



# Darebin ESD Building and Infrastructure Policy

Sustainable Design for Council Buildings and Infrastructure (internal practice policy)

<p><b>1.0 Purpose</b></p>	<p>1.1 The purpose of this document is to facilitate the delivery Environmentally Sustainable Development (ESD) into all building design and construction projects, major refurbishments, and building maintenance works at Darebin City Council.</p> <p>1.2 Darebin is responsible for over 300 buildings and there is a continual need for upgrades and new buildings costing millions of dollars each year. The policy sets out the minimum ESD standards that all building projects must achieve.</p> <p>1.3 The objectives of this policy and minimum requirements set out the necessary steps for Council to reduce its emissions and prepare for an uncertain future climate. Projects that implement this policy will align construction practices with the Council Plan sustainability ambitions and community expectations.</p> <p>1.4 Council building assets must aim to be designed and built to better withstand extreme weather events associated with a high emissions scenario (Representation Concentration Pathway 8.5) where emissions are expected to peak in 2100 around 936ppm CO<sub>2</sub>-e. Climate ready assets will cost Council and the community less over time due to decreased demanded for maintenance and repair as well as continue to reduce carbon emission and mitigate the impact of climate change on the community.</p> <p>1.5 In addition to addressing the long-term risk from climate change, buildings that integrate ESD have a positive return on investment within the lifecycle of the asset. Therefore, incorporating ESD into maintenance, renewal and development considerations is an important part of maximising community value from Council's funds.</p>
<p><b>2.0 Scope</b></p>	<p>2.1 This Policy applies to all projects within Council owned and/or managed buildings, including those managed by lessees and licensees.</p> <p>2.2 Where Council undertakes infrastructure projects such as roads, footpaths and drainage, the relevant ESD minimum standards for materials can be used voluntarily to guide best practice environmental outcomes.</p> <p>2.3 The Policy applies to the entire project life cycle covering all project stages including planning, design, demolition, construction, operation, maintenance, and disposal.</p>



2.4 This Policy focuses on environmental sustainability, however the importance of cultural, social, and financial aspects of sustainability should be acknowledged and considered within the scope of delivery as reasonably practicable.

### 3.0 Definitions and Abbreviations

ESD	Environmentally Sustainable Development
GBCA	Green Building Council of Australia <a href="http://www.gbca.org.au">www.gbca.org.au</a>
GECA	Good Environmental Choice Australia – Ecolabel sustainable and environmental materials and products database. <a href="http://www.geca.eco/">http://www.geca.eco/</a>
Global GreenTag	Sustainable materials and products database including certification. <a href="https://www.globalgreentag.com/">https://www.globalgreentag.com/</a>
HVAC	Heating, Ventilation and Cooling (building systems)
ICA	Independent Commissioning Agents role is to advise monitor and verify the running of building systems such as HVAC. They must be independent from the design and construction of the building.
kWh	Kilowatt Hour – a measure of electricity consumption
MWh	Megawatt Hour- a measure of 1,000 kWh of electricity consumption
NCC	National Construction Code
OH&S	Occupational Health and Safety
Project Cost	The total budget cost/total capital value, for example including site investigation costs, project management cost, consultancy fees etc.
PVC	Polyvinyl chloride is a common material used for plumbing pipes and electrical cables. The manufacture requires toxic chemicals and disposal is also toxic
R-Value	A measure of heat transfer that is used for insulation. The higher the R-Value the lower the heat loss from inside in winter and heat gain when hot outside.
SDA	Sustainable Design Assessment
SMP	Sustainable Management Plan
U-Value	A measure of the heat transfer from inside to outside that is used for windows. Lower U-Value = less heat loss.

	VOC	Volatile Organic Compounds – organic odour from glues, resins, carpets, etc that reduce indoor air quality and possibly impact human health
	WELS	Water Efficiency Labelling Scheme – benchmarks water efficiency and applies a WELS star rating of 1 to 6 stars
	WMP	Waste Management Plan
	WSUD	Water Sensitive Urban Design
<p><b>4.0 Policy Objectives Statement(s)</b></p>	<p>This policy requires that all Council building projects:</p> <p>4.1 Establish a consistent approach to <b>best practice ESD</b> for the budget, design, construction, operation, maintenance, and disposal of all Council owned and managed buildings and infrastructure to reduce environmental impact and improve climate resilience.</p> <p>4.2 Perform resilience, climate risk and/or consider <b>life cycle assessments</b> to inform <b>decision making</b> from project conception.</p> <p>4.3 Ensure <b>budget and procurement processes</b> include ESD costs upfront and the requirements are viewed as a ‘business as usual’ investment that will return financial savings, enhanced climate resilience, material recyclability and other co-benefits over the life of the asset.</p> <p>4.4 Select <b>construction and fit-out materials</b> and equipment to reduce lifetime carbon footprint, minimising embodied energy and priorities materials that are local, utilise recycle and/ or ecolabelled materials.</p> <p>4.5 Set clear requirements for ESD in the <b>operation of buildings</b> including, contractual and lease agreements, building user requirements and maintenance.</p> <p>4.6 Support Council’s <b>commitment to achieve net zero emissions</b> and respond to the climate emergency in line with Council’s commitment to the community.</p> <p>4.7 Clearly <b>communicate and track the benefits</b> of exceeding National Construction Code (NCC), and minimum Road Management Standards such as, return on investment, sustainable materials and stormwater pollution reduction.</p>	
<p><b>5.0 Key changes from the previous policy include:</b></p>	<p>5.1 The prohibition of new gas connections, appliances, and requirement to remove existing gas where possible.</p> <p>5.2 The introduction of minimum standards for replacement products in construction materials to address embodied emissions.</p> <p>5.3 The introduction of adaptation and future proofing measures to projects.</p>	



<p><b>6.0 Guiding Principles for delivery ESD in Capital Projects</b></p>	<p>6.1 Council is committed to integrating ESD principles into building and infrastructure projects and new lease and licence agreements to reduce their environmental impacts and enhance community wellbeing.</p> <p>6.2 All new building projects must aim to be net zero emissions, including 100% electric, passive design with appropriate renewable energy generation and storage.</p> <p>6.3 All building retrofit/renewal/redevelopment projects must replace any existing gas with electric or passive alternatives where feasible.</p> <p>6.4 All projects must consider the ability of the asset withstand extreme weather events expected under the high emissions scenario (RCP 8.5) when undertaking design and selecting materials.</p> <p>6.5 All projects must consider upfront emissions, embodied emissions, and embodied resources (such as water) throughout the lifecycle of the project and asset, including principles of circular economy and Council waste hierarchy, avoid, reuse, recycle and recovery.</p> <p>6.6 While many ESD measures can reduce upfront costs, Council recognises that some ESD measures can increase costs up front and will ensure the financial costs of implementing ESD initiatives, including the benefits of reduced operating costs and carbon offsets are integrated into long-term renewal forecasting, respective asset management plans and associated operational and capital budgets.</p> <p>6.7 Council will refine the cost allowance for ESD initiatives in capital works planning as ESD costs are better understood to ensure that the project specific requirements in Appendix B can be achieved.</p> <p>6.8 In prioritising ESD works within its renewal and maintenance programs, Council will prioritise those that also achieve financial benefit, if other factors are equal.</p> <p>6.9 Renewal and maintenance budgets will be reviewed or planned to include allocations to implement ESD improvements and upgrades, taking opportunities to minimise long term costs by completing similar works together: for example, it might upgrade insulation at the point in time a roof needs renewal.</p> <p>6.10 If the ESD Minimum Standards (Appendix C) are not met or cannot be achieved, alternative approaches must be discussed and gain support for the ESD Practice Lead (ESD Officer).</p>
<p><b>Responsibilities</b></p>	<p><b>How are individuals responsible for the success of the policy?</b></p> <p>All capital and facilities maintenance project managers are expected to read, understand and implement the Policy project management steps, project specific requirements, and ESD minimum standards.</p> <p><b>How are managers responsible for the success of the policy?</b></p>



