Sustainability Manual

November 2024

Government of South Australia
Department for Infrastructure and Transport

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A	June 2019	
B	June 2019	Figure 1 (steps & tools) updated
C		Minor corrections
D	Oct 2019	Section 5.3 and Appendix 7 (Site Accommodation requirements) added
E	May 2020	Section 4.1 (contractor requirements for IS ratings) and 4.2 (aligning planning investigations with IS requirements) added, Section 5.1 (planning phase sustainability plan) updated, Table 6.1 (scope of proving phase GHG emissions estimates) updated, Appendix 4 (BAU assumptions) updated
F	Dec 2020	Figure 1 (steps & tools) updated, Table 3.1 (business requirements) updated, Section 6.2-6.4 (requirements for estimating water, waste and materials lifecycle impacts) removed, Section 10.1 (Green Infrastructure) updated
G	July 2021	Section 1 (sustainability commitment) updated, Section 3 (benefits realisation and business requirements) updated, new Section 4 (determining project sustainability assessment requirements) added, Section 6 (requirements for sustainability plans) updated, Section 8 (Mandatory and Principal-nominated sustainability initiatives) updated, Section 9 (identifying and assessing sustainability initiatives) updated, Section 10

Version number	Date changed	Nature of amendment
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H	August 2022	Section 7 (Estimating impacts) updated, Section 11 updated to include reference to Green Infrastructure Commitment, ESD Report template updated, Appendix 5 (template for final Sustainability Plan) updated
I	November 2024	Changes throughout to align with updated Master Specifications and national decarbonisation initiatives and guidance. More detailed guidance for Green Infrastructure assessments and calculating canopy cover. Changes to the structure of the document to improve useability.

Approvals record

Approvers	Position	Date
Emma Hicks	Manager, Decarbonisation and Sustainability	11 November 2024

We acknowledge the Traditional Custodians of the Country throughout South Australia and recognise their continuing connection to land and waters. We pay our respects to the diversity of cultures, significance of contributions and to Elders past, present and emerging.

1 Sustainability Commitment

The Department for Infrastructure and Transport (the Department) is committed to delivering sustainable transport, infrastructure and programs in a manner that balances economic, environmental and social needs and aligns with the Department's Climate Change Priorities.

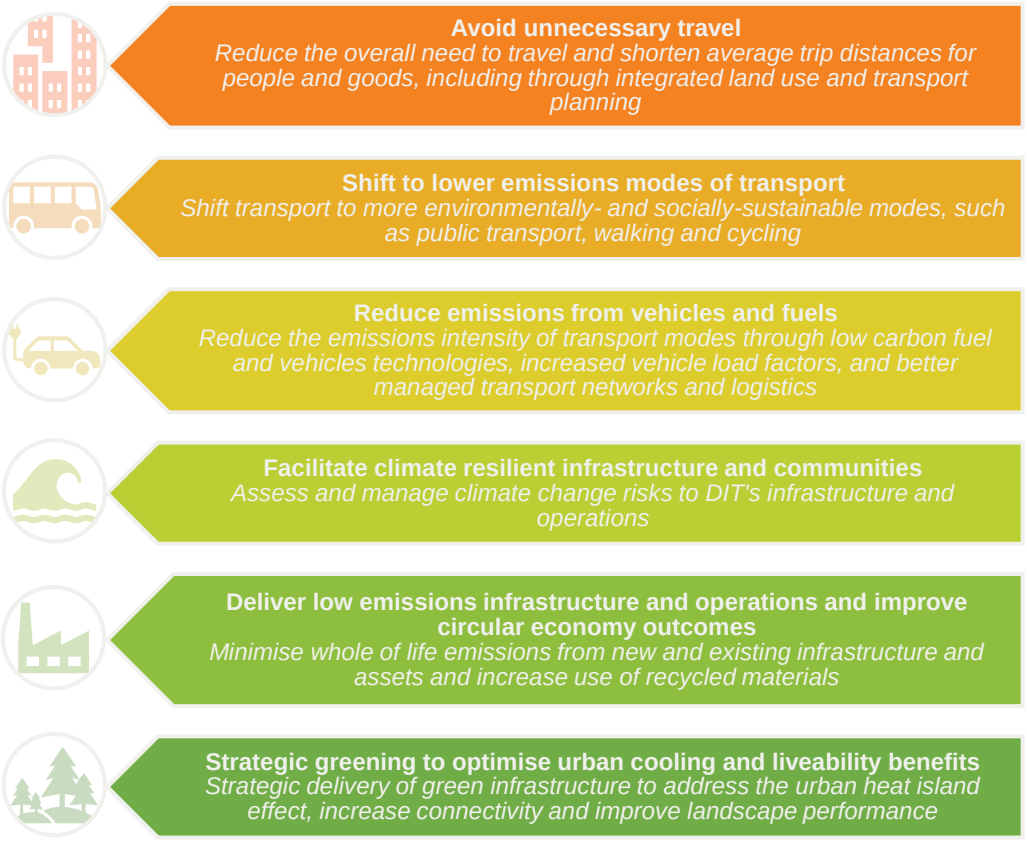


Figure 1 Climate Change Priorities

2 Purpose of this Manual

The Department uses a variety of tools and processes to minimise the impacts of its activities on - and where practicable enhance - the environment and deliver lasting benefits to the community. Figure 2 summarises the key tasks and tools to guide sustainable decision making throughout a project/program's planning, delivery and maintenance.

This Manual supplements the Master Specification for transport infrastructure by providing further detail on how project teams are to undertake key sustainability tasks which may be required by contract documents / specifications. These sustainability tasks aim to deliver improved outcomes in the following focus areas:

- Net Zero Alignment
- Carbon Reduction Hierarchy
- Sustainable procurement
- Waste hierarchy and the Circular economy
- Green Infrastructure
- Use of non-potable water
- Climate change resilience

Figure 2 Steps and tools applied through planning, design, delivery and maintenance phases to address sustainability risks and opportunities

PROJECT PHASE	RELEVANT STEPS/ TOOLS	SUSTAINABILITY MANUAL REFERENCE
Initiation Phase	**Alignment of Transport Planning with Net Zero outcomes:** Ensure consideration of future Net Zero transport scenarios when identifying 'problems' to address. The South Australian Government has committed to reducing travel demand and emissions by creating more walkable communities and driving a shift to low emission modes of transport (SA Net Zero Strategy 2024-2030). Check if transport modelling reflects this reduced travel demand and increased patronage of public transport/active travel. A Net Zero transport network is likely to require prioritisation of public transport and active travel over road expansion.	
	GATEWAY REVIEW: Check the initiative's alignment with Government policy objectives, plans, internal and external programs. Does the initiative support the SA Net Zero Strategy 2024-2030 and Climate Ready Government initiative (including SA Government Climate Change Resilience and Adaptation Actions and Net Zero Emission Government Operations program), i.e.: • Align transport planning with net zero emissions outcomes • Deliver low emission infrastructure and operations • Increase the use of public transport and active travel • Accelerate strategic urban greening • Assess and address climate change risk in government infrastructure decisions • Achieve Net Zero Emissions in South Australia by 2050.	Part 5
Proving Phase	**Planning Study:** PC-PL1 (Framework for Planning Studies) and PC-PL2 (Planning Investigations) include requirements to: (a) Include non-build solutions in options generation (b) Assess options for Net Zero Alignment (c) Undertake a high-level estimate of GHG emissions for each option (d) Include GHG emissions and Net Zero alignment as criteria in the ranking and assessment methodology (used to select a short list of options from a long list and to select a preferred concept design) (e) Undertake cost benefit analysis using ATAP guidelines (including monetisation of GHG emissions (using the National Carbon Values), sustainability benefits/disbenefits where possible) (f) Undertake GHG emissions assessment for the preferred option (g) Undertake a Green Infrastructure assessment (where applicable) to confirm Green Infrastructure targets to be achieved and identify priority areas for delivery of greening (h) Identify viable emission reduction and circular economy initiatives to be pursued in delivery (i) Assess climate change risks and adaptation options (j) Investigate flooding characteristics having regard to projected increase in intensity of extreme rainfall events due to climate change (k) Undertake environmental impact assessment (l) Undertake social, community and stakeholder investigations and consultation (m) Assess outcomes for Aboriginal People (n) Investigate economic development opportunities/constraints (e.g., property values, tourism and opportunities for business/industry and trade), as well as consideration of impacts on property owners/occupants (e.g., property viability, impact on livelihood).	Part 5 & 7 Part 8, 9 & 11
	GATEWAY REVIEW: Check that option selection has been informed by triple-bottom line assessment, including greenhouse gas impacts, Net Zero alignment and climate change risks. Does the preferred option align with Government's Climate Change commitments?	
	Community engagement is guided by the DIT **Community Engagement Toolkit**, which draws on the '**Better Together: Principles of Engagement**'.	
Pre-Delivery Phase	**Planning Phase Sustainability Plan:** PC-PL1 includes a requirement to prepare a Planning Phase Sustainability Plan that includes a Carbon Management Plan for the preferred concept design.	Part 6
	Land acquisition: PC-PL3 (Concept design development) requires concept plans to identify land acquisition requirements. Land acquisition requirements must take into account any relevant recommendations of the Green Infrastructure assessment (i.e., allow sufficient space to achieve project objectives for Green Infrastructure and open space/amenity).	Part 8
	Climate change considerations for stormwater design: PC-PL3 (Concept design development) requires: • the concept design to consider the outputs of the planning investigations (including predicted flooding characteristics under climate change) • the concept design report to specify the concept design basis, including key parameters (which include the climate change scenario that has been selected for stormwater modelling).	
	Cost Estimates: PC-PL5 requires that cost estimates are inclusive of the desired extent and type of Green Infrastructure (per Green Infrastructure assessment) and all viable decarbonisation and circular economy opportunities are included within the estimate, including those identified in the Planning Phase Sustainability Plan).	Part 5 & 8
	Ecologically Sustainable Development Report: PC-PL1 requires preparation of an ESD report, to support the Public Works Committee submission (where required).	Part 5

