

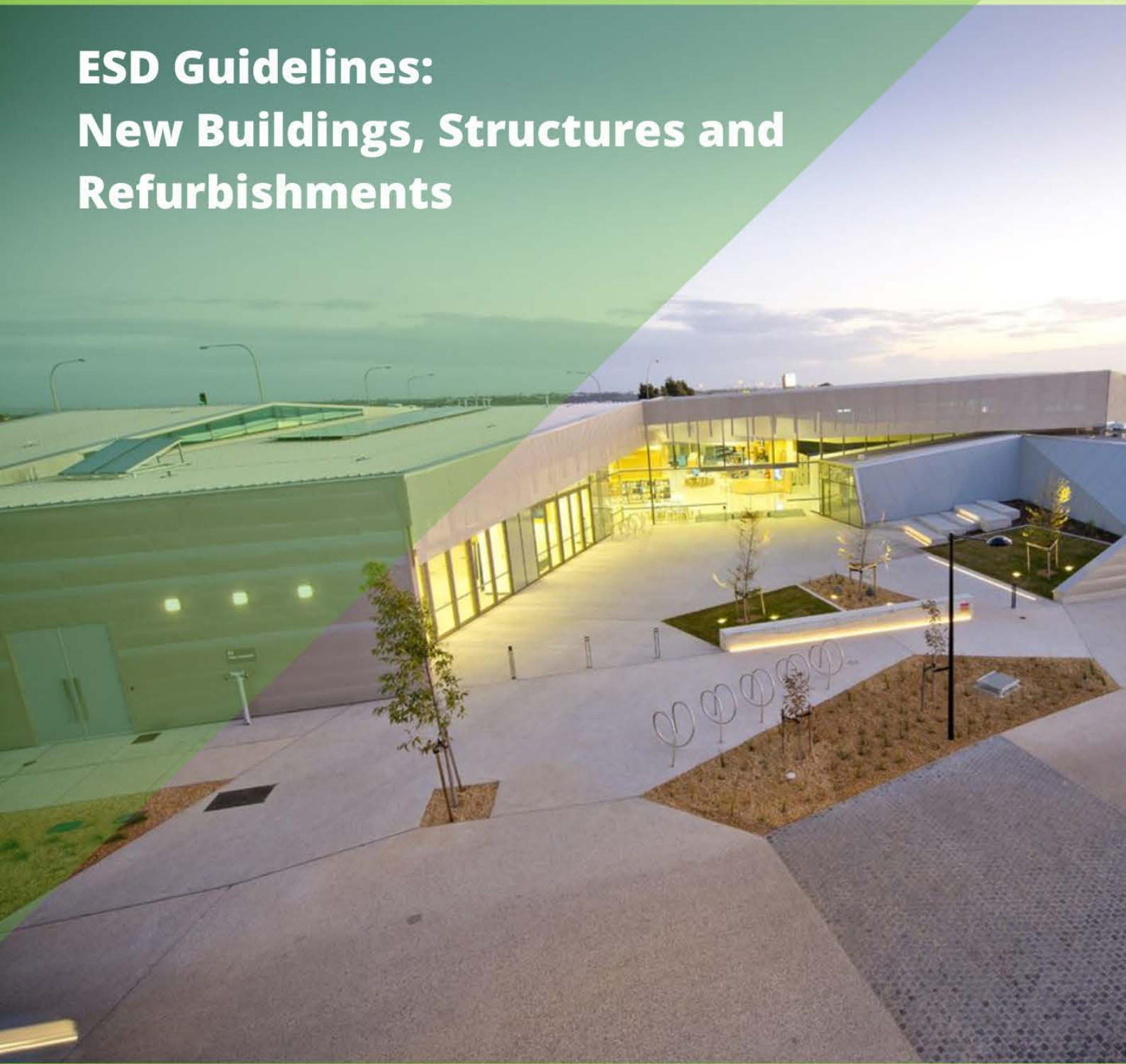
CITY OF

MARION



City of Marion

**ESD Guidelines:
New Buildings, Structures and
Refurbishments**



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1 Introduction

1.1 Strategic Context

The City of Marion owns, operates, and leases many buildings and facilities that are used by council staff and the community. These facilities vary in size and function, including the main Administration Building and Civic Centre (Sturt), City Services works depot and offices (Mitchell Park), Cove Civic Centre (Hallett Cove), Marion Cultural Centre (Oaklands Park), Park Holme Library, and numerous other community centres and sports facilities.

Buildings and infrastructure typically have a long life (at least 50 years) and require significant resources to construct and operate. Early decisions such as material selection, siting and the asset's connection to the surrounding natural environment can reduce or increase the ecological footprint for the life of the project.

The **City of Marion Strategic Plan 2019-2029**, endorsed by Council in August 2019, provides a roadmap for what we are going to achieve in our city and how we are going to deliver it. 10-year strategies in the 'Valuing Nature' theme include:

VN1 We will plan for and respond to extreme weather events through our services and urban form, managing infrastructure issues associated with flooding and stormwater

VN2 We will build community resilience to the impacts of climate change

VN3 We will operate more efficiently and sustainably in terms of energy and water use, using the best technologies and methods to be as self-sufficient as possible

We have several strategies to help achieve these key environmental objectives such as a regional climate change plan (Resilient South), and a strong commitment to growing the circular economy through procurement and recycling. In February 2021, a **Carbon Neutral Plan 2020 – 2030** was endorsed, detailing how carbon neutrality for Council operations would be achieved by 2030.

The development of these Guidelines seeks to bring these opportunities together for delivery within council buildings and facilities.