	<p>All direct managers are expected to understand the policy and ensure support is provided to project managers to successfully implement the Policy.</p> <p><b>How are other relevant parties responsible for the success of the policy?</b></p> <p>ESD Officer is expected to check off on how ESD is being implemented at different stages of the design and construction process. As well as provide support to the project managers on ESD matters.</p> <p>General Managers (GM): The GM is expected to ensure the budgeting process allows adequate budget to ensure ESD can be implemented.</p>		
<p><b>Organisational Values</b></p>	<p>Council’s organisational values enable and support the effective design and application of this policy by guiding staff in the course of their work.</p> <table border="1" data-bbox="586 737 1594 1318"> <tr> <td data-bbox="586 737 1092 1318"> <p><b>We Make a Difference:</b> We are driven by our desire to make a difference for the people we serve. Our work is purposeful and creates a positive impact for the community. We are proud to work here. Our work matters.</p> <p><b>We are Accountable:</b> We are empowered to own and take responsibility for our actions. We follow through on our commitments and deliver on our promises. We make it happen.</p> <p><b>We are Collaborative:</b> We are united by a common purpose to serve the community. We work together, connecting within our teams and across the organisation. We are inclusive and collaborative. We are one.</p> </td> <td data-bbox="1092 737 1594 1318"> <p><b>We have Integrity:</b> We act with integrity and transparency in conversations and decision-making. Through open and clear communication, we build trust. We’re honest. We walk the talk.</p> <p><b>We show Respect:</b> We are diverse, inclusive, respectful and caring. We encourage everyone to have a voice and we listen to each other. We recognise one another’s contributions and treat people fairly. We look after each other.</p> <p><b>We are Creative:</b> We are bold, courageous and innovative. We try new things, experiment and continuously improve. We are open-minded, creative and forward-thinking. We are leaders.</p> </td> </tr> </table>	<p><b>We Make a Difference:</b> We are driven by our desire to make a difference for the people we serve. Our work is purposeful and creates a positive impact for the community. We are proud to work here. Our work matters.</p> <p><b>We are Accountable:</b> We are empowered to own and take responsibility for our actions. We follow through on our commitments and deliver on our promises. We make it happen.</p> <p><b>We are Collaborative:</b> We are united by a common purpose to serve the community. We work together, connecting within our teams and across the organisation. We are inclusive and collaborative. We are one.</p>	<p><b>We have Integrity:</b> We act with integrity and transparency in conversations and decision-making. Through open and clear communication, we build trust. We’re honest. We walk the talk.</p> <p><b>We show Respect:</b> We are diverse, inclusive, respectful and caring. We encourage everyone to have a voice and we listen to each other. We recognise one another’s contributions and treat people fairly. We look after each other.</p> <p><b>We are Creative:</b> We are bold, courageous and innovative. We try new things, experiment and continuously improve. We are open-minded, creative and forward-thinking. We are leaders.</p>
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<p><b>Breach of Policy</b></p>	<p>Breaches of policies are treated seriously. Any concerns about non-compliance should be reported immediately to the owner of this policy.</p>		

**GOVERNANCE**

<p><b>Legislation and strategic context</b></p>	<p>This Policy is an integral part of Council's Strategic Planning Framework and aligns with the following documents:</p> <p><b>Local Government Act 2020:</b> The Local Government Act 2020 (the Act) sets out the overarching governance principles, role, purpose, responsibilities, and powers of local governments, including the provision of significant long-life infrastructure. The Act requires an integrated strategic reporting framework. Councils response to the LGA requirements are addressed through the following:</p> <ul style="list-style-type: none"> <li>• <b>Community Vision 2041:</b> Describes Council's aspirations for the future of the municipality. It includes a commitment to mitigating the climate emergency, creating</li> </ul>
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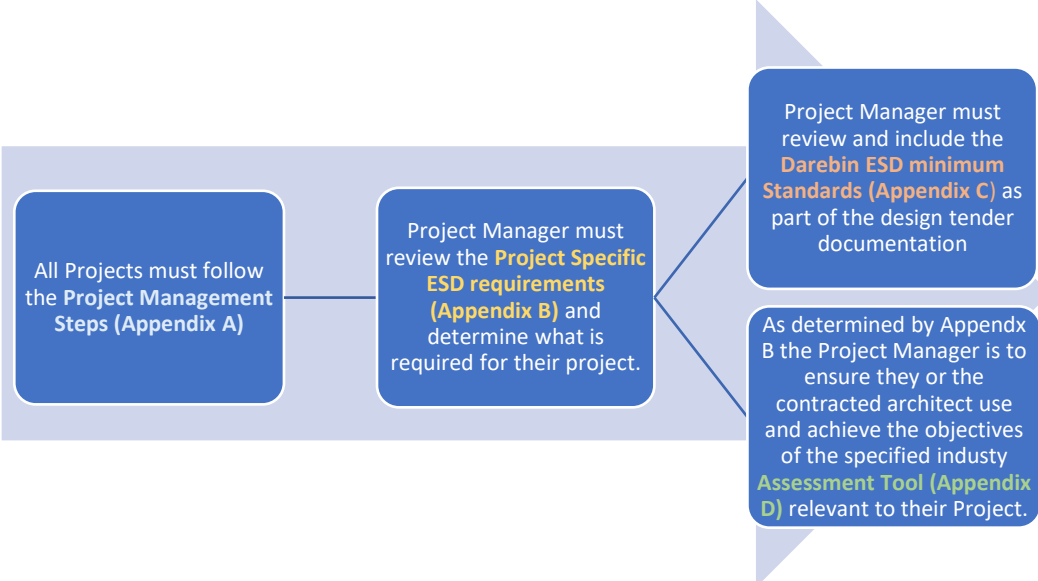
prosperity for current and future generations. This ESD Policy is a key policy to achieve this vision.

- Council Plan 2021-2025:** Council's principle strategic document, which includes Council's long-term strategic objectives. The Council Plan is further supported by a long-term Financial Plan and asset management plans to help ensure sustainable service delivery. Darebin Council Plan identifies addressing the climate emergency as a key responsibility of Local Government under Victorian Legislation and specifies the ambition of (net) zero emissions for the Darebin Community by 2030.
- Financial Plan:** The key financial planning document that is governed by a series of financial strategies and accompanying performance indicators that Council considers and adopts. It recognises Council's Strategic direction as Green and Sustainable, including improved biodiversity and canopy cover, waste reform and action towards a circular economy, solar installation and energy efficient retrofits for vulnerable community members. Council ESD policy shall be implemented considering financial, social and sustainability requirements and community expectations.
- Asset Plan:** Sets out how the Council proposes to manage the assets it owns, to help achieve the objectives defined in the Community Vision and Council Plan. The Asset Plan references the Council ESD Policy as a key mechanism for service delivery and climate resilience.

The Asset Plan references "that there is an expectation that there will be continued leadership from Council to develop and implement long term strategies to address and adapt to climate change impacts. These will range from the use of sustainable energy sources and materials to provide assets that are environmentally efficient, greening the city to reduce heat effects, waste recycling and resource recovery and building resilience into the drainage network to cope with severe storm events.

Assets will need to be built and renewed to a standard that can withstand at least 1.5 degrees of temperature increase. This may require different materials, methods of asset construction and other innovative approaches. Changing weather will lead to increased need for reactive maintenance and asset repair to mitigate asset deterioration and weathering."

<b>Revision History</b>	1.0	2017	Original ESD policy including minimum standards for Council buildings
	1.1	2018	Updated ESD policy including minimum standards for Council buildings
	2.0	2023	Update on minimum standards for buildings including new standards for reducing embodied emissions.

<p><b>This Policy in Practice</b></p>	<p>The below chart outlines the steps each project must take to adhere with the objectives and minimum requirements of this policy.</p> 
<p><b>Related Documents</b></p>	<p><b>Project Management Report:</b> A specialty excel spreadsheet that allows Project Managers to easily filter which of the below <b>ESD minimum requirements</b> are relevant to their project as well as provide a response to each requirement throughout different stages of the development.</p>
<p><b>Supporting Procedures and Guidelines</b></p>	<p>This policy should be read in conjunction with Council's:</p> <ul style="list-style-type: none"> <li>• <b>Appendix A:</b> ESD Project Management Steps.</li> <li>• <b>Appendix B:</b> Project Specific Requirements.</li> <li>• <b>Appendix C:</b> Darebin ESD Minimum Standards.</li> </ul>
<p><b>Legislation/ Regulation</b></p>	<p>Local Government Act 2020</p>
<p><b>Author</b></p>	<p>ESD Practice Lead</p>
<p><b>Policy Owner/ Sponsor</b></p>	<p>Climate Emergency and Sustainable Transport</p>
<p><b>Date Effective</b></p>	<p>06/02/2024 (Date adopted by Council)</p>
<p><b>Review Date</b></p>	<p>2026</p>
<p><b>Version Number</b></p>	<p>2.0</p>



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! All Darebin policies and procedures must be developed through the lens of key Darebin strategies, plans and related considerations. See the **Darebin Policy Review Lens** to inform and guide policy development and review.





