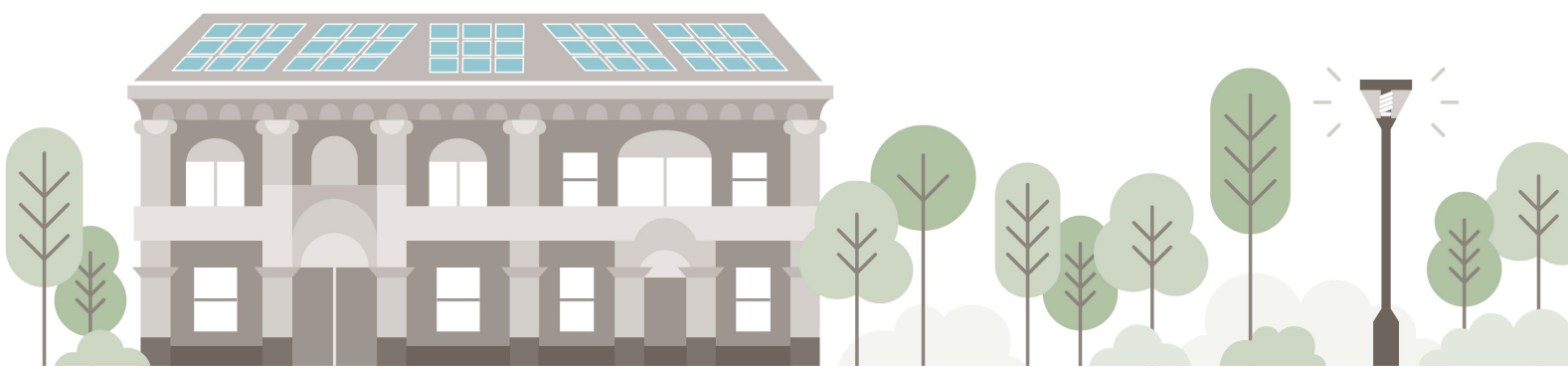




Environmentally Sustainable Design (ESD) Guidelines

**For New Council Buildings and Minor Works
and Refurbishments**





Acknowledgement of country

The project team wish to acknowledge the Traditional Custodians of all country throughout Australia, and their cultural, spiritual, physical, and emotional connection with their land, waters, and community. We pay our respects to all Elders past, present, and emerging.

DOCUMENT CONTROL

| Issue | Date | Change | Checked | Approved |
|-------|----------|--|---------|----------|
| 01 | 29/06/23 | First Outline Issue | AD | JP |
| 02 | 24/07/23 | Second Outline Issue | AD | JP |
| 03 | 07/09/23 | Final draft issue | AD | JP |
| 03 | 18/01/24 | Final issue incorporating council feedback | AD | JP |
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PURPOSE

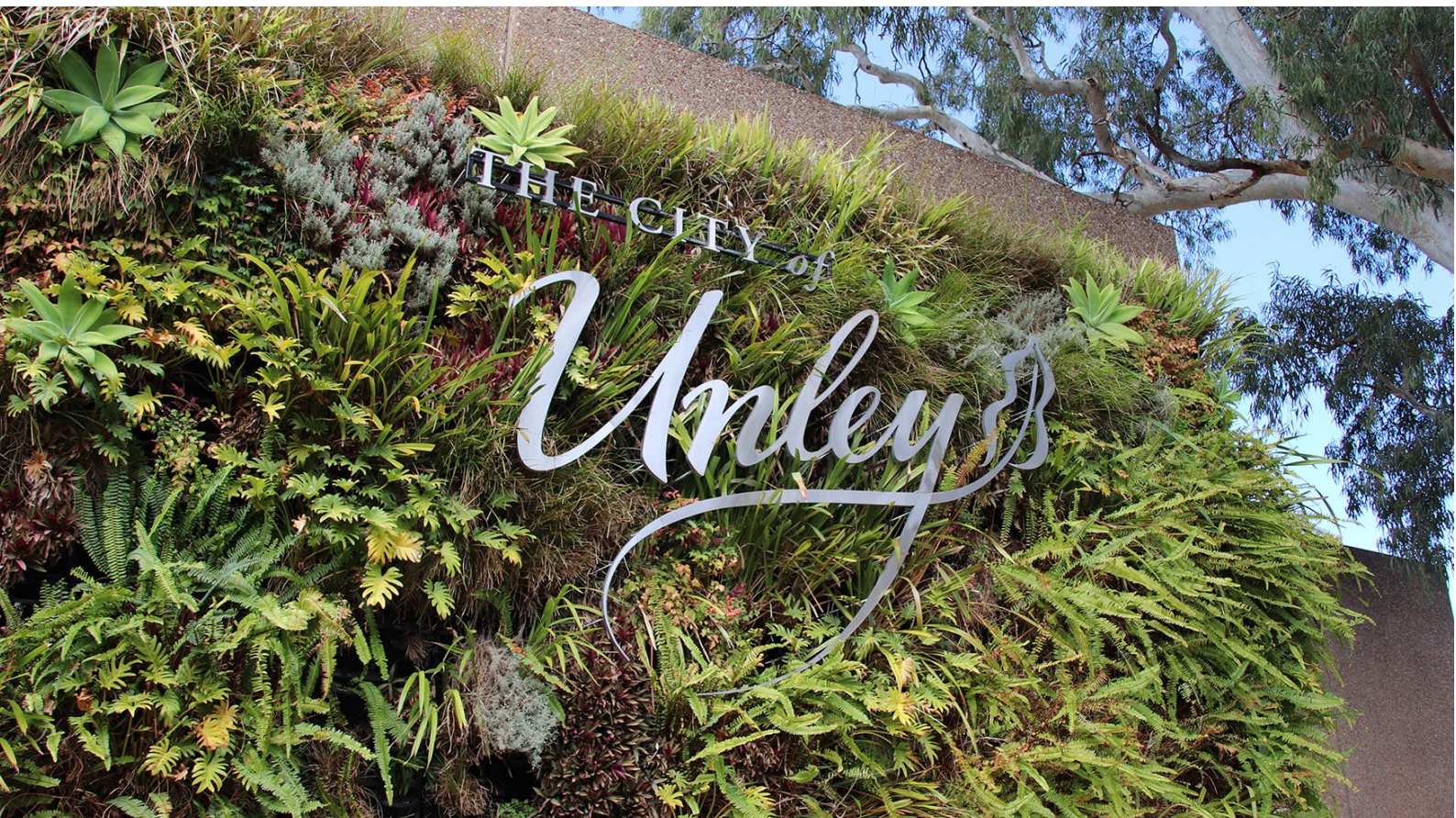
The City of Unley has a commitment to reduce its operational greenhouse gas emissions through the Climate and Energy Plan (2021) and aims to be Carbon Neutral by 2030. These *Environmentally Sustainable Design (ESD) Guidelines* are the outcome of an action specified in the Plan.

The ESD Guidelines is a checklist based tool developed to reduce greenhouse gas emissions and strive towards carbon neutrality by prescribing minimum performance requirements for building upgrade works and new developments. This document shall assist projects with pre-planning, budgeting and long-term planning, in order to make a genuine change and demonstrate leadership to the community.

The *Guidelines* provide a set of criteria and initiatives to:

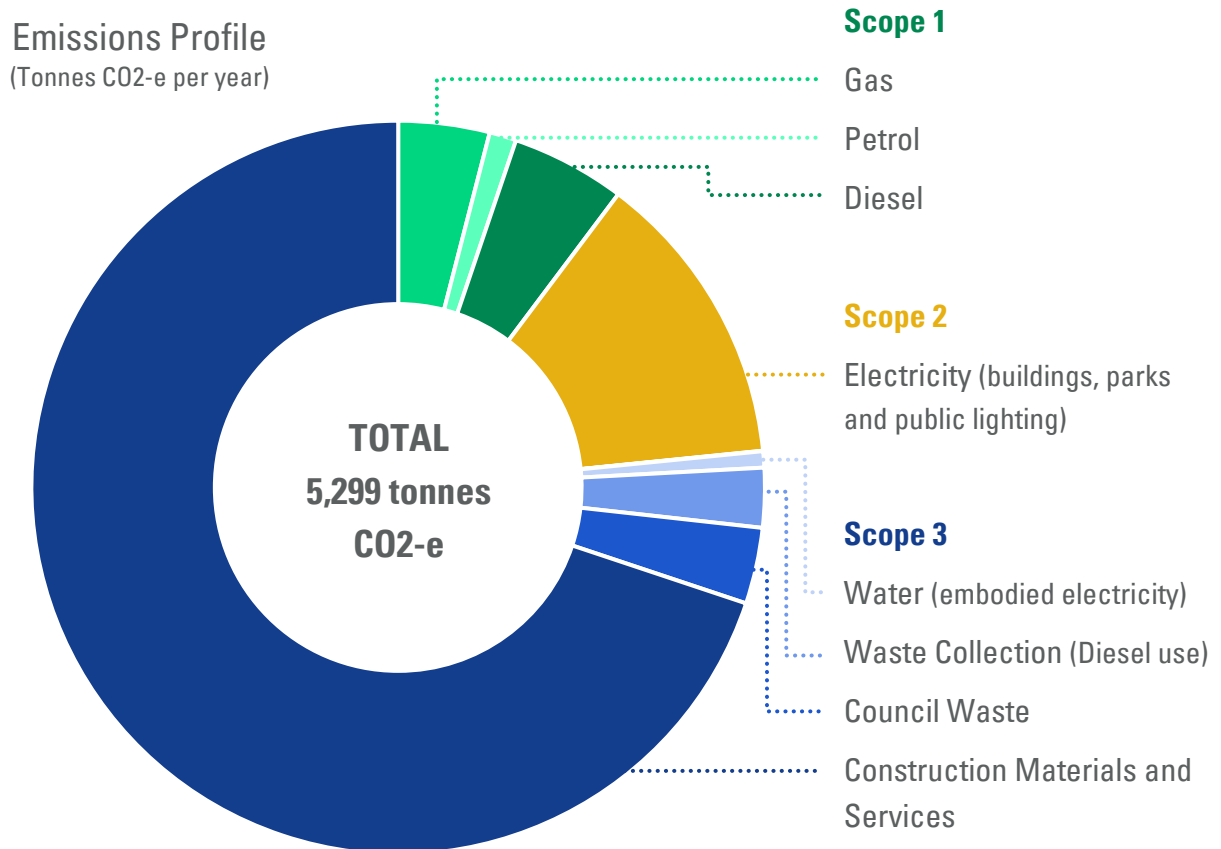
- reduce buildings' resource consumption
- increase energy efficiency
- facilitate a circular economy
- encourage low emissions transport
- increase health and wellbeing of building users
- celebrate local culture and history
- build resilience to a changing climate.