1.2 Levels of Service and Review

The City of Marion is committed to reducing the impact of our operations and procurement practices on the environment, including an ambitious goal to achieve carbon neutrality for Council operations by 2030.

Our buildings and open spaces play a large part in the services we offer to the community. To achieve our environmental sustainability goals, we aim to deliver buildings that showcase best practice in sustainable design, construction, and ongoing operations.

Levels of service identified in the **Buildings and Structures Asset Management Plan (AMP)** include:

- Provide safe facilities for all occupants whether they be community members, visitors, or staff
- Provide quality infrastructure and facilities that are fit for purpose
- Regular upkeep and security of buildings
- Efficient use of water, energy, and other resources essential to building operation

These guidelines have been developed in alignment with the AMP and outline the Environmentally Sustainable Design (ESD) requirements for all new buildings and major refurbishments within City of Marion Council's operational control.

It is intended that these Guidelines are dynamic, with regular updates conducted to ensure currency and alignment with latest green buildings thinking and in response to community expectations. Minor updates can be done as required in response to legislative and/or policy changes, with a comprehensive review of these Guidelines to be completed every 4 years.

1.3 ESD Principles

The key purpose of the Guidelines is to ensure that all works undertaken by project teams are complementary to the sustainability aspirations of the City of Marion. Projects must demonstrate contribution to and alignment with the **City of Marion Carbon Neutral Plan, 2020 – 2030**.

The processes needed to achieve sustainable design, material selection and construction are no different to those required to achieve any other aspect of good design. They rely on an understanding of the issues, an ability to respond to the site, climate and client requirements, and a wider understanding of the regulatory context and technical options.

All ESD requirements contained within these Guidelines are considered to be minimum requirements unless deemed 'not applicable' for the project. The reason for **not** meeting or considering any of the requirements must be provided on the checklist for review by the project team.

Variations to these guidelines may be considered if divergence is deemed to deliver equivalent or better levels of sustainable performance.

For the purposes of this document, the following definitions apply:

| | |
|--------------|---|
| Shall / Must | denotes the minimum requirement to meet the intent of these Guidelines |
| Should | denotes a recommendation or something that is advised, but not required to meet the intent of these Guidelines. |

ESD outcomes can be delivered through sound design in preference to a reliance on complex engineering technologies. Figure 1 outlines the principles that are to be used in the design and construction of new buildings and major refurbishments.

| | |
|--|---|
| Passive Design | <ul style="list-style-type: none">•Form and design that responds to the local microclimate•Building facade that effectively controls solar gain•Building systems that enable comfortable environments |
| Energy Efficiency and Low Carbon Emissions | <ul style="list-style-type: none">•Energy efficient, all-electric buildings•Powered by renewable energy•No new gas connections (including bottled gas) |
| Water Conservation | <ul style="list-style-type: none">•Water efficient fixtures and fittings•Use alternative water supplies (e.g. Oaklands ASR) if possible |
| Sustainable Materials | <ul style="list-style-type: none">•Choose local, durable, high recycled content, recyclable, low toxicity, low embodied carbon construction and fitout materials |
| Health and Wellbeing | <ul style="list-style-type: none">•Provision of high quality indoor environments to support occupant wellbeing |
| Climate Resilient Design | <ul style="list-style-type: none">•Plan for resilience of buildings, structures, and their surrounds•Consider site specific climate impacts (e.g. rainfall, heatwaves, flooding, drought, etc) in building or structure design |

Figure 1: City of Marion ESD Principles

2 Applying the ESD Guidelines

2.1 Introduction

The intent of these Guidelines is to inform internal or external design teams and related project staff of the best practice standards that are sought for each new building and refurbishment.

It is a requirement that all new building and refurbishment works, including large structures (e.g., coastal walkway) and fit out works, undertaken within the City of Marion control are approached in accordance with these Guidelines. Where a sustainability rating tool is being used by a project (such as Green Star), the rating tool takes precedent, however, all the requirements of these guidelines are to still be considered.

Each project is different so specific targets that align with the ESD principles are to be submitted for approval prior to Design Development. The project ESD Guideline Compliance Checklist is to be completed by the design team and/or sustainability consultant for each individual building or project.

For projects that relate to maintenance, please refer to the *Sustainable Building Maintenance Guidelines*.

2.2 Application

These Guidelines have been developed for use by any individuals or parties (internal to Council or external) involved in the planning, design and construction of new building and major refurbishments for the City of Marion.

When tendering new construction and refurbishment projects, the City of Marion's Project Brief must specify that the ESD Guidelines are to be used, and that compliance can be demonstrated by completing a project *ESD Guideline Compliance Checklist* (Appendix A).

Each project lead must address the requirements of the guidelines at all project stages, as shown in the Figure 2 below. Project teams shall provide commentary to explain if the project will meet the requirements, or the reason the project will be seeking consent to apply an alternative solution.

| | |
|---------------------------------|---|
| Pre-Design | <ul style="list-style-type: none">• Incorporate ESD Guidelines into project brief documents• Complete 'Pre-Design Environmental Checklist' |
| Concept Development | <ul style="list-style-type: none">• Review ESD requirements• Complete ESD Checklist and confirm project ESD goals• Submit ESD Checklist to CoM Project Manager for review |
| Detailed Design | <ul style="list-style-type: none">• Update ESD requirements to reflect project ESD goals• Submit ESD Checklist to CoM Project Manager for review |
| Construction | <ul style="list-style-type: none">• Update ESD requirements to record ESD practices during construction• Submit ESD Checklist to CoM Project Manager for review |
| Practical Completion | <ul style="list-style-type: none">• Update ESD Checklist to document ESD at project completion• Ensure appropriate hand-over to Building/Structure Manager(s) |
| Operation (by Building Manager) | <ul style="list-style-type: none">• Optimise and monitor building/structure performance• Provide appropriate training to building users• Consider ESD requirements in procurement |

Figure 2: Applying the ESD Guidelines

3 ESD Guidelines – Requirements

The following requirements relate to the management and construction of new projects and are reflected in the 'ESD Checklist – New Buildings, Structures and Refurbishments' (Appendix A).

