and building design to facilitate offices • Adequately equipped community centre.	Parking spaces for car share vehicles must be included in the total count of on-site parking spaces. Car share car parking spaces must be highly visible, on-grade spaces, located adjacent to a public road and readily accessible by car share participants who are not residents of the development. Car share spaces cannot be located within secure, 'residents only' parking areas. **3. Public Transport** Design all buildings to Maximise: • The type of mass transport services available within 1,000m of the site; • The number of routes served; and • The average interval between services during peak hours for all days of the week. **(New Item) Provision of Car Parking:** At least: - At least 25% less than the maximum local planning allowances applicable to the project. OR - Not exceeding minimum planning allowance by more than 10%. Ideally: - At least 50% less than the maximum local planning allowances applicable to the project. OR - No more than the minimum local planning allowances.

4. Community Design	**Masterplan and Buildings**	Design and community structure to encourage a safe environment and reduce crime and encourage positive interaction between residents and other local people using the area. This should include at least six of the following: • (RES/PRECINCT) 50% of houses overlooking public space (not just road). (Note: 'public space' is taken to mean land that is publicly accessed and 'overlook' is taken to mean having clear line of sight from within the building). This is to enhance community networking, passive surveillance and may improve the views from living areas. • (ALL) Central facilities (e.g. recreation facilities, shops, café, town hall, gardens, BBQ facilities etc). • (ALL) Community communication system (e.g. intranet, newsletter). • (ALL) Provision of community structures e.g. body corporate to run community facilities, community title, club, organisation, committee etc. Significant efforts must be made to ensure the longevity of such community bodies. • (RES/PRECINCT) Significant diversity of housing types including a mix of dwelling sizes (e.g. number of bedrooms) and/or densities of housing. [For example: mix of townhouses and 1 bed, 2 bed and 3 bed units] • (RES/PRECINCT) At least 10% affordable housing or land (less than 70% of the median price of all the other houses or blocks of land in the development or costing less than 30% of the median local income in either rent or repayments for both house and land). Affordable housing must be interspersed with other housing not in a group together or isolated from other housing. • (RES/PRECINCT) Community development officer. • (ALL) Strategy to unite community through unique assets or attributes of the area [e.g. cultural, environmental]	**Community Design Aspects:** • A minimum 25% of the total site area is developed as a communal garden; and • A maintenance manual describing the ongoing maintenance required for each of the outdoor communal facilities is developed and made available to the building owner(s);and • Some facilities listed below are provided (at least 3 and ideally 9): **a) Composting facilities:** One cubic metre of composting bins for every 500m2 of landscaped area (including garden plots and lawns), with a minimum overall composting volume of one cubic metre for the development, and up to a maximum overall composting volume of five cubic metres for the development. All compost facility designs should separate leachate from stormwater. Signage should be in place explaining the communal nature of the facility, and how to use and maintain it appropriately. **b) Communal or individual garden plots:** The residents must have direct physical access to and from the communal or individual garden plots. There must be: • Sufficient plots to allow at least 25% of dwellings to be allocated an individual plot that has a minimum dimension of 2m2; or • A communal garden plot, or series of communal garden plots, that has a total minimum dimension equal to that above. Signage should be in place explaining the communal nature of the facility, and how to use and maintain it appropriately. [NOTE: compost facilities to go within community or individual gardens, if provided]. **c) Worm farm facilities:** Worm farms with minimum surface area of 0.5m2 per dwelling should be provided, up to a maximum of 5m2. NB. Worm farming facilities will only be awarded points where communal or individual garden plots are provided (see above) AND worm farms are located within community or individual garden plots. Signage should be in

		• (ALL) Other evidence of design consideration and encouragement of community spirit and networks. • (ALL) Design for crime prevention, according to Crime Prevention Through Environmental Design (CPTED) or other accepted principles. • (ALL) Where fences are provided (or boundary or area is reasonably likely to be fenced) it is ensured that there are (or will be) no non-transparent or non-permeable fences higher than 1m at rear or side boundaries. • (ALL) Where fences are provided (or boundary or area is reasonably likely to be fenced) it is ensured that there are (or will be) no non-transparent or non-permeable fences higher than 1m at front of property (or where the property links to public space if this is not at the front). • (RES/PRECINCT) Development layout is designed to encourage interaction between members of the population. For example, property has rear lanes with garages not at the front of the property while the front of property is designed (and fences reduced) to encourage interaction. [Note: Community facilities must be situated in desirable locations]	place explaining the communal nature of the facility, and how to use and maintain it **d) In-ground deep soil planting:** 75% of all landscaped areas (including garden plots) should support deep soil planting. 'Deep soil planting' is defined as an area with a minimum depth of soil of 1 500mm. **e) Playground area:** Includes such items as climbing apparatuses, balance beams, ropes, swings, flying foxes etc. Playground areas are to be exclusively for play, and should be fenced off. They should be sufficiently large to allow play by groups of up to 20 children, and should be sized accordingly. Playgrounds should include rubber tiles or equal, to ensure the safety of children in the event of a fall. Playgrounds should comply with Australian Standards AS4685 Playground Safety, AS4486 Playgrounds and Play Equipment - Development, Installation, Inspection, Maintenance and Operation, AS4422 Playground Surfacing. **f) Open landscaped areas for active play:** Includes open areas for group and/or individual play such as areas for running, jumping, chasing, ball games, sporting activities, and areas for wheeled toys such as bike pathways. Landscaped areas for active play should be a minimum 25% of the total landscaped area. **g) Sun shaded area:** 25% or more of the total outdoor communal facilities should be shaded from the sun at any time. The shading can be from trees, buildings or sun sails or other sun shading devices. **h) Outdoor Gym:** An outdoor gym must include, as a minimum, three separate facilities for exercise. Instructions must be signposted for all the exercise facilities. **i) Swimming pool:** A swimming pool must be located outdoors in a communal area or

			indoors directly adjacent to an outdoor area, with views of the outdoors and direct access to it. **j) Retained bushland:** 10% or more of the total landscaped areas should be made up of established bushland that was existing prior to the development of the multi unit residential facility. 'Bushland' is defined as land that is covered with bush, that is, natural vegetation; habitat for native species dominated by trees and/or shrubs. **k) Seating:** Seating must be located in at least two different quiet areas with views of landscaped areas. Quiet contemplation should be possible. Quiet areas are defined as locations which are a minimum of 25 meters away from roads, driveways etc., and which are a minimum of 10m away from other sources of noise such as laundries etc. **l) Outdoor dining:** The outdoor dining area must, at a minimum, allow for two separate dinner parties of minimum six people. The following must be provided: Seating and tables; Sun shading; and Lighting. **m) Barbecue facilities:** The barbecue facilities must allow for two separate dinner parties of minimum six people. Signage should be in place explaining the communal nature of the facility, and how to use and maintain it appropriately.
5. Local Facilities	**Masterplan and Buildings**	Locate near (such that 75% of residences are within 2km) or provide at least five of the following local services: ▪ Employment opportunities for either 100 people or 50% of the projected number of dwellings, whichever is the lesser ▪ Newsagent ▪ Grocery/corner store ▪ Primary school	Locate near (such that 75% of residences are within 2km) or provide at least ten of the local services (see to left).