## APPENDIX A: ESD Project Management Steps

To ensure ESD is incorporated into building capital works and major projects a Project Management Report\* document has been developed for all Project Managers to use as part of the Project budgeting, tender, design, construction and closure. The Project Management Report offers a streamline approach for Project Managers to follow to ensure the **Darebin ESD Minimum Standards** and other Policy requirements are adequately integrated into the project.

\*Project Management steps and reporting requirements are adjusted to suit type and scale of project. This process will be established once the Policy is endorsed.

The following stages are crucial to ensure ESD is properly integrated into each project:

Project Stage	Requirement	Responsibility	ESD involvement
<b>Project Inception</b>	<p>1) Team developing <b>budget for the project must be aware of ESD minimum requirements and consider cost and benefit of different actions (e.g. removal of gas).</b></p> <p>It is recommended 2-4% of project budget be allocated for meeting ESD requirements.</p> <p>If it is a large project (&gt;\$10 million), costs of ESD certification with an independent body must be understood.</p>	Managers, Capital Works committee, budgeting team	If ESD requirements are unknown, ESD Officer can support costing and determining scope of what is required.
<b>Site investigation, due diligence, tender and design</b>	<p>2) ESD Officer to be a member of the <b>Project Working Group (PWG)</b> for medium to large projects (Project budget over \$1.5 million).</p> <p>3) Architects, building designers, ESD consultants to be assessed on ESD experience and knowledge.</p> <p>4) Project Manager to review this <b>Policy's requirements (Appendix B)</b> and ensure minimum standards, report requirements and required assessment tool and performance standards are understood.</p>	<p>Project Manager and Architect</p> <p>ESD Officer (as required)</p>	<p>Project Manager Report to be reviewed and endorsed by ESD Officer after architect is engaged and completes preliminary design.</p> <p>Design development drawings to be checked by ESD Officer and other</p>

	<p>5) ESD <b>Project Management Report</b> set up by Project Manager and provided as part of tender/contractual documents for architect, ESD consultant and builder to complete throughout project life.</p>		<p>relevant parties to ensure all commitments included.</p>
<p><b>Procurement of builder and construction</b></p>	<p>6) Builder to be assessed on ESD experience and knowledge.</p> <p>7) Project Management Report and ESD documents such as SDA/SMP, Green Star commitments, committed performance standards for concrete etc. to be provided to builder as part of procurement documents.</p> <p>8) Project Manager to check to ensure builder compliance with ESD requirements.</p> <p>9) Any changes to ESD throughout construction to be logged in Project Management Report and review and endorsed by ESD officer.</p>	<p>Project Manager, Builder</p>	<p>Building documentation to be review by ESD Officer prior to construction commencement to ensure ESD related features are consistent with commitments made earlier in the process.</p>
<p><b>Handover, realisation, monitoring and case studies</b></p>	<p>10) All manuals for all systems and appliances, and schedules for maintenance to be provided to Facilities Management and Building Manager. Building Users Guide to be written by ESD consultant in conjunction with information provided by the builder and given to building users.</p> <p>11) Project logged in Kinesis if relevant (i.e. consumes water, energy and emissions): Project Manager to inform Sustainability team by email that project is complete and to log into Kinesis. <u>For Major New Builds Only</u>: ICA to review all documentation and provide recommendation for Handover.</p> <p>12) Where a project used a new technology or was the first of its kind for Darebin a case study should be prepared in collaboration with the Sustainability team (e.g. Capital team collect data and Sustainability team write case study), and put on the Darebin website and be provided to Capital Works and Major Projects staff and ESD Officer for future reference, updates to policy, etc.</p> <p>13) Report project on any other shared platforms developed in the roll out of this policy, such as CAMS, Objective.</p>	<p>Project Manager, Builder ESD Officer (as required)</p>	<p>Review documents provide and undertake site inspections or engage an appropriately experience team member to undertaken site inspection.</p> <p>ESD will rely on Independent Commission Agent (ICA report where one has been engaged).</p>



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## APPENDIX B: Project Specific Requirements

### Each project must consider:

- The Project Management Steps (Appendix A) for engaging ESD.
- The report that is required (Sustainable Design Assessment (SDA) Sustainability Management Plan (SMP), or no report).
- The ESD minimum standards that must be met (Appendix C).
- The appropriate ESD measurement tool to use (BESS, Green Star etc.).

The industry tools below are considered best practice for the scale of project and provided a consistent sustainability assessment framework. The tools allow the sustainability commitments to be quantified and converted into greenhouse gas emission savings, water savings and other benchmarked requirements.

The following requirements need to be met at a minimum according to each category/infrastructure improvements.

Tables 1 and 2 below outline the project specific requirements dependent on project type) and cost of the project.

### Go to:

- **Table 1 Capital Building Projects.**
- **Table 2 Facilities Management.**

**Table 1: Capital Building Works Project Specific requirements.**

Building Type	Project Cost (total budget cost/total capital value)			
New buildings, building works and upgrades to existing buildings, refurbishment, including design and construction. Demolition.	<\$500,000	\$500,000 - \$1.5 million	\$1.5 million - \$10 million	> \$10 million
Council Building Examples	<ul style="list-style-type: none"> <li>• Renovations/ remedial/reconstruction type work.</li> <li>• Toilets and Small Pavilions Kiosks / Ticket Boxes</li> <li>• Depot buildings &amp; Larger Sheds.</li> <li>• Plant and equipment replacement, building maintenance, ESD retrofits</li> </ul>	<ul style="list-style-type: none"> <li>• Toilets and Small Pavilions Kiosks / Ticket Boxes</li> <li>• Depot buildings, portables and Sheds.</li> <li>• Plant and equipment replacement, building maintenance, ESD retrofits.</li> </ul>	<ul style="list-style-type: none"> <li>• Pavilions, Childcare and Maternal and Child Health Centres</li> <li>• Aged Care/Senior Citizens centres</li> <li>• Neighbourhood Houses, Community centres/halls</li> </ul>	<ul style="list-style-type: none"> <li>• Libraries, Aquatic Recreation centres, sports Stadiums, offices /Town Halls, larger Community Centres, Arts and Entertainment centres</li> </ul>
Report required	N/A	SDA	SDA or SMP	SMP
Objective	Meet ESD Minimum Standards (Appendix C) – Project Management Reporting tool to be used (developed 2024).			
ESD tool	Report project in Kinesis including energy, water and emissions.	BESS minimum 60% score where applicable. *	Green Star minimum 4 Star Certified by GBCA.  OR BESS assessment minimum 70% score.	Green Star minimum 5 Star 'Buildings' Certified by GBCA.  AND NABERS assessments where applicable: Embodied Emissions Initiative, Energy 5 stars and Water 5 stars.
	STORM 100% or equivalent where applicable. *	STORM 100% or equivalent where applicable. *	STORM 100% or MUSIC equivalent.	Minimum 100% STORM or MUSIC equivalent. **

**Table 2: Facilities Management Project Specific requirements**

Building Type	Project Cost (total budget cost/total capital value)		
<b>Facilities Management Service Contracts</b>	<b>&lt; \$500,000</b>		<b>&gt; \$500,000</b>
<b>Council Building Examples</b>	<ul style="list-style-type: none"> <li>• Generally non-structural – generally like for like, single components such as:</li> <li>• Small scale demolition/ decommissioning.</li> <li>• Repair work – replacing floors, restumping works, minor fit outs/minor renewal (e.g. kitchen, office, switchboards, roofs, public toilet fitouts).</li> <li>• Flooring and painting program.</li> <li>• Appliance replacement, heating and cooling upgrades, building fabric upgrade, water fixtures and fittings, tanks.</li> <li>• Sail and shade structures, Stores / Sheds, shelters associated with a building.</li> </ul>		Single components such as: <ul style="list-style-type: none"> <li>• Chillers</li> <li>• Roof renewal</li> </ul>
<b>Report required</b>	N/A	N/A	Small report listing initiatives implemented.
<b>Objective</b>	Meet ESD Minimum Standards (Appendix C) – Project Management Reporting tool to be used (developed 2024).		
<b>ESD tool</b>	Report project in Kinesis including the date and the works undertaken.	Report project in Kinesis including the date and the works undertaken.	Report project in Kinesis including the date and the works undertaken.
	N/A	N/A	STORM 100% or equivalent where applicable.