Design checklists will assist project teams in making decisions and support them to implement sustainable design initiatives with clear and practical actions.



GREENHOUSE GAS EMISSIONS PROFILE

The emissions profile for assets under Council’s operational control in FY2021/2022 is provided below.



The greatest emissions sources are attributed to operational electricity (Scope 2) and embodied emissions (Scope 3) for construction materials and services. Both emissions sources are directly associated with operation, construction, maintenance and refurbishment of Council buildings.

Emissions from natural gas consumption, refrigerant gases in air conditioning (Scope 1), water consumption (Scope 3), as a result of electricity used for pumping and filtration, and Council waste from operations (Scope 3), account for an additional 8% of total annual emissions.

As such, the design, construction, and operation of buildings provides a significant opportunity for emissions reduction to help achieve Council's Carbon Neutral target and support operational savings.

ENVIRONMENTALLY SUSTAINABLE DESIGN (ESD) FRAMEWORK

SCOPE

The *ESD Guidelines* must be applied to all building projects and refurbishments, acknowledging that varying project scales and building types will impact the ability to implement all sustainable design initiatives. As such the guidelines have been organised into two distinct project types to provide suitable initiatives and considerations based on project scope and extent.

A description of each project type is summarised below:



New Building Work

All new building development projects, including extensions and complete refurbishments of existing buildings or significant building elements (e.g. façade, roof, plant equipment).



Minor Works and Refurbishments

Includes minor updates, building repairs and ‘quick wins’ as well as new fit outs and fit out refurbishment.



HOW TO USE THESE GUIDELINES

This document provides a checklist for each project type. Each checklist is arranged into ESD categories (e.g. Energy Efficiency, Climate Adaptation) and provides a short objective, then itemises specific ESD initiatives. Each initiative is accompanied by a check box for review. All yellow highlighted initiatives are mandatory, and a project response is required against all initiatives to confirm the adopted strategy or provide an explanation for exclusion.

It is recommended that the checklists are reviewed throughout project delivery to ensure ESD requirements are being incorporated. For New Building Works the checklist provides two key reporting milestones, concept design and detailed documentation stages. This document also provides the following sections to support understanding and delivery of the ESD initiatives:

1. Roles and Responsibilities

A summary of key responsibilities for the successful implementation of these ESD Guidelines

2. Decisions Making Framework

Guidance for evaluating ESD initiatives that attract significant upfront investment with consideration of the building's whole-of-life impacts, potential emissions reduction, climate resilience and Council leadership.

3. Procurement Guidance

Outlines key inclusions in design brief and tender documentation.

4. Key ESD Concepts

A general overview of key ESD concepts including, Passive Design, Regenerative Design, Circular Economy, Net Zero Emissions and Climate Resilience. This section is designed to provide greater explanation and appreciation for initiatives outlined in the checklist and assist the project team in understanding how to implement the guidelines and why they are important.

5. Appendix Specifications

Appendices A to H at the end of the document, as referenced in the Checklists, provide greater detail on ESD specification requirements for Sustainable Building Certifications, Air Conditioning Systems, TVOC and Lead limits, Sustainable Product Certification and recycled content (Materials), Water Efficiency Ratings, Refrigerants, Lighting criteria and Green Cleaning.



ROLES AND RESPONSIBILITIES

The table below provides a summary of key responsibilities for the successful implementation of these ESD Guidelines:

| Role | Responsibilities |
|--|---|
| Project Sponsor | <ul style="list-style-type: none"> • Championing ESD objectives. • Allocate allowance for ESD requirements in project budget. • Review of project stage checklists. • Facilitating resolution or exemption for non-compliance with project team. • Sign-off acceptance of design. |
| Project Manager | <ul style="list-style-type: none"> • Determination of project level (Minor works / Refurbishments / New Building Work). • Distribution of this document to wider project team (architect, services engineers, contractors etc) and communication of project level and project requirements, including completion of project stage checklists. • Coordination of project stage checklist with project team to ensure completion at the end of each project stage. • Regular meeting of internal teams/personnel for continual learning (i.e. coordination of lessons learnt sessions). |
| Wider Project Team (inclusive of architect, services engineers, consultants and contractors) | Implementation of ESD Guidelines. |
| All Council Staff | Awareness of ESD guidelines and commitment to emissions reduction and sustainability in daily operations/activities. |
| Climate and Sustainability Lead, City Design | <ul style="list-style-type: none"> • Document ownership. • Coordination of periodic reviews and associated updates to the ESD Guidelines. • Advice on ESD checklists and targets and assist with procurement evaluation. • Championing ESD objectives. |

DECISION MAKING FRAMEWORK

Council's Building Asset Management Plan informs the proactive management and renewal of buildings and is integrated with Council's Long-Term Financial Plan. Aligned with these plans, the initiatives outlined in the ESD Checklists may require a significant upfront investment and should be evaluated with consideration of the building's whole-of-life impacts and cognisant of the following principles and potential triggers:

| Principle | Trigger |
|-----------------------------|--|
| Return on Investment | Undertake financial payback analysis for projected savings in operational expenditure (OPEX) compared to upfront cost (CAPEX) to determine pay-back period of investment. |
| Emissions Reduction | Determine contribution to emissions reduction and alignment with Council strategy for Carbon Neutrality. |
| Climate Resilience | Mitigates climate change risks projected to impact the community by 2030 (short term), in particular for vulnerable persons. Refer section 5 Climate Resilience. |
| Building Lifecycle | Forward plan the intended building use, occupation and lifecycle of a building, considering future (or current) plans for modification, change or use and expected lifespan or end-of life for building services infrastructure. |

Leadership

Demonstrates sustainability leadership to the wider community (i.e., public building or marketing opportunity) with the possible potential to attract investment. Provides an opportunity to test innovations or transform the market (i.e., support local manufacturing) that can be applied to other buildings for benefit towards the principles above.

Case by case assessment

Engaging an experienced building services professional to undertake a building energy audit as part of assessment maintenance programs and audit can be a useful tool to understand the main sources of energy consumption in a building, provide options for infrastructure upgrades and quantify the benefit of an ESD initiative or investment.

Not all initiatives will have a direct financial benefit to Council expenditure and may support cost savings for tenants or provide other social and environmental benefits to the community. As such initiatives shall be evaluated against all criteria to determine implementation.



PROCUREMENT GUIDANCE

The project brief and tender documents should:

- Include ESD objectives as deliverables.
- Use the ESD checklist to develop the project specifications.
- For New Building Works ask consultants for return brief outlining how they will respond to ESD objectives for project.
- Utilise the opportunity to request options and pricing for significant initiatives in order to evaluate a business-as-usual offering against a high performance ESD solution (e.g. building services, façade glazing) with respect to investment.
- Encourage prospective contractors to highlight their commitment to emissions reduction and sustainability, summarising any initiatives they have already implemented or targets they are working towards to assist with tender evaluation.
- Consider contractors with previous experience in ESD during procurement.
- Allocate weighting for ESD in tender evaluations.

Key inclusions to review in tender responses for ESD best practice include:

- Head Contractor holds and maintains an ISO14001 Environmental Management System (EMS) Accreditation throughout the duration of the contract and develops and implements a project specific Environmental Management Plan (EMP) for larger projects.
- Head Contractor provides quality site worker management practices, including provision of gender inclusive facilities and PPE and implementation of on-site policies to address and report issues of discrimination, racism and bullying onsite and support health and wellbeing for larger projects.
- Review lifecycle costing, target the best long-term value to Council, rather than the cheapest upfront cost.
- Review specification inclusions for alignment with ESD guidelines for materials – Refer Appendix C and Appendix D and give preference to local procurement.
- Review specification for alignment with ESD guidelines for air conditioning, refrigerants, lighting and fixtures and fittings – Refer Appendix B, Appendix E Appendix F and Appendix G.
- Preparation of handover information including Operation & Maintenance Manuals (O&Ms) for all applicable building services at a minimum and Building Logbook in accordance with CIBSE TM31 for larger projects.

- Sufficient commissioning activities and commitment to ongoing tuning of new building services for optimal performance.
- Onsite initiatives to reduce construction emissions (e.g. electric powered equipment, minimise idle vehicles). This could be an innovation question to provide low emission site amenities and equipment / machinery.

Request for tender should also utilise the opportunity to request options and pricing for significant initiatives in order to evaluate a business-as-usual offering against a high performance ESD solution (e.g. building services, façade glazing) with respect to investment.

It is also recommended to encourage prospective contractors to highlight their commitment to emissions reduction and sustainability, summarising any initiatives they have already implemented or targets they are working towards for tender evaluation.



KEY ENVIRONMENTALLY SUSTAINABLE DESIGN (ESD) CONCEPTS

The sections below provide an explanation of key themes nominated in the ESD guidelines:

1. Passive Design

The cornerstone of energy efficiency and thermal performance in any building is understanding the principles of Passive Design, in which the building design responds to the local climate to maintain comfortable temperatures internally.