It is recommended that a suitably qualified sustainability consultant / advisor is engaged on all new projects to ensure that appropriate targets are established, all efficiency opportunities are defined, cost estimates are reviewed, and the latest approaches and technologies are considered. Appropriate sustainable design input has the potential to yield substantial on-going cost savings, increase staff and building user productivity, reduce environmental impacts and increase educational outcomes and positive influence on building users.

3.1 General Requirements

3.1.1 Environmental Site Management

The Lead Contractor (Contractor) is to develop and implement a project specific Environmental Management Plan (EMP) to manage construction.

For large projects (over \$4M), the contractor should hold an ISO 14001 certification.

3.1.2 Waste Management During Construction

The Contractor is to develop and implement a project Waste Management Plan to ensure that at least 90% (by mass) of the waste produced during construction is recycled or reused. This Plan must account for all demolition and construction waste.

The Contractor is required to retain waste records for the duration of demolition and construction works stating the total amount (by mass and category) of waste generated and the percentage diverted from landfill (by category) via re-use or recycling.

3.1.3 Commissioning

Commissioning is an integral part of the project delivery process. The Contractor and appropriate sub-contractors must pre-commission, commission, and monitor quality for all building services in accordance with the requirements of the relevant Australian standards.

3.2 Passive Design

The following requirements support delivery of a building form that responds to the local microclimate and building systems that enable comfortable environments of building users.

3.2.1 Building Orientation

Create comfortable and healthy indoor environments by maximising natural light, outdoor and indoor planting, passive design, and cooling techniques such as night purging, adequate ventilation, and fresh air intake.

Consider sustainable performance at site selection stage and orientate buildings to the north where possible to gain most benefit from the winter sun and protection from the western summer sun.

3.2.2 Building Form

Thermal performance

All occupied buildings should be thermally insulated to a performance standard at least 10% higher than the National Construction Code (NCC 2019) requirement. Meet the following insulation levels as a minimum for occupied spaces:

| Construction | Insulation |
|----------------|------------|
| External walls | R3.5 |
| Internal walls | R2 |
| Roof | R4 |
| Ceilings | R2 |

Daylight

The following minimum requirements will maximise natural / passive lighting of buildings:

- Access to daylight and views for all occupiable spaces.
- Daylight modelling for facilities where daylight is critical, such as administration buildings, community centres, etc. These spaces should have access to daylight with a minimum 2.5% daylight factor achieved across 60% of the floor plate (when modelled with a uniform design sky).
- Outside views for a minimum of 60% of the occupiable spaces.
- Different types of spaces to allow physical connection to nature.
- Eaves or sun control shades fitted to northern elevations, and limited windows or sun control shades on eastern and western elevations.

Glare

Provide a glare-free office spaces using external shading devices so that no direct sunlight is present in the workspace for 80% of occupied hours. Where this is impractical for all seasons (for example, on north elevation during the winter months) preference, where possible, is to be given to the use of external green shading or tree plantings to provide solar control, with internal manually operated blinds provided as a secondary control measure.

Roofing

All roof coverings shall be light in colour to minimise the heat island effect. Roof solar absorptance¹ value limited to 0.45 in the NCC 2019.

3.3 Energy Efficiency and Low Carbon Emissions

The following requirements relate to strategies to reduce the ongoing energy consumption and greenhouse gas / carbon emissions from the facility. Business and user needs are also to be considered when making equipment and technology selections.

3.3.1 Lighting

Natural light to be prioritised where possible. Employ lighting systems and arrangements that allow natural light to be used in lieu of artificial light when external ambient sources can provide sufficient lighting levels. Where artificial lighting is used, the following minimum requirements are to be employed:

- Flicker free lights.
- Daylight and/or occupancy sensors and the ability to independently switch lighting in zones no larger than 100sqm in area.

¹ A **Solar Absorbance** (SA) value of 0 indicates that a roof absorbs none of the solar energy applied to it while a value of 1 indicates that a roof absorbs 100% of the incoming solar radiation. NCC = National Construction Code (NCC) has classified roof colour based on their solar absorptance, referred herein as Light (< 0.475), Medium (0.475 – 0.7), Dark (> 0.7). Volume One of NCC 2019 (regulates primarily multi-residential, commercial, industrial and public assembly buildings and some associated structures) requires the solar absorptance (SA) of the upper surface of the roof be ≤ 0.45 to use the Deemed To Satisfy pathway to compliance.

- Preference for LED light sources. Under no circumstances will the use of tungsten filament or halogen light sources be permitted.
- The lighting design must accurately address the perception of colour in the space. Refer to the guidance provided in *Table 7.2 in AS 1680.1:2006* to justify selection and design.
- Lighting levels must be appropriate to the tasks performed in the space. Minimum requirements can be found in *Table 3.1 of AS1680.2* for office spaces, and for other workspaces not covered by office spaces, refer to *Table 3.1 of AS1680.1*.