\* BESS and STORM are designed to assess the sustainability measures of the whole building or large extensions/retrofits. Where the project only includes the upgrade of a few features or is a small unconditioned site (such as a toilet block) BESS or STORM are not be appropriate tools. Speak with the ESD Officer if unsure whether to apply the tools. Generally, if a Planning Permit is required then the tool will be required.

\*\* STORM is not appropriate for large complex sites that have significant overland flow and/or multiple treatment trains/ reuse demands. MUSIC must be used in these instances. Speak to the ESD Officer to determine which tool if unsure.



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## APPENDIX C: Darebin ESD Minimum Standards

### Darebin ESD Minimum Requirements

The minimum requirements listed below must be satisfied for all projects independent of meeting the desire tool ratings and reporting requirements as specified in Appendix B. The minimum requirements are designed to ensure all projects are aligned with this Policy and Darebin strategic direction. Industry assessment tools are limited in their scope, e.g. BESS does not assess materials used. The ESD minimum requirements listed below are a necessary threshold for all projects to apply best practice ESD at Darebin.

The Project Management Report referred to in Appendix A (Project Management Steps) allows Project Managers to easily filter which of the below ESD minimum requirements are relevant to their project as well as provide a response to each requirement throughout different stages of the development.

The ESD minimum requirements outlined below apply as relevant to the mandated scope of works, to all major projects, capital works and building maintenance, asset renewal and civil infrastructure works. These should be discussed with the ESD Officer if the project manager is unclear which items are feasible for the scope of works. All internal projects will apply this policy from project conception to ensure that initial project scope and budget preparation includes these minimum requirements.

No.	MANAGEMENT		Links to Resources/ Standards
M1	Commissioning Report	<p><b>Large scale projects</b></p> <ul style="list-style-type: none"> <li>Where an Independent Commissioning Agent (ICA) is engaged (required for all Major projects &gt;\$10 million) through the Green Star Certification process), prior to practical completion of any project a commissioning report from the ICA must be provided confirming that the specified ESD minimum requirements have been implemented and that systems are performing in accordance with the design intent.</li> </ul>	<p><a href="https://www.gbca.org.au/uploads/142/35470/MAN_Commissioning%20and%20Tuning_draft_D1_distributed.pdf">https://www.gbca.org.au/uploads/142/35470/MAN_Commissioning%20and%20Tuning_draft_D1_distributed.pdf</a></p>
M2	Equipment	<p><b>Large scale projects</b></p> <ul style="list-style-type: none"> <li>Ensure all equipment such as Building Management System (BMS), HVAC, water tanks, solar panels are maintained and checked to run at peak efficiency with inspection and maintenance carried out according to the manufacturers recommended maintenance requirements.</li> </ul>	



BUILDING FABRIC		Links to Resources/ Standards
<b>BF1</b>	<b>Wall-glazing, roofs, floors (updated 2023)</b>	<p><b>DTS method: Wall-glazing</b></p> <p>The façade (wall-glazing construction) must exceed NCC deemed to satisfy (DTS) criteria by 25%. Reference Part J4 Building Fabric NCC for DTS Provision dependant on Building Class.</p> <p>Independent of meeting the above 25% improvement all new or replacement glazing in areas with active heating and cooling to be minimum double glazed.</p> <p>For renovations and extension retrofit insulation and glazing wherever possible.</p> <p><b>DTS method: Roofs, Floors</b></p> <p>The roof and floor must exceed NCC DTS R-Value requirements by 25%. Reference Part J4 Building Fabric NCC for DTS Provision dependant on Building Class.</p> <p>Independent of R-Value requirements all external walls, roofs and lightweight floors must have an approved radiant barrier (i.e. Reflective Foil Laminate) installed that has a NCC (National Construction Code) or a NFPA (National Fire Protection Association) flammability rating.</p> <p><b>JV3 method</b></p> <p>Where the above improvements on DTS provisions cannot be met a JV3 solution will be required to demonstrate compliance as per the NCC and achieve a minimum 10% improvement in the proposed design when modelled against a reference case.</p> <p>The following 'worst case' material values are required when using JV3 method:</p> <ul style="list-style-type: none"> <li>- Glazing systems with a maximum (total system) U-Value of 0.3.</li> <li>- Glazing systems with a minimum visual light transmittance of 0.4.</li> </ul>

		<ul style="list-style-type: none"> <li>- Ceilings/ roof minimum R 5.0 (Upper roof surface Solar Absorptance value to be not more than 0.4).</li> <li>- Floor R2.5 minimum.</li> <li>- Vertical edge of any slab on ground R1.25.</li> </ul> <p>Solar PV cannot be used to offset meeting 10% improvement on reference building.</p>	
<b>BF2</b>	<b>Building Sealing</b>	<ul style="list-style-type: none"> <li>- Building Sealing is a requirement under NCC Section J5 Building Sealing.</li> <li>- All windows and doors sealed and weather-stripped.</li> <li>- All exhaust fans to be fitted with self-sealing dampers.</li> <li>- Building wrap to be installed in a way that seals the whole wall with connector strips at top and bottom of walls, all joints sealed, and all penetrations sealed to building wrap (including pipes, wiring, windows etc).</li> <li>- Thermal bridging to be avoided.</li> </ul>	NCC Section J Part J5 Building sealing   NCC (abcb.gov.au) - <a href="https://ncc.abcb.gov.au/editions/ncc-2022/adopted/volume-one/j-energy-efficiency/part-j5-building-sealing">https://ncc.abcb.gov.au/editions/ncc-2022/adopted/volume-one/j-energy-efficiency/part-j5-building-sealing</a>
<b>BF3</b>	<b>Daylight</b>	<p>Maximise the use of natural light and use passive design principles.</p> <p>Provide adequate daylight for all spaces. If areas appear to have limited daylight demonstrate a mean daylight factor of at least 2% through modelling or daylight calculations (i.e. greens star hand calculations).</p> <p>Balance daylight and thermal performance measures by using the following rule of thumb:</p> <ul style="list-style-type: none"> <li>• Prioritise north glazing and then east glazing, shield west glazing in summer and use south glazing for picking up breezes.</li> <li>• The extent of glazing to the south and west should be less than that of the north and east.</li> </ul>	Energy Smart Housing Manual - <a href="https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/building-or-renovating/planning-and-design/energy-smart-housing-manual">https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/building-or-renovating/planning-and-design/energy-smart-housing-manual</a>

Heating Ventilation and Air Conditioning (HVAC)		Links to Resources/ Standards
H1	<p><b>Natural ventilation and passive cooling</b></p> <ul style="list-style-type: none"> <li>• Use passive design principles to avoid excessive heat gain. This includes: Minimising west facing glazing, install fixed external shading to north glazing, install adjustable external shading to east and west windows and glazed doors, zone spaces to shut off rooms not in use and cool only rooms being used, locate non-habitable rooms on the west as a buffer from heat gain.</li> <li>• Maximise operable windows and cross ventilation, use windows that maximise ventilation such as sliding, double hung and casement. Note – the NCC operable provisions do not guarantee effective ventilation.</li> <li>• Use natural ventilation or a mix of natural and mechanical ventilation.</li> <li>• Ceiling heights to be a minimum of 2.7 metres in occupied rooms so that ceiling fans can be installed safely.</li> <li>• Ceiling fans must be considered in regular use conditioned spaces.</li> </ul>	Energy Smart Housing Manual (see above)
H2	<p><b>Passive heating</b></p> <ul style="list-style-type: none"> <li>• Maximise passive winter heating with north facing windows, double glazing, winter gardens and internal thermal mass that is insulated.</li> </ul>	Energy Smart Housing Manual (see above)
H3	<p><b>HVAC Technology</b></p> <ul style="list-style-type: none"> <li>• No new natural or LPG gas appliances.</li> <li>• Preference heat pump technology for heating and/or cooling. Equipment to have Coefficient of Performance (CoP) and Energy Efficiency Ratios (EER) within 15% of the most efficient equivalent capacity unit available or no lower than COP 3.</li> </ul> <p><b>Large scale projects:</b></p> <ul style="list-style-type: none"> <li>• If VRF/VRV systems are being considered then an analysis should be provided to demonstrate the cost benefit of refrigerant heat recovery. Consultant to ensure equipment can maintain internal temperatures during design summer and winter ambient temperatures. From early</li> </ul>	