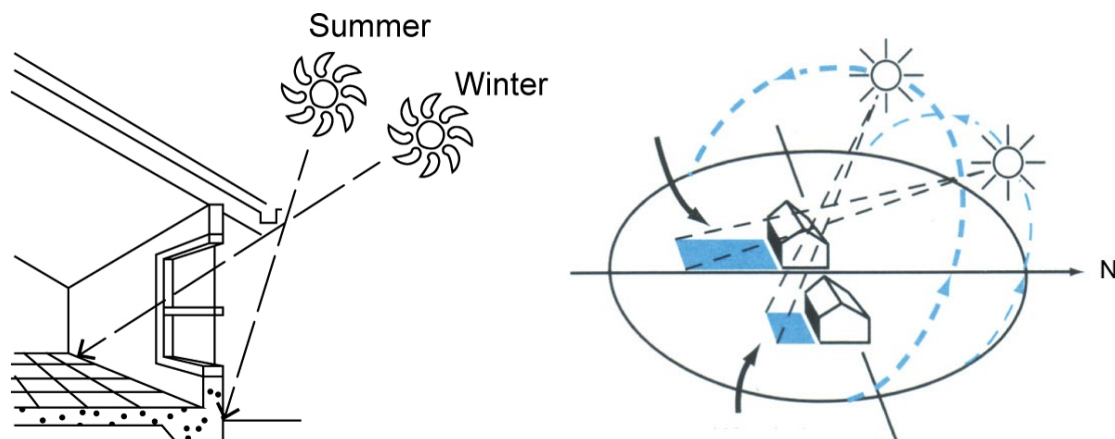


Figure 1: Sun movement from high angle in summer to low angle in winter, Source: Your Home [1]

There are four key aspects in understanding Passive Design:

Orientation

1

The direction the building and in particular windows are located can be optimised to work with the sun path to utilise passive solar energy. The sun travels through the Northern part of the sky, rising in the East and setting in the West and is lower in the Winter and higher in the Summer, which can be harnessed over the seasons to provide free heating (in winter) and reduce overheating (in summer).

Insulation

2

When the building envelope (external walls, roof and floors) are fitted with insulation, this inhibits the transfer of heat both into and out of the home. This means that the heater or air conditioner will run more efficiently, or might not be required at all, to maintain comfortable indoor temperatures.

Thermal Mass

3

Heavy, dense building elements such as concrete and brick have a 'Thermal Mass', which means they absorb heat energy. This energy is stored and released at a later time, known as a 'Thermal Lag'. In summer thermal mass elements will absorb heat, keeping the building cooler during the day, and release that energy at night-time when evening breezes can purge the building of built-up heat. In winter, heat released at night will help to warm the building as temperatures lower.

Glazing

4

Windows are an important element in all buildings. Whilst providing light, views and ventilation, they can also be a significant source of heat loss during winter and of unwanted heat gain during summer. Careful consideration of the size of the windows (window-to-wall ratio) as well as the orientation and shading is crucial to passive design and to achieve an agreeable balance between amenity and comfort.

2. Regenerative Design

Regenerative design is an approach that aims to have a positive environmental and social impact on the site, surrounding environment, and natural ecosystem. By reconnecting humans with nature, regenerative design works towards a living systems approach, where the built environment is part of closed loop system which shares materials, energy and water and ultimately can be safely returned to the biosphere when at end of life. This directly aligns with a circular economy approach (see above) by reducing the extraction of resources and also extends the net zero transition by simply reducing impacts and mitigating climate change, to having a net positive impact on the environment.

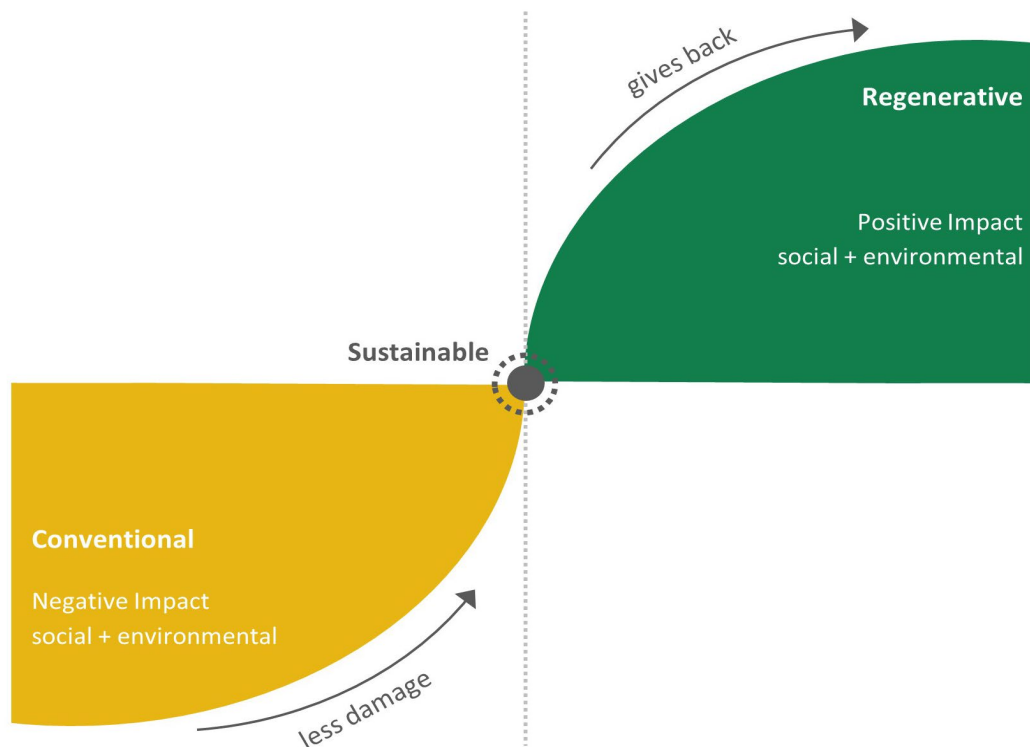


Figure 2: Regenerative Design, Source: dsquared Consulting

Benefits to the community in this approach is regenerating sites with a net increase in vegetation and tree canopy by integrating landscaping and plantings that improve biodiversity, soil conditions and habitats, while also eliminating the use of hazardous materials and pollutants and mitigating the effects of climate change, including urban heat island effect.

3. Circular Economy

The Circular Economy is an economic model that aims to retain the value of resources, products, parts, and materials as part of a circular model. It aims to create innovative business models that promote long life, maximise reuse, encourage refurbishment, and boost the use of renewable materials. A Circular Economy prioritises the reuse and recycling of materials to minimise and ultimately eliminate waste in a closed loop ‘circular’ system. This concept is in contrast to the current linear model of ‘take-make-dispose’ and encourages projects to reduce and avoid consumption in the first instance.

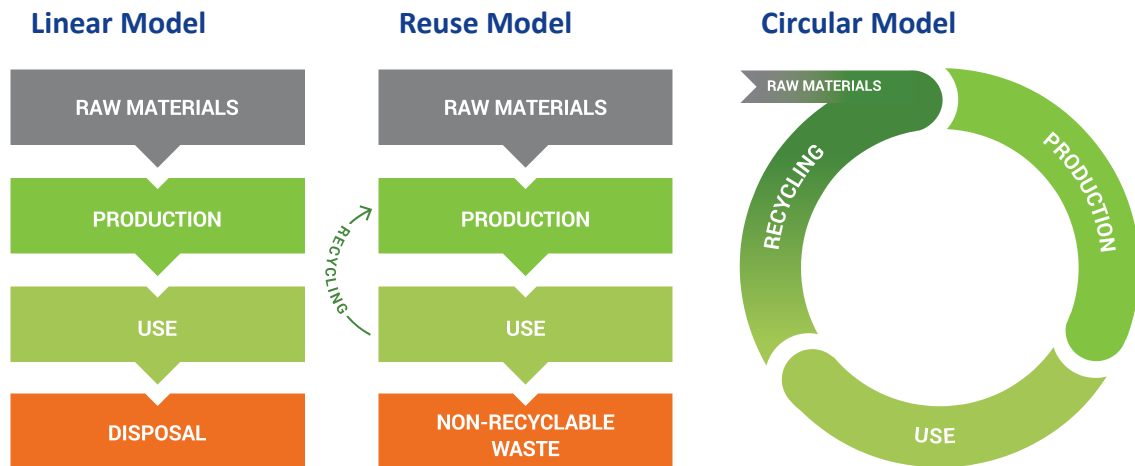


Figure 3: Linear, reuse and circular economy models, Source: Circular Economy in South Australia’s Built Environment Action Plan [3]

In addition to transitioning from a linear to circular economy, there are multiple levels of circularity, where the highest priority is to avoid or prevent the use of raw materials and the lowest priority is energy recovery. Processes which historically would have aimed to minimise impact on the environment can be redesigned to regenerate or improve natural ecosystems. This could be enhanced through engagement with Aboriginal and Torres Strait Islander peoples for knowledge sharing and understanding traditional land management practices.



4. Net Zero

(to meet Council’s 2030 Carbon Neutral Target)

Mitigating the impacts of climate change requires emission reduction activities, which include reducing emissions through the built environment. The concept of Net Zero is when greenhouse gases going into the atmosphere are balanced by removal out of the atmosphere. The emissions generated by the built environment, including embodied emissions from materials and equipment, and operational emissions such as energy, refrigerants and waste, can be quantified and offset by other activities that sequester carbon. This process is known as carbon sequestration via carbon sinks and carbon offsetting which involves the purchase of accredited carbon offsets to neutralise the emissions generated by the project.