		▪ Secondary school ▪ Kindergarten, preschool, or childcare ▪ Medical practice ▪ Chemist ▪ Specialty stores ▪ Parks and open space ▪ Playground and/or recreation facilities ▪ Community centre ▪ Public transport hub ▪ Bank or cash machine ▪ Post office ▪ Emergency Services (including rural fire brigade, ambulance, police etc) ▪ Communication centre or business centre ▪ Information exchange medium e.g. community notice board, newsletter, website ▪ Community portal (ADSL or better facilities) ▪ Community accessible facilities / spaces e.g. rooms, public areas, education centres etc. ▪ Educational facility or material e.g. interpretative signage, tours, open days, brochures.	
6. Safe and Accessible Housing	**Masterplan and Buildings**	Must achieve at least one of the following options: • *(*RES/OTHER) *Safe and Accessible Housing Checklist* - At least 50% of dwellings must achieve 12 points or more under the EnviroDevelopment Safe and Accessible Housing Checklist (comparable to the social section of the BCC Sustainable Home Checklist Part 3, 4, 5). • *Comparable efforts for safe accessible community* - Show evidence that significant efforts have been made to ensure that individual dwellings and/or local buildings (e.g. community facilities including recreation clubs, community centres etc.) will be comfortable, accessible, safe and appropriate for a variety of people, including aging or disabled people and children. This can also include measures to reduce noise or light pollution.	NA

		• *(COMMERCIAL) Comparable efforts for safe accessible community* - Show evidence that significant efforts have been made to ensure that buildings will be comfortable, accessible, safe and appropriate for a variety of people, including aging or disabled people and children.	
7. Indoor Environment Quality (IEQ)	**Buildings only**	Must meet requirements for at least one of the following options: **1. Good ventilation** - provided to all dwellings, offices and community facilities where applicable. This can be shown through any of the following options: A) Evidence that natural ventilation will be good and that noise and security issues are unlikely to cause occupants to keep windows closed. B) Evidence of good ventilation in mechanically ventilated buildings, could include: • The fans and ductwork are sized to meet greater than 20% improvement on the outside air requirements required by AS1668.2-2002, or • Locating outdoor air intake away from air pollutant sources (such as traffic) so that air supply is designed to meet AS1668.2-2002 requirements, or • Removing pollutants from local outdoor sources through the use of an appropriate filtration system capable of achieving ≥ F8 filter performance rating in accordance with AS1324.1-2001 or equivalent improvement in air quality. **2. Kitchens**: At least 60% of kitchens in the development have a range hood which is flued to the outside of the building on all gas ovens and/or kitchens are effectively naturally ventilated or mechanically ventilated with dedicated exhausts.	Meet the requirements for at least THREE of the options to the left. Furthermore, incorporate the following options, where possible: **1. Good ventilation –** utilise the following: - Each room included in the living area with a floor area greater than 4m2 is provided with a trickle ventilator that introduces outside air; - Cumulative size of trickle ventilators in dwellings >8,000mm2; - The size of the trickle ventilator in each room >4,000mm2; - The trickle ventilators are positioned above windows or doors at a minimum height of 1.75m from finished floor level; and - In rooms with mechanical extract fans, the trickle ventilator is independent of the mechanical extract so that replacement air can be provided when the extract fan is operating. **Natural Ventilation:** • 90% of dwellings have effective natural ventilation. • 95% of the net floor area of the common lobbies is provided with natural ventilation. The openable size of windows must be 5% or more of the net floor area on a floor-by-floor basis. **2. Kitchens**: At least **90%** of kitchens in the development have a range hood which is flued to the outside of the building on all gas ovens and/or kitchens are effectively naturally ventilated or mechanically ventilated with dedicated exhausts.

		3. Noise: If provided, air conditioning is located and shielded so as to prevent noise nuisance to occupiers of residential buildings or minimize noise transmission from external sources (e.g. traffic noise) i.e. design buildings so that the bedrooms, living rooms and offices are designed to be capable of achieving the satisfactory noise levels recommended by AS2107 -2000: Acoustics – Recommended design sound levels and reverberation times for building interiors. **4. Toxic fumes**: non-toxic materials are used to create a healthy INDOOR environment. This could include choosing two (2) or more of the options below: • Paints that are water based low-VOC paints • Carpets that are low-VOC • Carpets are mechanically fixed • Low VOC, non-carpet floors • Adhesives and sealants that are low-VOC or no adhesives/sealants used • Composite wood product is low emission formaldehyde or no composite wood product used • Wood products are stained with wood treatments that are natural, such as linseed oil or beeswax polish • Reduced use of formaldehyde products [NOTE: Must be demonstrated by third party certification or verification e.g. ecospecifier.org and GreenTag™]	**3. Noise:** Internal noise level (combined building services noise and external noise intrusion), irrespective of building location, does not exceed: - 35 dBLAeq(1 hour) in any bedroom in the building during the night time period 10pm to 7am; and - 40 dBLAeq (1 hour) in other habitable rooms (other than a garage, kitchen, bathroom or hallway) at any time. **Noise continued:** - The bounding apartment construction to habitable areas results in an airborne noise isolation standard of Rw + Ctr ≥ 55; and - The floor construction above habitable rooms of adjacent dwellings (i.e. floor cover) results in an impact isolation standard of Ln,w+Cl ≤ 55. **4. Toxic Fumes:** Include Walls and Ceilings to the list (to the left). Furthermore try to achieve at least 6 of the 10 options (when walls and ceilings are added to the original 8 options). **5. (New Item) Private external space:** Private external space is provided for at least 90% of the dwellings. This space must: • Be equivalent in size to at least 15% of the living area of each dwelling or at least 2.0m x 3.0m whichever is greater; • Be directly adjacent and accessible from the dwelling; • Have managed solar access as follows: - A minimum of 80% of each private external space must be shaded from direct sunlight for a minimum of 3 hours between 9am and 5pm in mid-summer and receiving a minimum of three hours direct sunlight at anytime of the day in mid-winter.

2. WATER - ESD Initiatives and Targets

OBJECTIVE: Improve water use efficiency

TARGET: Measures that would achieve minimum 55% reduction in potable water use across the development (compared to recent historical data and/or 'traditional' development meeting basic regulatory standards).

PRINCIPLES

Reduce potable water use. There are two fundamental strategies to achieve this, although a combination of these strategies may also be selected:

- Reduce overall water use by 55% – e.g. through water efficiency mechanisms
- Utilise alternative water sources (e.g. rainwater, stormwater, dual reticulation) for more than 55% of the development's water use (without increasing water use unnecessarily/unreasonably). If underground water/bore water is to be used to supplement potable supplies, there will also need to be evidence of water efficiency mechanisms and water balance calculations to show aquifer recharge.

