

Environmentally Sustainable Design (‘Green’ Buildings)

Discussion Paper

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1. Introduction:

At the Council Meeting held on the 17 February 2009, Council requested: *'— a Green Building Policy to encourage construction and retro-fitting of Green Star buildings in the City of Joondalup be prepared for consideration by the Policy Committee'*¹.

'Green Star' is a voluntary environmental rating system that evaluates the design and construction of large buildings. Green Star Rating was developed by the Green Building Council of Australia² to support sustainable planning, design and construction of commercial office buildings, healthcare facilities, retail centres, education facilities, industrial buildings and multi-residential buildings. A pilot rating tool has also been developed for convention centres. The Green Building Council of Australia has strongly recommended that Green Star Rating be used as a voluntary tool and *not* as a mandatory standard. Therefore, it is recommended that the rating tools not be implemented as a mandatory standard by the City of Joondalup.

In addition to the original request, at the Council Meeting held on 16 March 2010, Council requested: *'— a report be submitted to the Policy Committee on the current trend of greening of houses, addressing issues such as PV cells, wind turbines and other initiatives, and information on the guidelines for installation on existing and new homes from a development perspective'*³.

This discussion paper has been prepared to address these requests and present ways in which the City can more effectively implement the underlying principles of Green Star Rating — **environmentally sustainable design**. The discussion paper details the City's role in promoting the construction and retro-fitting of 'green' buildings in the community, and possible ways the City could extend this role. The discussion paper also outlines relevant resources that are available to the community concerning 'green' buildings.

It is recommended that the Policy Committee examine the options and recommendations presented and provide direction to Council on the role the City should play in encouraging environmentally sustainable design in the community.



Conceptual 'green' buildings

¹ City of Joondalup 2009, 'CJ037-02/09 — Draft Joondalup City Centre Structure Plan', in *Minutes of Meeting of Council*, 17 February 2009, p. 158.

² The GBCA is a not-for-profit organisation that is supported by both industry and governments. The aim of the GBCA is 'to promote sustainable development and the transition of the property industry by promoting green building programs, technologies, design practices and operations'.

³ City of Joondalup 2010 'CJ039-03/10 Minutes of Policy Committee Meeting Held on 23 February 2010', in *Minutes of Meeting of Council*, 16 March 2010, p. 72.

2. What is environmentally sustainable design:

Environmentally sustainable design is an approach that considers each building project from a 'whole-of-life' perspective, from the initial planning to eventual decommissioning. In practice, environmentally sustainable design reduces the overall environmental impact of a building.

There are five fundamental principles of environmentally sustainable design, including: siting and structure design efficiency; energy efficiency; water efficiency; materials efficiency; and indoor air quality enhancement. These principles are outlined below:

- a. **Siting and structure design efficiency:** Environmentally sustainable design seeks to affect siting and structure design efficiency through site selection, and passive solar design.
 - i. **Site selection:** The selection of an appropriate building site should be carefully considered in the construction of a new building or in making a decision to purchase an existing building. Making the most of a site's natural attributes can yield significant economic, lifestyle and environmental benefits. In determining whether or not a site is appropriate, the following should be considered:
 - size;
 - orientation;
 - gradient;
 - terrain;
 - climatic features;
 - solar access;
 - microclimate; and
 - existing vegetation.A site should be selected based on whether the location suits the purpose of the building, and its proximity to services. Wherever possible, a building should preserve the natural features of the site.
 - ii. **Passive solar design:** This is design that does not require mechanical heating or cooling. Buildings that are passively designed take advantage of the natural climate in order to maintain thermal comfort. The City of Joondalup experiences a warm, temperate climate which is characterised by low daytime temperature range, and four distinct seasons with temperatures in the summer and winter months often exceeding human comfort range. In this context, buildings should be passively designed to keep out the summer sun and let in the winter sun. To incorporate passive solar design, the following should be taken into account:
 - northerly orientation of daytime living areas with large windows, and minimal windows to the east and west;
 - passive shading of glass;
 - sufficient thermal mass in building materials for storing heat;
 - insulation and draught sealing;
 - floor plan zoning based on water and heating needs and the supply of hot water; and
 - advanced glazing solutions.

- b. **Energy efficiency:** Environmentally sustainable design aims to reduce energy use through energy efficiency measures that can include the use of renewable energy and low energy technologies.
- i. **Renewable energy technologies:** These are technologies that use renewable energy sources to produce electricity with very low or nil greenhouse gas emissions. Renewable energy utilises the sun, wind and water, which are continuously replenished from natural sources. In Western Australia, readily available renewable energy technologies include photo-voltaic panels and wind energy systems. Planning approval from local government is required for the installation of wind energy systems.

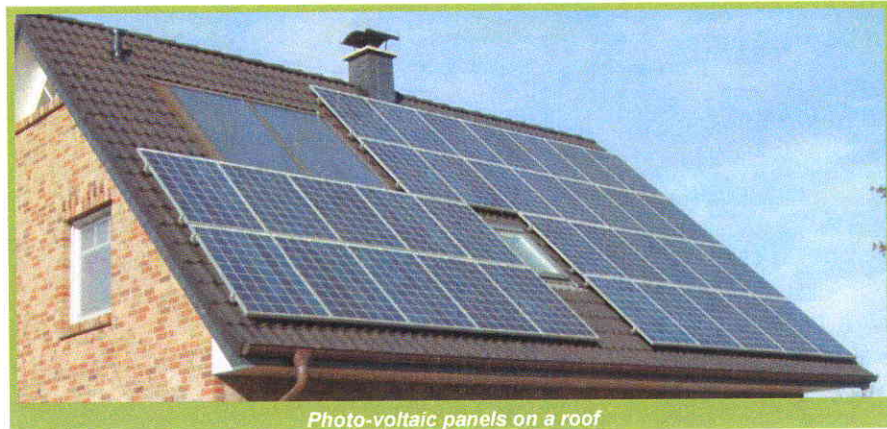
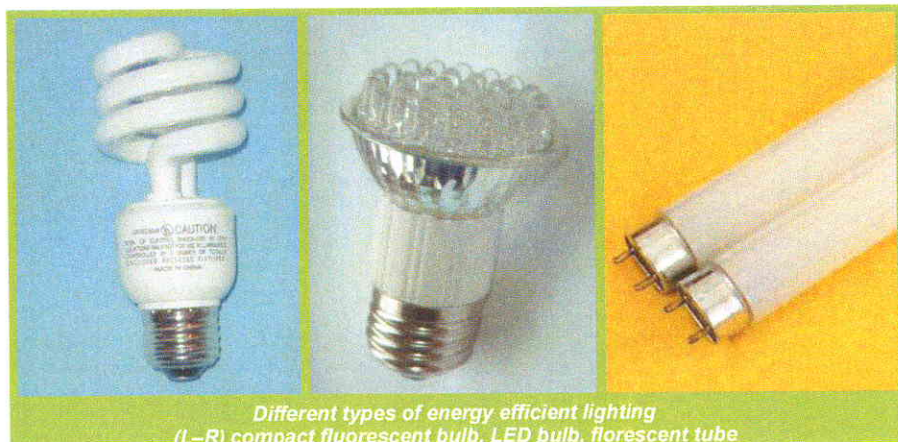