3.3.2 Heating, Ventilation and Cooling (HVAC)

Natural ventilation to be prioritised where possible. Where artificial HVAC is used, electric systems should be prioritised over gas, and the following minimum requirements are to be employed:

- All HVAC system compressors have a minimum Coefficient of Performance (COP)² of 3.7 and a minimum Energy Efficiency Ratio (EER)³ of 3.24.
- All split air conditioning units have the highest available energy star rating at the time of purchase.
- All refrigerants used in the project have an Ozone Depletion Potential (ODP)⁴ of zero.
- All ducted air conditioning systems include an automatically controlled economy cycle allowing additional outside air to be used for free cooling when ambient conditions allow.
- All existing ductwork proposed for re-use are inspected and thoroughly cleaned of all dust and debris prior to re-commissioning.

Consideration should also be given to the use of widened temperature set points, and alternative temperature set points in summer and winter seasons to reduce the size of HVAC plant required, and to reduce associated ongoing energy consumption. Project Lead to confirm agreed temperature set points with Property team.

3.3.3 Information and Communication Technology

Selection of office equipment is often one of the last tasks and it is important procurement processes preference equipment that is **Energy Star** compliant or similar and uses little power on standby where possible.

Select printers that allow the following functions:

- Double sided printing and scanning.
- Long life printing drums and toner cartridges.
- Ability to use refilled toner or ink cartridges.
- Toner or ink-saving modes, such as draft, black, and white only.
- Manual energy saving button and programmable power management features?
- Consider if a multifunction device (MDF) is more cost effective and have lower environmental impact than individual pieces of equipment.
- Chose equipment with an emissions certificate to ECMA-328⁵ to reduce toxic emissions.

Select efficient computers:

- Prioritise laptops over desktop computers where use is limited.

² The term COP stands for **Coefficient of Performance** and is commonly used as an index for heating efficiency. It is a performance rating that tells us how effective a heat pump or air conditioner is at transferring heat versus the amount of electrical power it consumes.

³ The term EER stands for **Energy Efficiency Ratio** and can be defined as the ratio of cooling capacity (measured in Btu) to the amount of energy consumed (Wh). When we talk about the size of an HVAC system, we refer to its output capacity. The higher the COP of a system, the higher its efficiency.

⁴ The term ODP stands for **Ozone Depletion Potential** and refers to the relative amount of degradation a chemical compound can cause to the ozone layer compared with a similar mass of trichlorofluoromethane (CFC-11). CFC-11, with an ozone depleting potential of 1.0, is used as the base figure for measuring ozone depleting potential. The higher the number, the more damage a chemical can cause to the ozone layer. Production of most ozone depleting substances has been phased out under the Montreal Protocol.

⁵ ESMA-328 Determination of chemical emission rates from electronic equipment (<https://www.ecma-international.org/publications-and-standards/standards/ecma-328/>)

- Choose LED or LCD monitors.
- Choose those with the ability to be automatically powered down when not in use for a long period or add power sensing and shut-off devices where possible.
- Incorporate video conferencing facilities into all new office projects to reduce the need for travel for meetings.

3.3.4 Equipment

Energy consuming appliances and equipment (e.g., fridge, TV, etc.) are generally purchased at practical completion or during the operational stage. Selecting equipment that has the highest available rating under the Australian Government's '**Energy Rating**' labelling system at the time of purchase will support achievement of Council's carbon neutral targets.

To support a transition away from fossil fuels, electric water heating and cooking appliances should be prioritised.

3.3.5 Metering and Monitoring

Install appropriate metering on all new buildings and, where possible, in refurbishment works, to enable energy and water use to be monitored.

Consideration should be given to selecting small areas in larger complex buildings, to meter and then display the energy use of specific equipment and/or spaces, to promote positive energy consumption awareness and behaviours of occupants.

In a building with a large floor plate, energy meters should be provided separately for lighting consumption, and other power consumption where possible to enable greater granularity of energy use data.

3.3.6 Renewable Energy and Battery Storage

In consideration of Council's carbon neutral targets, a review must be undertaken of opportunities for on-site solar generation to offset building energy consumption and minimise the use of mains electricity.

- A minimum of 20% of the building energy use should be provided by **on-site renewable energy** generation systems and roof space is to be designed to allow for such installations where possible.
- A minimum of 70% of the available roof area should be capable of supporting **solar** photovoltaic panels for future installation and electricity generation.

Use of battery storage must be considered at the design stage, with the ability to install battery storage post-construction if not included in the initial build due to an unfavourable business case.

To support a transition to electric vehicles (EV), the ability to provide on-site EV charging infrastructure as part of any new build or major refurbishment must be considered.

Emerging EV Vehicle-to-Grid (V2G) charging technology should also be considered as it can unlock the energy stored in electric vehicle batteries so that fleets can support the grid during peak demand periods. V2G gives utilities access to the renewable energy stored in vehicles so they can better balance loads and mitigate grid bottlenecks.

3.4 Water Conservation

The following requirements relate to strategies to reduce the ongoing mains water use at the facility.

3.4.1 Water Efficiency

Select water consuming appliances (dishwashers, etc) to have the highest available rating under the Australian Government's Water Efficient Labelling Scheme (WELS) at the time of purchase.

All fixtures and fittings installed to have the following minimum water efficiencies, as measured using the Australian Standard 6400:2016 Water efficient products — Rating and labelling:

| Type | WELS Star Rating |
|---------------|------------------|
| Toilet | 6 star |
| Bathroom Taps | 4 star |
| Cleaners Taps | 6 star |
| Showerheads | 3 star |

Rainwater or recycled water should be supplied to all toilets for flushing, and all site irrigation requirements where possible. Where available and achievable, connection should be made to the Oaklands Water recycled water supply. If not available, onsite rainwater harvesting and/or stormwater reuse should be considered.

A minimum of 80% of the building's fire test water **should** be captured for on-site storage and re-use.

Where landscape irrigation or external wash down systems are provided, they should use 100% rainwater or recycled water where possible.