		<p>planning phases, designers must allow for larger plant associated with high COP outdoor units.</p> <ul style="list-style-type: none"> <li>• Where refrigerant based equipment is deemed unsuitable due to scale of project, preference is for high efficiency adiabatic air cooled chillers OR reverse cycle air-cooled heat pumps. Consultants to provide HVAC selection matrix to justify strategy in relation to project specific requirements.</li> <li>• For projects that have large amounts of wastewater (e.g. swimming pools), consider heat recovery from wastewater systems.</li> <li>• Where continuous 100% fresh air is required (e.g. Gymnasiums), HVAC systems will employ closed loop heat exchange technology with conversion efficiency greater than 75%. Specify maximum heat exchanger pressure drop of 100Pa. Specify low pressure heat recovery bypass (not equivalent to heat recovery pressure drop) for systems over 500 L/s.</li> <li>• For spaces with highly variable occupancy (e.g. auditoriums, gymnasiums etc), provide CO2 control to modulate outdoor air to maintain CO2 concentration of 700ppm.</li> </ul>	
<p><b>H4</b></p>	<p><b>Economy features</b></p>	<p><b>Large scale projects:</b></p> <ul style="list-style-type: none"> <li>• Motorised and fully modulating economy dampers to be fitted to all integrated HVAC systems (packaged or split ducted) with 100% outside air capability.</li> <li>• For new buildings install Heat Recovery Ventilation (HRV) as part of HVAC system where possible.</li> <li>• All air handling unit (AHU) fans to include Variable Speed Drive (VSD) technology capable of being controlled by non-original equipment manufacturing (OEM) external direct digital controllers (DDC). Fan Coil</li> </ul>	

		<p>units are to utilise Electronically Commutated (EC) motor technology. Fan or pump motors to be direct drive. Belts and pulleys are not to be used.</p> <ul style="list-style-type: none"> <li>All heat pumps to employ variable refrigerant flow (i.e. Electronically Controlled variable Thermostatic Expansion valves or variable speed refrigerant flow/compressors)</li> </ul> <p><i>Note that design plans must demonstrate that HVAC has been sized according to building load requirements.</i></p>	
H5	<b>Reverse cycle systems</b>	<ul style="list-style-type: none"> <li>New or replacement systems to be highest energy star rating available for size (kW) and system required.</li> </ul>	
H6	<b>Control Systems</b>	<p><b>Large scale projects:</b></p> <ul style="list-style-type: none"> <li>All HVAC changes to include control strategies that demonstrate and follow the load of the building in conjunction with ambient conditions. To be included but not limited to; pump speeds, CO2 sensor limits and thresholds, staging according to conditions, agreed temperature set points.</li> <li>All systems to utilise variable supply based on occupancy using CO2 monitoring and/or occupancy detection for zone ventilation control. This includes Passive Infra-Red (PIR) for splits, fan coils, AHU's or Variable air volume (VAV) (Projects that do not meet this requirement to submit to Environment Officer - Energy for approval)</li> <li>Unitary controls – where systems employ unitary controls only, supplementary control shall be available for high level interface (HLI) to BMS or other systems as required. HLI shall be open protocol per relevant industry standards.</li> <li>Building Management Systems (BMS) – Any BMS deployed to provide control and / or monitoring of equipment shall be capable of HLI to existing BMS used by council for supervisory control and data acquisition.</li> </ul>	

H7	Refrigerants	<p><b>Large scale projects:</b></p> <ul style="list-style-type: none"> <li>• Use of natural/hydrocarbon refrigerants with Global Warming Potential (GWP) &lt;5 (e.g. Ammonia, CO<sub>2</sub>). The refrigerants that are known to satisfy this requirement include: water, air, carbon dioxide, ammonia, some hydrofluoroolefins (e.g. R-1233zd, R-1234yf, R-1234ze, R-514A), propylene (R-1270).</li> <li>• If refrigerants with GWP &lt;5 are not available, then limit GWP to no more than 750 with low overall volume.</li> </ul>	<p>Green Star Performance Refrigerant Impacts calculator</p> <p><a href="https://www.gbca.org.au/get/resources/2070/10A38AF6236C66BD1B2473165E2E84F">https://www.gbca.org.au/get/resources/2070/10A38AF6236C66BD1B2473165E2E84F</a></p>
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ENERGY		Links to Resources/ Standards
E1 (2023)	Gas connections	<ul style="list-style-type: none"> <li>• No new gas connections are permitted.</li> <li>• No new or additional gas appliances permitted.</li> <li>• Existing gas connections are to be decommissioned and buildings electrified where possible (see EA1 for appliance requirements).</li> <li>• Exemptions: Project Managers may remove the requirement to decommission existing gas connections if all the following are provided: <ul style="list-style-type: none"> <li>○ Justification for gas removal being out of scope (e.g. cost, end use requirements, future project plans to remove). For medium to large (&gt;\$1.5 million) this may require cost benefit analysis be undertaken.</li> <li>○ Details of the current gas appliances on site and their condition/expected end of life.</li> <li>○ Detail what actions will be taken to prepare for future gas removal as part of current project (e.g. upgrading switchboard to accommodate future electricity loads, updating to 3 phase power).</li> </ul> </li> </ul> <p><a href="https://energy.vic.gov.au">Victoria's Gas Substitution Roadmap (energy.vic.gov.au)</a></p> <p><a href="https://planning.vic.gov.au">Victoria's Gas Substitution Roadmap (planning.vic.gov.au)</a></p>

<p><b>E2</b></p>	<p><b>Renewable Energy Systems</b></p>	<ul style="list-style-type: none"> <li>• For new construction of buildings expected to consume less than 5 MWh/year (e.g. toilet blocks): To be designed to be energy independent (i.e. produce as much as they consume) with their own renewable energy source (solar PV and backup). Project Manager may delete from the specifications due to financial restraints, subject to a report being tabled documenting the initial and ongoing costs/ efficiencies comparisons based on expected energy use.</li> <li>• All other projects: Installation of a micro-generation renewable energy system to supply a minimum of 25% of annual building energy consumption is required.</li> <li>• Renewable energy systems should have monitoring set up: production and consumption through Solar Analytics or speak with Climate officer for how this can be achieved.</li> </ul> <p>All solar PV to be installed as per best practice, i.e. orientated to the north as first preference then west and east, have tilt angle of at least 20 degrees (on flat roofs) to facilitate self-cleaning, have maintenance access, multi-string inverters if overshadowing potential, and include the provision of a third-party monitoring system.</p> <p><b>Exemption:</b> Where not practical the Project Manager may adjust the requirement to meet 25% of the building demand but justifying a smaller system, e.g. roof space, roof structure. Document the initial and ongoing costs/ efficiencies comparisons.</p>	
<p><b>E3</b></p>	<p><b>Separate metering</b></p>	<ul style="list-style-type: none"> <li>• Install separate metering and zoning for different tenants.</li> </ul>	
<p><b>E4 (2023)</b></p>	<p><b>Battery installation</b></p>	<p><b>Install battery(s)</b> for onsite storage and reuse, or if not justifiable as part of scope ensure:</p> <p>Switchboards and electrical circuit updates can cater for future battery, electrification, electric vehicle charging demand and solar feed. See NCC 2022</p>	<p>Part J9 Energy monitoring and on-site distributed energy resources   NCC (abcb.gov.au)  <a href="https://ncc.abcb.gov.au/editions/ncc-2022/adopted/volume-">https://ncc.abcb.gov.au/editions/ncc-2022/adopted/volume-</a></p>