Photo-voltaic panels on a roof

- ii. **Low energy technologies:** These are technologies that demand less energy to run and hence reduce operational and environmental costs. Low energy technologies that are readily available in Western Australia include energy efficient lighting, (e.g.: fluorescent lamps and light emitting diodes (LEDs)), and energy efficient heating and cooling technologies, (e.g.: gas heaters, reverse-cycle heating, and evaporative air-conditioning). Many other electrical appliances (e.g.: refrigerators, freezers and washing machines) are sold with mandatory 'Energy Rating' labels, and, wherever possible, the most energy efficient appliances available should be used.



Different types of energy efficient lighting
(L-R) compact fluorescent bulb, LED bulb, fluorescent tube

c. **Water efficiency:** Environmentally sustainable design aims to reduce water use through effective water conservation measures and water recycling. This can include stormwater management, water reuse, rainwater tanks, and water efficient technologies.

i. **Stormwater management:** Stormwater management should involve the effective incorporation of water sensitive design (WSUD) principles. Water sensitive urban design seeks to:

- protect natural systems and conserve water;
- use and infiltrate stormwater at the source;
- protect water quality;
- convey water in natural systems, or systems which mimic natural drainage processes;
- protect the built environment from flooding and waterlogging; and
- provide liveable communities.

Effective on-site stormwater management aims to minimise impervious surfaces through the use of permeable paving on driveways and footpaths, garden beds designed for infiltration, and vegetated swales and soak wells. Stormwater management that incorporates water sensitive urban design can provide improved aesthetics, a recharge to groundwater, and reduce erosion and the downstream effects of stormwater pollution on nearby rivers, lakes and oceans.

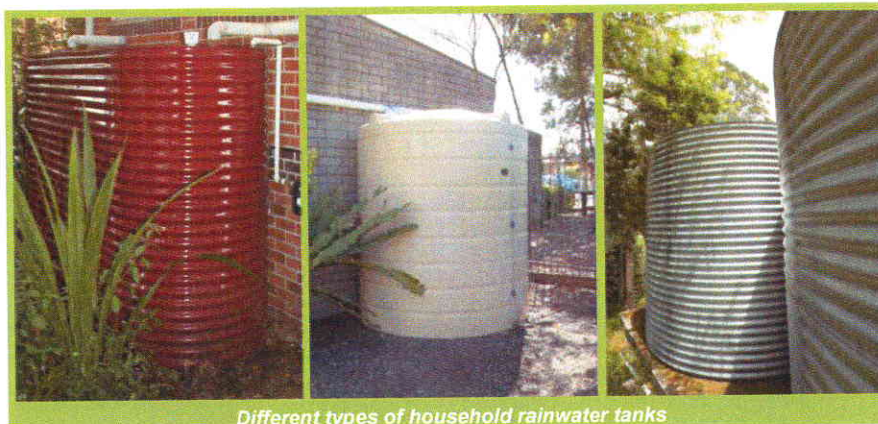


Vegetated swales which allow rainwater to infiltrate at the source.

ii. **Water reuse:** This is a form of water recycling that reuses either greywater, (e.g.: from laundries, showers, and dishwashing), or treated sewerage, for non-potable purposes, (e.g.: toilet flushing and irrigation). Water reuse methods range from manual 'bucketing', which involves collecting excess greywater from showering or dishwashing in a bucket, to a complex greywater reuse system, which screens and treats greywater before piping it into a sub-surface irrigation system. Water reuse can reduce the demand on quality groundwater and surface water supplies. In Western Australia, greywater reuse systems must be Department of Health approved, and approval must be sought from the environmental health department of local government before installation.

iii. **Rainwater tanks:** Rainwater tanks can provide a useful supplementary water supply in metropolitan Perth. Although drinking rainwater in the metropolitan area is inadvisable, rainwater can be effectively used for toilet flushing, laundries and irrigation. Rainwater

tanks come in various shapes and sizes to suit residential homes and offices, as well as large mixed-use facilities and industrial sites. Rainwater tanks may require planning approval from local government, (particularly if they are visible from the street or located on commercial properties).



Different types of household rainwater tanks

iv. Water efficient technologies: These are technologies that demand less water to run and hence reduce operational and environmental costs. Water efficient technologies that are readily available in Western Australia include water efficient showerheads, taps and dual-flush toilets. Many other water-using appliances (e.g.: dishwashers and washing machines) are sold with mandatory 'Water Efficiency' rating levels (WELS labels), and wherever possible, the most water efficient appliances should be used.

d. Materials efficiency: Environmentally sustainable design aims to use materials efficiently in the construction of a building. Consideration is given to the lifecycle of materials and the processes adopted to extract, process and transport them to the site. Wherever possible, materials should be locally sourced⁴ and reused on-site. Sustainable building materials should also be used; these include building materials that are recycled (e.g.: recycled timber, recycled metal), rapidly renewable (e.g.: bamboo, linoleum, sheep wool, seagrass, cork, haystacks), non-toxic (e.g.: rammed earth, mud brick (adobe)), and recyclable (e.g.: timber, metal, glass, cork). In addition, effective waste management practices should be put into place to ensure that waste is minimised and materials are recycled, wherever possible.

e. Indoor air quality enhancement: Environmentally sustainable design aims to enhance the quality of air in buildings. Poor indoor air quality may cause a range of health effects from mild and generally non-specific symptoms such as headaches, tiredness or lethargy, to more severe effects such as aggravation of asthma and allergic responses. Indoor air quality enhancement seeks to reduce volatile organic compounds (VOCs) and other air impurities such as microbial contaminants. During the design and construction phases, construction materials, (e.g.: fittings, furniture, paints, adhesives, and cleaning/maintenance products), should be selected that are low allergenic and do not emit toxic gases.