3.4.2 Metering and Monitoring

The following water uses should be metered as a minimum:

- Fire system water
- Irrigation systems
- Recycled water supply

3.4.3 Hot water Systems

All hot water systems should be electric (solar boosted) systems. Gas hot water systems will not be acceptable.

3.5 Sustainable Materials

The following requirements relate to strategies to use environmentally conscious / low embodied carbon materials and minimise waste where possible.

3.5.1 Materials Selection

As a minimum, where possible:

- Select low emission and non-toxic internal finishes and furniture, as per the Materials Technical Specification (Appendix B).
- Enhance the local circular economy by prioritising the purchase of recycled-content materials and products.
- Give preference to materials with low embodied energy / carbon.
- Choose materials according to the waste management hierarchy (ranked most preferable to least): avoid, reduce, reuse / salvage, recycle, recover, treat, dispose. Use post-consumer recycled materials over pre-consumer.

3.5.2 Appropriate Sourcing

Wherever practicable, source all products and trade labour as per the following hierarchy:

1. South Australian businesses.
2. Australian businesses.
3. Materials sourced from the Asia-Pacific Region.

Do not source products and trade labour from outside of Australia unless there are unique circumstances that dictate otherwise.

Refer to Materials Technical Specification (Appendix B) and the Facilities Design Specification for more information on selection and procurement of materials.

3.5.3 Operational Waste Management

All new building works and refurbishment shall include adequate space and facility to allow for the easy separation, storage, and collection of waste for recycling generated at the site. As a minimum, space shall be provided for general waste, mixed recycling (paper, card, glass, plastic) and organics (where kitchen or break-out space is included).

All bins should be emptied by building cleaners daily, or as required, from the fit-out spaces and all wastes transferred to the central waste storage area for collection by waste contractors.

3.6 Health and Wellbeing

The following requirements relate to strategies to improve occupant health and wellbeing in the facility design.

3.6.1 Connection with Nature

Building or structure elements that showcase or emulate natural systems and processes may be incorporated where possible. This may include:

- Internal planting, including green walls.
- Indoor/outdoor space for relaxations, working, dining, etc.
- Integration with building energy or water systems.
- Integration with surrounding landscapes.
- Building elements that emulate or represent natural elements.

3.6.2 Indoor Air Quality

Provision of high levels of fresh air through openable windows and mechanical systems should receive high priority, and can be supported through:

- Locating the ventilation system away from potential outdoor contaminants (petrol fumes, etc.) and designing them to minimise the entry of pollutants.
- Avoiding introducing bad air from nearby facilities, equipment and utility areas including from food preparation areas, photocopying and high-volume printers and other production equipment.
- Selecting low emission internal finishes and furniture, as per the ESD Materials Technical Specification (Appendix B).

3.6.3 Sustainable Transport

Buildings that are regularly occupied should include facilities to encourage the use of more sustainable transport options such as walking, cycling, car sharing and public transport. Provision of covered and secure facilities for cyclists including bike racks/compounds/containers, showers and change facilities will support the uptake of more active and sustainable transport options.

3.7 Climate Resilient Design

The following requirements relate to strategies to improve the resilience of Council buildings to the impacts of a changing climate.

3.7.1 Climate Risk Assessment

Prepare for projected changes in climate for southern Adelaide (particularly rising temperatures and increased frequency of high heat days/heatwaves, decrease in annual rainfall, more intense rainfall events, sea level rise) by increasing the resilience of buildings and infrastructure to these conditions. Ensure that a Climate Risk assessment is undertaken to identify local climate risks during the design stage for all projects.

Treatments could include:

- Batteries to store solar power generated in-site to support business continuity and power needs during brown/blackouts.

- Light coloured roof coverings, shade structures and pavers to minimise the heat island effect. Roof solar absorptance⁶ value limited to 0.45 in the NCC 2019.
- Appropriately sized gutters for anticipated rain events.
- Finished floor levels that consider local climate risks such as localised flooding and sea level rise.
- Selection of materials better suited to withstand anticipated climate conditions and impacts.

3.7.2 *Natural Landscaping*

Retain existing trees and vegetation wherever possible through the design and construction phases.

Prepare the site to support and maximise the establishment of vegetation by avoidance of compaction of soils during construction and undertaking pre-planting amelioration such as decompaction, increasing organic matter (humus) in the soil profile, increasing soil moisture infiltration by treating hydrophobic soils, and ensuring the most effective irrigation strategies.

Other strategies could include:

- Climate resilient plant species to be incorporated into landscaping design to minimise irrigation requirements longer term and increase biodiversity.
- Landscape plans that include trees and vegetation to cool and/or shade the building and surrounds.
- Green roofs or green walls are suitable for the site.
- Preference for permeable surfaces to reduce stormwater runoff.

⁶ A **Solar Absorbance** (SA) value of 0 indicates that a roof absorbs none of the solar energy applied to it while a value of 1 indicates that a roof absorbs 100% of the incoming solar radiation. NCC = National Construction Code (NCC) has classified roof colour based on their solar absorptance, referred herein as Light (< 0.475), Medium (0.475 – 0.7), Dark (> 0.7). Volume One of NCC 2019 (regulates primarily multi-residential, commercial, industrial and public assembly buildings and some associated structures) requires the solar absorptance (SA) of the upper surface of the roof be ≤ 0.45 to use the Deemed to Satisfy pathway to compliance.