Water - Initiative	Development	Base Target	Stretch Target
1. Overall Potable Water use	**Masterplan and Buildings**	In addition to the regulatory requirements for water efficiency, a development will need to meet the criteria below for at least one of the options to show reduction of potable water demand from community supplies of 55% compared to historical water use or water use for 'traditional' development types, or compared to similar commercial or industrial operations (or other efficiency as outlined below): • **Stormwater Harvesting -** e.g. broad scale collection of stormwater runoff for use in irrigation. • **Recycled Water -** Plumbing of recycled water reticulation (such as dual reticulation facilitating the reuse of treated effluent water). • **Greywater Reuse** - e.g. plumbing to facilitate reuse of greywater on lot. • **Rainwater Harvesting** - e.g. collection of rainwater in tanks from roof runoff). • **Water Use Efficiency -** Where the buildings and/or landscaping are being constructed or mechanisms are in place to ensure water efficiency measures will be implemented, ensure that they achieve	Show a reduction of potable water demand from community supplies of 60% compared to historical water use or water use for 'traditional' development types, or compared to similar commercial or industrial operations. Also incorporate some or all of the additional initiatives in this chapter (Water) to achieve this target.

		water efficiency of 55% or greater. Examples of fittings and features to achieve this may include: min 3 stars WELS rated fittings (and ideally 5 Star or better where possible), low flow dual flush toilet, rainwater tanks, flow restrictors, etc. (Recognition may also be given to high-rise type designs that either are designed not to need water based air-conditioning or choose air-conditioning systems that are extremely water efficient.) • **Combination of the Above Options**	
2. Irrigation	**Masterplan and Buildings**	See Stretch Target	• Potable water consumption for landscape irrigation has been reduced by 90%; **OR** • A xeriscape garden has been installed.
3. Heat Rejection Water	**Buildings Only**	See Stretch Target	**At least:** - Potable water consumption of water-based heat rejection systems is reduced by 50%. **Ideally:** - Potable water consumption of water-based heat rejection systems is reduced by 90%; **OR** - No water-based heat rejection systems provided; **OR** - The building is naturally ventilated; **OR** - The building is Mechanically Assisted Naturally Ventilated (MANV).
4. Fire System Water	**Buildings Only**	See Stretch Target	• There is sufficient temporary storage for a minimum of 80% of the routine fire protection system test water and maintenance drain-downs, for reuse on-site; and • Each floor fitted with a sprinkler system has isolation valves or shut-off points for floor-by-floor testing; **OR** • The fire protection system does not expel water for testing.

5. Efficient Water Appliances	**Buildings Only**	See Stretch Target	• Dishwasher and clothes washers are installed as part of the base building works; and • All dishwashers and clothes washers are at or within one point of the highest available rating under the Australian Government's WELS rating system as per the WELS Standard AS/NZS6400:2005 Water-efficient Products - Rating and Labelling. A dwelling design that provides neither space nor plumbing for the installation of dishwashers will be deemed to be equivalent to installing a dishwasher that is within one point of the highest available WELS rating.
6. Swimming Pool/Spa Water Efficiency	**Masterplan and Buildings**	See Stretch Target	• A pool blanket is included to prevent water loss from evaporation; and • The potable water consumption has been reduced by at least 70% through either or a combination of: - Efficient swimming pool filtration system compared to traditional sand filtration; - Backwash water is collected and treated for reuse on site; and - The pool makeup water is non-potable water.

3. ENERGY - ESD Initiatives and Targets

OBJECTIVE: Reduced usage of polluting and non-renewable energy sources

TARGET: Measures that would achieve 45% reduction in greenhouse gas (GHG) production from energy use across the development (compared to recent historical data and/or 'traditional' development meeting basic regulatory standards)

PRINCIPLES

To reduce energy use there are two fundamental options, although the solution for a development may be a combination of these options:

- Reduce overall energy use by 45% compared to recent historical data or plausibly modelled performance of a comparable non-EnviroDevelopment development.
- Encourage alternative energy sources (e.g. solar, wind, biomass, gas, hydro) for a portion of the development's energy use (without increasing energy use unnecessarily/unreasonably) such that the overall emissions are reduced by 45% compared to recent historical data or plausibly modeled performance of a comparable non-EnviroDevelopment development (prior to March 2006).

Energy - Initiative	Development	Base Target	Stretch Target
1. Energy Basics	**Masterplan and Buildings**	• Meet regulatory requirements, such as under the BCA. • Development must consider solar orientation of lots and solar access to buildings. Hence, developments must be masterplanned to demonstrate passive design of buildings. • Development should show evidence that shielding from hot summer sun, ventilation and topography have been considered and addressed. • Measures aimed at specifically reducing peak load. This should include use of off-peak energy or timers for uses such as pool filters, unless energy is provided by an energy source independent of the grid and some measures are in place aimed at reducing the use of air conditioners.	NA

		• Evaporative air conditioners should be supported over refrigerative types. Where air conditioners are included in single dwellings/units, the systems must have at least 4.5 star heating and cooling energy rating and be professionally sized. • Efficient lighting in common areas, such as through utilising solar power or fluorescent fittings, etc.	
2. Greenhouse Gas Emissions	**Masterplan and Buildings**	Development must take measures to ensure that it meets the requirements of at least one of the following options (to achieve 45% reduction in greenhouse gas production from energy use across the development: • **Renewable, Non-Polluting Energy Source -** Provision of solar power (or other non-polluting, renewable power source) for >45% predicted energy use for the development. • **Reduced Emission Energy Source -** Provision of reduced emission energy source to achieve > 45% reduction in emissions from the predicted energy use for the development. For example, if a power source has produced half the GHGs of coal generated electricity, then it would need to be used for 80% of the development to achieve the same 45% reduction in GHG emission as would be achieved simply by using 45% less coal generated electricity. • **Building Energy Efficiency -** Buildings will achieve 45% energy efficiency through design, fittings and features. Examples of means to achieve this may include: insulation, cross ventilation, eaves, enhanced natural lighting, very low energy water heating, solar powered room heating and cooling (e.g. solar powered fans), 100% energy efficient lighting, design for passive climate control etc. • **Combination of the Above**	50% or more reduction in greenhouse gas production from energy use across the development: Also incorporate some or all of the additional initiatives in this chapter (Energy) to achieve this target.

3. Renewable Energy and Peak Electricity Demand Reduction	**Masterplan and Buildings**	See Stretch Target	- No air-conditioning or heating system is installed and good 'Thermal Comfort' is achieved (See "Thermal Comfort" below) **OR** - The building includes two of the features below: • All cooking appliances provided as part of the building are non-electric. • On-site energy generation can provide 1kW per apartment at time of peak electricity demand in the supply network. • All installed air-conditioning equipment is within one star of the best available energy star rating (www.energyrating.gov.au) • A heating system with non-electric primary energy source is used • "Thermal Comfort" target is satisfied (see below)
4. Thermal Comfort	**Buildings Only**	See Stretch Target	Achieve high levels of thermal comfort to reduce the energy demands for mechanical heating and cooling: • Average heating and cooling loads of less than 30 MJ/m2 are achieved. All heating and cooling loads must be calculated using a NatHERS (second generation) approved software (such as BERS Pro or AccuRate) • Ceiling fans are provided for at least 95% of all apartments to living, dining and each bedroom .
5. Hot Water	**Buildings Only**	See Stretch Target	Use energy efficient hot water such as gas-boosted solar, whenever possible. This will reduce peak energy demands and overall energy demands.
6. Lighting	**Buildings Only**	See Stretch Target	**Lighting Types:** Use efficient lighting such as fittings suitable only for CFLs or LEDs within dwellings and common areas. **Suitable Light Levels:** Provide adequate lighting for specific tasks and activities within residential dwellings. A minimum of 300 lux is achieved on the surface (nominally 900mm above floor level) of the following: Kitchen Sink; Cooktop or Stove; and Vanity Basins in Bathrooms and Ensuites.