Procurement Phase

GATEWAY REVIEW: Check that appropriate sustainable procurement measures are included in procurement documents, in line with DIT's Sustainable Procurement Policy.

Check that project estimates allow for implementation of viable low carbon and circular economy opportunities (informed by the Planning Phase Sustainability Plan) and provision of Green Infrastructure (informed by the Green Infrastructure assessment).

Check that land acquisition plans allow for provision of Green Infrastructure in priority locations (informed by Green Infrastructure Assessment).

Contract requirements, Request for Tender, Project agreement: The Department's Sustainable Procurement Policy includes several mandatory requirements for certain projects, including use of a Sustainability Commitments Schedule, requirements for head contractors to have organisational emission reduction target(s), requirements to include sustainability criteria in tender evaluation. Contract requirements, returnable schedules and KPIs should be informed by low carbon and circular economy opportunities identified in the Planning Phase Sustainability Plan.

Part 5

GATEWAY REVIEW: Check that the procurement decision has taken into account tenderers' ability to achieve the project's sustainability objectives and deliver low emission infrastructure and operations.

Where tenderers have submitted a Sustainability Commitments Schedule, ensure these commitments are incorporated into contract documents.

Delivery Phase

Detailed Design: PC-ST1 (Sustainability in Design) includes requirements for:

(a) ensuring the design basis establishes the design parameters required to achieve Green Infrastructure targets
(b) obtaining an IS Rating (where applicable)
(c) preparing a preliminary and final design phase Sustainability Plan, and reporting progress
(d) implementing mandatory, principal-nominated and contractor-nominated sustainability initiatives
(e) holding a sustainability workshop, identifying and implementing additional sustainability initiatives (level 1 only)
(f) estimating whole of life GHG and achieving a minimum 10% reduction (level 1 only)
(g) achieving circular economy outcomes
(h) assessing opportunities to reduce potable water use
(i) ensuring discipline design reports include a sustainability initiatives register and identify applicable climate risks and treatments
(j) ensuring the design incorporates sufficient and suitable Green Infrastructure to achieve the applicable Green Infrastructure targets
(k) review and implement outputs of Climate change risk assessment (or undertake a Climate change risk assessment if one has not previously been undertaken).

Part 6, 7, 8, 9, 10 & 11

PC-EDM1 (Design Management) requires significant design decisions to be subject to a multi-criteria decision making process that includes consideration of whole-of-life environmental, economic, social and technical criteria relevant to the decision.

Part 9

PC-PM4 (Risk Management) includes a requirement to address climate change/natural hazard risks in the Contract specific Risk Register. Climate change risks must be assessed and treated in accordance with the Department's Climate Change Adaptation Guideline.

Part 11

PR-LS-D1 / D2 (Landscape and Urban Design) includes requirements to achieve the Green Infrastructure targets and objectives specified for the project.

PC-ENV3 (Environmental Design), PC-ENV4 (Noise Assessment and Treatment Implementation), RD-DK-D1 (Road Drainage) and PC-SI2 (Site Investigations) establish the requirements for assessing and managing environmental impacts including vegetation, fauna, air quality, noise, water quality and site contamination.

PC-H1 (Aboriginal Heritage & Native Title) includes requirements to avoid damage, disturbance to Aboriginal sites, objects or remains. PC-H2 (Non-Aboriginal Heritage) includes requirements to assess and appropriately manage impacts to heritage listed sites.

Construction: PC-ST2 (Sustainability in Construction) includes requirements for:

(a) obtaining an IS Rating (where applicable)
(b) preparing a preliminary and final construction phase Sustainability Plan and reporting progress
(c) implementing mandatory, principal-nominated and contractor-nominated sustainability initiatives
(d) identifying and implementing additional sustainability initiatives (level 1 assessment only)
(e) estimating whole of life GHG and achieving a minimum 10% reduction (level 1 only)
(f) achieving circular economy outcomes and reporting on recycled material use
(g) assessing and implementing opportunities to reduce potable water use
(h) demonstrating achievement of applicable Green Infrastructure targets and objectives
(i) sustainable site accommodation and equipment
(j) practising sustainable procurement (level 1 only)
(k) implementing climate change risk treatments.

Part 6, 7, 8, 9, 10 & 11

PC-ENV1 (Environmental Management) and PC-ENV2 (Environmental Protection), establish the requirements for Contractors' environmental management systems and environmental protection/mitigation measures.

GATEWAY REVIEW: Check that any residual climate change risks and ongoing mitigation measures (e.g., increased frequency of clearing stormwater infrastructure) are included in the Residual Risk and Hazard Register and incorporated into asset management programs/ schedule where appropriate.

Handover: PC-CN2 (Asset Handover) requires the contractor to provide the asset owner with the Residual Risk and Hazard Register.

3 Sustainability Terms and Concepts

3.1 Key Terms

A number of sustainability terms are used throughout this document. Refer toGlossary.

3.2 Key Concepts

3.2.1 Net Zero Alignment

The Government of South Australia has committed to achieving a net zero emission society by 2050 and net zero emissions in government operations prior to 2050 where feasible. The transport sector is currently the largest source of emissions in South Australia. As such, a key focus of *South Australia's Net Zero Strategy 2024-2030* is to align transport planning with net zero emissions outcomes and support a shift to lower emissions transport modes, including public transport and active travel.

The construction, operation and maintenance of transport infrastructure is also a significant source of emissions, and *South Australia's Net Zero Strategy 2024-2030* and the *Net Zero Emissions for Government Operations Program* includes actions to deliver low emissions infrastructure and operations, through use of low and zero emissions technology and materials and by supporting recycling and reuse as part of a more circular economy.

When making policy or investment decisions, it is important to consider options' strategic alignment to net zero policy, considering the system, network and project level – both in terms of:

- the greenhouse gas emissions generated through construction, operation and maintenance of an infrastructure asset; and
- the potential for the policy/asset/program to either support a shift to low emission transport modes or encourage continued/greater use of less sustainable transport modes (refer Figure 3).

To facilitate this assessment, relative alignment with net zero policy is defined as follows:

Net Zero Aligned	The action or decision would result in a material reduction in greenhouse gas emissions and/or would positively contribute to achieving a zero emission transport system or economy, e.g. by enabling/facilitating greater use of sustainable transport modes such as public or active transport (refer Figure 3).
Net Zero Agnostic	The action or decision will neither contribute to nor hinder the transition to a zero emission economy. In the context of transport infrastructure, it will not significantly facilitate use of sustainable transport modes such as public or active transport, but nor will it encourage greater use of private vehicles.

Not Net Zero Aligned	The action or decision would result in a material increase in greenhouse gas emissions and/or does not support the transition to a zero emission transport system or economy. For example, an investment decision that facilitates greater use of private vehicles by making these forms of transport more convenient/attractive is Not Net Zero Aligned.