		J9D5 Facilities for solar photovoltaic and battery systems on expected electrical upgrade.	<a href="#">one/j-energy-efficiency/part-j9-energy-monitoring-and-site-distributed-energy-resources</a>
<b>E5 (2023)</b>	<b>Future proofing and resilience for vital services</b>	<p>For buildings identified as ‘critical/vital service buildings’ (e.g. health support, childcare, immunisation service, heat refuge), as determined by Council strategic documents:</p> <ul style="list-style-type: none"> <li>Consider whether a <b>‘resilience circuit’</b> is necessary for the buildings vital services to continue to operate when the mains power goes down. A hybrid on-grid/ off-grid system should be considered from the following options to supply energy to the circuit depending on the requirements of the building: <ol style="list-style-type: none"> <li><b>Solar and battery storage option</b>, where the entire building needs to stay live during a power outage. This requires a solar power system set up for safe islanding with a compatible solar inverter and substantial battery storage. With a safe solar island system, the inverter assumes a highly complex but crucial role during a power outage. The design must also include the ability to connect to an external power source (e.g. generator) as backup if/when the off-grid system runs out of capacity.</li> <li><b>Battery only option</b>, for buildings that have specific services that need to stay live: This circuit requires a battery to work, including an EV battery (equipped with vehicle-to-grid (V2G) or vehicle-to-home (V2H) technology). The design must also include the ability to connect to an external power source (e.g. generator) as backup if/when the off-grid system runs out of capacity.</li> </ol> </li> <li>Identify what will be connected to the essential services circuit (provide a list of what these items are per site, common examples include lighting, AC, refrigerators, storage of perishable food or vaccines etc.), so everything else can be turned off and the battery life is maximised.</li> </ul>	



	<ul style="list-style-type: none"> <li>Determine how long the services need to stay live and size the battery kW to meet this requirement.</li> </ul> <p>Once the above is considered provide a brief report detailing what features will be implemented and how the building will be managed in a power outage.</p>	
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Lighting		Links to Resources/ Standards
L1	<b>Technology</b> <ul style="list-style-type: none"> <li>LED technology exclusively for all new and replacement lighting.</li> </ul>	
L2	<b>Illumination</b> <ul style="list-style-type: none"> <li>Lighting illumination power density target of no greater than 5 watts/sq. metre average across the building (indoor lighting).</li> <li>Low upward light spill ratios (i.e. no deflected or up lighting unless agreed by project team and meets above target) with colour rendering index 80 and above.</li> <li>Design lux levels               <ul style="list-style-type: none"> <li>between 240 minimum and 280 maximum for general lighting unless otherwise specified, combined with task lighting (e.g. desk lamps, directional spotlights, built in workstation lighting etc.) in specific areas when higher lux levels are required (indoor lighting).</li> <li>Lower lux levels (80) for corridors, walkways, storerooms, etc.</li> </ul> </li> </ul>	
L3	<b>Control systems</b> <ul style="list-style-type: none"> <li>Lighting control to be linked to BMS and/or security system.</li> <li>Motion detectors in all areas with inconsistent use such as toilets, stores rooms, meeting rooms, etc.</li> </ul>	

		<ul style="list-style-type: none"> <li>• Sensors to be positioned above the entry of the room facing the activity area. Fitting integrated sensors can be used where appropriate.</li> </ul>	
<b>L4</b>	<b>Other</b>	<ul style="list-style-type: none"> <li>• Design for easy access to change lights.</li> <li>• Factor in cost of changing light bulbs and maintenance when costing.</li> </ul>	

<b>EQUIPMENT AND APPLIANCES FITOUT</b>		<b>Links to Resources/ Standards</b>	
<b>EA 1</b>	<b>Equipment Efficiency standards</b>	<ul style="list-style-type: none"> <li>• Refrigeration: equipment to be designed so rejected heat can be expelled easily to outside or reused for heating within building.</li> <li>• Hand dryer: Only high energy efficient hand dryers utilising no heat, high air speed technologies along with air filters to promote hygiene are to be installed in toilets, bathrooms and change rooms.</li> <li>• Paper towels and paper towel dispensers are not to be used unless hand dryers are considered to be unsuitable (with supporting evidence).</li> <li>• Highest available energy efficient ventilation systems and extraction fans.</li> <li>• Equipment used (e.g. fridge / freezer / dishwasher / oven / cook top (induction only) / range hood) in fit out to be within one-star rating of best available technology for energy and water efficiency. Where equipment is not star rated such as cook tops select the best available technology (i.e. induction). Specific star minimum star rating requirements for water fixtures and fitters can be found in <b>W1</b>.</li> <li>• New gas appliances are not permitted, old gas appliances are to be decommissioned and replaced with efficient electric or justification is required as per <b>E1</b>.</li> </ul>	<p>Energy efficiency of appliances can be confirmed on the website <a href="http://www.appliancesonline.com.au">www.appliancesonline.com.au</a> with performance ratings based on information provided on the website <a href="http://www.energyrating.gov.au">www.energyrating.gov.au</a></p>

	<ul style="list-style-type: none"> <li>• Install timers on tea and coffee boilers so they switch off over weekends and overnight. No urns to be used.</li> </ul>	
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HOT WATER		Links to Resources/ Standards
HW1	<p><b>Hot Water Technology</b></p> <ul style="list-style-type: none"> <li>• High efficiency electric heat pump hot water systems to be used. Gas hot water systems are prohibited.</li> <li>• Hot Water heat pump technology to have Coefficient of Performance (CoP) Ratio 85% or better than the most efficient equivalent capacity unit available.</li> <li>• Hot water systems to be scheduled to operate during solar generation hours. Where there is a solar PV system on site and the hot water storage capacity is over 1,000L, a smart controller should be installed to utilise excess solar power to heat water as thermal storage.</li> </ul>	
HW2	<p><b>Pipe insulation</b></p> <ul style="list-style-type: none"> <li>• All new hot water pipes must be insulated.</li> </ul> <p><b>Large projects</b></p> <ul style="list-style-type: none"> <li>• All hot water piping (flow and return) above 25mm Outside Diameter (OD) shall be insulated with pre formed sectional glass wool or polyester insulation or similar, having a maximum thermal conductivity of 0.036 W/m2.K at 20°C mean temperature. All exposed pipe work insulation shall be sheathed with 0.5mm thick zinc anneal sheet metal or approved equivalent. All sheathing shall be installed in a manner which resists entry of water and UV light.</li> <li>• All hot water pipes (flow and return) 20mm Outside Diameter (OD) or less shall be fully insulated with Armaflex FR 13mm or approved equivalent.</li> </ul>	

		<ul style="list-style-type: none"> <li>All exposed pipe work insulation shall be sheathed in a UV protective coating, i.e. foil tape or equivalent coating. All sheathing shall be installed in a manner which resists entry of water and UV light.</li> </ul> <p>Note: Pre-lagged (Kemlag or Polytag) pipe and PEX (or crosslinked polyethylene) hot water pipe is not considered to be insulated in accordance with requirements and must be insulated in accordance with NCC 2022 J6D9.</p>	
<b>HW3</b>	<b>Control Systems</b>	<ul style="list-style-type: none"> <li>Ring main hot water systems will include a digital time clock control mechanism that: <ul style="list-style-type: none"> <li>+ prevents hot water circulation during non-occupancy hours.</li> <li>+ starts ring main at least one hour prior (or greater if required for occupational and health and safety requirements) to building occupancy to circulate any accumulated bacteria through 60 degree water to kill any legionella bacteria.</li> </ul> </li> <li>Preference for connection to a BMS or building security system.</li> </ul>	

<b>WATER EFFICIENCY AND STORMWATER</b>		<b>Links to Resources/ Standards</b>	
<b>W1</b>	<b>Fixtures and fittings</b>	<ul style="list-style-type: none"> <li>Shower heads: 3 star WELS, maximum 7.5L/min flow rate</li> <li>Shower taps: push button time delay variable temperature mixing valve</li> <li>Toilets: 4 star WELS minimum</li> <li>Urinals: 6 star WELS, sensor operated or waterless urinals</li> <li>Taps: 6 star WELS, push button or with sensor</li> </ul>	Water fixture STAR ratings - <a href="https://www.waterrating.gov.au/">https://www.waterrating.gov.au/</a>
<b>W2</b>	<b>Other appliances</b>	Water efficiency of appliances can be determined by using <a href="http://www.waterrating.gov.au">http://www.waterrating.gov.au</a>	