7. Space Heating and Cooling	**Buildings Only**	See Stretch Target	Use energy efficient space heating and cooling (suited to the climate and other mechanical systems). This will reduce peak energy demands and overall energy demands.
8. Energy Efficient Appliances	**Buildings Only**	See Stretch Target	- Internal or external clothes lines and/or hoists are provided that have a total line length of not less than 7.5m per dwelling. **Also as a minimum:** - All clothes dryers and dishwashers have the highest available rating under the Australian Government's "Energy Rating" labeling system; or - All clothes dryers, dishwashers, refrigerators and clothes washers are at or within one point of the highest available rating under the Australian Government's "Energy Rating" labeling system; **Ideally:** - All clothes dryers, dishwashers, refrigerators, and clothes washers have the highest available rating under the Australian Government's "Energy Rating" labeling system
9. Daylight	**Buildings Only**	See Stretch Target	Maximise daylighting to apartments. 95% of the apartments meet the daylight criteria for kitchens and 60% of the living area in these apartments meets the daylight criteria below: • A Daylight Factor (DF) of no less than 2% for kitchen and 1.5% for other living areas measured at the floor level under a uniform design sky. **OR** • A Daylight Illuminance (DI) of no less than 200 lux for kitchen and 150 lux for other living areas measured at the floor level under a uniform design sky.
10. Unoccupied Areas	**Buildings Only**	See Stretch Target	Minimise or eliminate energy use for spaces when unoccupied: • **As a minimum**: each apartment includes occupancy controls to minimise air-conditioning and lighting energy. At a minimum this must include a dwelling shutdown switch near the main entry door to turn off all lighting and air-conditioning and heating. • **Ideally**: **ALL** areas within the building, excluding the dwelling units, includes automated controls to minimise air conditioning and lighting energy use when unoccupied.

4. MATERIALS - ESD Initiatives and Targets

TITLE: Materials

OBJECTIVE: Environmentally responsible material usage

TARGET: Development that predominantly utilises environmentally responsible materials to lower environmental impacts in preference to other materials when such options are available and feasible, without significantly jeopardising the functionality or livability of the development.

PRINCIPLES

- Encourage selection of materials from environmentally responsible sources such as:
  - reuse resources (including buildings, structures and materials)
  - use recycled resources (e.g. materials)
  - renewable sources
  - non-polluting sources
  - low lifecycle energy materials (i.e. encourage choice of materials that are not energy-intensive to produce, are locally available and durable)
  - materials that are non-toxic and do not liberate toxic gases or dangerous particles
- Decrease use of less environmentally responsible materials
- Encourage high indoor air quality through choice of materials
- Maintain design and performance standards
- Encourage the use of materials that can be recycled or reused at the end life of the development
- Maintain affordability within reasonable parameters

Materials - Initiative	Development	Base Target	Stretch Target
1. Sustainable Materials	**Masterplan and Buildings**	Minimum 20% construction (by volume) made from either (or a combination of): ▪ Reused resources ▪ Materials with high content of post consumer recycled material ▪ Sustainable, renewable sources ▪ Materials with lifecycle energy at least 30% lower than	Increase the % to the left to 30% or more. Also use some or all of the additional strategies listed in this Chapter (Materials) to reduce overall material impacts.

		standard alternative product fulfilling a comparable purpose (considering extraction, production transport and durability) ▪ Responsibly sourced and manufactured materials [NOTE: Must be demonstrated by third party certification or verification e.g. ecospecifier.org and GreenTag™]	
2. Reused Resources and Recycled Materials	**Masterplan and Buildings**	The recycled content can be achieved through: ▪ Reused structure or façade, etc. ▪ Reuse of products such as steel or timber ▪ Choice of materials that have a high post consumer recycled product content Note: If a material contains less than around 50% post consumer recycled content then it will need to contribute a higher portion of the building pro rata i.e. a material of 25% recycled content would need to make up approximately 40% of the building materials.	At least 1% of the project's total contract value is represented by: • Re-used products/materials (from the existing building or any other building); OR • Products/materials with a post-consumer recycled content of at least 20%. Note: This target excludes materials specifically addressed by other credits (i.e. steel, concrete, PVC and timber); neither does it address the re-use of the original building(s) on the site.
3. Sustainable, Renewable Materials	**Masterplan and Buildings**	Sustainable, renewable sources include materials that come from sustainably produced organic products such as sustainable forestry operations, straw, sustainable bamboo plantations etc. They can also include other materials that are produced and recycled through an environmentally friendly (low energy usage, non-polluting etc) process.	NA
4. Total Lifecycle Energy	**Masterplan and Buildings**	Materials with lifecycle energy at least 30% lower than standard alternative product fulfilling a comparable purpose (considering extraction, production transport and durability). Where no suitable scientific data exists for total lifecycle energy components of particular materials, it would be expected that calculations be done factoring in: ▪ An estimation of the energy required in their production (embodied energy); ▪ An estimation of the energy required for their transport (thereby advantaging local suppliers); and ▪ An estimation of the longevity of the materials compared to alternative products (i.e. if a product is twice as durable and likely to be used for this purpose for twice as long then under this formula it can afford to utilise twice as much energy in its	NA

		production and/or transport than alternative products and still have the same lifecycle energy estimate). [NOTE: Must be demonstrated by third party certification or verification e.g. ecospecifier.org and GreenTag™] The lifecycle energy of a component should be evaluated by comparison to other products fulfilling a comparable role. For example, for a wall it should be per m2 of wall area and for insulation it should be compared to other products that achieve the same R score. [NOTE: Must be demonstrated by third party certification or verification e.g. ecospecifier.org and GreenTag™] .	
5. Responsibly Sourced and Manufactured Materials	**Masterplan and Buildings**	Use of suppliers who produce responsibly sourced and manufactured materials. Materials from manufacturers who have sourced input materials from sustainable sources and have implemented cleaner production principles i.e. the manufacturing process involves minimal use of non-renewable energy and water and either there are no polluting by products or such by products are significantly reduced. To qualify, products should be from manufacturers who certify (or ideally have externally certified) that their product manufacturing process uses less than 70% of the water or fossil fuel energy and reduces wastes and polluting by-products by more than 30% compared to industry standards or major manufacturers producing comparable products. Note: to meet this requirement, materials making up 20% of those used must include materials used in at least 3 of the following categories: 1. Framing 2. Roof 3. Flooring 4. External walls 5. Internal walls 6. Foundations 7. Staircases 8. Other [NOTE: Must be demonstrated by third party certification or verification e.g. ecospecifier.org and GreenTag™]	NA

6. Non-Toxic Materials	**Buildings only**	Non-toxic and low emission products should be utilised in common areas and encouraged in private dwellings or commercial space and meet at least two of the following options: • Use of non-toxic or low toxicity paints on >90% of all internal painted surfaces. • Use of non-toxic or low toxicity floor coverings on >80% of all indoor covered floors. • Use of low-toxicity sealants and adhesives etc. where possible. • Select non-allergenic materials for furnishings where feasible. Note: Non-toxic products include those that do not emit VOC gases or other known toxic substances. Preference should also be given to reducing formaldehyde. [NOTE: Must be demonstrated by third party certification or verification e.g. ecospecifier.org and GreenTag™]	Meet three or more of the options to the left.
7. Local Products	**Masterplan and Buildings**	Developers have considered utilising local manufacturers and/or suppliers where possible, or utilise the most economical method of transportation with regard to fossil fuels. [For example: products within 100km]	NA
8. Minimised Packaging	**Masterplan and Buildings**	Developers have, where appropriate chosen materials and suppliers that minimise and/or recycle packaging.	NA
9. Concrete	**Masterplan and Buildings**	See Stretch Target	The project will reduce the absolute quantity of Portland cement, as an average across all concrete mixes, by substituting it with industrial waste product(s) or oversized aggregate as follows: - At least 30% for in situ concrete, 20% for pre-cast concrete and 15% for stressed concrete; - ideally 60% for in situ concrete, 40% for pre-cast concrete and 30% for stressed concrete. Furthermore (if one of the above points is achieved):