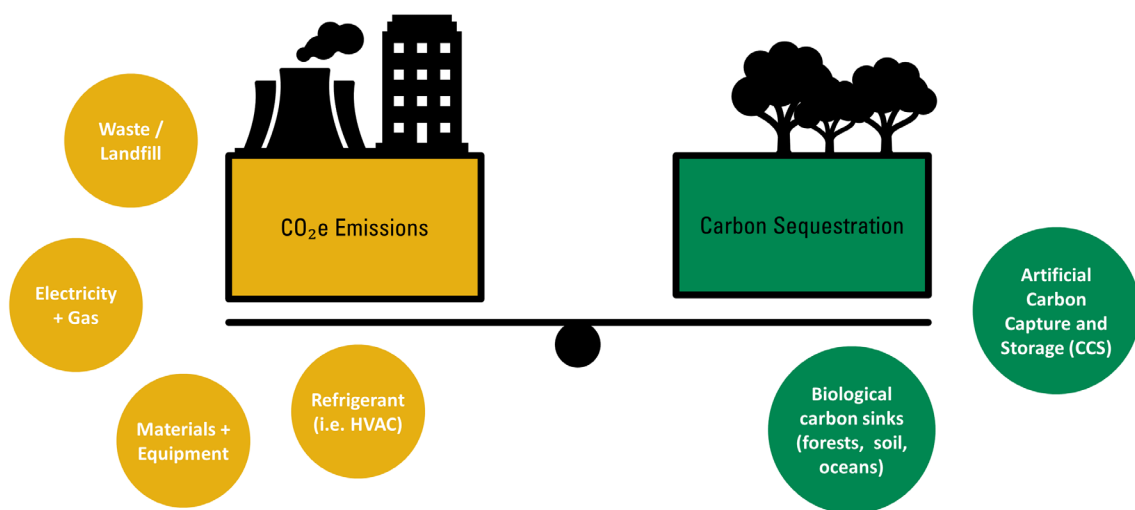


Figure 4: Net Zero emissions, Source: dsquared Consulting

Carbon sequestration can occur through biological carbon sinks such as forests, soil and oceans, or through artificial Carbon Capture and Storage (CCS) initiatives, which involves technological interventions. Carbon offset projects are developed based on sequestration activities, such as planting forests, but can also include projects that support emissions reduction and avoidance, for example investing in the development of renewable energy infrastructure or replacing fossil fuel cooking with electric alternatives in developing countries. As such these projects can also deliver social and economic benefits to communities over and above emissions reduction.

All projects should focus on emissions reduction opportunities in the first instance before choosing to offset.

5. Climate Resilience

Emissions reduction aims to mitigate the impacts and risks of severe climate change variables. Conversely, climate resilience addresses the preparedness and capacity of systems including social, economic, engineered, natural and ecosystems, to manage the trends, hazards and disturbances of a changing climate. A resilient built environment is designed for a future climate, or has the ability to adapt, so that it continues to function and support the health, wellbeing and safety of the occupants, particularly those that are vulnerable.

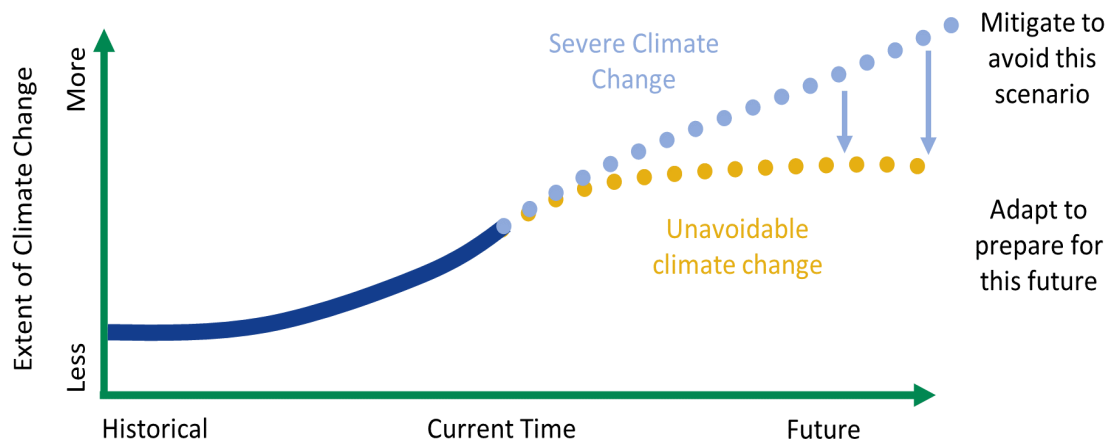


Figure 5: Climate resilience and mitigation, source: dsquared Consulting

Projects should review the climate change projections [2] for the period the development is operating (e.g. 2030 and 2070/2090) and assess the potential impacts and risks to the projects. Common design responses have been included in the ESD checklists for consideration by the project team. The below is an example of climate change variables for 2030 however it should be noted that the 2030 projections are expected to be met earlier.

| | | |
|---|---|---|
| | | |
| Average annual temperature increase up to | Decrease in seasonal rainfall by up to | Increase in extreme heat and heatwaves of up to |
| ↑ 1.1°C | ↓ 10% | +7 days |
| More frequent periods of hot days and extreme heat. Increased energy demand or cooling in summer. | Increased rainfall intensity (i.e., downpours) and rainfall variability and associated waterway flooding. | per year above 35°C, resulting in an increased risk of heat related illnesses and death, and electricity outages. |

New Building Works

ESD Checklist



NEW BUILDING WORKS

This checklist must be completed for at least two design reporting milestones in project delivery, concept design and then detailed documentation stages. Use the completed checklist to develop the procurement specifications. All highlighted initiatives are mandatory.

Project name:

Approved By:

Date Approved:

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|----------------|---------------------------------------|--------------|------------------------------|--------------|
|----------------|---------------------------------------|--------------|------------------------------|--------------|

Brief Development – Establish overarching sustainability goals and vision for the for the building, with multi-stakeholder input and consideration for building occupants and users.

| | | | | |
|-----------------|--|--|---|--|
| ESD Workshop | Conduct multi-stakeholder workshop to develop project specific ESD vision and goals to drive design and decision making. Consider attaining a Green Building Certification – refer Appendix A | | Review design against project ESD vision and key sustainability goals. | |
| User Engagement | Undertake surveys or focus groups with users (current/future) of the facility to identify opportunities for improvements with response to, thermal, lighting and acoustic comfort, amenity, usability, health and wellbeing. | | Review developed design against user surveys to ensure it is 'fit for purpose'. | |

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|----------------------|--|--------------|------------------------------|--------------|
| Innovation | Consider opportunities for innovation above and beyond standard building practices to foster transformation in supply chain, adopt new technology or demonstrate leadership. | | N/A | |
| Culture and Heritage | Consider incorporating design initiatives that celebrate local heritage and indigenous culture (e.g. colours, artwork, patterns, place making/naming) | | N/A | |

Brief Development Comments:

Passive Design – Create an efficient building envelope that limits heat transfer in and out of the building to maintain comfortable internal temperatures, minimising the need for active heating and cooling.

| | | | | |
|----------------------------------|--|--|--|--|
| Site Selection | Prioritise selecting sites to maximise passive design opportunities, considering orientation to North and natural shading. | | N/A | |
| Energy Modelling / Façade Design | Mandatory Undertake early design energy modelling to guide design. | | Mandatory Undertake energy modelling to optimise the design and improve performance – 20% less energy use than NCC Section J minimum. | |

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|-----------------|---|--------------|--|--------------|
| Façade Design | Optimise facade glazing arrangement / extent with external shading and ventilation strategies (e.g. openable windows) | | Mandatory Façade windows required to be double glazed units. Specifications and thermal breaks to be confirmed as part of energy modelling. | |
| Thermal Mass | Identify opportunities to include thermal mass (e.g. concrete slab, internal brick walls) | | N/A | |
| Insulation | Spatial allowance in wall thicknesses and roof design to accommodate insulation. | | Roof insulation to be placed at roof level within roof spacer system preferred. | |
| | NOTE: minimum insulation levels determined by energy modelling. | | | |
| Natural Shading | Consider using plants and trees to provide good shading to improve cooling, air quality and visual appeal of building. Where this is impractical, for e.g in cooler periods, passive heating methods should be applied. | | N/A | |

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|----------------|---------------------------------------|--------------|------------------------------|--------------|
|----------------|---------------------------------------|--------------|------------------------------|--------------|

Passive Design Comments:

Energy Efficiency - Seek strategies to remove all fossil fuels and develop all-electric designs for building services to enable 100% renewable energy operation and carbon neutrality.

| | | | | |
|--------------------------------|---|--|---|--|
| All electric building services | Mandatory Develop all-electric strategy for building services and equipment, including hot water (e.g. heat pump) and heating (e.g. reverse cycle air conditioning). No gas infrastructure to be included for base building services. | | Select/specify heat pump and HVAC with consideration of performance outlined in O and refrigerants outlined in F. | |
| Lighting | Mandatory All new lighting to meet criteria in Appendix G | | Mandatory All new lighting to meet criteria in Appendix G | |
| Metering and Monitoring | Mandatory Provide energy and water submetering for lighting, general power and individual uses greater than 20kVA separately. | | Mandatory Specify automatic monitoring system connected to submetering, capable of detecting faults, raising alerts and provide data reporting. | |

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|----------------|---------------------------------------|--------------|------------------------------|--------------|
|----------------|---------------------------------------|--------------|------------------------------|--------------|

Energy Efficiency Comments:

Renewable Energy – Reduce operational building emissions through supply of 100% renewable energy.

| | | | | |
|-----------------|---|--|---|--|
| Solar PV | Spatial allowance for Solar PV on rooftop in consideration with other building services equipment and overshadowing. | | Solar PV design to be optimised based on the facility’s load and available rooftop as part of a renewable energy assessment and financial analysis. | |
| Battery Storage | Spatial allowance for battery or thermal energy storage with consideration for ventilation, fire safety and protection from the elements. | | Battery or thermal energy storage to be considered with a financial, back-up power and resilience analysis. | |

Renewable Energy Comments:

Water Efficiency – Develop building designs that minimises potable water consumption in operations.