⁴ 'Locally sourced' will be defined in different ways depending on the type of material and its availability. For example, 'locally sourced' may refer to materials sourced from the Perth region, south Western Australia, Western Australia, or Australia.

In addition to these five fundamental principles, environmentally sustainable design can be complemented by the incorporation of additional 'green' concepts, including water-wise landscaping, resource sharing, and the provision of 'end-of-trip' facilities (such as bicycle parking and changeroom/showers).

Further to this, the operation and maintenance of a building should also be considered. No matter how sustainable a building may have been in its design and construction, it can only remain so if it is operated responsibly and maintained properly. Wherever possible, operations and maintenance considerations should be part of the planning and development process.

3. What is the City doing concerning environmentally sustainable design:

There are numerous initiatives in which the City is already involved to encourage builders, architects, businesses and home-owners to incorporate environmentally sustainable design into developments and retro-fits. The City also performs various legislative duties that incorporate environmentally sustainable design principles. These are outlined below.

- a. **Building Code of Australia:** The *Building Code of Australia* is produced and maintained by the Australian Building Codes Board on behalf of the Australian Government and State and Territory Governments. The Code contains technical provisions for the design and construction of buildings and other structures and has the status of building regulations in all States and Territories. The City of Joondalup is required to implement the Code for all Building Licences issued. Some energy efficiency provisions are built into the Code; these are detailed below. In addition, the Australian Building Codes Board is currently working with the Federal Government and Council of Australian Governments (COAG) to investigate measures for improving the water efficiency and environmental sustainability of building materials.
- i. **Energy efficiency provisions:** These form part of the Code and include provisions for the:
- ability of the roof, walls and floor to resist heat transfer;
 - resistance to heat flow and solar radiation of the glazing;
 - orientation and shading of doors and windows;
 - sealing of doors and windows;
 - provision of air movement for free cooling (in terms of openings and breeze paths);
 - insulation and sealing of air-conditioning ductwork and hot water piping;
 - power allowances for lighting and electric power saving features;
 - access to certain energy efficiency equipment for maintenance purposes;
 - adaptability for grey-water reuse systems; and
 - the requirement for pool blankets.



- b. **Residential Design Codes:** The *Residential Design Codes (R-Codes)* have been developed by the Western Australian Planning Commission to provide a comprehensive basis for the control, through local government, of residential development throughout Western Australia. The *R-Codes* are intended to cover all requirements for planning control purposes and to minimise the need for local governments to introduce separate planning policies or variations. The City of Joondalup is required to implement the *R-Codes* in assessing and determining applications for residential development. Some environmentally sustainable design requirements are built into the *R-Codes*, including solar access under the 'design for climate' requirements.
- i. **'Design for climate' requirements:** These requirements incorporate the protection of solar access for residential buildings. Under this section of the *R-Codes*, a new development must be designed with a maximum allowed percentage of overshadowing (specific to its density code). Building designs that have a greater percentage are subject to additional requirements, so that they do not overshadow outdoor living areas, major openings to habitable rooms, solar collectors, balconies, or verandahs. In addition, unlike previous versions of the *R-Codes*, 'aesthetics' is no longer a consideration in the selection of solar panel location.
- c. **Mandatory disclosure of commercial office building energy efficiency:** A national mandatory disclosure scheme is due to commence in late 2010. This scheme will require owners of commercial office buildings to provide up-to-date energy efficiency information when they sell or lease office space covering more than 2,000 square metres. Building owners will need to disclose a valid Building Energy Efficiency Certificate, which will include a National Australian Built Environment Rating System (NABERS) Energy base building star rating. It will also include an assessment of the lighting energy efficiency of tenancies and some suggestions on how to improve the building's energy efficiency. The intention of the scheme is that potential buyers and tenants will have access to consistent, credible and meaningful information about a building's energy efficiency in order to make informed decisions when they buy or rent office space. The City of Joondalup will be required to prepare Building Energy Efficiency Certificates for all its buildings applicable under the new scheme (e.g.: Lotteries House (Joondalup), Community Vision Resource & Activity Centre (Kingsley)).
- d. **City plans and strategies:** The City has various plans and strategies which contain actions/principle/provisions for environmentally sustainable design, including the *Environment Plan 2007–2011* and *Greenhouse Action Plan 2007–2010*.
- i. **Environment Plan 2007–2011:** This Plan aims to 'To provide ongoing environmental leadership to the community to ensure the City retains its natural environmental assets and preserves them for future generations to enjoy.' Action 1.1.5 specifically references environmentally sustainable design; namely, 'Develop guidelines and awareness programs that pursue environmentally sustainable building designs in accordance with relevant legislation'.
- ii. **Greenhouse Action Plan 2007–2010:** This Plan was developed 'to pursue the ongoing reduction of greenhouse gas emissions across the City of Joondalup's corporate and community sectors'. There are

numerous actions in this Plan that refer to environmentally sustainable design. Including: 21 — 'Continue to investigate the construction of an environmentally friendly [residential] building project'; 22 — 'Continue to develop and promote energy efficiency initiatives for new and renovation building projects'; and 24 — 'Include energy efficiency policies in the development of the new *District Planning Scheme*'.

- e. **City policies:** The City has two policies which incorporate environmentally sustainable design principles. These include the *Sustainability* policy, and the draft *Dual Density Code* policy.
 - i. **Sustainability:** This policy requires the City to ensure that sustainability considerations are embedded into all strategic documents, including those relating to buildings design and construction.
 - ii. **Draft Dual Density Code:** This draft planning policy contains sustainability criteria for 'housing opportunity areas'. This policy promotes environmentally sustainable principles as an incentive to developers to achieve a higher density code (e.g.: energy, landscaping and water criteria). The draft *Dual Density Code* policy has been released for public comment with the draft *Local Housing Strategy*, and the results will be analysed and presented to Council in late 2010/early 2011.
- f. **Structure plans:** Structure plans form part of the *District Planning Scheme No. 2* and guide development within a defined area. All developments in structure plan areas must comply with the provisions of the relevant plan. Several of the City's structure plans include environmentally sustainable design principles including Burns Beach, Cook Avenue, Iluka, Joondalup City Centre, and Woodlake Retreat Structure Plans.
 - i. **Burns Beach:** The objectives relating to environmentally sustainable design for the Residential R20, R40 and R60 Precincts of the Burns Beach Structure Plan include: providing for solar orientation for residential home sites to facilitate the construction of energy efficient dwellings; providing home sites with coastal proximity to derive benefit from the cooling sea breezes; and providing for the maintenance of general landform and natural gradients wherever possible.
 - ii. **Cook Avenue:** The objective relating to environmentally sustainable design for each of the Residential Precincts in the *Cook Avenue Structure Plan* includes: solar orientation for residential home sites to facilitate the construction of energy efficient dwellings.
 - iii. **Iluka:** The objectives relating to environmentally sustainable design for the Residential Precinct of the *Iluka Structure Plan* include: providing lots which are orientated and dimensioned to suit energy efficient housing; providing lots which optimise coastal views, solar orientation and cooling coastal breezes; and guiding building layout and access on laneway lots to enable efficient use of land and protection of neighbourhood amenity.
 - iv. **Joondalup City Centre (draft Structure Plan):** The objectives relating to environmentally sustainable design for the *Draft Joondalup*