			- 20% of all aggregate used for structural purposes is recycled (Class 1 RCA in accordance with HB155-2002) or slag aggregate; and - No natural aggregates are used in non-structural uses (e.g. building base course, sub-grade to any car parks and footpaths, backfilling to service trenches, kerb and gutter).
10. Steel	**Buildings Only**	See Stretch Target	At least 60% (ideally 90%) of all steel, by mass, in the project either has a post consumer recycled content greater than 50%, or is re-used. If the material cost of steel represents less than 1% of the project's total contract value, this credit is NA.
11. PVC Minimisation	**Masterplan and Buildings**	See Stretch Target	At least 30% (ideally 60%) of the total cost of PVC content is reduced through replacement with alternative materials,.
12. Best Practice PVC	**Masterplan and Buildings**	See Stretch Target	A percentage of a project's PVC flooring, resilient wall coverings, cable insulation, pipe and conduit - which together account for the majority of PVC use in buildings and which are referred to as 'common uses of PVC' in this credit – meet the Best Practice Guidelines for PVC in the built environment. - At least 60% (ideally 90%) of the common uses of PVC products in buildings (by cost) must comply. If the cost of PVC products in common uses of PVC represents less than 0.05% of the project's total contract value, or there are no PVC products present in the project for any of the common uses of PVC, this credit is 'Not Applicable'
13. Sustainable Timber	**Masterplan and Buildings**	See Stretch Target	95% (by cost) of all timber products used in the building and construction works have been sourced from any combination of the following: – Re-used timber; – Post consumer recycled timber; or – Forest Stewardship Council (FSC) Certified Timber. Note: If material cost of timber represents less than 0.1% of the project's total contract value then credit is Not Applicable

14. Timber	**Masterplan and Buildings**	See Stretch Target	95% (by cost) of all timber used in the building and construction works is certified by a forest certification scheme that meets the GBCA's 'Essential' criteria for forest certification (e.g. all schemes accredited by FSC International or PEFC); or is from a reused source; or is sourced from a combination of both.
15. Design for Disassembly	**Buildings Only**	See Stretch Target	• 50% (by area) of the structural framing, roofing, and façade cladding systems are designed for disassembly; OR • 95% of the total façade is designed for disassembly
16. Dematerialisation	**Buildings Only**	See Stretch Target	Achieve at least any two (ideally four) of the initiatives below: **a) Structure:** - Within projects where at least 50% of the nominated area is framed in structural steel, and where it is demonstrated that the building's structural requirements and integrity have been achieved using 10% less steel (by mass) than in a structure with conventional steel framing, without changing the load path to other structural components; **b) Ductwork** - The building is fully naturally ventilated; OR - The requirement for ductwork has been reduced by 95%. **c) Finishes** As-installed final design must require no finish: - 90% of all base building floor material is exposed structure with no covering (e.g. exposed sealed concrete floor); OR - 90% of all base building ceiling is exposed structure (and services, where relevant) with no cladding (e.g. exposed concrete ceiling). **d) Piping** - No water supply piping is used for flushing of toilets (i.e. all toilets are waterfree); OR - Mass of underground piping is reduced by 25% for the same functional

			requirement and material. **e) Cladding** - 25% of the roof cladding area has a dual function (e.g. roof garden substrate or photovoltaic shingles serve as cladding); OR - 25% of the façade cladding area has a dual function (e.g. photovoltaic panels serve as cladding). **f) Unit sizes** - 50% of dwellings meet the maximum size criteria as follows: > For studio apartments: 40m² > For one bedroom apartments: 50m² > For two bedroom apartments: 70m² > For three bedroom apartments: 95m² **g) Prefabricated Kitchens** - 50% of kitchens are prefabricated modules **h) Prefabricated Bathrooms** - 50% of bathrooms are prefabricated modules **i) Bathroom to Bedroom ratio** - All dwellings have no more than one bathroom and toilet for every two bedrooms."
17. Flooring, Joinery and Internal Walls	**Buildings Only**	See Stretch Target	Use flooring, joinery and walls which have included most of the principals above (e.g. recycled content, recyclability, take-back schemes, EMS, durability, eco-preferred content, designed for disassembly, modularity, etc.) [or have been eco-certified or verified by a third party]
18. Universal Design	**Buildings Only**	See Stretch Target	All publicly accessible areas and at least 10% of dwellings have been designed to comply with the Class A, B or C requirements of AS4299-1995 'Adaptable Housing' at a minimum.

5. WASTE - ESD Initiatives and Targets

OBJECTIVE: Reduced waste sent to landfill, more efficient use of resources.

TARGET: Development that has implemented waste management procedures and practices which reduce the amount of waste to landfill and facilitates recycling.

PRINCIPLES

- Encourage recycling of construction and demolition materials and reduce the amount of waste being dispatched to landfill
- Minimise on-site pollution during the construction phase
- Promote the re-use of existing buildings and materials and reduce demand for resources
- Promote occupancy awareness of waste generation and encourage recycling, composting and waste reduction through the provision of appropriate facilities
- More efficient use of resources

Waste - Initiative	Development	Base Target	Stretch Target
1. Pre-Construction (Demolition, Land Clearing and Site Preparation)	**Masterplan and Buildings**	Must achieve each of the following requirements: • Site waste management plan for pre-construction and construction phases. • Where possible, reuse of existing materials including steel or timber etc, from the original façade. • Minimum 40% of demolition, land clearing, or civil works materials/products are recycled or reused on site. In the event that demolition, land clearing or civil works materials cannot be recycled on site, arrangements are made for recycling off site. Recyclable materials include, but are not limited to: cardboard, bricks, glass, metal, timber and concrete. Materials which can be reused include but are not limited to: cleared vegetation used as mulch, rock recycled for road aggregate, piping recycled, crushed concrete reused for road base.	• The contractor implements a Waste Management Plan (WMP), retains waste records and quarterly reports to the building owner; and • A percentage (by mass) of all demolition and construction waste is reused or recycled as follows: - At least 60% of the waste; - Ideally over 80% of the waste. **Topsoil** Ensure that: • All topsoil affected by the construction works is separated and protected from degradation, erosion or mixing with fill or waste; • There is no net change in the volume of topsoil on the site; and • 95% of all topsoil (by volume) retains its productivity.