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|-------------------------------------|--|--------------|--|--------------|
| Fittings, fixtures and appliances | New fittings, fixtures and appliances shall be high efficiency (high WELS ratings), refer to Appendix E. | | Mandatory Select/specify fittings, fixtures and appliances with highest possible WELS rating, refer to Appendix E | |
| Rainwater Harvesting | Spatial allowance for rainwater collection. | | Reticulation provided for rainwater reuse for landscaping irrigation <u>AND</u> WC flushing, where roof catchment area is significant. | |
| Water Sensitive Urban Design (WSUD) | Include WSUD elements in drainage design to contribute to landscape design and urban cooling (e.g. permeable materials). | | Review design to ensure WSUD initiatives have been achieved. | |
| Irrigation | N/A | | Landscaping to include subsurface dripper irrigation. | |
| Air Conditioning | Air conditioning system to include no water-based heat rejection (i.e. no cooling towers), refer to Appendix B . | | N/A | |

Water Efficiency Comments:

Indoor Environment Quality (IEQ) – Enhance occupant comfort, health and wellbeing and experience within the indoor spaces.

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|--------------------|---|--------------|--|--------------|
| Thermal Comfort | Markup thermal boundary/envelope to guide efficient construction detailing. | | Incorporate Air Permeability testing in specifications to verify construction quality. | |
| Daylight and Glare | Optimise façade glazing to maximise natural daylight, whilst balancing thermal comfort and thermal energy performance (HVAC). | | All windows in regularly occupied spaces shall be fitted with operable blinds to mitigate the effects of glare. | |
| Handwashing | N/A | | Provide hands-free soap dispensers and taps for best practice hygiene and cross contamination management. | |
| Acoustics | Engage suitably qualified engineer to develop tailored acoustic solutions, including acoustic lining/panels and insulation. | | All partitions separating enclosed spaces shall meet dBRw45, or dBRw35 when containing a door. dBRw50 shall be achieved through floors between occupied spaces. To be reviewed by acoustic consultant. | |
| Air Quality | N/A | | Mandatory All internally applied paints, adhesives, sealants, carpets and engineered timber to have low VOC content, including formaldehyde. Refer to Appendix C for maximum permitted levels. | |

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|------------------------------|--|--------------|---|--------------|
| Carbon Dioxide Control (IAQ) | <p>Outside air supply shall be minimum 50% higher than AS1668.2 requirements.</p> <p>Mechanical design to consider CO₂ monitoring with demand control ventilation to limit internal CO₂ levels to maximum 700 ppm in regularly occupied areas.</p> | | <p>50% higher outside air than AS1668.2 requirements achieved. accommodate increased outdoor air rates.</p> <p>CO₂ monitors shall be located in each individually controlled supply zone so they are an accurate representation of concentration in occupied spaces.</p> | |

Indoor Environment Quality (IEQ) Comments:

Climate Resilience – Design buildings that are resilient to the impacts of a changing climate and natural disasters.

| | | | | |
|--------------------|--|--|---|--|
| Heat Island Effect | <p>Mandatory</p> <p>All new roofing to be light in colour.</p> <p>Minimise hardscaping elements (e.g. concrete, paving) and dark surfaces (asphalt), and consider high albedo or permeable materials as alternatives.</p> | | <p>Mandatory</p> <p>Specify/select roofing materials with an initial Solar Reflectance Index (SRI) minimum 39.</p> | |
| Shading | <p>Incorporate external shading (trees, canopies, awnings) to provide a cooling effect in summer.</p> | | N/A | |

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|----------------------------|---|--------------|---|--------------|
| Back-up Power | Consider incorporating back-up power systems for emergency response capabilities. | | N/A | |
| Building Services Design | <p>Mandatory</p> <p>HVAC equipment to be sized for projected climate temperature increase. Summer HVAC design set point increased by 2°C above current AIRAH standard set-points.</p> <p>Refer to Appendix B for HVAC system specifications.</p> | | <p>Mandatory</p> <p>Electrical supply infrastructure to be sized for increased air-conditioning energy demand.</p> | |
| Stormwater System Capacity | Oversize gutters and stormwater system to accommodate projected increase in peak rainfall events. | | N/A | |
| HVAC Air Filtration | Provide carbon filtration in HVAC system (permanent or temporary) to mitigate impacts of bushfire smoke inundation. Permanent filtration will increase indoor air quality but will have an impact on energy performance. | | Provide procedures / guidelines on increased air filtration maintenance and operation. | |

Climate Resilience Comments:

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|----------------|---------------------------------------|--------------|------------------------------|--------------|
|----------------|---------------------------------------|--------------|------------------------------|--------------|

Circular Economy – Retain the value of resources by avoiding consumption, prioritizing reuse and recycling, reducing embodied emissions and subsequently minimising waste.

| | | | | |
|------------------------------------|---|--|--|--|
| Embodied Emissions | Consider design alternatives to avoid high emission materials and consider opportunities to reduce embodied energy through minimalist design strategies or innovative services, such as ‘lighting-as-a-service’ or hire/rental services for fitout items. | | Undertake Life Cycle Assessment (LCA) with minimum 20% embodied emissions reduction. | |
| Sustainable and Circular Materials | <p>Prioritise selection of recycled, reused, local and sustainably certified materials – Refer Appendix D</p> <p>Prioritise materials that have ease of disassembly, the potential for reuse and support modularity, for a higher material value at end-of-life.</p> <p>Preference materials and appliances that are capable of being repaired.</p> | | <p>Mandatory</p> <p>Timber shall be sustainably sourced (e.g. FSC certified) and steel sourced from a responsible steel maker.</p> <p>Pipes, cables, flooring and blinds shall be PVC free or meet Best Practice Guidelines.</p> <p>Concrete mix to have minimum 30% SCM content (e.g. fly ash) or comprise a low-carbon concrete mix. Refer Appendix D</p> | |

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|-----------------------------------|--|--------------|---|--------------|
| Construction and Demolition Waste | Identify opportunities to reduce impact of demolition activities, including reusing site materials as part of the new construction, as well as material and fit-out reuse and recycling on other projects. | | Mandatory >90% landfill diversion for C&D waste. | |
| Operational Waste | Mandatory Spatial allowance for separation and storage of waste including general waste, comingled recycling and organics at a minimum. | | Mandatory Operational waste management to include general waste, comingled recycling and organics at a minimum. Specialist waste (i.e. batteries, electronics) to be considered based on facility type. | |
| Hand Drying | N/A | | Provide recycled paper towels, <u>Or</u> Provide Jet Air Dryers with HEPA filters to reduce GHG emissions associated with energy consumption and manufacturing, and waste to landfill. | |

Circular Economy Comments:

Nature – Reduce negative impacts on the environment and support increase of biodiversity and greening of the urban environment for human connection.

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|-----------------------|---|--------------|---|--------------|
| Biodiversity | N/A | | Include drought tolerant, native plantings as part of landscaping to increase biodiversity. | |
| Tree Canopy | Mandatory No net long term tree canopy loss. Identify opportunities for project to contribute to tree canopy target. Ensure project maximises retention and planting of canopy trees. | | N/A | |
| Connection to nature | Incorporate design elements that increase human connection to nature (e.g. views to the outside, nature patterns, interior plants). | | N/A | |
| Stormwater management | Evaluate opportunities to reduce stormwater discharge and pollutants through onsite initiatives, including Water Sensitive Urban Design (WSUD). | | Mandatory Post development stormwater discharge should not exceed predevelopment discharge flows. Provide pollutant reduction initiatives where designs include carparking. | |

Nature Comments:

Transport – Facilitate a reduction of the dependency on private fossil fuel car use and encourage uptake of sustainable transport alternatives.

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|-------------------|--|--------------|---|--------------|
| End of Trip (EOT) | Incorporate EOT facilities into spatial planning, allowing for shower and change facilities, secure all weather bike storage and lockers. | | Review design to ensure EOT facilities have been included. Provide secure E-Bike/Scooter charging facilities. | |
| Electric Vehicles | Ensure planning and budget considers EV infrastructure charging requirements and EV fleet transition for the site. Also consider safety requirements for enclosed EV parking, such as appropriate sprinkler systems. | | Incorporate electric vehicle charging stations or provision for EV infrastructure (e.g. conduits, electrical board capacity) into carparks. | |

Transport Comments:

Construction Requirements and Handover – Provide responsible onsite practices to facilitate optimised building performance and informed building handover to occupants and FM teams.

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|-------------------|---------------------------------------|--------------|---|--------------|
| Commissioning | N/A | | <p>Mandatory</p> <p>All appropriate contractors shall pre-commission, commission and monitor quality of building services in accordance with CIBSE Commissioning Codes, ASHRAE Guideline 1-1996 and AIRAH DA27 and DA28. Commissioning Reports to be provided.</p> | |
| Mechanical Tuning | N/A | | <p>The contractor shall undertake quarterly tuning of all mechanical and electrical systems for minimum 12 months post practical completion to ensure systems perform to their design potential.</p> | |
| Ductwork | N/A | | <p>Mandatory</p> <p>All new ductwork shall be cleaned at the fabricators and delivered to site bagged and protected and maintained in a clean condition during construction activities. Refer to Appendix B .</p> | |

| ESD Initiative | Planning / Concept Stage Requirements | Achieved Y/N | Detailed Design Requirements | Achieved Y/N |
|----------------------|---------------------------------------|--------------|---|--------------|
| Building Information | N/A | | Mandatory Contractor shall provide Operation & Maintenance Manuals (O&Ms) for all applicable building services and Building Log Book in accordance with CIBSE TM31 to AHC in digital format for distribution to facilities/property management. | |

Construction Requirements and Handover Comments:

Minor Works and Refurbishments

ESD Checklist



MINOR WORKS AND REFURBISHMENT

This checklist must be completed at project initiation. Use the checklist to guide procurement for the project, and review prior to construction commencement to ensure ESD objectives are being met. All highlighted initiatives are mandatory.