City Centre Structure Plan include: creating a more energy efficient urban environment; reducing dependency on private car travel and encouraging the use of less energy consumptive travel modes; balancing the needs of resource conservation with other good urban design principles; ensuring development respects the climatic conditions of a site; and requiring environmentally sustainable development in accordance with the relevant local planning policy.

- g. **Greywater reuse system incentives:** The City offers a fifty percent reduction on the application fee for the approval of a greywater reuse system, (this is in addition to the Federal Government rebate of up to \$500 as part of their National Rainwater and Greywater Initiative). The installation of a greywater reuse system requires approval from local government prior to installation, and the City of Joondalup has reduced the fee for this approval to \$104 as a further incentive to home-owners.
- h. **Water Campaign:** The City is a member of the International Council for Local Environmental Initiatives (ICLEI) Water Campaign. The Water Campaign is an international freshwater management program which aims to build the capacity of local governments to reduce corporate and community water consumption and improve local water quality. By resolving to join the program the City has demonstrated commitment to working towards achieving the 5 Milestones of the Campaign. The City has set goals to reduce water consumption within facilities and operations. To date, the City has completed Milestones 1, 2, 3 and 4 (formal recognition for Milestone 4 will be given to the City in August).
- i. **Rebates 4 Residents program (under the Switch Your Thinking! program):** The Rebates 4 Residents program is a joint initiative between the City of Joondalup and local businesses selling 'green' products. This program offers residents and business in the City access to rebates on solar photo-voltaic systems, solar hot water systems, roof and wall insulation paint, window tinting, rainwater tanks, and pool covers from Switch Your Thinking! program partners.
- j. **ECOSTAR:** The City recently hosted the 2010 Climate Cam for Council Workshop which was presented by Newcastle City Council. The 2-day Workshop focused on Newcastle's leading resource efficiency initiatives and their ECOSTAR Project. ECOSTAR aims to raise awareness of environmental technologies through retrofitting community facilities. The City is currently investigating opportunities to conduct a similar pilot project in the community
- k. **Environmental Education Program:** The City's Environmental Education Program contains discrete education initiatives for the local community. These initiatives are related to various aspects of environmental education, conservation and sustainability, and are reviewed and updated annually. With relation to environmentally sustainable design, the City has recently delivered World Environment Day activities and is currently partnering with the 'Great Gardens' team to deliver Synergy Energy Efficiency Workshops.
- i. **World Environment Day:** The City recently coordinated a large display at Lakeside Joondalup Shopping Centre for World Environment Day 2010. At this event, the City distributed useful information to the community on several aspects of environmentally sustainable design, including water and energy efficiency, greywater reuse systems and

rainwater tanks. The City also provided information to the community on complementary 'green' concepts, including water-wise landscaping, waste and recycling.



Displays from World Environment Day 2010

- ii. **Synergy Energy Efficiency Workshop:** The information covered in these workshops includes many principles of environmentally sustainable design, such as: passive solar design, passive heating and cooling; energy efficiency; and microclimate control. In addition, the workshops cover complementary 'green' concepts, including water-wise landscaping.



'Great Gardens' workshops run by the City

4. What resources are available concerning environmentally sustainable design:

There are numerous resources already available from State Government and Federal Governments agencies as well as non-governmental organisations designed to encourage builders, architects, businesses and home-owners to incorporate environmentally sustainable design principles into developments and retro-fits. A broad selection of these is outlined below.

- a. **Rebates:** Rebates are provided chiefly by governmental organisations and are used as an incentive to encourage builders, architects, businesses and home-owners to invest in 'green' products. Examples include: Energy Efficient Homes Package (Australian Government); Green Loans (Australian Government); National Rainwater and Greywater Initiative (Australian Government); Solar Homes and Communities Program (Australian Government); and Solar Water Heater Subsidy (Western Australian Government).
- b. **Guidelines, checklists and manuals:** Government agencies, as well as private and not-for-profit organisations, have developed various guidelines, checklists and manuals that address aspects of environmentally sustainable design. Many of these are freely available to the public, such as the *Your Home Technical Manual* (Australian Government), *Energy Smart Homes* (Western Australian State Government); *Environmentally Sustainable Design and Construction: Principles and Guidelines for Capital Works Projects* (Victorian State Government); and *Designing an Energy Efficient Home* (South Australian State Government).
- c. **Rating tools:** Voluntary rating tools exist to assist builders, architects, businesses and home-owners in assessing developments for the inclusion of environmentally sustainable design principles. The application of these rating tools usually requires the appointment of a consultant and an auditor to assess the building (at the design phase and/or the construction phase) and determine the rating. Examples of rating tools include: Green Star (Green Building Council of Australia); and the National Australian Built Environment Rating System (New South Wales Government). The latter will be utilised in the mandatory disclosure of commercial office building energy efficiency, soon to implemented at a national level, (see 'What is the City doing concerning environmentally sustainable design' above).
- d. **Design tools:** There are various tools available to assist builders, architects, businesses and home-owners in designing buildings that incorporate environmentally sustainable design principles. Some of these are freely available to the public; for example, the Climate Design Wizard (Think Brick Australia).
- e. **Training courses:** Training is important for the development of a skilled design industry. Various training courses are offered by educational institutions and construction/building organisations. For example: the Housing Industry Association (HIA); and the Green Building Council of Australia.
- f. **Awards:** There are numerous awards available across Australia to encourage environmentally sustainable design in the development and retro-fitting of

buildings. Awards can be helpful in identifying best-practice examples of environmentally sustainable design, and showing leadership in the industry. Examples include: REAL Challenge (Landcorp); LookHome Green Design Awards (James Hardie); Professional Excellence in Building Awards (Australian Institute of Building); and GreenSmart Home Award (Housing Industry Australia).