		• Topsoil must be stockpiled and reused to best advantage on site. • Hazardous substances, pollutants and contaminants are treated on site to a safe standard according to a sanctioned remediation process or, if this is not feasible, are removed from the site and treated according to a sanctioned remediation process. • Vegetative debris to be recycled and reused on site (e.g. for landscaping or composting purposes) to the greatest extent possible. If not feasible, arrangements should be made for vegetative debris to be transported and reused off site e.g. contract with landscaper. There should be no pit burning of green waste on site. • Acid Sulphate Soils are treated for use as per *The Treatment and Management of Acid Sulfate Soils, 2001* (Environmental Protection Agency) and/or the *QASSIT Queensland Acid Sulfate Technical Manual Legislation and Policy Guide 2004.* • Appropriate and conforming site management to control erosion, run-off, dust etc., through silt fencing, dust control etc.	
2. Construction Waste	**Masterplan and Buildings**	Must achieve at least four out of the following options: • Use of written strategies (e.g. incentive programs) and/or contracts with sub-contractors and contractors including a clause requiring waste minimisation practices and a requirement to dispose of or reuse/recycle waste in an environmentally responsible manner. • Utilisation of waste-recycling contractors or sub-contractors. • Waste minimisation techniques, waste recycling and waste management plans and policies of sub-contractors to be considered and used as criteria during the tender/selection process.	Achieve more than four of the options (to the left). Also: • The contractor implements a Waste Management Plan (WMP), retains waste records and quarterly reports to the building owner; and • A percentage (by mass) of all demolition and construction waste is reused or recycled as follows: - At least 60% of the waste; - Ideally over 80% of the waste.

		• Provision on site of separate bins to recover timber, glass, metal, concrete and other recyclable materials from the waste stream. • Waste minimisation techniques to be included as a part of the employee induction and/or ongoing training process. • Use of suppliers who take off-cuts or excess materials for reuse. • Selection of materials and products which minimise and/or recycle packaging (e.g. avoid excessive packaging such as plastic wrapped fixtures or fasters). Advise suppliers of preference for materials not to be over-packaged. • Development designed to maximise use of standard sizes of materials wherever possible to minimise waste. • Use of skip bins rather than cages. • Use of skip providers who recycle or reuse waste.	
3. Post-Construction Waste	**Masterplan and Buildings**	Development is designed to facilitate access by trucks (e.g. minimum height clearance of 4.5 metres, width of 3 metres and sufficient space away from car parks or other obstacles to allow safe maneuvering or as agreed with local waste and recycling collecting organisation) for collecting recyclable material and provision of recycling bins on site for use by occupants. Must achieve at least one of the following requirements: • Provision is made on lot and/or on site for a compost facility for use by each dwelling/office/facility if this is possible and practical on site (e.g. if there is also a garden of sufficient size to use it on etc). If individual household/office/facility compost bins cannot be provided, a communal facility may be provided. Compost facility should be suitably sized [at least 1 cubic meter] and can be used to recycle a balanced mix of green material (fruit & vegetable scraps) and brown material (twigs etc.)	**Recycling Waste Storage:** Ensure any 3 of the 5 initiatives below are implemented (and ideally all five): **a) Dedicated storage area** Dedicated storage area for the separation, collection and recycling of waste is provided and it: - Can be easily accessed by all building occupants; - Has suitable access for recycling companies; - Is sufficiently sized to accommodate the storage equipment for the following recyclables, as a minimum: ▪ cardboard; ▪ glass; ▪ plastics - mixed containers; ▪ plastics - soft plastics; ▪ plastics - polystyrene; ▪ metals; and ▪ batteries

		• Where possible ensure that there are arrangements in place (e.g. contract with appropriate organisation, body corporate procedures or local government service) to provide collection and reuse of garden/green waste.	**b) Convenience of recycling** • Disposal of recycling is at least as convenient as disposal of general waste (for example where waste chutes are provided for general waste, chutes are also provided for recycling). **c) Compost Facilities:** • Facilities are provided for on-site disposal and re-use of compost and green waste. **d) Facilities for over-sized household items:** • Space is provided in common areas for the collection of over-sized household items to facilitate re-use within the building and it must be: - Large enough to contain a 2m3 cage; - Clearly labeled for items for re-use; - Separated from the general waste and recycling area; and - Its existence and location must be communicated to tenants.

6. ECOSYTEMS - ESD Initiatives and Targets

OBJECTIVE: Healthy, sustainable ecosystems based on natural processes and rich with native biodiversity

TARGET: Development that aims to protect and enhance existing native ecosystems and encourages natural systems and native biodiversity and rehabilitates degraded sites.

PRINCIPLES

- Encourage maintenance (during and after construction) of native vegetation where existing, and rehabilitation of locally native vegetation where not already in existence in a healthy state
- Encourage protection (during and after construction) of existing habitats for native animals or rehabilitation of such habitats where not already in existence in a healthy state
- Protect habitats and maintain connectivity to reduce fragmentation
- Avoid water pollution and degradation of water quality in waterways and natural systems and remediate any water quality problems occurring on-site or in neighbouring areas
- Minimise disruption to landform and natural ecosystems
- Encourage development on previously developed or degraded sites, whilst considering affordability
- Promote biodiversity awareness

Ecosystems - Initiative	Development	Base Target	Stretch Target
1. Site Analysis	**Masterplan and Buildings**	Conduct thorough site analysis to ascertain key features of relevance to this section, including hydrological features, flora, fauna habitats, and landforms.	NA
2. Regulatory Compliance	**Masterplan and Buildings**	Use a qualified environmental professional to confirm that the development has complied with all relevant regulatory requirements. This includes the Environment Protection Act 1997, Nature Conservation Act 1980 etc.	NA
3. Water Quality	**Masterplan and Buildings**	Meet the following: • Protect natural hydrological regime including riparian zones and buffers (where relevant depending on site).	Achieve all targets to the left. Also for Stormwater: **a) As a minimum:** - The development does not increase peak

		• Water Sensitive Urban Design (WSUD) principles incorporated into development design (e.g. swales, bioretention basins and wetlands utilised as water treatment devices). • Development should be compatible with broadly supported catchment management plans. • Minimise use of pesticides, herbicides and artificial fertilisers (can be achieved through choice of landscaping and physical termite barriers etc). • Incorporate natural hydrological features into the development design including maintenance of natural watercourses (where relevant depending on their presence on site). • Appropriate drainage to protect both the water cycle and the development integrity. This should include permeable surfaces and pavements where possible and appropriate. • Stormwater management provisions during and post construction must be adequately considered and incorporated to avoid enhanced risk of flooding and flood damage and to reduce risk of pollution entering waterways. Must also consider impact on and from adjacent sites. • Sediment and erosion control measures in place during construction/operation	stormwater flows for rainfall events of up to a one-in-two year storm; and - All stormwater leaving the site, at any time up to a one-in-twenty year storm event, is treated or filtered in accordance with either: > Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO 1999); or > Australian and New Zealand Environment Conservation Council (ANZECC)'s Guidelines for Urban Stormwater Management." **b) Ideally:** - The points above are achieved; and - A Riparian Buffer Zone (RBZ) that has three separate zones of pollution buffering is installed within nine metres of a waterway or natural watercourse and the development.
4. Landform	**Masterplan and Buildings**	Conduct a thorough site analysis to identify areas of prime significance for preservation and to identify areas where clearing and/or major earthworks should specifically not occur. This site analysis should also consider the suitability of the site for earthworks and construction. Achieve at least 4 of the following: • Retain local and adjacent natural landform and integrates with natural landscape and topographic features or build on brownfield site rehabilitating open space areas and minimise detrimental landform-change impacts on water or sediment movement. • Locate on a brownfield site or site that had been significantly modified from its natural state and had little or no ecological value. Site must be decontaminated and where there will be significant open space, efforts must be made to rehabilitate natural ecosystems, natural resources, and native biodiversity values of the site.	NA