Project name:

Approved By:

Date Approved:

| ESD Initiative | Requirements | Achieved Y/N |
|----------------|--------------|-----------------|
|----------------|--------------|-----------------|

Brief Development – Establish overarching sustainability goals and vision for the project, with consideration for building occupants and users.

| | | |
|----------------------|--|--|
| User Engagement | Undertake surveys or focus groups with users (current/future) of the facility to identify opportunities for improvements with response to, thermal, lighting and acoustic comfort, amenity, usability, health and wellbeing. | |
| Culture and Heritage | Consider incorporating design initiatives that celebrate local heritage and indigenous culture (e.g. colours, artwork, patterns, place making/naming) | |

Brief Development Comments:

Passive Design – Create an efficient building envelope that limits heat transfer in and out of the building to maintain comfortable internal temperatures, minimising the need for active heating and cooling.

| | | |
|------------------|---|--|
| External Shading | Review current shading strategy and install new external shading to windows exposed to solar heat gain. | |
| Ventilation | Provide opportunities for natural ventilation (e.g. openable windows/door). | |

| ESD Initiative | Requirements | Achieved Y/N |
|----------------|---|-----------------|
| Insulation | <p>Mandatory</p> <p>Replace ineffective insulation, including around services (lagging, hot water storage covers) and install insulation where absent and practical to do so. Suggested minimum performance R-Values:</p> <ul style="list-style-type: none"> • Walls/Floors – R2.5 • Roof/Ceiling – R4.0 | |

Passive Design Comments:

Energy Efficiency - Seek strategies to remove all fossil fuels and develop all-electric designs for building services to enable 100% renewable energy operation and carbon neutrality.

| | | |
|-----------------------------|--|--|
| Building Services | <p>Mandatory</p> <p>Identify inefficient building services and those at end-of-life and preference all-electric options for replacement services. In particular, under bench hot water units, small instant gas systems, and window mounted air-conditioners.</p> | |
| Fossil Fuel Transition Plan | Develop CAPEX transition plan for fossil fuel powered services not being replaced. | |
| Lighting | <p>Mandatory</p> <p>Replace all non-LED lighting (i.e. incandescent and fluorescent). All new light fittings to meet criteria in Appendix G .</p> | |
| Metering and Monitoring | Ensure accessible energy and water metering for all common uses and major uses, connected to the Building Management System (BMS) for monitoring consumption and trends. | |

Energy Efficiency Comments:

| ESD Initiative | Requirements | Achieved Y/N |
|----------------|--------------|-----------------|
|----------------|--------------|-----------------|

Renewable Energy – Reduce operational building emissions through supply of 100% renewable energy.

| | | |
|-----------------|---|--|
| Solar PV | Solar PV to be optimised based on the facility’s load and available rooftop as part of a renewable energy assessment. | |
| Battery Storage | Battery or thermal energy storage to be considered with a financial, back-up power and resilience analysis. | |

Renewable Energy Comments:

Water Efficiency – Develop building designs that minimises potable water consumption in operations.

| | | |
|-----------------------------------|---|--|
| Fittings, Fixtures and Appliances | <p>Mandatory</p> <p>New fittings, fixtures and appliances shall be high efficiency (high WELS ratings). Refer to Appendix E for minimum performance star ratings.</p> <p>Consider replacing existing fixtures and fittings where the star rating is below minimum performance recommendations.</p> | |
| Rainwater Harvesting | Install rainwater collection and reticulation for use in toilets and laundry, or for landscape irrigation. | |

Water Efficiency Comments:

Indoor Environment Quality (IEQ) – Enhance occupant comfort, health and wellbeing and experience within the indoor spaces.

| | | |
|--------------------|---|--|
| Daylight and Glare | Review opportunities to increase access to natural daylight and external views. (e.g. larger windows, reduced partitions). Install operable blinds to all windows in regularly occupied spaces. | |
|--------------------|---|--|

| ESD Initiative | Requirements | Achieved Y/N |
|-----------------|---|-----------------|
| Thermal Comfort | <p>Mandatory</p> <p>Replace ineffective weather seals around existing windows and doors and caulk/seal all gaps in construction, which are sources of air infiltration.</p> <p>Consider benefits of conducting Air Permeability testing to identify locations for remediation.</p> | |
| Acoustics | <p>Engage a suitably qualified engineer to provide tailored acoustic solutions based on extent of refurbishment and practicality, including acoustic lining/panels and retrofitting insulation.</p> | |
| Air Quality | <p>Mandatory</p> <p>All internally applied paints, adhesives, sealants, carpets and engineered timber to have low VOC content, including formaldehyde.</p> <p>Refer to Appendix C for maximum permitted levels.</p> | |
| Handwashing | <p>Provide hands-free soap dispensers and taps for best practice hygiene and cross contamination management.</p> | |

Indoor Environment Quality (IEQ) Comments:

Climate Resilience – Design buildings that are resilient to the impacts of a changing climate and natural disasters.

| | | |
|--------------------|---|--|
| Heat Island Effect | <p>Mandatory</p> <p>All new or replacements roofing to be light in colour with an initial Solar Reflectance Index (SRI) minimum 39.</p> <p>Minimise hardscaping elements (e.g. concrete) and dark surfaces (e.g. asphalt) and consider high albedo or permeable materials as alternatives.</p> | |
|--------------------|---|--|

| ESD Initiative | Requirements | Achieved Y/N |
|----------------------------|---|-----------------|
| Building Services Design | <p>HVAC equipment to be sized for projected climate temperature increase. Summer HVAC design set point increased by 2°C above current AIRAH standard set-points to cater for projected temperature increase.</p> <p>Electrical supply infrastructure to be sized for increased air-conditioning energy demand.</p> <p>Refer to Appendix B for HVAC system specifications.</p> | |
| Back-up Power | <p>Consider incorporating back-up power systems for emergency response capabilities.</p> | |
| Stormwater System Capacity | <p>Oversize gutters and stormwater system to accommodate projected increase in peak rainfall.</p> | |
| HVAC Air Filtration | <p>Provide carbon filtration in HVAC system (permanent or temporary) to mitigate impacts of bushfire smoke inundation. Permanent filtration will increase indoor air quality but will have an impact on energy performance.</p> | |
| Shading | <p>Incorporate external shading (trees, canopies, awnings) to provide a cooling effect in summer. Where this is impractical, for e.g in cooler periods, passive heating methods should be applied.</p> | |

Climate Resilience Comments:

Circular Economy – Retain the value of resources by avoiding consumption, prioritizing reuse and recycling, reducing embodied emissions and subsequently minimising waste.

| | | |
|--------------------|--|--|
| Embodied Emissions | <p>Consider design alternatives to avoid high emission materials and consider opportunities to reduce embodied energy through minimalist design strategies or innovative services, such as ‘lighting-as-a-service’ or hire/rental services for fitout items.</p> | |
| Circular Materials | <p>Prioritise materials that have ease of disassembly, the potential for reuse and support modularity, for a higher</p> | |

| ESD Initiative | Requirements | Achieved Y/N |
|-----------------------------------|---|-----------------|
| Sustainable Materials | <p>material value at end-of-life. Preference materials and appliances that are capable of being repaired.</p> <p>Prioritise selection of recycled, reused, local and sustainably certified materials – Refer Appendix D</p> <p>Mandatory</p> <p>Timber shall be sustainably sourced (e.g., FSC certified) and steel sourced from a responsible steel maker.</p> <p>Pipes, cables, flooring and blinds shall be PVC free or meet Best Practice Guidelines.</p> <p>Concrete mix to have minimum 30% SCM content (e.g. fly ash) or comprise a low-carbon concrete mix. Refer Appendix D</p> | |
| Circular Materials | <p>Prioritise materials that have ease of disassembly, have the potential for reuse and support modularity, to maintain a higher material value at end-of-life.</p> <p>Preference materials and appliances that are capable of being repaired.</p> | |
| Construction and Demolition Waste | <p>Identify opportunities to reduce impact of demolition activities, including reusing site materials as part of the new construction, as well as material and fit-out reuse and recycling on other projects.</p> <p>>70% landfill diversion for C&D waste.</p> | |
| Operational Waste | <p>Mandatory</p> <p>Spatial allowance for separation and storage of waste including general waste, comingled recycling and organics at a minimum.</p> | |
| Hand Drying | <p>Provide recycled paper towels,</p> <p><u>Or</u></p> <p>Provide Jet Air Dryers with HEPA filters to reduce GHG emissions associated with energy consumption and manufacturing, and waste to landfill.</p> | |

| ESD Initiative | Requirements | Achieved Y/N |
|----------------|--------------|-----------------|
|----------------|--------------|-----------------|

Circular Economy Comments:

Nature – Reduce negative impacts on the environment and support increase of biodiversity and greening of the urban environment for human connection.

| | | |
|-----------------------|---|--|
| Landscaping | <p>Mandatory</p> <p>Include drought tolerant, native plantings as part of landscaping to increase biodiversity.</p> | |
| Tree Canopy | <p>Mandatory</p> <p>No net long term tree canopy loss. If a tree is removed, replacement tree should have equal or greater canopy cover as the one removed. Identify opportunities for project to contribute to tree canopy target. Ensure project maximises retention and planting of canopy trees.</p> | |
| Connection to Nature | <p>Incorporate design elements that increase human connection to nature (e.g. views to the outside, interior plants, water features, natures patterns, curves)</p> | |
| Stormwater Management | <p>Evaluate opportunities to reduce stormwater discharge and pollutants through onsite initiatives, including Water Sensitive Urban Design (WSUD).</p> | |

Nature Comments:

Transport – Facilitate a reduction of the dependency on private fossil fuel car use and encourage uptake of sustainable transport alternatives.