In determining Net Zero Alignment, consideration shall be given to the sustainable transport hierarchy (adapted from Wales Transport Strategy 2021, UK)[1]:

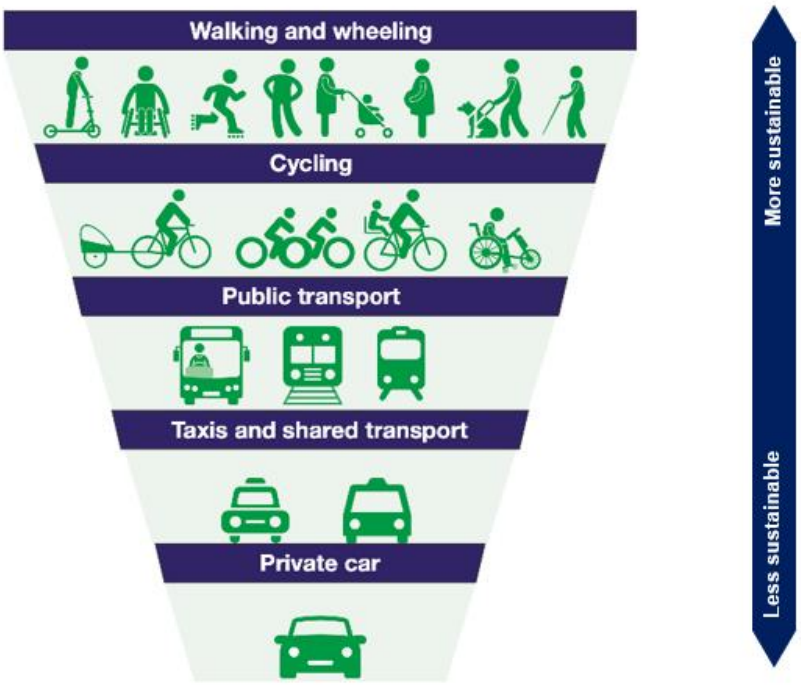


Figure 3 Sustainable Transport Hierarchy

3.2.2 Carbon Reduction Hierarchy

The carbon management requirements in this Sustainability Manual have been aligned to the PAS2080 Carbon Management in Buildings and Infrastructure 2023 (PAS2080) standard. This includes application of the Carbon Reduction Hierarchy (illustrated in Figure 4) and appropriate management of carbon reductions throughout the value chain, acknowledging that different members of the value chain have differing ability to influence whole of life carbon outcomes (refer to Figure 5).

[1] Llwybr Newydd: the Wales transport strategy 2021 | GOV.WALES

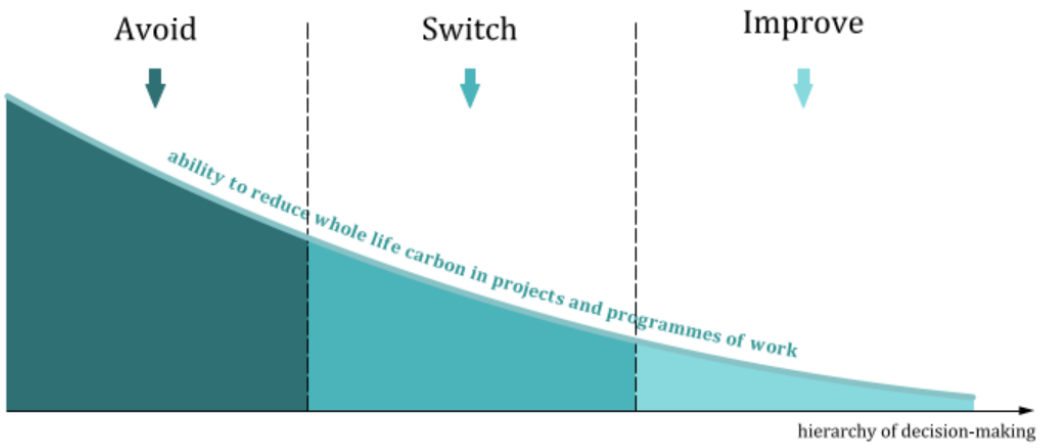


Figure 4 Carbon Reduction Hierarchy (Source: PAS2080)

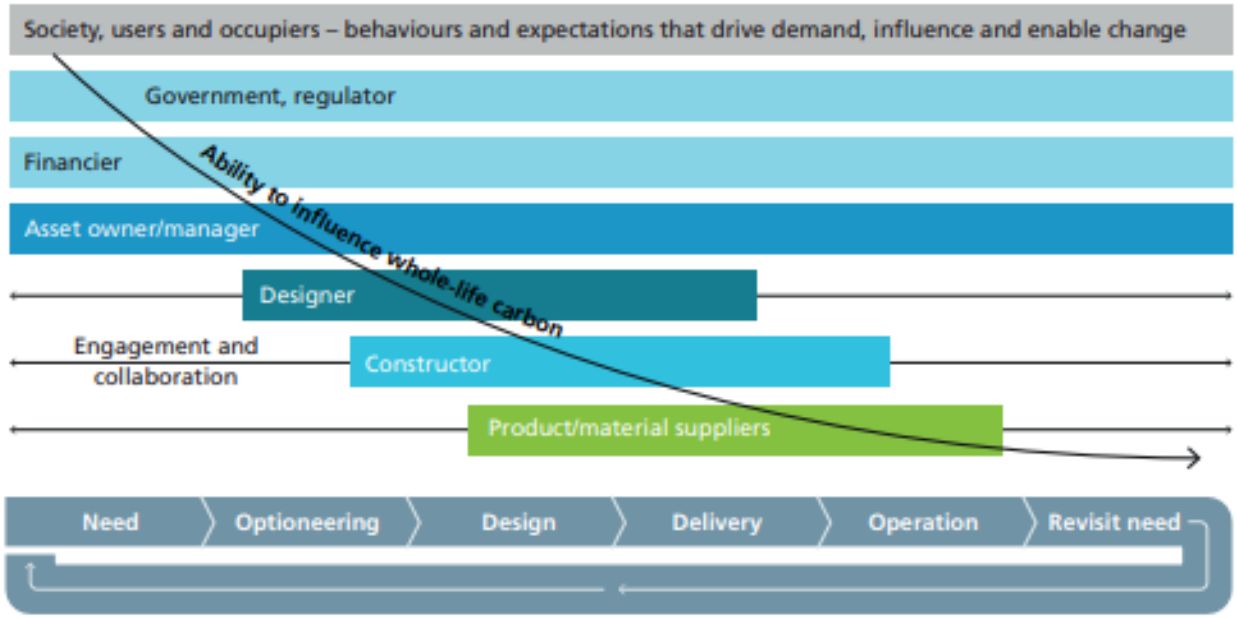


Figure 5 Value chain members ability to influence whole of life carbon (Source: PAS2080)

3.2.3 Lifecycle modules

When quantifying GHG emissions, it is necessary to define the 'emission boundary', i.e. which sources of emissions are included and excluded in the estimate. Figure 6 categorises GHG emissions by lifecycle modules.