- g. Demonstration buildings:** Demonstration buildings provide a model to encourage builders, architects, businesses and home-owners to incorporate environmentally sustainable design principles into their own buildings. There are numerous demonstration buildings that have been constructed/retro-fitted by Federal, State, and local governments, as well as non-governmental organisations. These buildings are often designed and/or developed in partnership with builders and architects as well as other organisations. Examples include: Council House 2 (City of Melbourne); The Green House (City of Armadale, City of Gosnells, Shire of Serpentine-Jarrahdale); and Newhaven Easy Street Display Village (APG Homes, Dale Alcock Homes, Homebuyers Centre, Celebration Homes).



City of Melbourne's Council House 2: (L-R) outside façade, foyer, wind turbines on roof

5. What can the City do to further encourage environmentally sustainable design:

The City of Joondalup can play an active role in further encouraging the development and retro-fitting of buildings that incorporate environmentally sustainable design. Strategies for how this might be achieved are explored below.

- a. **Leadership:** The City can show leadership in environmentally sustainable design by ensuring that, wherever possible and appropriate, City buildings are constructed and/or retro-fitted to comply with environmentally sustainable design principles. It is recommended that such an approach be presented as a Council Policy to demonstrate the City's strategic position to the community. (N.b.: the City already shows leadership in environmentally sustainable design by way of City plans and strategies (see 'What is the City currently doing concerning environmentally sustainable design' above)).

Advantages:

- The City would be leading-by-example.
- The community may feel more confident that the City is supporting environmentally sustainable design.

Disadvantages:

- Incorporating environmentally sustainable design into all City buildings may require additional budget.

- b. **Policy:** The City can develop an environmentally sustainable design policy which encourages applicants wishing to develop or retro-fit buildings in the City to incorporate these design principles. Such a policy would detail the broad principles of environmentally sustainable design and would encourage, but not mandate. (N.b.: community members are already required to incorporate many environmentally sustainable design principles under the *Building Code of Australia*, *R-Codes* and City structure plans (see 'What is the City currently doing concerning environmentally sustainable design' above)).

Advantages:

- A policy may assist in making the community aware of the City's strategic position on environmentally sustainable design.

Disadvantages:

- Community members may find a policy too 'high-level' and consequently difficult to read and interpret.

- c. **Promotion and education:** Community education is important to ensure the dissemination of accurate and useful information. Community education should concentrate primarily on residential housing as this is the primary source of building construction and retro-fitting in the City. Aspects of community education could include: providing guidelines/information sheets with Building Applications; referring requests for assistance to relevant 'green' building organisations; and providing educational workshops for residents on aspects of environmentally sustainable design. (N.b. the City already conducts educational workshops as part of the Environmental Education Program (see 'What is the City doing concerning environmentally sustainable design' above)).

Advantages:

- General promotion/education (e.g.: workshops; website information) may provide community members with the opportunity to learn more about environmentally sustainable design, which may encourage them to incorporate the design principles into their own buildings.
- Targeted education (e.g.: requiring checklists with applications for Building Licences; providing guidelines/information sheets with Development Approvals) may ensure that those members of the community who are actually intending to construct buildings are provided with relevant information, which may encourage them to incorporate environmentally sustainable design principles into their proposals.

Disadvantages:

- The City would be replicating information that is already freely available to the public, as there are numerous governmental agencies and private and not-for-profit organisations that produce educational information on environmentally sustainable design (see 'What resources are available concerning environmentally sustainable design' above).
- Targeted education (e.g.: requiring checklists with applications for Building Licences; providing guidelines/information sheets with Development Approvals), may discourage members of the community from building in the City, as there are already numerous forms required under legislation (e.g.: a *DTS Energy Efficiency Declaration* must be submitted with applications for Building Licences).
- Promotion and education may require additional budget.

- d. **Incentives:** The City can provide incentives to the community to encourage environmentally sustainable design. Such incentives could include: grants; funding; subsidies; awards; fee reductions; density bonuses; and the fast-tracking of applications (N.b. the City already provides incentives for the installation of greywater reuse systems, for 'green' products through the Rebates 4 Residents program, and 'density bonus' incentives are proposed in the draft *Dual Density Code* policy (see 'What is the City doing concerning environmentally sustainable design' above)).

Advantages:

- Incentives may encourage community members to incorporate environmentally sustainable design principles into their own buildings.
- Some incentives (e.g.: awards may offer the City an opportunity to promote environmentally sustainable design to a broader audience (e.g.: by way of media coverage).

Disadvantages:

- Some incentives may reach only a small sector of the community (e.g.: those who would be applying for a specific approval).
- Some incentives would not apply to many applications received by the City, as the vast majority of these are for patios, swimming pools and dwelling additions (due to the fact the City is mostly 'built out').
- Some incentives may require additional budget.

- e. **Enforcement:** There are various means by which the City can mandate environmentally sustainable design for all new buildings. The City can create a statutory planning policy requiring all buildings to utilise environmentally

sustainable design principles. Such a policy would apply to all new buildings that require development approval from the City (e.g.: multi-residential developments and commercial developments (n.b.: not single residential developments)). Alternatively, the City can embed the principles of environmentally sustainable design into the *District Planning Scheme No. 2*. This would have the effect of applying the design principles to all new buildings that require development approval from the City (e.g.: multi-residential developments and commercial developments (n.b.: not single residential developments)). Thirdly, the City can ensure that environmentally sustainable design principles are required to be incorporated into the design of *all* structures in the City (e.g.: single residential developments; backyard sheds; swimming pools; retaining walls; and patios). This could be achieved by altering the *District Planning Scheme No. 2* to require all structures to be approved by the City (currently the aforementioned structures only require a Building Licence).

Advantages:

- The City would be mandating the use of environmentally sustainable design principles in private construction/retro-fitting (i.e.: community members would be *required* to incorporate environmentally sustainable design).