| | | |
|-------------|--|--|
| End of Trip | <p>Review current layout and consider opportunities to provide end-of-trip facilities, including secure all weather bike storage, showers, change areas and lockers. Provide secure E-Bike / E-Scooter charging facilities where possible.</p> | |
|-------------|--|--|

| ESD Initiative | Requirements | Achieved Y/N |
|-------------------|--|-----------------|
| Electric Vehicles | Incorporate electric vehicle charging stations or EV infrastructure provisions (e.g. conduits and electrical board capacity) into carparks where possible. | |

Transport Comments:

Environmental Management Plan Handover – Provide responsible onsite practices to facilitate optimised building performance and informed building handover to occupants and facilities/property management teams.

| | | |
|----------------------|---|--|
| Hazardous Materials | Conduct comprehensive Hazardous Materials Survey on existing facilities and remove or stabilise any materials composed of lead, asbestos or PCBs. Ensure register and management plan for identified materials is in place. | |
| Commissioning | <p>Major plant upgrades</p> <p>All appropriate contractors shall pre-commission, commission and monitor quality of new/upgraded building services in accordance with CIBSE Commissioning Codes, ASHRAE Guideline 1-1996 and AIRAH DA27 and DA28. Commissioning Reports to be provided.</p> | |
| Tuning | The contractor shall undertake quarterly tuning of all new/upgraded mechanical and electrical systems for minimum 12 months post practical completion to ensure systems are performing to design potential. | |
| Ductwork | <p>Mandatory</p> <p>All new air intake and supply ductwork shall be cleaned at the fabricators and delivered to site bagged and protected and maintained in a clean condition during construction activities.</p> | |
| Building Information | Contractor shall provide Operation & Maintenance Manuals (O&Ms) for all applicable building services for distribution to facilities/property management. | |

Environmental Management Plan Handover Comments:

Building Operation

ESD Checklist



BUILDING OPERATION

This checklist outlines opportunities for more sustainable building operations. The checklist can be used to periodically review building operations by facilities management teams and operational staff to identify opportunities for improvement.

Building/Site name:

Reviewed By:

Date Approved:

| ESD Initiative | Requirements | Implemented Y/N |
|------------------------------|---|--------------------|
| Performance Targets | <p>Set up a system for tracking sustainability performance (at building operation level) and set targets and periodic reviews. Performance metrics may include:</p> <ul style="list-style-type: none"> • Energy consumption (gas / electricity) • Water consumption • Waste diversion • Carbon emissions | |
| Operational Waste Management | <p>Schedule periodic waste audits to encourage sustainable waste behaviours by building users and ensure Council operational waste reduction targets are met.</p> | |
| Maintenance | <p>Schedule regular building maintenance to reduce prevention wear and tear and premature replacement of building elements and fitout.</p> | |
| HVAC | <p>Lower thermostat settings for heating and cooling, encouraging occupants to dress appropriately to be comfortable in a wider temperature band (every additional degree increases energy consumption by around 10%).</p> <p>Use 'auto-off' controls/programmes to turn-off heating/cooling after 2 hours (to ensure that it is not left on by default) and at the end of a typically day or period of occupation.</p> | |

| ESD Initiative | Requirements | Implemented Y/N |
|---------------------------|---|--------------------|
| Services Tuning | Undertake half yearly tuning of all mechanical and electrical systems (post initial 12-month DLP period) to ensure systems are performing to their design potential. | |
| Printing and Photocopying | <p>Select printing and photocopying equipment that are certified in accordance with the following pollutant emissions test standards:</p> <ul style="list-style-type: none"> • ECMA-328 • RAL-UZ 171 • GGPS.003 (Greenguard) <p>Preference the selection of Carbon Neutral and FSC certified paper suppliers.</p> | |
| Digital Operations | <p>Implement digital operations (paperless).</p> <p>Delete unnecessary emails (limit cloud-based storage) from inbox and reduce the number of emails sent (e.g. consolidate messages sent and unsubscribe from unwanted emails). Send large files via cloud-based storage rather than attachments (e.g. One Drive, Liquid Files).</p> <p>Procure Carbon Neutral cloud-based data storage solutions or providers that operate data centres with 100% renewable energy.</p> | |
| Task Lighting | Provide user-controlled workstation task lighting, to minimise the use of main building lighting when conditions are suitable. | |
| Green Cleaning | Implementation of a 'Green Cleaning Policy' addressing safe storage, natural alternatives to chemical-based products, hand-hygiene, education and training, waste management, reducing water use, procurement of equipment and products and quality assurance systems. Refer to Appendix H for cleaning standards and general recommended guidelines. | |

| ESD Initiative | Requirements | Implemented Y/N |
|-------------------------|--|--------------------|
| Hand Drying | Provide recycled paper towels (or accredited with Green Seal-1 standard). | |
| Occupancy Surveys | Undertake periodic surveys with staff or users of the facility to identify opportunities for improvements with response to, thermal, lighting and acoustic comfort, amenity, usability, health and wellbeing (e.g. bespoke survey or third party framework such as BOSSA / SHE). | |
| Sustainable Procurement | <p>Implement sustainable procurement policy in accordance with ISO 20400.</p> <p>Preference to products and supplies that are locally made, recycled, reused and hold sustainably certifications, such as Carbon Neutral, GreenTag, GECA etc.</p> | |
| Irrigation | Install/set timers for irrigation to operate on an efficient schedule, including overnight when evapotranspiration is low. | |
| Promote Active Travel | Encourage staff to walk or ride staff e-bikes to site visits or meetings. | |

Review Comments:

ADDITIONAL RESOURCES

INDUSTRY INFORMATION

Further information on concepts discussed in these guidelines can be found at the following links:

Energy Rating

<https://www.energyrating.gov.au/>

Global GreenTag

<https://www.globalgreentag.com/>

Water Rating

<https://www.waterrating.gov.au/>

Good Environmental Choice Australia (GECA)

<https://geca.eco/>

Clean Energy Council Approved Solar Retailer

<https://www.cleanenergycouncil.org.au/consumers/buying-solar/find-an-approved-solar-retailer>

Steel Sustainability Australia

<https://www.steel.org.au/what-we-do/focus-areas/sustainability/environmental-sustainability-charter/>

Responsible Wood

<https://www.responsiblewood.org.au/>

Responsible Steel

<https://www.responsiblesteel.org/standard/>

Forest Stewardship Council

<https://fsc.org/en>

Air Tightness Testing and Measurement Association (ATTMA)

<https://www.bcta.group/attma/>

National Construction Code (NCC)

<https://ncc.abcb.gov.au/>

Air Infiltration and Ventilation Association Australia (AIVAA)

<https://aivaa.asn.au/>

Vinyl Council Best Practice PVC Guidelines

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

CSIRO – State of the Climate 2022

<https://www.csiro.au/en/research/environmental-impacts/climate-change/state-of-the-climate>

COUNCIL STRATEGIC PLANS, POLICIES AND DOCUMENTS

The following Council strategic plans, policies and documents are to be taken into account along with the requirement of these ESD Guidelines:

Corporate Plan

Four-Year Delivery Plan

Long Term Financial Plan

Asset Management Plans

Climate & Energy Plan

Disability Action & Inclusion Plan

Waste Management & Resource Recovery
Plan

Environmental Sustainability Strategy

Asset Management Policy

Climate Change Policy

Environmental Policy

Procurement Policy

Property Management Policy

Project Management Framework

Procurement Framework

REFERENCES

- [1] "Your Home: Australia's Guide to Environmentally Sustainable Homes," Australian Government, [Online]. Available: www.yourhome.gov.au.
- [2] DEW, "Climate science, information and resources," [Online]. Available: <https://www.environment.sa.gov.au/topics/climate-change/climate-science-knowledge-resources>.
- [3] Green Building Council of Australia (GBCA), "Circular Economy in South Australia's Built Environment Action Plan," 2023.

*Climate projections for City of Unley area obtained from NARClm 1.5 modelling and Guide to Climate Projections for Risk Assessment and Planning in South Australia 2022, prepared by the Department for Environment and Water. Projections based on high emissions scenario (RCP8.5) for 2030. These data sources are reviewed and updated periodically, and as such the projections are likely to change and should be revised accordingly. Refer <https://www.environment.sa.gov.au/topics/climate-change/climate-science-knowledge-resources/latest-climate-projections-for-sa>

Appendix A SUSTAINABLE BUILDING CERTIFICATIONS

Further to the initiatives and guidelines set out in this document, formalised Green Building Rating Tools and certification options can be considered for buildings and building projects. Recognized independent third-party certification provides assurance and validity to the achievement of sustainable outcomes and demonstrates leadership to the wider community. Certification schemes set a best practice or world leadership benchmark, well beyond minimum compliance, that drives projects and buildings towards excellence in sustainability.

A summary of applicable Green Building Rating Tools and certification options is provided below:



Green Star is Australia's principle rating system setting the standard for healthy, resilient, positive buildings and places, founded and administered by the Green Building Council of Australia (GBCA) since 2003. Developed for the Australian environment, Green Star has certified thousands of sustainable fitouts, buildings, homes and communities across the country.



5-Star Green Star certification demonstrates Australian Best Practice and 6-Star Green Star certification demonstrates World Leadership for building design and construction. The rating tool can be applied to fitout projects through the 'Interiors' tool, entire buildings through the 'Buildings' tool, and precinct masterplans using the 'Communities' tool and awards a one-time 'As Built' certification. In addition, ongoing building operational performance can be benchmarked through the 'Performance' tool and renewed every 3 years and can also support Carbon Neutral Certification through the Climate Active framework.



The WELL Building Standard is an internationally recognised rating system that takes a holistic approach to health in the built environment addressing behaviour, operations and design. The standard is developed and administered by the International Well Building Institute (IWBI) and is grounded in a body of medical research that explored the connection between the built environment and its impact on the health and well-being of occupants.

WELL uses a performance-based system for measuring, certifying, and monitoring features of the built environment through ten concepts – air, water, nourishment, light, movement, thermal comfort, sound, materials, mind and community.