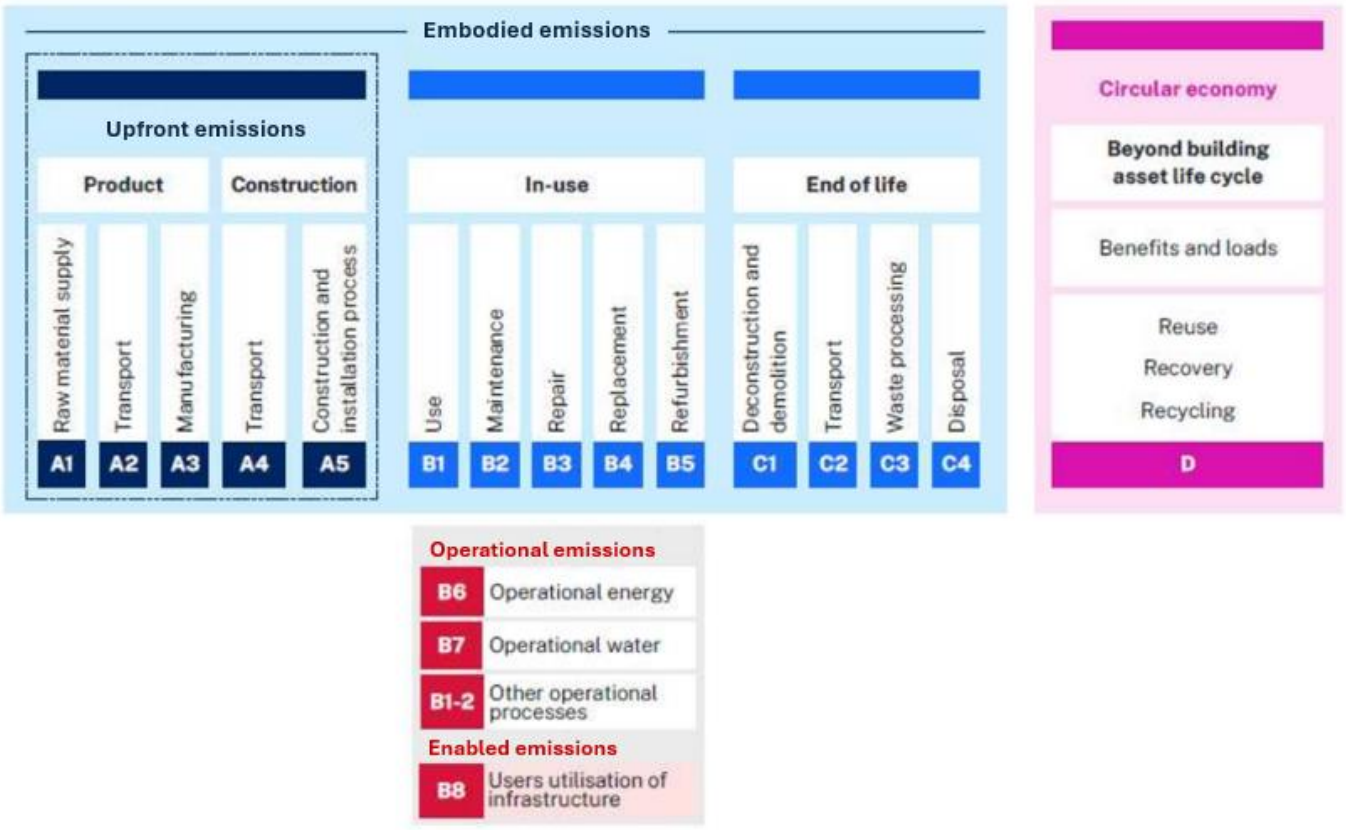


Figure 6 Sources of GHG emissions throughout the asset lifecycle (adapted from PAS2080:2023 and lifecycle modules in EN 1742:2022)

3.2.4 Waste Hierarchy and the Circular Economy

The waste hierarchy is an internationally accepted guide for prioritising waste management practices with the objectives of achieving a more sustainable, circular economy – i.e. one in which products and materials are kept in circulation through processes like reuse, refurbishment and recycling, rather than becoming waste via the traditional 'take-make-dispose' model. The waste hierarchy sets out the preferred order to waste management practices, from most to least preferred. It forms the basis for South Australia's Waste Strategy 2020-25, and can be applied throughout the infrastructure lifecycle to reduce consumption of finite resources and minimise generation of waste and greenhouse gas emissions.

Infrastructure projects have an opportunity to drive the circular economy through: redesign, reduction in material use, reuse and recycling of materials and supporting the procurement of products with recycled and recyclable content.

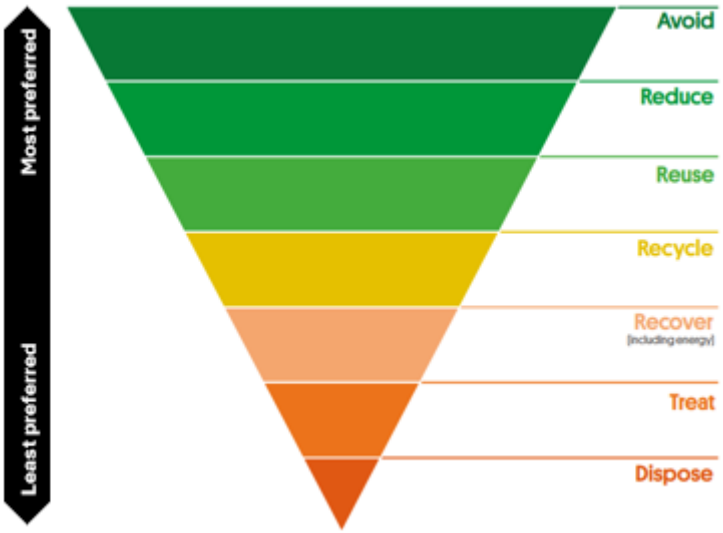


Figure 7 Waste management hierarchy (South Australia's Waste Strategy 2020-25)

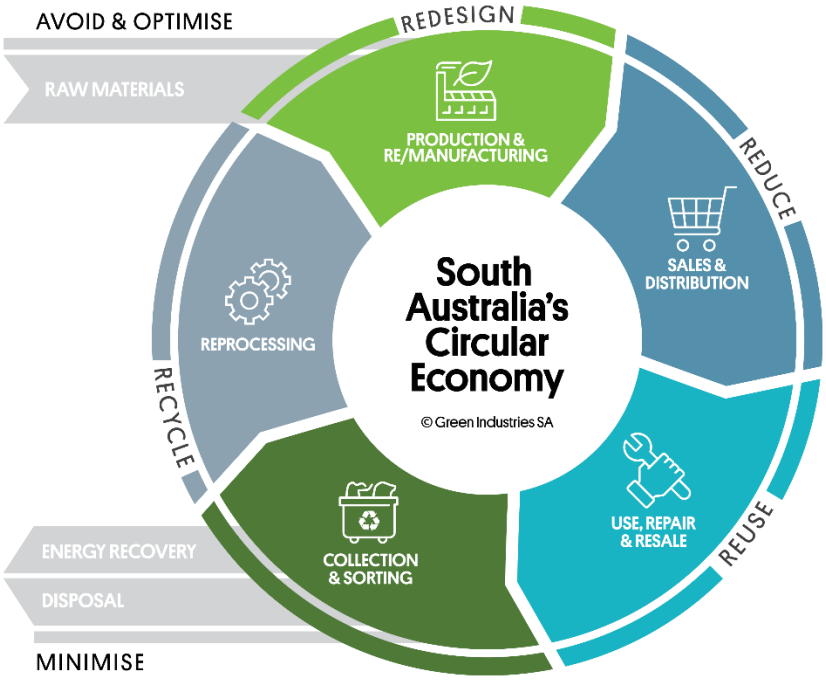


Figure 8 Circular Economy (South Australia's Waste Strategy 2020-25)

3.2.5 Climate change resilience

Climate change resilience describes to the ability to withstand or recover quickly from the effects of climate shocks or stresses. In the context of transport infrastructure this may mean designing and constructing an asset so that it is capable of retaining its desired condition and functionality under projected future climate conditions.

Climate resilient infrastructure avoids/ minimises the direct costs of climate hazards (such as lost revenue or repairs/ early replacement of assets) as well as indirect costs (such as impacts on local businesses or the costs of passenger and freight delays).

3.2.6 Green Infrastructure

Green Infrastructure refers to both natural and engineered ecological systems (e.g., trees and other landscaped areas, stormwater detention basins, wetlands etc) that deliver a range of ecosystem services and community benefits, such as:

- Shade/ respite for pedestrians and cyclists;
- Improved liveability and amenity;
- Improved community health and wellbeing;
- Mitigation of urban heat island effect/ increased resilience to extreme heat;
- Reduction in stormwater run-off;
- Water and air quality improvement;
- Increased property values for adjacent landowners;
- Increased habitat/ biodiversity;
- Reduced demand on downstream drainage infrastructure; and
- Carbon sequestration.

Refer to the Department's Green Infrastructure Commitment for further information including focus areas and commitments.

3.2.7 Sustainable Procurement

Sustainable procurement is 'procurement that has the most positive environmental, social and economic impacts possible over the entire life cycle' (ISO 20400:2017 Sustainable Procurement – Guidance). Traditionally, procurement decisions have been based on three core criteria: time, cost and quality. Sustainable procurement seeks to ensure that procurement decisions also take into account social, environmental and economic impacts.

4 Determining Project Sustainability Assessment Requirements

All transport infrastructure projects delivered by the Department are subject to sustainability requirements. The level of assessment undertaken for a project should be commensurate with the project's value/ risk and the ability to materially influence sustainability outcomes.

During the early planning phase, a number of sustainability tasks are undertaken, regardless of project value. These are discussed in Section 5.

Following selection of a preferred option, projects will undergo further sustainability assessment. The level of assessment required should be determined during a project's planning study, having regard to the criteria in Table 1, and documented within the project's Full Planning Study Report (Master Specification PC-PL1, Task 9).

Whilst the majority of the sustainability aspects covered by the Infrastructure Sustainability (IS) Rating Scheme are addressed by the Department's Master Specification and project management framework, the rating scheme provides a more robust sustainability assessment, third party verification and benchmarking against other projects.