4 Useful References

American Society of Heating, Refrigerating and Air-Conditioning Engineers: <https://www.ashrae.org/>

Australasian Furnishing Research and Development Institute:
http://www.furntech.org.au/index.php/commercial_furniture

Carpet Institute of Australia Limited: <https://www.carpetinstitute.com.au/classification/accs-labels/>

CIBSE Commissioning Codes: <https://www.cibse.org/Knowledge-by-publication-type/Commissioning-Codes>

ECMA International: <https://www.ecma-international.org/>

EcoSpecifier Global: <http://www.ecospecifier.com.au/>

Energy Rating: www.energyrating.gov.au

Energy Star: <http://www.energystar.gov.au/>

Good Environmental Choice Australia (GECA): <http://www.geca.org.au/>

Green Building Council of Australia: Best Practice Guidelines for PVC: <https://new.gbca.org.au/pvc/>

Green Building Council of Australia: Green Star Design and As Built Tool: <https://www.gbca.org.au/green-star/rating-tools/green-star-design-as-built/>

Institute for Market Transformation: <https://www.imt.org/>

International Living Future Institute: Living-Future.org

Living Building Challenge: <http://living-future.org/lbc>

NABERS: <http://www.nabers.gov.au/>

National Construction Code: <https://ncc.abcb.gov.au/>

PVC Best Practice Guidelines: <https://www.vinyl.org.au/in-greenstar/best-practice-pvc-product-register>

State Procurement Board: <https://spb.sa.gov.au/content/policies-guides>

The Australasian Procurement and Construction Council: <http://www.apcc.gov.au>

Water Rating (WELS): <https://www.waterrating.gov.au/>

WELL Certification: <https://www.wellcertified.com/certification>

Appendix A ESD Checklist – New Buildings, Structures and Refurbishments

ESD Checklist – New Buildings, Structures and Refurbishment Projects

It is intended that this checklist is completed and reviewed at each project stage as not all elements will be known at Pre-Design or even Concept Design stages.

| | | |
|--|-----------------|--|
| Project Details | | |
| Project Title: | | |
| Description of proposed works: | | |
| Building Location: | | |
| Gross floor area (m ²): | | |
| Consultant Details <i>(to be completed by person compiling checklist)</i> | | |
| Name | | |
| Role: | | |
| Contact Details: | | |
| 1. General Requirements | | |
| Independent Sustainability Advice | Yes / No | <i>If 'No', please provide detail explaining why this requirement has not been met</i> |
| Has the project received Independent ESD Advice? | | |
| <i>If Yes, then include:</i> | | |
| <i>Consultant Name:</i> | | |
| <i>Company:</i> | | |
| <i>Contact Details:</i> | | |
| Green Building Ratings | | |
| Has a Green Building Rating been implemented? | | |
| Testing and Commissioning | | |
| Will the building be commissioned in accordance with relevant Codes? | | |
| Environmental Management System (EMS) | | |
| Has an EMS been implemented? | | |
| Has the City of Marion 'Pre-design Environmental Checklist' been completed? | | |
| Does the Lead Contractor have a valid ISO14001 EMS accreditation? | | |
| Construction Waste Management | | |

| | | |
|--|--|--|
| Will construction waste be diverted from landfill and results reported? | | |
| 2. Passive Design | | |
| Building Orientation | | |
| Has the building and site orientation been optimised? | | |
| Does the design consider likely use of the building by occupants, to support ESD outcomes, over the asset life? | | |
| Building Form | | |
| Has the building been thermally insulated to a performance standard at least 10% higher than the National Construction Code? | | |
| Has daylight modelling been undertaken? | | |
| Does 60% of all occupiable space achieve a 2% daylight factor? | | |
| Does 60% of all administration space achieve a 2.5% daylight factor? | | |
| Does 60% of all occupiable space have a view to outside? | | |
| Is the space naturally ventilated? | | |
| Does the space receive fresh air at levels 50% better than AS1668.2? | | |
| Does the building incorporate external sun shading? | | |
| Does the project include glare reduction measures? | | |
| Are window blinds provided? | | |
| Does the roofing material have a solar absorbance (SA) value less than 0.45? | | |
| Does the building design ensure access to, or quality of air, sunlight or natural water ways is not blocked or diminished? | | |
| 3. Energy Efficiency and Low Carbon Emissions | | |
| Lighting | | |
| Lighting does not use tungsten or halogen fittings? | | |
| Are all lights flicker free? | | |
| Are all lighting zones less than 100m ² ? | | |
| Is all project lighting LED? | | |

| | | |
|---|---------------------------|---------------------------|
| Are lighting systems provided with daylight and/or occupancy sensors? | | |
| Do lighting systems accurately address perception of colour in the space and comply with Table 7.2 in AS 1680.1:2006? | | |
| Do lighting levels meet Table 3.1 in AS 1680.1:2006.2? | | |
| External Lighting | | |
| Does external lighting have a luminaire with an upward light output ratio exceeding 5%? | | |
| Does external lighting design comply with AS4282? | | |
| Heating Ventilation and Cooling (HVAC) | | |
| All refrigerants used are zero ODP? | | |
| All ducted HVAC systems have an economy cycle? | | |
| All existing ductwork has been cleaned prior to re-use? | | |
| Widened temperature bands have been included in the control strategy? | | |
| Specify the HVAC system and performance levels, including COP and EER. | | |
| Metering and Monitoring | | |
| Has the metering been integrated with the Building Management System? | | |
| Is there an energy metering display visible to occupants? | | |
| Has compliant energy metering been included? | | |
| Renewable Energy | | |
| Is at least 20% of building energy provided by on-site renewable energy? | | |
| Have battery storage options have been reviewed? | | |
| Have electric vehicle charging stations been installed? | | |
| Have bi-directional / vehicle-to-grid (V2G) electric vehicle chargers been considered? | | |
| Equipment | | |
| Complete the following table to indicate the Energy Star rating applied to selected energy consuming equipment: | | |
| Item | Energy Consumption | Energy Star Rating |