		• Build only on stable, non-flooding land, or if building on land prone to flooding, the site design must: Create a flood credit and reduce levels in flood volumes; Reduce velocity of floods coming off the site; and Deliver environmental benefits (e.g. wetland) to site or adjoining land • Maximum cut and fill of 1.5m (i.e. total retaining wall height of 1.5 metres or 75cm cut and 75cm fill for example) including bulk earthworks (excluding those earthworks which are necessary for WSUD measures or which have been included to meet local Council requirements). Credit can not be gained for this point if there is reason to believe that builders will later increase the cut and fill. This may mean that for sloping lots some form of architectural solutions or review mechanism (e.g. for body corporates) may need to be provided. • Cut and fill on max 30% of site. This may mean that for sloping lots some form of architectural solutions or review mechanism (e.g. for body corporates) may need to be provided. • Construction methods to minimise disruption to landform and natural drainage contours (e.g. elevated platforms lightweight in construction are generally encouraged on sloping sites in preference to cut and fill concrete slabs on earth, unless other significant environmental benefits can be shown from the cut and fill approach). • Minimise site disturbance during construction and limit earthworks and clearing of native vegetation to a maximum of 15 metres beyond building footprint, 2 metres beyond roadway curbs or swales, and 10 metres beyond other constructed areas (e.g. detention basins etc), although concessions will be made where necessary for protection against bushfires. • Street layout is designed and constructed to fit with topography with only minimal disruption.	
5. Flora	**Masterplan and Buildings**	Conduct a thorough Ecological Assessment (as outlined below) to identify areas of prime significance for preservation and to identity areas where clearing and/or major earthworks should specifically not occur. The development must adequately consider and preserve significant areas based on advice of this report.	Achieve more than 10 points (see left). Fundamentally, the ecological value of the site should be enhanced beyond its previously existing state (see left).

		Avoid planting invasive species as per WONS (Weeds Of National Significance) and Weeds on National Environmental Heritage List (Department of Environment and Heritage). Achieve at least 10 points out of the following options: • Have an appropriately qualified scientific professional conduct an upfront site assessment of areas of ecological value and ensure that the development will protect such areas to the greatest extent possible. • Conduct thorough ecological flora survey to ascertain biodiversity and populations of vulnerable or threatened species and design development to facilitate the preservation of such species. The development should take significant additional steps over and above the standard requirements and demonstrate significant net gain to the flora and ecosystems, above the standard requirements. • >40% of all plants introduced to the site for landscaping public spaces, or for landscaping private areas prior to sale, are locally native[2] and >90% are native to Australia or productive. • Designate and protect any sensitive conservation areas. • Rehabilitate disturbed sites and degraded natural ecosystems. • Locate on a brownfield site or site that had been significantly modified from its natural state and had little or no existing ecological value. • Have a bushfire mitigation and management plan and take appropriate management actions. • Demonstrate appropriate consideration of future maintenance of native flora and habitat, including initiating a maintenance plan and arranging means for the continuation of this beyond the development and sales stage. • Retain at least 40% of the existing native trees above 3 metres in height. • Encourage local native plant species and natural ecosystems through retaining them where possible on 30% or more of the site. • Implement an appropriate weed and pest management strategy, including site rehabilitation and removal of noxious weeds.	

		• Encourage local native plant species through their incorporation in landscaping and encouragement of their use by purchasers and private land holders. • Contribute green space (as a nature conservation area) significantly in excess of the requirements for green space (subject to acceptance by government (usually local government but may be State or Federal Government)) of its suitability as either parkland or for conservation value. This requirement can be fulfilled by either provision of an appropriate area of suitable land (under secure title though not necessarily handed over to government) or monetary contribution to the relevant authority or an established not-for-profit green group for conservation or green space purposes. Points are to be allocated pro-rata for each 20% (i.e. 1 point for each 20% contribution in excess of government requirements and 5 points for 100% in excess of government requirements). This is capped at a maximum of 5 points.	
6. Fauna	**Masterplan and Buildings**	Conduct thorough Ecological Assessment (as outlined above) to identify areas of prime significance for preservation and to identity areas where clearing and/or major earthworks should specifically not occur. The development must adequately consider and preserve significant areas based on the advice of this report. Must achieve at least 10 points out of the following options. • Conduct a thorough ecological fauna survey (as outlined above) to ascertain biodiversity and populations of vulnerable or threatened species and design development to facilitate the preservation of such species. Take significant additional steps over and above the standard requirements and demonstrate significant net gain to fauna above the standard requirements. • Locate on a brownfield site or a site that has been significantly modified from its natural state and had little or no ecological value. • Retain and enhance ecological corridors linking vegetated and open space areas. • Protect land and aquatic habitats for native species, with particular focus on threatened or endangered species.	Achieve more than 10 points (see left). Fundamentally, the ecological value of the site should be enhanced beyond its previously existing state (see left).

		• Ensure ecological corridors are not severed by road networks without provision of appropriate fauna crossings, bridges or tunnels. • Limit fencing and other structures that restrict safe fauna movement. • Adopt traffic management strategies to protect fauna. • Provision of appropriate structures and policies to facilitate native fauna habitation. • Adopt measures to protect native animals through maintenance of habitat and control of non-native predators or competing species. • Implement a pest management strategy. • Have dog and/or cat exclusion zones to allow safe movement of native fauna, particularly in wildlife corridors. • Heat Island reduction - consider reduction of pavement, carparks, roofs or different materials for their construction (e.g. open-grid pavement) etc. or green (vegetated) or shaded surfaces or light coloured surfaces. • Minimise light and noise pollution during and post-construction i.e. no direct beam light should be directed beyond the site boundaries or upwards, except where it is falling directly on a surface that it is intended to illuminate (exemptions may be made for illuminated place names). • Contribute green space (in the form of nature conservation area) significantly in excess of the requirements for green space (subject to agreement by government (usually local government but may be State or Federal Government) of its suitability as either parkland or for conservation value – however this does not mean that the land title must be handed over to government). This requirement can be fulfilled by either provision of an appropriate area of suitable land (under secure title though not necessarily handed over to government) or monetary contribution to the relevant authority or an established not-for-profit environmental group for conservation or green space purposes. Points are to be allocated pro-rata for each 20% (i.e. 1 point for each 20% contribution in excess of government requirements and 5 points for 100% in excess of government requirements). This is capped at a maximum of 5 points.	

7. MANAGEMENT - ESD Initiatives and Targets

OBJECTIVE: Improved efficiency of buildings through various management initiatives

TARGET: Development that aims to improve efficiency in all areas through various management initiatives such as: professional ESD advice (from Green Star Accredited Professionals), commissioning, building tuning, independent commissioning agents, building users guides, environmental management, waste management and metering.