Disadvantages:

- A planning policy would only apply to new buildings that require development approval from the City (i.e.: not single residential, backyard shed, patio, etc — which form the majority of developments in the City.)
- Altering the City's *District Planning Scheme No. 2* would require all structures to be approved by the City which would result in a *considerable* administrative increase and, consequently, significant delays in approval (e.g.: in 2009, the City determined 3,459 Building Applications averaging approximately 17 days each; the City also determined 1,215 Development Applications averaging approximately 24 days each; if the City were required to approve *all* structures, then, based on 2009 values, the average time taken to determine applications would increase to approximately 40 days⁵). Furthermore, an administrative increase would require addition budget.
- A planning policy or any alterations to the *District Planning Scheme No. 2* would only apply to new buildings or retro-fits (of a significant scale), as the City has no control over how the community conducts small-scale retro-fitting.
- Overly onerous planning requirements may discourage developers from building in the City of Joondalup, especially as neighbouring local governments (e.g.: City of Wanneroo), have less onerous planning requirements and more affordable land available.

⁵ N.b.: This is based on an equivalent increase in staffing numbers; if staffing levels were to remain the same, the time taken to process applications would be much higher.

6. Conclusions and recommendations

Environmentally sustainable design considers each building from a 'whole-of-life' perspective with the aim of reducing its overall environmental impact. There are five fundamental principles of environmentally sustainable design, including: siting and structure design efficiency; energy efficiency; water efficiency; materials efficiency; and indoor air quality enhancement. In addition to these principles, environmentally sustainable design can also be complemented by the incorporation of additional 'green' concepts, including water-wise landscaping, resource sharing, and the provision of 'end-of-trip' facilities (such as bicycle parking and changeroom/showers). Further to this, the operation and maintenance of a building should be taken into account; wherever possible, operations and maintenance considerations should be part of the planning and development process.

This discussion paper has outlined the various means by which the City is already addressing many of the principles of environmentally sustainable design. In particular, the City is involved in implementing the *Building Code of Australia*, the *R-Codes*, City plans and strategies, City policies, and structure plans. Moreover, the City is involved in providing Building Energy Efficiency Certificates for its buildings, as well as offering incentives to install greywater reuse systems, and delivering the Environmental Education Program and Rebates 4 Residents program. There are also numerous resources which are freely available to the community relating to environmentally sustainable design, including rebates, guidelines, checklists, manuals, rating tools, design tools, awards and demonstration buildings.

In conclusion, it is clear that the City, as well as various governmental agencies and private organisations, are already heavily involved in promoting environmentally sustainable design within the community. However, there may be means by which the City could extend its role in this area. This discussion paper has suggested strategies including showing leadership, developing a policy, providing further promotion and education, offering incentives, and instigating enforcement measures. An analysis of the different strategies has been provided as advantages and disadvantages and, based on these, the City offers the following recommendations:

a. Develop an environmentally sustainable design policy to apply to all City-owned buildings.

The City should be leading-by-example in the promotion of environmentally sustainable design. Therefore, it is recommended that the City develop a policy position that ensures that, wherever possible and appropriate, all City-owned buildings are constructed and/or retro-fitted to comply with environmentally sustainable design principles. A draft policy has been included as Attachment 1.

b. Develop a small scale renewable energy systems policy to establish criteria for the development of small scale renewable energy systems on land or buildings within the City.

The installation of popular small scale renewable energy systems, such as wind turbines and photo-voltaic panels are not readily defined in current planning documents. It is recommended that the City develop a policy position that provides guidance to the community on the acceptable criteria and approvals required to install small scale renewable energy systems such as

these in the City of Joondalup. A draft policy has been included as Attachment 2.

- c. **Develop an environmentally sustainable buildings policy for large residential, commercial and mixed-use buildings and redevelopments in the Joondalup City Centre to accompany the *Draft Joondalup City Centre Structure Plan*.**

Council adopted the *Draft Joondalup City Centre Structure Plan* on 25 May 2010⁶. Part 2.1(13) of this Plan addresses resource conservation with the objective: *'to require environmentally sustainable development in accordance with the relevant local planning policy'*. As such, it is recommended that the City develop a planning policy which addresses this objective. A draft policy has been included as Attachment 3, with a draft checklist for environmentally sustainable design included as Attachment 4.

- d. **Continue the promotional and educational initiatives the City is already undertaking.**

The City is currently involved in highly successful and effective promotional and educational initiatives. It is suggested that encouragement rather than enforcement will be a more effective means by which the City can promote environmentally sustainable design to the community. This is largely due to the fact that the City is almost entirely 'built out', which means that most building work will take the form of retro-fits (which the City has mostly no control over). It is recommended that the City continues to deliver the programs it is currently involved in, and reviews these annually, in line with current targets.

⁶ City of Joondalup 2010, 'CJ073-05/10 — Joondalup City Centre Structure Plan and Scheme Amendment No. 42 — Finalisation/Adoption', in *Minutes of Meeting of Council*, 25 May 2010, pp. 43–54.

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ENVIRONMENTALLY SUSTAINABLE BUILDINGS

STATUS:	<i>Council Policy — A strategic policy that sets governing principles and guides the direction of the organisation to align with community values and aspirations.</i> <i>Council policies are developed by the Policy Committee for approval by Council.</i>
RESPONSIBLE DIRECTORATE:	Planning and Development
OBJECTIVE:	To facilitate the integration of environmentally sustainable design principles into the siting, design and construction of new City-owned buildings, renovation projects and retro-fitting. Environmentally sustainable design considers the environmental impact of a building for the entire life of the asset.

1. STATEMENT

In pursuance of its commitment to sustainability, the City seeks to promote buildings which are environmentally sustainable and strongly encourages a sustainable approach to building design in the community.

2. DESCRIPTION:

Wherever practicable, the City of Joondalup will improve the eco-efficiency of City-owned buildings and assets by implementing environmentally sustainable design principles into the construction, renovation and retro-fitting of all future building assets. The City will look to incorporate the following design principles into its own buildings:

- Designing and constructing buildings to preserve the natural features of the site.
- Designing and constructing buildings to include passive solar design.
- Increasing the energy efficiency of buildings and retro-fits by using low energy technologies for lighting, heating and cooling, appliances and equipment.
- Using renewable energy technologies.
- Increasing water efficiency and encouraging water reuse and water recycling for buildings and landscaping.

- Selecting sustainable building materials, such as locally sourced and recycled content.
- Reducing the amount of waste that is created through the construction process by implementing waste management practices on site.
- Encouraging adaptability in the design and construction to ensure longevity of the building;
- Increasing the indoor air quality of buildings by using low allergic and low volatile organic compound (VOC) fittings, furniture, paints and adhesives.
- Utilising water wise and native gardening techniques.