The Standard can accommodate all project types and sectors, awarding Silver, Gold or Platinum certification levels. Certification is initially awarded following on-site performance verification testing of the completed building and can be renewed every 3 years through ongoing performance monitoring, testing and continuous improvement.

NABERS (National Australian Built Environment Rating System) provides simple, reliable, and comparable operational sustainability performance measurement across building sectors including, hotels, shopping centres, apartments, offices and data centres. NABERS is a national initiative managed by the NSW Government on behalf of the Federal, State and Territory governments of Australia, and awards a star rating that is benchmarked against similar buildings, where the highest rating is 6 Stars, indicating the building's performance is Market Leading.



Ratings are verified through robust performance data, including energy and water consumption, and valid for 12 months to represent up-to-date operational performance. This annual model assists building owners to accurately measure and communicate the environmental performance and progress of buildings, whilst also identifying areas for savings and improvements. NABERS is most commonly used to certify efficient energy performance, which can also support Carbon Neutral Certification through the Climate Active framework. It can also be used to certify Water, Waste and Indoor Environment.

The Climate Active Carbon Neutral Standard for Buildings is a voluntary standard to achieve carbon neutrality through Climate Active certification. It provides best-practice guidance on how to measure, reduce, offset and report emissions data for buildings and is an initiative of the Australian Government.



Buildings are eligible to achieve carbon neutral certification in conjunction with NABERS and Green Star ratings, through the purchase of eligible carbon offsets.

Appendix B AIR CONDITIONING SYSTEMS

Where air conditioning systems are installed, they should:

- Have an inverter compressor with minimum Coefficient of Performance (COP) of 3.7 and a minimum Energy Efficiency Ratio (EER) of 3.24.
- All split air conditioning units shall have the highest available energy star rating at the time of purchase.
- All ducted air conditioning systems shall 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 shall be inspected and thoroughly cleaned of all dust and debris prior to re-commissioning.
- Consideration should be given to the use of widened temperature set points, and alternative temperature set points in summer and winter seasons in order to reduce the size of HVAC plant required, and to reduce associated ongoing energy consumption.
- Use refrigerants in line with Appendix F .

Appendix C TVOC AND LEAD LIMITS

Limits below are in accordance with Green Building Council of Australia (GBCA) guidelines.

Paints, Adhesives, Sealants

| Product category | TVOC limit (g/L) | Lead |
|--|------------------|--|
| General Purpose adhesives and sealants* | 50 | Industrial surface paints and coatings shall not contain lead nor lead components. |
| 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' category of the table above, unless they clearly belong in the other specialised product categories.

Carpets

| Compliance Option | Test Protocol | TVOC Limit (mg/m ² per hour) |
|---------------------------------------|---|---|
| ASTM D5116 | ASTM D5116 - Total VOC limit* | 0.5 |
| | ASTM D5116 - 4-PC (4-Phenylcyclohexene)* | 0.05 |
| ISO 16000 / EN 13419 | ISO 16000 / EN 13419 - TVOC at three days | 0.5 |
| ISO 10580 / ISO/TC219 (Document N238) | ISO 10580 / ISO/TC 219 (Document N238) – TVOC at 24 hours | 0.5 |

Formaldehyde Limits (Engineered Wood Products)

| 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 |

Appendix D SUSTAINABLE PRODUCT CERTIFICATION & RECYCLED CONTENT

Minimum Requirements

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

The following products as a minimum shall be selected to have a third-party green certification:

- Internal blinds
- Flooring
- Carpets

These products shall be certified in accordance with one of the certification schemes for Product Certification:

- Global GreenTag GreenRate Level A
- Good Environmental Choice Australia (GECA)
- Cradle to Cradle Certified (Version 3.1 and 4.0)
- Climate Active Carbon Neutral for Products & Services
- Declare 2.0 – Red list Free
- The New Zealand Ecolabelling trust (ECNZ)

Purchasing of internal furniture shall give preference to selection of low emission internal finishes and furniture with an approved Eco-Rating as per above.

Best Practice Guidelines for PVC (BEP)

All common uses of PVC in the project shall be either PVC products sourced from manufacturers which meet the Vinyl Council of Australia's 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>

Environmental Product Declarations (EPDs)

Preference shall be given to the selection of construction materials which have an Environmental Product Declaration (EPD) certified in accordance with ISO 14025.

The following products as a minimum shall be selected to have a certified EPD:

- Internally applied paints
- Plasterboard

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

Recycled Content

Preference shall be given to the selection of construction materials which are recycled or have a recycled content. Post-consumer recycled content is preferred.

These may include:

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

Structural and Reinforcing Steel

Minimum 60% of steel, including structural and reinforcing bar and mesh used in concrete reinforcement in the buildings structure, shall be sourced from a Responsible Steel Maker, certified by:

- Australian Steel Institute Steel Sustainability Australia (SSA) Certification Program Technical Requirements Version 0.7 (Level 2a and level 2B as a minimum, Level 3 preferred)
- Responsible Steel Standard Version 1.1 and Version 2 (international)
- CARES Sustainable Constructional Steel- ACRS

Certified Timber

Timber used in the building and construction works shall be certified by a forest certification scheme that meets the GBCA's 'Essential' criteria for forest certification, such as:

- Forest Stewardship Council (FSC)
- Responsible Wood (Australian Member of PEFC)
- From a reused source
- Combination of any of the above

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).

Concrete

All concrete used in the project should target a 30-60% embodied emission reduction, through a combination of initiatives, such as reduction in Portland Cement content by using supplementary cement materials (SCMs – fly ash, slag etc), recycled water, recycled aggregates and local procurement. (e.g. Holcim EcoPACT).

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

Appendix E WATER EFFICIENCY RATING

Fixtures, Fittings and Appliances

All fixtures, fittings and appliances installed shall have the following minimum water efficiencies, as measured using AS/NZS6400:2005 Water-efficient products-Rating and labelling:

| Fixture/Fitting | Minimum Water Star Rating |
|-------------------------|----------------------------------|
| Taps | 6 Star WELS |
| WC | 4 Star WELS |
| Urinal | 5 Star WELS |
| Shower | 3 Star WELS |
| Dishwasher | 4 Star WELS |
| Clothes Washing Machine | 4 Star WELS |

Appendix F REFRIGERANTS

Summary of preferred refrigerants for air conditioning systems and hot water heat pumps.

All refrigerants shall have an Ozone Depletion Potential (OPD) of zero.

Refrigerants shall be selected with a strong emphasis on procuring those with the lowest Global Warming Potential (GWP) available. It is recognised that the refrigerants market is rapidly changing, and the lowest GWP refrigerants available may change.

The following table provides a guide to selecting refrigerants based on system type/capacity.

| System Type / Capacity | Recommended GWP | Examples |
|---------------------------------|--|--|
| Hot Water System (Heat Pump) | GWP less than 10 | Natural refrigerant e.g. CO ₂ |
| HVAC system > 50kW | GWP less than 500 | Natural refrigerant e.g. CO ₂ HFOs e.g. R1234ze R454b |
| HVAC system < 50kW | <i>First Preference:</i> GWP < 10 | Natural refrigerant e.g. CO ₂ HFOs e.g. R1234ze |
| | <i>Second Preference:</i> GWP < 800 | R410a R134a R407c |

Refrigerants with GWP between 800 and 2100 should be avoided where other refrigerant options or alternative design solutions are available.

Refrigerants with GWP greater than 2100 should not be used.

Appendix G LIGHTING

Summary of recommended lighting specifications.

The lighting design shall meet the following:

- Lighting levels and uniformity to be appropriate to tasks performed in the space, in accordance with AS 1680.1 for office and AS 1680.2 for all other uses.
- Include automatic controls based on the room function where possible, e.g. building automation systems, occupancy sensors to reduce unnecessary lighting in common areas, daylight sensors and automatic dimming, auto-off timers for infrequently used spaces.

All luminaires shall meet the following specifications:

- Have a colour rendering Index (CRI) of 85 or higher.
- Have a Standard Deviation Colour matching (SDCM) of 3 or lower.
- Be fitted with baffles, louvre, translucent diffuser (to obscure the direct light source).
- Are flicker free.

Appendix H GREEN CLEANING

Recommended guidelines for green cleaning.

All cleaning undertaken is recommended to be cognisant of the following general reference standards, including product selection:

- GECA Standard 17-2012 for Cleaning Products;
- ACCORD Environmental Credentials Scheme for Cleaning Products; and
- The Green Seal Standard for Cleaning and Degreasing Agents.

General guidelines and initiatives for a Green Cleaning strategy include:

- Use natural (non-toxic, phosphate free) alternatives to chemical based products for surface hygiene whenever practicable, such as vinegar, bicarbonate of soda and electrolysed water.
- All cleaning products shall low VOC and be free of the following ingredients:
 - Carcinogenic, mutagenic, or reprotoxic substances including H340, H350, and H360.
 - Systemic/toxicity organ impacting substances including H372.
 - Skin and respiratory irritating substances including H317 and H334.
- Consideration shall be given to reducing surface contamination at the source by using measures such as the installation of entry-way floor mats to reduce foot-bound dirt entry into the building.
- Use micro-fibre cloths and chemical-free, water-based cleaning tools, to minimise water and chemical use. Where available, use recycled water for cleaning of floors and external surfaces, in preference to potable water.
- Vacuum cleaners shall meet the requirements of the Carpet and Rug Institute “Green Label” Testing Program— Vacuum Cleaner Criteria, shall be capable of capturing 96% of particulates 0.3 microns in size using HEPA or other filters.
- Powered floor equipment, such as buffers and burnishers, shall be equipped with vacuums, guards and/or other devices for capturing fine particulates.
- All general and recyclable bin bags and liners shall be 100% fully bio-degradable.
- All organic bin bags and liners shall be 100% compostable.