<b>W3</b>	<b>Rainwater tanks</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting system as minimum to supply toilets, urinals and irrigation with additional options of laundries.</li> <li>• Rainwater tanks must be sized so that:             <ul style="list-style-type: none"> <li>○ Minimum 80% of building water demand is satisfied.</li> <li>○ Minimum 50% of irrigation demand is satisfied.</li> </ul> </li> <li>• Tanks to have adequate filtration when connected to internal uses. Gutter guards, first flush diverters, etc. need to be included.</li> </ul>	<b>MUSIC or STORM.</b>  <a href="https://storm.melbournewater.com.au/">https://storm.melbournewater.com.au/</a>
<b>W4</b>	<b>Stormwater</b>	<ul style="list-style-type: none"> <li>• Footpaths, bicycle paths and carparks to be designed as permeable where feasible.</li> <li>• Independent on meeting Best Practice Stormwater Management requirements determined by the EPA, at least 75% of hard impermeable surfaces (that will otherwise drain to the stormwater network) to be treated by infiltration raingarden or other WSUD features (proprietary products are not suitable).</li> </ul>	<a href="https://storm.melbournewater.com.au/">https://storm.melbournewater.com.au/</a>  Options for treating stormwater - <a href="https://www.melbournewater.com.au/building-and-works/stormwater-management/options-treating-stormwater">https://www.melbournewater.com.au/building-and-works/stormwater-management/options-treating-stormwater</a>  BEPM <a href="https://www.publish.csiro.au/book/2190">https://www.publish.csiro.au/book/2190</a>  Pollutant reduction: <a href="https://www.melbournewater.com.au/building-and-works/stormwater-management/options-treating-stormwater/stormwater-quality-objectives">https://www.melbournewater.com.au/building-and-works/stormwater-management/options-treating-stormwater/stormwater-quality-objectives</a>
<b>W6 (2023)</b>	<b>Proprietary systems</b>	<ul style="list-style-type: none"> <li>• Proprietary systems (e.g. SPEL) cannot be used to achieve stormwater pollutant reduction targets for suspended solids, nitrogen and phosphorous.</li> <li>• Proprietary systems may be used as gross pollutant traps (GPTs).</li> </ul>	

BUILDING MATERIALS		Links to Resources/ Standards
M1	Fit out materials	<ul style="list-style-type: none"> <li>For building and fit out materials, where possible choose products from Global GreenTag, Good Environmental Choice Australia (GECA). ECNZ, Green star or equivalent ecolabels and/or ISO14001 EMS certified suppliers where possible.</li> <li>Consider the Life Cycle of all materials – reuse existing materials in the new building or landscaping, select materials with a low embodied energy, that are durable, low maintenance, have a recycled content, that can be recycled, that have buy back schemes, etc.</li> </ul>
M2	External surface finishes	<ul style="list-style-type: none"> <li>Light materials with Solar Reflectance Index (SRI) &gt;.40 or Solar Absorptance (SA) &lt;.60 are to be used for roof and external facade to reduce urban heat island effect and reduce cooling load.</li> <li>Roofing material preference: Colorbond Coolmax or approved equivalent</li> </ul>
M3	Timber	<ul style="list-style-type: none"> <li>The use of tropical hardwoods such as Merbau, Mirabow, Ipil, Kwila, Vesi are strictly prohibited.</li> <li>All engineered wood products, including office furniture and fit outs to comply with E0 standard for formaldehyde levels. Where no E0 Product is readily available criteria within the Green Star Buildings Credit 13: Exposure to toxins can be applied.</li> <li>Where feasible use laminated timber structural members (products such as Cross Lamination Timber (CLT) as preference of over native hardwood structural members.</li> <li>Where possible all timber shall be re-used or recycled.</li> </ul>

		<ul style="list-style-type: none"> <li>At least 90% timber used to be FSC or PEFC accredited or re-used/recycled.</li> </ul>	
<b>M4</b>	<b>Poly Vinyl Chloride (PVC)</b>	<ul style="list-style-type: none"> <li>To reduce environmental and health impacts for building users, internal plastic materials (e.g. vinyl flooring and carpet underlays) should exclude PVC.</li> <li>Where PVC is used apply Best Practice Guidelines for PVC in the Built Environment by specifying eco-labels (e.g. Global-Mark Certified) that comply with the Green Star PVC credit or equivalent.</li> </ul>	<p>A Material Safety Data Sheet is a means of verifying that a product does not contain PVC. <a href="http://gbca.org.au">Green Star PVC Credit (gbca.org.au)</a></p> <p>Ecolabel certified products</p>
<b>M5</b>	<b>Internal surfaces and finishes</b>	<ul style="list-style-type: none"> <li>Zero or Low Volatile Organic Compound (VOC) office furnishings, flooring and internal coatings (i.e. paints, adhesives and sealants) in accordance with the Refer Green Star Buildings Credit 13: Exposure to Toxins.</li> <li>Plasterboard with recycled content or third-party certified plasterboard (e.g. <a href="https://www.gyprock.com.au/resources/geca-certificates">https://www.gyprock.com.au/resources/geca-certificates</a> ).</li> </ul>	<p>Page 100 to 106 of Green Star Buildings Submission Guidelines Version 1: Revision B <a href="#">The GBCA Online Store - Green Building Council Australia (GBCA)</a></p>
<b>M6 (2023)</b>	<b>Concrete</b>	<ul style="list-style-type: none"> <li>All concrete (including concrete block pavers, pre-cast concrete for pipes, pits and drains and poured in place concrete) to: <ul style="list-style-type: none"> <li>Minimum 30% (SCM) reduction in Portland Cement (replacement materials include slag/ fly ash), and</li> <li>Minimum 40% coarse aggregate substitution/recycled aggregate OR 25% fine (sand) aggregate substitution.</li> <li>Replace in-situ concrete with precast design elements wherever possible (aim for approximately 30% of project).</li> </ul> </li> </ul> <p>Additionally, suppliers should demonstrate a reduction is potable water by providing details of where the mix water is sourced from. Best practice will include</p>	<p>GBCA minimum requirements and standards for measuring: <a href="https://www.gbca.org.au/uploads/149/35477/MAT_Concrete%20Sourcing%20and%20Use_draft_D1_distributed.pdf">https://www.gbca.org.au/uploads/149/35477/MAT_Concrete%20Sourcing%20and%20Use_draft_D1_distributed.pdf</a></p>

		minimum 50% of all mix water for concrete used in the project is from a captured or reclaimed source (e.g. rainwater tank or recycled).	
<b>M7 (2023)</b>	<b>Asphalt</b>	<ul style="list-style-type: none"> <li>Recycled content to be used to the maximum allowance of Table A of <a href="#">VicRoads Technical Note TN 107</a> or any more recent revisions of the Technical Note.</li> <li>Prioritise Reclaimed Asphalt Pavement (RAP) 20-40% (no lime)</li> <li>Warm Mix Asphalt (WMA) should be prioritised over hot mix, complying with <a href="#">Standard Sections - 400 Series - Asphalt and Surface Treatments</a> relevant to the asphalt used.</li> <li>Use materials that will weather and withstand future conditions, that is materials that are stronger, can withstand longer periods of wetting, are more resistant to thermal expansion and contraction, and are more durable in acid and saline conditions.</li> </ul>	<p>VicRoads Technical Note TN 107 - <a href="https://www.vicroads.vic.gov.au/business-and-industry/technical-publications/technical-publications-a-to-z">https://www.vicroads.vic.gov.au/business-and-industry/technical-publications/technical-publications-a-to-z</a></p> <p>VicRoads Standards Sections - <a href="https://webapps.vicroads.vic.gov.au/vrne/csdspeci.nsf/">https://webapps.vicroads.vic.gov.au/vrne/csdspeci.nsf/</a></p>
<b>M8</b>	<b>Steel</b>	<ul style="list-style-type: none"> <li>Steel suppliers must meet the objectives of Green Star Rating tool i.e have a valid ISO 14001 Environmental Management System certificate and are a member of the World Steel Association (WSA) Climate Action program (CAP).</li> <li>Where possible use steelwork fabricators, steelwork processors and contractors that have signed up to the Environmental Sustainability charter of the Australian Steel Institute (ASI) &amp; are certified to ISO 14001 EMS.</li> </ul>	<a href="http://steel.org.au/asi-committees/environmental-sustainability-charter/find-a-charter-member/">http://steel.org.au/asi-committees/environmental-sustainability-charter/find-a-charter-member/</a>
<b>M9 (2023)</b>	<b>Products</b>	Carpets, bollards, outdoor furniture, signs and other products as considered\ to prioritise replacement materials such as recycled plastic.	See products such as replas: <a href="https://www.replas.com.au/product-category/furniture/">https://www.replas.com.au/product-category/furniture/</a>