AMENDMENTS:

RELATED *Local Government Act 1995*
DOCUMENTATION: Policy 1-3 — Sustainability
Policy 5-4 — Sustainability

ISSUED:

SMALL SCALE RENEWABLE ENERGY SYSTEMS

STATUS:	<i>City Policy — A policy that is developed for administrative and operational imperatives and has an internal focus.</i> <i>Developed by the Policy Committee and/or the administration and adopted by Council.</i>
RESPONSIBLE DIRECTORATE:	Planning and Development
OBJECTIVE:	To establish criteria for the development of small scale renewable energy systems on land or buildings within the City. To protect the quality of the streetscape and amenity (particularly visual and acoustic amenity) of adjoining properties from the impact of renewable energy technologies.

1. POLICY AREA

This policy shall apply to the installation of all small scale renewable energy systems within the City of Joondalup.

2. DEFINITIONS

- a. **Solar energy system:** A system which converts energy from the sun into useable electrical energy, heats water or produces hot air or a similar function through the use of solar panels.
- b. **Small scale renewable energy system:** A solar energy system of up to 100kW capacity, or a small wind energy system of up to 10kW capacity.
- c. **Total height:** The vertical distance from natural ground level to the tip of a wind generator blade when the tip is at its highest point.
- d. **Wind energy system:** Equipment that converts and then stores or transfers energy from the wind into usable forms of energy. This equipment includes any base, blade, foundation, generator, nacelle, rotor, tower, transformer, vane, wire, inverter, batteries or other component used in the system.

3. APPROVALS REQUIRED

a. Solar energy system:

An application for planning approval is **required** for a solar energy system installation except where it is installed on a dwelling in a residential zone.

A *Building Licence* is **not required** for the installation of a solar energy system. However, it remains the property owner's duty of care to ensure that any installation does not impact on the structural integrity of the building on which it is installed or any other structure.

b. Wind energy system:

An application for planning approval is **required** for all wind energy system installations.

A *Building Licence* is **required** for the installation of any wind energy system.

4. STATEMENT

a. Solar energy system:

i. Development provisions:

Solar energy systems should be designed and positioned on rooftops so as not to detract from the building itself or impose on the existing streetscape.

b. Wind energy system:

i. Development provisions:

All wind energy systems are to comply with the general provisions listed below and the development standards provided in Table 1:

- The system must be well setback from any overhead power lines.
- The turbine system must be fitted with an automatic and manual braking system or an over-speed protection device.
- Unless colour-matched to the supporting roof, the wind energy system and any tower structure must remain painted or finished in the colour or finish applied by the manufacturer.
- No signage, other than the manufacturer's or installer's identification, shall be attached to the system.

- Any electrical components and wires associated with a small wind energy system must not be visible from the street.
- The system must not be located on a property/building on the City's Heritage List.

Table 1: Development standards

	Residential and Special Residential zones and Single and grouped dwellings in City North and Lakeside District of the Joondalup City Centre	All other zones:
Number of turbines	• Maximum of 1 per lot	• Maximum of 1 per 1,000m² of lot area
Minimum lot size	• 350m²	• 1,000m²
Nameplate capacity	• Maximum 2 kW	• Unlimited
Height	Pole Mounted: • Maximum 5m total height above natural ground level Roof Mounted: • Maximum total height 3m above roofline if mounted on a single-storey dwelling • Minimum 1m clearance above roofline • Not permitted on dwellings 2-storeys or more	Pole Mounted: • Maximum 10m total height above natural ground level Roof Mounted: • Maximum total height 7.5m above roofline
Diameter	• Maximum blade diameter 2m	• Maximum blade diameter 5.5m
Boundary setbacks (street)	• Not permitted between the building and the street alignment	• Not permitted between the building and the street alignment
Boundary setbacks (side and rear)	Pole Mounted: • Setback from boundaries is not less than the total height of the wind energy system Roof Mounted: • No minimum setback from boundary; however, wind energy system to be located a minimum of 7.5m from major opening of adjoining dwelling	Pole Mounted: • Setback from boundaries is not less than half of the total height of the wind energy system Roof Mounted: • No minimum setback from boundary; however, wind energy system to be located a minimum of 7.5m from major opening of adjoining building

5. ADVERTISING

Applications for planning approval that do not comply with this policy will require consultation with adjoining property owners likely to be affected by the proposal for a minimum period of 21 days prior to the determination of the application. Consultation will include neighbours on the opposite side of the street where the structure may be visible from the street and will be undertaken by the City.

Where planning approval is granted for development that complies with this policy, the owners of adjoining properties will be notified of the approved development in writing.

6. OTHER

a. Compliance with other legislation:

All wind energy systems are required to comply with the *Environmental Protection (Noise) Regulations 1997*. In addition, wind energy systems that connect to the electric utility supply must comply with the requirements of the relevant public authorities.

Manufacturer's specifications and a statement demonstrating compliance with the *Environmental Protection (Noise) Regulations 1997* must be submitted with the planning application.

7. VARIATIONS

Where a proposal does not meet the specific requirements of this policy, the applicant is to provide appropriate justification, and the proposal will be considered in accordance with the objectives of this policy.

AMENDMENTS:

RELATED DOCUMENTATION: *Environmental Protection (Noise) Regulations 1997*
Office of the Renewable Energy Regulator

ISSUED:

ENVIRONMENTALLY SUSTAINABLE BUILDINGS IN THE CITY OF JOONDALUP CITY CENTRE

STATUS: *City Policy — A policy that is developed for administrative and operational imperatives and has an internal focus.*

Developed by the Policy Committee and/or the administration and adopted by Council.

**RESPONSIBLE
DIRECTORATE:** Planning and Development

OBJECTIVE: To encourage the integration of environmentally sustainable design principles into the siting, design and construction of both new and redeveloped residential, commercial and mixed-use buildings and redevelopments (excluding single and grouped dwellings, internal fitouts and minor extensions) in the City of Joondalup City Centre. Environmentally sustainable design considers the environmental impact of a building for the entire life of the asset.

1. POLICY AREA

This policy shall apply to the construction and redevelopment of all residential (excluding single and grouped dwellings), commercial and mixed-use buildings (excluding single and grouped dwellings, internal fitouts and minor extensions) in the City of Joondalup City Centre.

2. DEFINITIONS

a. Joondalup City centre: The area defined by the Structure Plan Map in the Joondalup City Centre Structure Plan.

23. STATEMENT

In pursuance of its commitment to sustainability, the City seeks to encourage a sustainable approach to building design in the Joondalup City Centre.