Table 1 Criteria and requirements for project sustainability assessment

Infrastructure Sustainability (IS) Rating	Level 1 sustainability assessment	Level 2 sustainability assessment
CRITERIA DETERMINING LEVEL OF ASSESSMENT		
Use of the IS rating tool will be considered on a case-by-case basis where the project Capital cost is > $200m (including design, construction and land costs but not including GST) and none of the following apply: • the design duration is less than 12 months; • the procurement model is construct only; • the project scope is to complete systems upgrades (e.g., rail electrification, signals upgrades, EV charging network).	Required where: • the project will not be registered for an IS Rating; and • the estimated project Capital cost (including design, construction and land costs but not including GST) is ≥$100 million	Required where: • the project will not be registered for an IS Rating and does not trigger a Level 1 assessment
REQUIREMENTS		
Planning Phase: • A planning phase Sustainability Plan (including a Carbon Management Plan) must be prepared for preferred concept (as per PC-PL1).	Planning phase: • A planning phase Sustainability Plan (including Carbon Management Plan) must be	Planning phase: • A planning phase Sustainability Plan is not required. Delivery phase:

• Additional requirements and considerations apply for projects that will undergo an IS Design rating (refer section 5.2.7.1 and section 5.3 of this Manual). Delivery Phase: • The Contractor is required to comply with the requirements in Section 4.1 of this manual.	prepared for the preferred concept (as per PC-PL1). Delivery phase: • completion of all design and construction sustainability tasks is required (as per PC-ST1 and PC-ST2).	• completion of a limited number of design and construction sustainability tasks is required (as per PC-ST1 and PC-ST2).

4.1 Requirements for Projects Undergoing IS Ratings

For projects undergoing an IS rating, the contract will specify a minimum rating or score that must be achieved.

For all projects undergoing an IS rating, the Contractor is required to undertake the following tasks in accordance with the current version of the IS Technical Manual:

- Register the project with the Infrastructure Sustainability Council (ISC) for the required IS rating;
- Undertake a kick-off workshop with ISC and representatives from the Department and the project team;
- Undertake or review a Materiality Assessment and seek verification from ISC;
- Set up sustainability management systems for the project, including appropriate governance;
- Complete all required actions and tasks within the Establishment Period;
- Prepare a Base Case Proposal for the project utilising the design stated in the contract (or other design agreed with the Principal) and seek verification from ISC;
- Register any potential innovations with ISC;
- Complete the IS rating tool scorecard in accordance with the requirements of the current IS Technical Manual;
- Unless otherwise agreed in writing with the Principal, obtain the required rating within 3 months of:
    - completion of 100% design (for a design rating)
    - project completion (for an as-built rating).

The Contractor must provide an experienced Sustainability Manager for the duration of the design and construction phases.

The Sustainability Manager must be directly responsible to the Contractor’s senior management and must be responsible for (as a minimum):

- Administering the IS Rating process and preparing rating submissions on behalf of the project team;
- Complete monitoring, auditing and reporting requirements;
- Encouraging and supporting the project team to identify and act on opportunities to improve the sustainability of the project, including assessing the feasibility and driving implementation of new ideas or technologies;

- Ensuring sustainability considerations are integrated into project decision making processes;
- Keeping the Principal informed of progress against Mandatory, Principal-nominated and Contractor-nominated sustainability initiatives.

These duties shall take precedence over any other activity undertaken by the Sustainability Manager. The Sustainability Manager must be an Infrastructure Sustainability Accredited Professional.

The Contractor must include sustainability aspects in monthly project reports (PC-PM1 Project Management and Reporting), and also issue to the Department's Principal Sustainability Advisor. This must include, as a minimum, an updated scorecard/ credit pathway showing the target level and score for each credit (current at the time of preparing the progress report), any barriers/ risks to achieving the target level/ score and how these will be managed.

5 Planning phase requirements

5.1 Proving Phase

5.1.1 Options Generation

In accordance with the Carbon Reduction Hierarchy and PC-PL2, the options generation process must include consideration of the following:

• **Non-build solutions**	*Such as policy, technology or behaviour change that would deliver similar outcomes without requiring the construction of new infrastructure. For example, reducing the speed limit and/or installing warning signs instead of realigning an intersection*
• **Upgrades or repurposing of existing infrastructure**	*For example, converting an existing traffic lane to a dedicated public transport lane*
• **Using assets for multiple purposes**	*For example, including a shared use path on a service road or rail bridge*

5.1.2 Strategic Merit Test

The Strategic Merit Test must confirm that there is a clear link from strategy to project level, i.e. the project is contributing to the Department's and the State Government's broader vision, and complements other existing or planned projects / programs. To effectively consider an option's or initiative's alignment with goals, objectives and strategic priorities, the Strategic Merit Test should consider key DIT and SA Government sustainability commitments, obligations, and programs, including assessment for Net Zero Alignment (refer to section 3.2.1 of this Manual).

Key DIT and SA Government sustainability commitments, obligations, and programsAppendix 1 provides a list of key sustainability commitments, obligations, and internal and external programs to consider when undertaking the Strategic Merit Test.

5.1.3 Green Infrastructure Assessment

Projects within Metropolitan Adelaide or rural townships must undertake a Green Infrastructure assessment to confirm Green Infrastructure targets to be achieved and identify priority areas for delivery of greening. Refer to section 8 of this Manual for guidance on undertaking a Green Infrastructure Assessment.

5.1.4 Climate Change Risk Assessment

Master Specification PC-PL2 'Planning Investigations' and the Department's Climate Change Adaptation Guideline (available from the Department's Standards and Guidelines webpage) establish the requirements for undertaking a climate change risk assessment during the planning phase.

5.1.5 Options Analysis (including Cost Benefit Analysis)

All projects must consider sustainability as part of options analysis. Specifically, *GHG emissions impact* and *Net Zero Alignment* must be included as criteria in the options analysis, both at long-list and short-list stage. Refer to section 7 of this Manual for expectations regarding GHG emissions estimates, and section 3.2.1 for guidance on how to assess Net Zero Alignment.

5.1.5.1 Cost Benefit Analysis

Cost benefit analyses consider whole-of-life costs and benefits of the investment decision, including all material externalities arising from the option / initiative. Materiality should be considered on a cumulative basis, for example if a project proposes to remove a small number of trees but is located in an area with an already low tree canopy cover, this externality may still be material.

Externalities that may need to be considered when assessing infrastructure projects include:

- Upfront, operational and enabled GHG emissions;
- Climate change resilience;
- Noise;
- Air and water pollution;
- Enhanced safety;
- Aesthetics;
- Biodiversity and tree canopy cover; and
- Land use changes and urban renewal
- Waste generation/ circular economy outcomes.

Cost benefit analyses must include monetised GHG emission impacts (using the National Carbon Values (NCVs) provided in Infrastructure Australia's Guidance Note: Valuing emissions for economic analysis) wherever GHG emissions have been estimated. Refer to section 7 of this Manual for requirements for estimating GHG emissions.

5.2 Pre-delivery phase

5.2.1 Business Case

All projects must include the following information in business case document(s), as a minimum:

- Where options analysis results in proceeding with option(s) which require construction of new infrastructure, clear rationale for this decision.
- Assessment of Net Zero Alignment for each option (noting this is mandatory criterion for MCA).
- Estimate of GHG emissions for each option[2] (noting this is a mandatory criterion for MCA).

If, through planning investigations, sustainability initiative(s) have been identified which offer potentially significant emission reduction and are considered viable, an additional option must be presented: one which reflects the preferred option but with the sustainability initiative(s) implemented. An updated GHG emissions estimate, cost estimate and benefit cost ratio (BCR) should be prepared for this option. This is particularly relevant where the initiative(s) would materially influence project costs and/or delivery timeframes (for example, use of low carbon liquid fuels for construction fuel use).

5.2.2 Planning Phase Sustainability Plan

Note that projects subject to Level 2 sustainability assessment are not required to complete a Planning Phase Sustainability Plan, but are still required to document outcomes from sustainability planning investigations as specified by PC-PL2.

For projects requiring Level 1 assessment, a planning phase sustainability plan is required as specified by PC-PL1 (Task 9). The planning phase sustainability plan must provide a summary of the most significant sustainability impacts and opportunities associated with the project, and must include:

- Whole of life GHG emissions estimate for the reference design[3], prepared in accordance with part 7 of this Manual;
- Outcomes of the following tasks undertaken as part of the Planning Investigations (as applicable):
    - Circular Economy assessment;
    - Climate Change Risk Assessment;
    - Green Infrastructure Assessment;
- Initial Carbon Management Plan for the project (refer to requirements specified in section 6.2 of this Manual);

[2] Refer to Part 7 for guidance on which sources of emissions must be estimated and how. Where GHG emissions impacts have been estimated, they must be monetised using the National Carbon Values (NCVs) provided in Infrastructure Australia's Guidance Note: Valuing emissions for economic analysis

[3] The emissions estimate should be based on the reference design, including any sustainability initiatives that have been implemented in the reference design (i.e. specified in reference design documentation and allowed for in the cost estimate). It should not assume implementation of any sustainability initiatives (including mandatory sustainability initiatives in PC-ST1 or PC-ST2) that are still to be investigated/ confirmed for implementation.