| | | |
|--|----------------|---------------------------|
| (e.g. laptop, tv, dishwasher, etc) | | |
| | | |
| | | |
| | | |
| | | |
| 4. Water Conservation | | |
| Water Harvesting and Reuse | | |
| Does the building supply rainwater or recycled water (e.g., Oaklands Water) to toilets for flushing and site irrigation? | | |
| Is at least 80% of the building fire test water capture for on-site storage and re-use? | | |
| Water Efficiency | | |
| How much rainwater is captured and stored on site? | | ML |
| Annual Rainwater Capture | | |
| Annual Water Use | | |
| Percentage of Annual Water provided by rainwater | | |
| Complete the following table to confirm the WELS rating of water fittings used: | | |
| | Fitting | WELS Star Rating |
| | Tap | |
| | Toilet | |
| | Urinal | |
| Complete the following table to indicate the Water (WELS) Star rating applied to selected water consuming equipment: | | |
| | Item | Energy Star Rating |
| (e.g. Dishwasher) | | |
| | | |
| | | |
| Metering and Monitoring | | |
| Has compliant water metering been included? | | |
| 5. Sustainable Materials | | |
| Refer to Appendix B for details of suitable materials and products. | | |
| Embodied Carbon: | | |
| Has an assessment of the embodied carbon been completed? | | |
| <i>If YES ...</i> | | |

| | | |
|---|--|--|
| <ul style="list-style-type: none"> Are there any opportunities to reduce the embodied carbon? | | |
| Red List: | | |
| NO red list materials are being used? | | |
| Materials Selections as per ESD Guidelines: | | |
| Paints and coatings | | |
| Sealants and adhesives | | |
| Wall and ceiling coverings | | |
| Flooring materials (carpets, etc.) | | |
| Composite wood products | | |
| Timber | | |
| Steel | | |
| Concrete | | |
| PVC (or no PVC) | | |
| Insulation | | |
| Operational Waste Management: | | |
| Is there a Waste Management Plan for the project? | | |
| Is enough space provided in a convenient location to allow for separation of recyclables and storage of waste? | | |
| Is the space easily accessible for both building users and collection agencies? | | |
| Will well labelled and colour-coded bins be provided? | | |
| Space allowance should be made for each of the separation and storage of the following waste streams: <i>If these waste streams are not included indicate as not applicable (n/a) and rationale.</i> | | |
| Waste Stream | | |
| Glass | | |
| Plastic | | |
| Metals | | |
| Green Waste | | |
| Food Waste | | |
| Paper/Cardboard | | |
| Ink/Print Cartridges | | |
| Batteries | | |
| Other (please list): | | |

| | | |
|--|------------------------------|-------------------------------|
| | | |
| Furniture | | |
| Eco-Rated Furniture is being specified? | | |
| Furniture compliance | Percentage | |
| Eco-Rated | | |
| Supplier Statements | | |
| Non-Compliant | | |
| Total | 100% | |
| 6. Health and Wellbeing | | |
| Does the mechanical system meet the prescribed criteria? | | |
| Does the building include elements which show case or emulate natural systems and processes? | | |
| Does the location of the building encourage the use of more sustainable transport options such as walking, cycling, car sharing and public transport? | | |
| Does the building include cyclist facilities, showers, secure lockers and under cover bike storage? | | |
| Does the building include any additional initiatives to promote wellbeing and social sustainability? | | |
| 7. Climate Resilient Design | | |
| Has a climate change adaptation review been undertaken to identify climate risks and adaptation measures to incorporate into the design? | | |
| Has material selection considered measures to reduce the project's contribution to the urban heat island effect, including replacing roofing with light coloured material or using paint with a high solar reflective index (SRI)? | | |
| Have existing trees and vegetation been retained and integrated into the design? | | |
| Where trees and vegetation are removed and/or retained, quantify: | | |
| • numbers of trees | <i>removed</i> | <i>retained</i> |
| • canopy area | <i>m² removed</i> | <i>m² retained</i> |
| • amount of vegetation (other than trees) | <i>m² removed</i> | <i>m² retained</i> |

| | | |
|--|--|--|
| Has vegetation and landscaping been designed to provide cooling functions to the building and surrounds? | | |
| Does the building or structure encourage interaction with the natural environment? | | |

Appendix B Materials Technical Specification

This ESD Specification can be used by project teams for new building and refurbishment projects, where appropriate.

VOC Levels in Paints, Sealants and Adhesives

All internally applied paint, adhesive and sealant products should not exceed the following TVOC limits:

| Product Type | Maximum VOC Content (g/litre) |
|--|-------------------------------|
| General Purpose adhesives* | 50 |
| Interior wall and ceiling paint, all sheen levels | 16 |
| Trim, varnishes, and wood stains | 75 |
| Primers, sealers, and prep coats | 65 |
| One and two pack performance coatings for floors | 140 |
| Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives | 250 |
| Structural glazing adhesive, wood flooring and laminate adhesives and sealants | 100 |

**Most adhesives and sealants are addressed in the 'General purpose adhesives and sealants' category of the table above unless they clearly belong in the other specialised product categories.*

Lead Content in Paints

Industrial surface paints and coatings shall not contain lead nor lead components.