Wherever practicable, the City of Joondalup encourages the integration of environmentally sustainable design principles into the construction and redevelopment of residential (excluding single and grouped dwellings, internal fitouts and minor extensions), commercial and mixed-use buildings (excluding single and grouped dwellings, internal fitouts and minor extensions) within the City of Joondalup City Centre.

To this end, the City will seek to prioritise the assessment of planning applications and associated, subsequent building applications that demonstrate the development has been designed and assessed against a

national recognised rating tool. (via the Environmentally Sustainable Design Checklist that will need to accompany the planning application) the inclusion of environmentally sustainable design principles into the design of the proposed building.

The incorporation of the following design principles **is** encouraged:

- Designing and constructing buildings to preserve the natural features of the site.
- Designing and constructing buildings to include passive solar design.
- Increasing the energy efficiency of buildings by using low energy technologies for lighting, heating and cooling, appliances and equipment.
- Using renewable energy technologies.
- Increasing water efficiency and encouraging water reuse and water recycling for buildings and landscaping.
- Selecting sustainable building materials, such as locally sourced and recycled content.
- Reducing the amount of waste that is created through the construction process by implementing waste management practices on site.
- Encouraging adaptability in the design and construction to ensure longevity of the building;
- Increasing the indoor air quality of buildings by using low allergic and low volatile organic compound (VOC) fittings, furniture, paints and adhesives.
- Utilising water wise and native gardening techniques.

43. OTHER

a. **City of Joondalup City Centre — Environmentally Sustainable Design Checklist:**

Applications for planning approval for residential, internal fitouts and minor extensions, commercial and mixed-use buildings (excluding single and grouped dwellings, internal fitouts and minor extensions) for sites located within the Joondalup City Centre must be accompanied by a completed City of Joondalup City Centre — Environmentally Sustainable Design Checklist.

AMENDMENTS:

RELATED

Local Government Act 1995

DOCUMENTATION: *Joondalup City Centre Structure Plan*
*City of Joondalup City Centre — Environmentally Sustainable
Design Checklist*
Policy — Sustainability

ISSUED:

City of Joondalup City Centre

Environmentally Sustainable Design Checklist

Under the City's planning policy, *Environmentally Sustainable Design in the City of Joondalup City Centre*, the City encourages the integration of environmentally sustainable design principles into the construction of all new residential, commercial and mixed-use buildings and redevelopments (excluding single and grouped dwellings, internal fitouts and minor extensions) in the City of Joondalup City Centre.

Environmentally sustainable design is an approach that considers each building project from a 'whole-of-life' perspective, from the initial planning to eventual decommissioning. There are five fundamental principles of environmentally sustainable design, including: siting and structure design efficiency; energy efficiency; water efficiency; materials efficiency; and indoor air quality enhancement.

For detailed information on each of the items below, please refer to the *Your Home Technical Manual* at: www.yourhome.gov.au, and *Energy Smart Homes* at: www.clean.energy.wa.gov.au.

This checklist must be submitted with the planning application for all new residential, commercial and mixed-use buildings and redevelopments (excluding single and grouped dwellings, internal fitouts and minor extensions) in the City of Joondalup development in the Joondalup City Centre (excluding single houses and grouped dwellings).

The City will seek to prioritise the assessment of your planning application and the associated building application if you can demonstrate that the development has been designed and assessed against a national recognised rating tool.

Please tick the boxes below that are applicable to your development.

Siting and structure design efficiency

Environmentally sustainable design seeks to affect siting and structure design efficiency through site selection, and passive solar design.

Does your development retain:

- ☐ existing vegetation; and/or
- ☐ natural landforms and topography.

Does your development include:

- ☐ northerly orientation of daytime living/working areas with large windows, and minimal windows to the east and west;
- ☐ passive shading of glass;
- ☐ sufficient thermal mass in building materials for storing heat;
- ☐ insulation and draught sealing;
- ☐ floor plan zoning based on water and heating needs and the supply of hot water; and/or
- ☐ advanced glazing solutions.

Energy efficiency

Environmentally sustainable design aims to reduce energy use through energy efficiency measures that can include the use of renewable energy and low energy technologies.

Do you intend to incorporate into your development:

- ☐ renewable energy technologies (e.g.: photo-voltaic cells, wind generator system, etc.) and/or
- ☐ low energy technologies (e.g.: energy efficient lighting, energy efficient heating and cooling, etc.) and/or
- ☐ natural and/or fan forced ventilation.

Water efficiency

Environmentally sustainable design aims to reduce water use through effective water conservation measures and water recycling. This can include stormwater management, water reuse, rainwater tanks, and water efficient technologies.

Does your development include:

- ☐ water reuse system(s) (e.g.: greywater reuse system); and/or
- ☐ rainwater tank(s).

Do you intend to incorporate into your development:

- ☐ water efficient technologies (e.g.: dual-flush toilets, water efficient showerheads, etc.).

Materials efficiency

Environmentally sustainable design aims to use materials efficiently in the construction of a building. Consideration is given to the lifecycle of materials and the processes adopted to extract, process and transport them to the site. Wherever possible, materials should be locally sourced and reused on-site.

Does your development make use of:

- ☐ recycled materials (e.g.: recycled timber, recycled metal, etc.);
- ☐ rapidly renewable materials (e.g.: bamboo, cork, linoleum, etc.); and/or
- ☐ recyclable materials (e.g.: timber, glass, cork, etc.); and/or
- ☐ natural/living materials such as roof gardens and “green” or planted walls.

Indoor air quality enhancement

Environmentally sustainable design aims to enhance the quality of air in buildings, by reducing volatile organic compounds (VOCs) and other air impurities such as microbial contaminants.

Do you intend to incorporate into your development:

- ☐ low-VOC products (e.g.: paints, adhesives, carpet, etc.).

‘Green’ Rating

Has your proposed development been designed and assessed against a nationally recognised “green” rating tool?

- ☐ Yes ☐ No

If yes, please indicate which tool was used and what rating your building will achieve:

If yes, please attached appropriate documentation to demonstrate this assessment.

If you have not incorporated or do not intend to incorporate any of the principles of environmentally sustainable design into your development, can you tell us why:

Is there anything else you wish to tell us about how you will be incorporating the principles of environmentally sustainable design into your development:

When you have checked off your checklist, sign below to verify you have included all the information necessary to determine your application.

Thank you for completing this checklist to ensure your application is processed as quickly as possible.

Applicant's Full Name: _____ Contact Number: _____

Applicant's Signature: _____ Date Submitted: _____

Accepting Officer's Signature: _____