- Recommended Principal-nominated sustainability initiatives, bid-back items and other contract requirements for the design and construction of the asset, including GHG emission reduction target(s), prepared in accordance with section 5.2.3 - 5.2.7 of this Manual.

A template for the Planning Phase Sustainability Plan is provided in Appendix 3.

5.2.2.1 Additional requirements for projects that will be registered for an IS Design rating

Where Planning phase tasks include developing a Concept Design to Reference Design stage, and the Principal has confirmed that the project will be registered for an IS Design rating, the Sustainability Plan must include the following additional components:

- Draft IS rating pathway (including undertaking an initial materiality assessment);
- Recommended design to be chosen for the Base Case;
- Quantification of energy and materials use during construction by estimators to ensure appropriate data available for Design / As-built rating;
- Draft Resource Efficiency Strategy including targets.
- A recommended minimum IS Design rating and As Built rating score;
- Suggested minimum levels to be achieved for individual credits.

5.2.3 Setting GHG emission reduction targets

For projects where the preferred option requires Level 1 assessment, or will undergo an IS rating, GHG emission reductions SMART targets should be established and recorded in the Carbon Management Plan for whole of life GHG emissions where possible.

In determining the GHG emission reduction target(s), the following must be considered:

- The Base case GHG emissions estimate, against which the target reductions will be measured, will be for the reference design, including any sustainability initiatives that have been implemented in the reference design (i.e. specified in the design documentation and allowed for in the cost estimate) but not including any other sustainability initiatives that are still to be investigated in the detailed design and construction phase.
- Targets should be realistic, reflecting viable potential design and construction initiatives which go beyond those incorporated in the reference design.
- Reductions achieved on previous Department projects and relevant interstate examples[4].
- Potential value in setting multiple targets, driving reductions across several GHG emission sources (noting a singular target for whole of life or upfront GHG emissions could potentially be satisfied by achieving reductions for just one emission source).

[4] NB: Infrastructure Australia's Embodied Carbon Projections for Australian Infrastructure and Buildings report (Appendices) includes emission reduction potential for a number of sustainability initiatives

It is noted that the following summarise default GHG emission reduction requirements specified by Master Specification parts PC-ST1 and PC-ST2:

- Reduction in whole of life scope 1 and scope 2 GHG emissions (measured in units $CO_{2\text{-}e}$) of at least 10%, compared to the project's base case.
- Reduction in whole of life scope 3 GHG emissions associated with materials use (measured in units t $CO_{2\text{-}e}$) of at least 10%, compared to the project's base case.

The intent of developing project-specific GHG emission reduction requirements in the planning phase is to identify and pursue opportunities to achieve more significant and ambitious reductions in whole of life GHG emissions, compared to the current default requirements. Proposed project-specific GHG emission reduction targets developed during a project's planning phase will be considered by the Department and, where deemed appropriate, will be included as a contractual requirement for the project (overriding the default Master Specification requirements).

Reducing GHG emissions beyond the existing default requirements is achievable, but relies on work commencing early in planning phase to ensure relevant significant design and construction decisions can be influenced (e.g. changes to construction program and staging to allow for extensive use of concrete with reduced Portland cement, compared to the BAU), as well as enabling early industry engagement and ensuring GHG emission reduction initiatives are suitably allowed for in project cost estimates.

5.2.4 Identifying and assessing sustainability initiatives for concept design development

The earlier phases of a project lifecycle offer the greatest ability to influence sustainability outcomes. Therefore planning and concept design phases are critical for achieving the Department's sustainability objectives. For example, successful integration of Green Infrastructure within a transport corridor requires careful spatial consideration in the early planning stages.

A key planning phase sustainability task involves identifying and assessing opportunities to reduce whole of life GHG emissions. These investigations can inform recommendations for Principal-nominated Sustainability Initiatives to be implemented during detailed design and construction (refer to part 5.2.5), but they should also inform concept design development, including material choices.

For example, if the initial GHG emissions estimates indicate that the largest source of emissions in a structure is concrete, then the project team should investigate and compare the emissions footprint and feasibility of using an alternative material such as steel. Similarly, if a project's asphalt use generates significant emissions, then the project team should assess and compare the relative emissions footprint of a rigid pavement. The outcome of these investigations should be used to inform concept design decisions, cost estimates, and proposed GHG emission reduction targets.

5.2.5 Recommending Principal-nominated Sustainability Initiatives for detailed design and construction

Master Specification parts PC-ST1 and PC-ST2 contain a number of Mandatory Sustainability Initiatives which must be implemented on all projects. However, where an opportunity has been identified to deliver

improved sustainability outcomes (beyond the mandatory initiatives), the Department may choose to specify additional project-specific Principal-nominated Sustainability initiatives in the delivery contract.

One of the objectives of the planning phase sustainability investigations is to identify any such opportunities early, so that any promising initiatives can be embedded in the Reference Design, allowed for in cost estimates, flagged in early market engagement activities and/or included in the contract for detailed design and construction.

For projects which will undergo Level 1 sustainability assessment or which will be registered for an IS Design & As Built Rating, the planning phase Sustainability Plan must include recommended Principal-nominated Sustainability Initiatives, based on an assessment of key sustainability impacts and opportunities for the project.

Recommended Principal-nominated sustainability initiatives must be reflective of the nature and scale of opportunities presented by the project and must be based on credible evidence of the benefit / impact that can realistically be achieved.

Examples of Principal-nominated sustainability initiatives include requirements to design and implement a trial of recycled plastic railway sleepers, use a nominated non-potable water source, achieve certain targets for recycled content or canopy cover.

5.2.6 Recommending bid-back items, Key Result Areas and performance indicators

The Department's Sustainable Procurement Policy requires the use of a Sustainability Commitments Schedule for design and construction contracts >$50 million. The Sustainability Commitments Schedule is a place where Contractors can 'bid back' commitments that exceed the minimum requirements, for example, the percentage of recycled content they will achieve for granular pavement materials, or the percentage reduction in embodied emissions they will achieve. This:

- encourages tenderers to identify and include in their costing and non-price submission initiatives and innovative approaches to delivering more sustainable outcomes
- helps the Department to assess tenderers' relative commitment and capacity to maximise achievement of the sustainability objectives in tender evaluation.

The commitments made in the returnable schedule become contractual requirements, thereby 'locking in' better sustainability outcomes than would otherwise be required by the specification.

A template Sustainability Commitments Schedule is provided in Appendix 8. One of the sustainability tasks for the planning phase is to confirm which sustainability outcome areas should be included in the schedule.

Defining Key Result Areas (KRAs) in a project contract is another means of driving project performance above and beyond minimum requirements. Progress and performance in KRAs is typically reported on monthly to the project leadership team, and good performance can be encouraged and rewarded through the use of financial incentives.

Planning phase Sustainability Plan may include recommended KRAs and Key Performance Indicators (KPIs) such as:

- Reduction in the project's whole-of-life GHG emissions associated with energy-use (measured in units t CO2-e);
- Reduction in the project's GHG emissions associated with materials use (measured in units t CO2-e);
- Circular Economy outcomes through use of recycled and/or recyclable materials;
- Achievement of Sustainability Commitments/ bid-backs; and
- On-time completion of sustainability plans and progress reports.

5.3 Aligning Planning Investigations with IS Requirements

Where it is intended to register a project for an IS Design and As Built rating, the Planning Investigations and/or Concept Design development should be undertaken in such a way that facilitates the achievement of the relevant IS Design credits, and avoids the need for re-work during the design phase.

Where an IS Planning Rating has been completed, the following documents can be used as the basis of this IS Design and As-built credit but must be reviewed (and updated if required) in line with the IS Design and As-built credit requirements:

- Sustainability goals, objectives and targets (such as project-specific resource recovery performance targets);
- Priority stakeholder issues, community and key stakeholders' heritage values and legacy initiatives;
- Sustainability opportunity and initiatives assessment (such as opportunities to beneficially reuse resource outputs, water use and demand assessment);
- Climate and natural hazard risk assessment and adaptation plan;
- Resilience plan;
- Resource Efficiency Strategy (RES);
- Heritage Assessment; and
- Environmental baseline and assessment reports (including ecology and biodiversity).