VOC Levels in Carpets

All carpets shall comply with the Total VOC limits specified in the table below.

| Test Protocol | Maximum VOC Content |
|---|---------------------------------|
| ASTM D5116 – Total VOC limit | 0.5 mg/m ² per hour |
| ASTM D5116 – 4 – PC (4-Phenylcyclohexene) | 0.05 mg/m ² per hour |
| ISO 16000 / EN 13419 – TVOC at three days | 0.5 mg/m ² per hour |
| ISO 10580 / ISO / TC 219 (Document N238) – TVOC at 24 hours | 0.5 mg/m ² per hour |

Composite Wood Products

All engineered wood products shall have formaldehyde emissions that meet the E0 levels shown in the table below.

Provide certification of the quantities of all engineered wood products delivered to site, and manufacturer/supplier certification to demonstrate compliance with the specified emissions limits.

| Emission class | Formaldehyde emissions limit (mg/L) | Formaldehyde emissions limit (ppm) |
|----------------|-------------------------------------|------------------------------------|
| E0 | Less than or equal to 0.5 | Less than or equal to 0.041 |

Timber

At least 95% (by cost) of all timber used in the building and construction works should be certified by a forest certification scheme that meets the GBCA's 'Essential' criteria for forest certification, such as Australian Forest Standard (AFS) or Forest Stewardship Council (FSC); or is from a reused source; or is sourced from a combination of both.

Any certified timber used in the project shall be supplied in accordance with the Chain of Custody (CoC) rules of the respective forest certification scheme (e.g., relevant CoC certificates or invoices including a relevant CoC code or serial number).

Steel

At minimum of 95% of all steel used should be from a responsible steel maker with ISO 14001 Accreditation.

For reinforcing steel, at least 60% of all reinforcing bar and mesh should be produced using energy-reducing processes in its manufacture (measured by average mass by steel maker annually). Reinforcing steel includes reinforcing bar and mesh used in concrete reinforcement in the building structure. This includes steel in situ, stressed, and pre-cast concrete applications.

Concrete

At least 30% of the concrete in the Portland cement used in the project will be reduced by replacing concrete with substitute materials such as fly ash, recycled aggregate, hemp (hempcrete), or wood chips (durisol).

The reduction will be measured by mass across all concrete used in the project compared to the reference case.

PVC

At least 90% of all common uses of PVC in the project should be either PVC products sourced from manufacturers which meet the Best Practice Guidelines for PVC in the Built Environment; OR are products that do not contain PVC.

Common uses of PVC products for this project include cables, pipes, flooring, and blinds.

Best Practice PVC products and suppliers can be found via the BEP PVC Product Registry: <http://www.vinyl.org.au/bep-pvc-product-registry>

Insulation

All insulation used shall have an Ozone Depleting Potential (ODP) of zero in both its manufacture and composition. Insulation covers building services (i.e., refrigerant pipe work, ductwork, hot & cold-water pipes, water tanks, etc.) and building fabric including walls, roofs, floor, window frames, doors, cavity closures and lintels.

Product Certification

All products and materials used in construction should be selected in accordance with the following requirements.

Third Party Certification

Preference to be given to the selection of construction materials which have a third-party green certification.

The following products, as a minimum, should have a third-party green certification:

- Internal blinds
- Flooring
- Carpets

These products are to be certified in accordance with one of the certification schemes assessed against the GBCA Framework for Product Certification:

- Carpet Institute of Australia Limited, Environmental Certification Scheme (ECS) v1.2

- Ecospecifier GreenTag GreenRate v3.2
- Australasian Furnishing Research and Development Institute, Sustainability Standard for Commercial Furniture - AFRDI Standard 150
- Good Environmental Choice Australia (GECA), including six standards

Environmental Product Declarations (EPD)

Preference for construction materials that have an Environmental Product Declaration (EPD) certified in accordance with ISO14025.

The following products, as a minimum, are to have a certified EPD:

- Internally applied paints
- Plasterboard

The manufacturer of the products will have an EPD for the product/material certified in accordance with ISO 14025 and published on the EPD website.

Product Stewardship

Preference for construction materials where the manufacturer and/or supplier of the products provides a contractual agreement to take back the product at the end of its service life for reuse, recycling, or reprocessing.

Local Content

Preference for construction materials sourced, manufactured, or assembled in South Australia, in accordance with the South Australian Industry Participation Policy (IPP)⁷ and Council's Procurement and Contractor Management Policy.

Recycled Content

Construction materials that are recycled or have a recycled content are preferred where possible. These may include:

- Steel products
- Timber products
- Carpets
- Insulation
- Concrete and aggregates

Red List

Building Maintenance activities cannot utilise any of the materials or chemicals established in the Red List as produced by the [International Living Future Institute](#). This list will be updated as new research on chemical toxicity and health and environmental impacts emerge. Contractors and maintenance teams are encouraged to periodically review this via the International Living Future Institute website.

The [Red List](#) includes substances such as (as at May 2022):

- Asbestos compounds
- Chlorinated Polyethylene (CPE) and Chlorosulfonated Polyethylene (CSPE)
- Chlorofluorocarbons (CFCs)
- Chloroprene (Neoprene)
- Formaldehyde (added)
- Halogenated Flame Retardants (HFRS)
- Hydrochlorofluorocarbons (HCFCs)
- Lead (added)

⁷ SA Industry Participation Policy (<https://industryadvocate.sa.gov.au/wp-content/uploads/2020/03/2020-SA-Industry-Participation-Policy.pdf>)

- Mercury
- Petrochemical Fertilisers and Pesticides
- Phthalates
- Polyvinyl Chloride (PVC) – use alternatives where possible, or select from Best Practice PVC guidelines (see Resources section)
- Toxic Heavy Metals including arsenic, cadmium, chromium (VI), lead (added), mercury
- Volatile Organic Compounds (VOCS)
- Wood treatments containing Creosote, Arsenic or Pentachlorophenol

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