PRINCIPLES

- A Green Star Accredited Professional is used through all stages
- Commissioning, pre-commissioning and monitoring is used
- Building Tuning is used
- Independent Commissioning Agent is used
- Building Users' Guides are produced to improve awareness
- Environmental Management is enforced during the construction stages
- Waste Management targets are used (for construction and demolition waste)
- Metering is used

Management - Initiative	Development	Base Target	Stretch Target
1. Green Star Accredited Professional	**Masterplan and Buildings**	See Stretch Target	A principal participant in the design team is a Green Star Accredited Professional engaged to provide sustainability advice from the schematic design phase through to construction completion.
2. Commissioning Clauses	**Buildings Only**	See Stretch Target	**Firstly:** • Comprehensive pre-commissioning, commissioning, and quality monitoring are contractually required to be performed for all building services (BMS, mechanical, electrical and hydraulic); and • The works outlined above are done in exact accordance with CIBSE Commissioning Codes or ASHRAE Commissioning Guideline 1-1996 (for mechanical services only) and CIBSE Commissioning Codes for the other Services. **Secondly:** • The design team and contractor are required to transfer project knowledge to the building owner/manager through all of the following:

			- Documented design intent; - As-built drawings; - Operations and Maintenance Manual; - Commissioning Report; and - Training of building management staff.
3. Building Tuning	**Buildings Only**	See Stretch Target	Use commissioning initiatives that ensure optimum occupant comfort and energy efficient services performance throughout the year: • After handover, the building owner implements tuning of all building systems; • A relevant member of the design team is involved in the tuning process; • Monthly monitoring is undertaken and the outcomes are reported to the building owner quarterly; • Full re-commissioning is undertaken 12 months after practical completion; and • A Building Tuning Report on the outcomes of the tuning process will be provided to the building owner and made available to the design team.
4. Independent Commissioning Agent	**Buildings Only**	See Stretch Target	Use an Independent Commissioning Agent (from project design through to handover) to: • Provide commissioning advice to the building owner and the design team; and • Monitor and verify the commissioning of all building systems.
5. Building Users' Guide	**Buildings Only**	See Stretch Target	A simple Building Users' Guide, which includes information relevant for the building residents and management, is developed and made available to the building owner and residents.
6. Environmental Management	**Masterplan and Buildings**	See Stretch Target	Adopt a formal environmental management system in line with established guidelines during construction: - The Contractor implements a comprehensive, project-specific Environmental Management Plan (EMP) for the works in accordance with Section 3 of the NSW Environmental Management System guidelines 2007. - The Contractor has a valid ISO14001 Environmental Management System (EMS) accreditation prior to and throughout the project.

7. Waste Management	**Masterplan and Buildings**	See Stretch Target	Encourage and recognise management practices that minimise the amount of construction waste going to disposal. • The contractor implements a Waste Management Plan (WMP), retains waste records and quarterly reports to the building owner; and • A percentage (by mass) of all demolition and construction waste is reused or recycled as follows: - At least 60% of the waste; and - Ideally over 80% of the waste.
8. Metering	**Buildings Only**	See Stretch Target	Encourage and recognise the design and installation of building systems that facilitate effective metering and monitoring of water and energy consumption: **Water Meters** Firstly: - Water meters are installed for all major water uses in the building; and - There is an effective mechanism in place for monitoring water consumption data. Secondly: - A domestic cold water meter is installed in each dwelling; and - There is an effective mechanism in place for monitoring water consumption data. **Energy Sub-metering** Firstly - Sub-metering is provided for: > substantive energy uses within the building (greater than 100kVA); > light and general power consumption for common areas; and - There is an effective mechanism in place for monitoring energy consumption data. Secondly - The following uses are sub-metered for each apartment: > electricity; > gas (if provided to other gas uses than cook tops, stoves and ovens); - hot water flow (where centralised hot water is provided); and - There is an effective mechanism in place for monitoring energy consumption data.

			Smart-Metering Smart metering is provided for each dwelling. The smart-metering system must: • Be installed in an easy accessible and visible location in each dwelling for use by the resident; and • Provide as a minimum: - A visual display of the real time consumption. - A function to analyse the data at regular intervals i.e. on a daily, weekly, monthly basis; - A function that can present the costs associated with the usage. As a minimum: • Smart-metering is provided for either the consumption of electricity, water or gas (if provided for other uses than cook tops, stoves and ovens); Ideally: • Smart-metering is provided for the consumption of electricity, water and gas (if provided for other uses than cook tops, stoves and ovens)."

8. EMISSIONS - ESD Initiatives and Targets

OBJECTIVE: Reduce Emissions from the Development

TARGET: Development aims to use minimise the discharge of emissions from the site including sewage, light pollution, gases with ODP and gases with GWP.

PRINCIPLES

Minimise all emissions pertaining to sewage, light pollution, gases with ODP and gases with GWP.

Innovation - Initiative	Development	Base Target	Stretch Target
1. Refrigerant ODP	**Buildings Only**	See Stretch Target	• All HVAC refrigerants have an Ozone Depletion Potential (ODP) of zero; OR • No refrigerants are used; OR • The building is naturally ventilated; OR • The building is Mechanically Assisted Naturally Ventilated (MANV)
2. Refrigerant GWP	**Buildings Only**	See Stretch Target	**At least:** 50% of all HVAC refrigerant have a Global Warming Potential (GWP100) of 10 or less; and **Ideally:** - All refrigerants have a GWP100 of 10 or less; OR - No refrigerants are used; OR - The building is naturally ventilated; OR -The building is Mechanically Assisted Naturally Ventilated (MANV)
4. Insulant ODP	**Buildings Only**	See Stretch Target	All thermal insulants in the project avoid the use of ozone-depleting substances in both their manufacture and composition.

5. Discharge to Sewer	**Masterplan and Buildings**	See Stretch Target	The building outflows to the sewerage system due to building occupants' usage have been reduced against an average-practice benchmark as follows: - At least 30% reduction; - Ideally 50% to 90% reduction. Furthermore, if there is a blackwater treatment facility: - There is a Blackwater Treatment Maintenance Plan; and - There is a maintenance contract for a minimum of five years to ensure that the blackwater treatment system operates as intended by the design.
6. Light Pollution	**Masterplan and Buildings**	See Stretch Target	• No external luminaire has an upward light output ratio that exceeds 5%; and • The lighting design complies with AS 4282 'Control of the Obtrusive Effects of Outdoor Lighting'.
7. Legionella	**Buildings Only**	See Stretch Target	Use building systems design that eliminates the risk of Legionnaires' disease (legionellosis): • There is no water-based heat rejection system(s) serving the building; • The water-based heat rejection system(s) meets all of the following: - Does not contain water that is kept at a temperature between 20ºC and 50ºC; - Does not release an aerosol spray during operation; - Is designed and built to maintain constant movement of the water in the system,when in operation, to prevent stagnation; - Is designed and built for routine and periodic flushing to remove bio-film build-up and stagnant water from the system(s) whenever it is not in operation; and - Is designed, located and built in accordance with AS/NZS 3666.1:2002; AND - A Legionella Risk Management Plan has been prepared in accordance with AS/NZS 3666.2:2002 or AS/NZS 3666.3:2000 and has been included in the Operations and Maintenance (O&M) Manual provided to the building owner. OR • The building is naturally ventilated; OR • The building is Mechanically Assisted Naturally Ventilated (MANV).

9. INNOVATION - ESD Initiatives and Targets

OBJECTIVE: Innovative Strategies, Technologies and Systems

TARGET: Development aims to use innovative technologies or processes that are a first for Australia and/or that contribute to the broader market transformation towards sustainable development

PRINCIPLES

- Use an initiative is a technology or process that is considered a 'first' in Australia or in the world
- The project substantially contributes to the broader market transformation towards sustainable development in Australia or in the world

Innovation - Initiative	Development	Base Target	Stretch Target
1. Innovative Strategies & Technologies	**Masterplan and Buildings**	See Stretch Target	Use one (or more) innovation initiative where: • The initiative is a technology or process that is considered a 'first' in Australia or in the world; or • The project substantially contributes to the broader market transformation towards sustainable development in Australia or in the world.