For example a climate change risk assessment undertaken during Planning Investigations could be reviewed, updated and submitted as part of the IS Design rating, as long as it satisfies the applicable IS credit requirements.

It should also be noted that key decisions at the planning stage will influence the ability to achieve high sustainability performance in areas such as: ecology and biodiversity, stormwater water quality, legacy and extent of stakeholder and community engagement (which influence performance in a large number of IS credits).

5.4 ESD Report for Public Works Committee and Cabinet Submissions

In line with section 16A of the Parliamentary Committees Act 1991, all public works with a capital value greater than $4 million must be considered by the Public Works Committee (PWC) of Parliament.

Where required in the contract, in accordance with Task 9 of a planning study (PC-PL1), the Contractor must prepare an Ecologically Sustainable Development (ESD) report for the purpose of complying with requirements of Cabinet and the Public Works Committee (PWC) of Parliament.

Premier and Cabinet Circular PC 015 requires that submissions to PWC demonstrate how the work incorporates ESD initiatives and associated matters. The ESD section of the submission must identify the key ESD risks, opportunities and initiatives associated with the project, and proposed strategies that will be implemented to manage or realise them. The Department's ESD system was endorsed by the Department for Environment and Water (DEW) in February 2024. No separate ESD Acquittal is required from DEW prior to PWC report submissions.

A standard ESD report template can be found on the Department's 'Standards and Guidelines' webpage.

6 Sustainability Plans and Progress Reports

Section 6.1 – 6.3 of this Manual establish the requirements for Sustainability Plans (including Carbon Management Plans) and progress reports prepared in the Design, Construction and Maintenance phases. The requirements for Planning Phase Sustainability Plans are set out in section 5.2.2.

All Sustainability Plans and Progress Reports must conform to the templates provided in Appendices 3, 4, 5, 11 and must be submitted to the Principal[5] in accordance with Table 2.

Table 2 Timing for submission of Sustainability Plans and Sustainability Progress Reports

Project Phase	Preliminary Sustainability Plan	Interim	Final Sustainability Plan
Planning phase	n/a	n/a	Upon completion of the planning study
Design phase	30% design	Sustainability Progress Reports must be submitted on a six-monthly basis.	100% design
Construction phase	Within 1 month of Contract Award[6]		At the time of submitting as built drawings and information
Maintenance phase	Draft submitted during tender phase. Re-submitted within 1 month of Contract Award.	Annual update to the Sustainability Plan. Sustainability Progress Reports must be submitted on a six-monthly basis.	6 months prior to completion of the Maintenance program

[5] The Department's Principal Sustainability Advisor
[6] Construction phase Preliminary Sustainability Plans are only required for Construct-only contracts.

6.1 Design and Construction Phase Sustainability Plans

Note that projects undergoing an IS Rating are not required to complete a Design or Construction phase Sustainability Plan. The IS Rating requirements apply instead of (not in addition to) these requirements.

The Preliminary Sustainability Plan is prepared early in each project phase to:

- identify the opportunities that the project team intends to investigate / implement to achieve the Principal's sustainability objectives (as set out in PC-ST1 and PC-ST2), the mandatory and principal-nominated sustainability initiatives, and any other sustainability requirements in the contract.
- detail the processes and methodologies for embedding sustainability initiatives into design, and to establish a strategy for early market engagement; and
- outline the sustainability management framework, including interfaces with other project processes and milestones to ensure integration of sustainability requirements in design; and
- detail the processes and methodologies for assurance, monitoring, auditing, corrective action and reporting on sustainability performance (including performance against sustainability targets).

The Preliminary Sustainability Plan for the design or construction stage must conform to the template provided in Appendix 4. Throughout the works, as opportunities are identified, investigated and assessed, information on the status of initiatives and progress towards the GHG emissions reduction requirement(s) is reported via a 6-monthly Sustainability Progress Report[7]. As a minimum, the Sustainability Progress Report must include:

- An indication of current status for the GHG emission reduction requirement(s) (e.g. On-track to being achieved with proposed initiatives, additional initiatives still required to achieve minimum requirement);
- An up-to-date register of sustainability initiatives (including new initiatives that have been identified since preparation of the preliminary sustainability plan), indicating current status of investigations/assessment and next steps;
- An update on progress towards achieving the Green Infrastructure objectives and canopy cover targets that apply to the project/ asset (if applicable).

Note that Sustainability Progress Reports may be submitted as part of the relevant monthly project report (if applicable), but must also be issued to the Department's Principal Sustainability Advisor.

At the end of each project phase a Final Sustainability Plan is submitted, which includes final details of all sustainability initiatives identified and investigated by the project team as well as details of which opportunities were/ were not implemented and the rationale. The Final Sustainability Plan will form part of handover documentation between project phases.

The Final Sustainability Plan must conform to the template provided in Appendix 5.

[7] where the duration between Preliminary and Final Sustainability Plans is less than 6-months, a progress report must be submitted as a 70% design deliverable

6.1.1 Carbon Management Plans

For projects requiring Level 1 assessment, a Carbon Management Plan must be developed, implemented, reviewed and updated throughout delivery of the project. Where a Carbon Management Plan has been prepared in the planning phase, this should be reviewed and used to inform the plan for the next phase of the project.

The purpose of the Carbon Management Plan is to ensure appropriate measures and processes are in place to meet or exceed the project's GHG emission reduction target(s). The Carbon Management Plan must document the following:

- SMART target(s) for whole of life GHG emission reduction, developed with consideration to part 5.2.2 of this document;
- Changes in the project's GHG emission reduction target(s) to reflect the successful bid for design and construction phases;
- The expected supply chain participants and opportunities to influence GHG emissions;
- Identified priorities, risks and management measures to ensure the project's GHG emission reduction requirements are satisfied;
- The roles and responsibilities for carbon management and measurement (both in the project team and across the value chain members), including responsibilities for delivering GHG emission reduction target(s). It is recommended that project-wide GHG emission reduction targets are broken down into targets for individual packages (for example, if a project has an overall target of 20% GHG emission reduction, x % of this reduction will be achieved through initiatives relating to concrete, y % to pavements etc);
- How the procurement strategy seeks to promote early engagement and innovative decarbonisation approaches;
- How and when supply chain participants should be involved as part of early engagement, for example in relation to the application of low carbon design and construction methods;
- Methodology to measure, monitor and track GHG emissions and reductions;
- How GHG emission reduction opportunities will be identified, assessed and implemented through the value engineering process;
- How GHG emission impacts will be considered for significant design decisions (with reference to PC-EDM1 - requirements for Design Management Plans);
- Progress and outcomes in achieving GHG emission reduction target(s);
- Results of whole of life GHG emission estimation for the project, in accordance with part 7 of the Sustainability Manual.

6.2 Maintenance Sustainability Plans

A Maintenance Sustainability Plan is prepared at the beginning of a maintenance contract (and updated annually). The plan must:

- establish SMART targets, for each of the sustainability objectives that have been identified for the maintenance work, with associated actions and key performance indicators[8]
- define roles and responsibilities for implementing sustainability actions and monitoring and reporting progress against targets
- document the baseline GHG emissions for year 1 of the contract
- document the Contractor's methodology for measuring and monitoring GHG emissions and reductions (refer section 7 of this Manual)
- identify material sustainability risks in the Contractor's supply chain and procurement actions to mitigate them (refer section 10.2 of this Manual).

Over the duration of the Contract, Sustainability Progress Reports are submitted to provide:

- current status for sustainability targets, actions and key performance indicators
- consumption data (and associated emissions data) for key emission sources.

The templates in Appendix 10 must be used to record targets, actions and progress toward achieving them, and to report consumption and emissions data.

[8] Annual updates to the Sustainability Plan provide an opportunity to amend targets and actions, for example where additional actions are required to achieve the targets or where more ambitious targets are proposed

7 GHG Emissions Impacts

Estimating GHG emissions across the lifecycle of the asset or maintenance program is important to:

- understand where the biggest impacts are,
- identify and prioritise GHG emission reduction efforts,
- inform GHG emission reduction targets,
- compare the carbon impact of different design options (in terms of how they influence enabled emissions as well as the relative carbon intensity of materials and construction processes),
- measure/ verify contractors' performance in terms of achieving GHG emission reduction targets,
- contribute to ongoing development/ refinement of emission intensity benchmarks
- help the Department measure its scope 3 emissions footprint and meet government GHG emission reduction requirements.

The purpose and method for estimating emissions differs depending on the value of the project and when the estimate is being prepared. Section 7.1 establishes the minimum requirements for GHG emission estimates at each project stage.