TRANSPORT		Links to Resources/ Standards
T1	<b>Bike parking</b>	<ul style="list-style-type: none"> <li>• Secure mix of on wall and on ground bicycle parking for staff and visitors in excess of planning scheme and/or to meet BESS Best practice.               <ul style="list-style-type: none"> <li>○ Where there is no Planning Scheme requirement provide at least 1 secure parking space for 20% of the building occupants.</li> </ul> </li> <li>• Provide covered bike parking wherever possible in a secure location.</li> <li>• Provide power points for micro EVs such as electric bikes and scooter.</li> <li>• Provide showers, lockers and change rooms for staff.</li> <li>• Continuous and accessible travel to the bike parking area.</li> </ul>
T2 (2023)	<b>Electric cars and bikes</b>	<ul style="list-style-type: none"> <li>• All new and retrofitted Class 5, 6, 7b, 8 or 9 buildings, including carpark works associated with buildings must double the NCC Section J9D4 Electric Vehicle Charging distribution board and sizing requirements.</li> <li>• For projects over \$10 million that have a carpark 100% of carparks must have appropriate cabling and infrastructure as required by the NCC. Provide dedicated circuit and distribution boards, cable tray space, and load management.</li> <li>• Where chargers are installed, Level 2 chargers must be provided at minimum, or if the future site requires high-powered fast chargers, Level 3 should be considered.</li> <li>• Where feasible supply charging for waste trucks, vans, buses and other vehicles.</li> </ul> <p> <a href="https://ncc.abcb.gov.au/editions/ncc-2022/adopted/volume-one/j-energy-efficiency/part-j9-energy-monitoring-and-site-distributed-energy-resources">https://ncc.abcb.gov.au/editions/ncc-2022/adopted/volume-one/j-energy-efficiency/part-j9-energy-monitoring-and-site-distributed-energy-resources</a>            NCC: be sized to support the future installation of a 7 kW (32 A) type 2 electric vehicle charger in—            100% of the car parking spaces associated with a Class 2 building; or            10% of car parking spaces associated with a Class 5 or 6 building; or            20% of car parking spaces associated with a Class 3, 7b, 8 or 9 building; and         </p>

WASTE AND RECYCLING		Links to Resources/ Standards
<b>W1</b>	<b>Demolition</b> <ul style="list-style-type: none"> <li>• Firstly, consider if any of the building can be given a second life but taking a 'retrofit first' approach',</li> <li>• Secondly identify what can be reused on site, then identify and appropriately divert waste from landfill.</li> <li>• Where works require partial or complete demolition at least 80% (by weight) of all demolished materials will be recycled or reused with verification. The Green Star tool has a suitable method of assessing recycling of materials.</li> </ul>	
<b>W2 (2023)</b>	<b>Operational waste</b> <ul style="list-style-type: none"> <li>• Design to minimise waste to landfill through appropriate separation inside and outside with equal access for waste, glass, organic waste and recycling bins and further separation where relevant/feasible for cardboard, e-waste etc.</li> <li>• All lights, paint, e-waste and other problematic waste to be delivered to the Darebin Resource Recovery Centre (DRRC) for recycling and disposal as practicable.</li> <li>• Tech and furniture (anything with a second life option) to be directed to the DRRC as practicable.</li> <li>• For retrofits and new builds ensure space is allocated for an onsite location for 'beyond lifecycle/broken' furniture (e.g., filing cabinets, bins, computer chairs). Label the space appropriately, include details in Waste Management Plan (WMP) (if required by planning), as well as contact information for collection.</li> </ul>	

URBAN ECOLOGY		Links to Resources/ Standards
U1 (2023)	Urban Greening and biodiversity	<ul style="list-style-type: none"> <li>• Design to ensure the maximum number of existing trees and area of vegetation are maintained.</li> <li>• Identify and justify outcome desired from vegetation, i.e. canopy cover for urban cooling along bike/pedestrian paths, or habitat and biodiversity regeneration or both.</li> <li>• Plant species accordingly:               <ul style="list-style-type: none"> <li>○ Indigenous, native plant and drought tolerant species to enhance bio-diversity.</li> <li>○ Rewilding to create / enhance wildlife corridors.</li> <li>○ Where canopy is required, all new and replacement trees irrigation options other than potable water such as passive irrigation through tree pits, or water capture and reuse.</li> </ul> </li> </ul>
U2 (2023)	Synthetic / artificial grass	<ul style="list-style-type: none"> <li>• 100% synthetic grass is not accepted.</li> <li>• Where the use (e.g. childcare) requires a play surface other than grass, prioritise natural materials such as bark, sand, gravel, and rocks. Consider the colour selection (i.e. Solar Absorptance) and how the area will be shaded to avoid overheating.</li> <li>• Hybrid products are acceptable where the synthetic percentage is limited, and the product is predominately natural grass.</li> <li>• Consider how the grass will be irrigated, connect to the rainwater tank where possible.</li> </ul> <p>See example products of hybrid grass:  <a href="https://www.hgturfgroup.com.au/products/hero-hybrid-grass">https://www.hgturfgroup.com.au/products/hero-hybrid-grass</a>  <a href="https://synlawn.com.au/what-is-hybrid-grass/">https://synlawn.com.au/what-is-hybrid-grass/</a></p> <p>News article about challenge: <a href="#">Rolled up: is synthetic turf on Australian sports fields worth the environmental risk?   Environment   The Guardian</a></p>

## APPENDIX D: Glossary of Terms and ESD Assessment Rating Tools

### Glossary of Terms

ESD	Environmentally Sustainable Development
GBCA	Green Building Council of Australia <a href="http://www.gbca.org.au">www.gbca.org.au</a>
GECA	Good Environmental Choice Australia – Ecolabel sustainable and environmental materials and products database. <a href="http://www.geca.eco/">http://www.geca.eco/</a>
GFA	Gross Floor Area – a measure of the size of a building
Global GreenTag	Sustainable materials and products database including certification. <a href="https://www.globalgreentag.com/">https://www.globalgreentag.com/</a>
HVAC	Heating, Ventilation and Cooling (building systems)
ICA	Independent Commissioning Agents role is to advise monitor and verify the running of building systems such as HVAC. They must be independent from the design and construction of the building.
kWh	Kilowatt Hour – a measure of electricity consumption
MWh	Megawatt Hour- a measure of 1,000 kWh of electricity consumption
MSS	Municipal Strategic Statement
NCC	National Construction Code
OH&S	Occupational Health and Safety
PVC	Polyvinyl chloride is a common material used for plumbing pipes and electrical cables. The manufacture requires toxic chemicals and disposal is also toxic
R-Value	A measure of heat transfer that is used for insulation. The higher the R-Value the lower the heat loss from inside in winter and heat gain when hot outside.
SDA	Sustainable Design Assessment
SMP	Sustainable Management Plan
U-Value	A measure of the heat transfer from inside to outside that is used for windows. Lower U-Value = less heat loss.
VOC	Volatile Organic Compounds – organic odour from glues, resins, carpets, etc that reduce indoor air quality and possibly impact human health
WELS	Water Efficiency Labelling Scheme – benchmarks water efficiency and applies a WELS star rating of 1 to 6 stars
WMP	Waste Management Plan



WSUD	Water Sensitive Urban Design
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***End of Documents***