In general:

- **embodied emissions** must be measured in accordance with the *Embodied Carbon Measurement for Infrastructure: Technical Guidance*.
- **enabled emissions** must be measured in accordance with the *Australian Transport Assessment and Planning Guidelines (ATAP)*.
- **operational emissions** must be measured in accordance with section 7.3 of this Manual.

Section 3.2.3 of this Manual provides an overview of the different sources of GHG emissions generated throughout the asset lifecycle (referred to as lifecycle modules) and how they are categorised into embodied, enabled and operational emissions.

7.1 Minimum requirements for GHG emission estimates by project stage

Note the below thresholds and requirements apply to programs as well as projects, unless otherwise approved by the Department's Principal Sustainability Advisor

Project phase	Required emissions estimate	Method
Options Analysis – Long-list	**All projects:** High-level estimate of upfront GHG emissions *NB: whilst other emission sources (such as enabled emissions) are not required to be quantified at this stage, they are considered qualitatively through assessment of net zero alignment (refer section 3.2.1 and 5.1.5 of this Manual).*	Include lifecycle modules A1-A5. Upfront emissions to be estimated using asset-level carbon intensity benchmarks, in accordance with part 5 and Appendix 7 of the *Embodied Carbon Measurement for Infrastructure Technical Guidance**
Options Analysis – Short-list (Cost Benefit Analysis)	**Projects with capital value <$100m:** High-level estimate of upfront GHG emissions, monetised using the National Carbon Values *NB: whilst other emission sources (such as enabled emissions) are not required to be quantified at this stage, they are considered qualitatively through assessment of net zero alignment (refer section 3.2.1 and 5.1.5 of this Manual)*	Include lifecycle modules A1-A5. Upfront emissions to be estimated using asset-level carbon intensity benchmarks, in accordance with part 5 and Appendix 7 of the *Embodied Carbon Measurement for Infrastructure Technical Guidance** Emissions to be monetised in accordance with Infrastructure Australia Guidance Note – Valuing emissions for economic analysis
	Projects with capital value >$100m **and** **Projects <$100m where carbon valuation will significantly increase the opportunity for emission reduction, eg where it is likely to have a material impact on NPV and BCR:**	Include lifecycle modules A1-A5, B3-B6, B8. Upfront (A1-A5) and in-use (B3-B5) emissions to be estimated using best available project data and emission factors^, in accordance with part 5 of the *Embodied Carbon Measurement for Infrastructure Technical Guidance.* Where upfront (A1-A5) and/or in-use (B3-B5) emission estimates are based on quantity data, they must have regard to the BAU assumptions in Appendix 6 of this Manual. Emissions from operational energy use (B6) to be estimated in accordance with section 7.2 of this Manual

	High-level estimate of whole of life GHG emissions (including upfront, in-use, operational and enabled emissions), monetised using the National Carbon Values	In-use and Operational impacts to be calculated over a 50-year period, unless valid reasons are provided to justify a different period. Any alternative period must be clearly recorded in the business case documentation. Enabled (B8) emissions to be estimated and monetised using ATAP PV5. Upfront, in-use and operational emissions to be monetised in accordance with Infrastructure Australia Guidance Note – Valuing emissions for economic analysis
Planning phase sustainability plan	**Projects with capital value <$100m:** Planning phase sustainability plan not required	n/a
	Projects with capital value >$100m: Planning phase sustainability plan to include refined estimate of whole of life GHG emissions (including upfront, in-use and operational emissions, but excluding enabled emissions) *NB: enabled emissions are excluded from emission estimates as there is little opportunity to influence this once a preferred option has been selected*	Include lifecycle modules A1-A5, B3-B6. Upfront (A1-A5) and in-use (B3-B5) emissions to be estimated using best available project data and emission factors^, in accordance with part 5 of the *Embodied Carbon Measurement for Infrastructure Technical Guidance.* Estimates must be based on the reference design, including any sustainability initiatives implemented in the reference design. Where sustainability initiatives have not been implemented in the reference design, estimates should be based on the BAU assumptions in Appendix 6 of this Manual. Emissions from operational energy use (B6) to be estimated in accordance with section 7.2 of this Manual. In-use and Operational impacts to be calculated over a 50-year period, unless valid reasons are provided to justify a different period. Any alternative period must be clearly recorded in the Sustainability Plan.
	Planning phase sustainability plan to include additional estimates of GHG emissions reduction potential of additional initiatives (i.e. initiatives which go beyond those implemented in the reference design) to inform proposed emission reduction target(s)	GHG emission reduction potential to be estimated using best available project data and emission factors^, in accordance with: - part 5 of the *Embodied Carbon Measurement for Infrastructure Technical Guidance* (for embodied emissions) - section 7.2 of this Manual (for operational emissions).
Design phase - preliminary sustainability plan	**Projects with capital value <$100m:** GHG emission estimates not required	n/a
	Projects with capital value >$100m:	Include lifecycle modules A1-A5, B3-B6.

	Estimate of whole of life GHG emissions for the 'base case' (including upfront, in-use and operational emissions, but excluding enabled emissions) *NB: enabled emissions are excluded from emission estimates as there is little opportunity to influence this once a preferred options has been selected.*	Base case must be based on the reference design, including any sustainability initiatives implemented/ specified in reference design documentation but not including initiatives or commitments proposed by the Contractor during tender phase. Where sustainability initiatives have not been implemented/ specified in the reference design, estimates should be based on the BAU assumptions in Appendix 6 of this Manual. Upfront (A1-A5) and in-use (B3-B5) emissions to be estimated using best available project data and emission factors^, in accordance with part 5 of the *Embodied Carbon Measurement for Infrastructure Technical Guidance.* Emissions from operational energy use (B6) to be estimated in accordance with section 7.2 of this Manual In-use and Operational impacts to be calculated over a 50-year period, unless valid reasons are provided to justify a different period. Any alternative period must be clearly recorded in the Sustainability Plan.
	Additional estimates to: - demonstrate GHG emission reduction impact of initiatives implemented in the design phase (as at 30%) - demonstrate current performance (at 30%) against the project's GHG emission reduction target(s)	
Design phase – final sustainability plan	**Projects with capital value <$100m:** GHG emission estimates not required	n/a
	Projects with capital value >$100m: Estimate of whole of life GHG emissions for the final design (including upfront, in-use and operational emissions, but excluding enabled emissions)	As for preliminary design phase sustainability plan, but the base case estimate will be updated (if necessary~) and final design estimate must be based on the 100% design, including all sustainability initiatives implemented in the design and planned to be implemented in the construction phase.
	Additional estimates required to: - demonstrate GHG emission reduction impact of initiatives implemented in the design phase - demonstrate performance against the project's GHG emission reduction requirement(s); and	
Construction phase – preliminary sustainability plan	**Projects with capital value <$100m:** GHG emission estimates not required	n/a
	Projects with capital value >$100m:	Include lifecycle modules A1-A5, B3-B6.

	Estimate of whole of life GHG emissions for the 'construction base case' (including upfront, in-use and operational emissions, but excluding enabled emissions) *NB: Construction base case estimate only required if whole of life GHG emissions have not been estimated during the design phase*	Estimate to be based on the 100% design, including all sustainability initiatives implemented in the design. Where sustainability initiatives are not shown in the design documentation, estimates should be based on the BAU assumptions in Appendix 6 of this Manual. Upfront (A1-A5) and in-use (B3-B5) emissions to be estimated using best available project data and emission factors^, in accordance with part 5 of the *Embodied Carbon Measurement for Infrastructure Technical Guidance.* Emissions from operational energy use (B6) to be estimated in accordance with section 7.2 of this Manual In-use and Operational emissions to be calculated over a 50-year period, unless valid reasons are provided to justify a different period. Any alternative period must be clearly recorded in the Sustainability Plan.
	Additional estimates to: - demonstrate GHG emission reduction impact of initiatives implemented in the construction phase (to date) - demonstrate current performance against the project's GHG emission reduction target(s)	
Construction phase – final sustainability plan	**Projects with capital value <$100m:** GHG emission estimates not required	n/a
	Projects with capital value >$100m: Estimate of whole of life GHG emissions for the as-constructed asset (including upfront in-use and operational emissions, but excluding enabled emissions)	Include lifecycle modules A1-A5, B3-B6. Upfront (A1-A5) and in-use (B3-B5) emissions to be estimated using actual measured construction data, in accordance with part 5 of the *Embodied Carbon Measurement for Infrastructure Technical Guidance.* Emissions from operational energy use (B6) to be estimated in accordance with section 7.2 of this Manual In-use and Operational emissions to be calculated over a 50-year period, unless valid reasons are provided to justify a different period. Any alternative period must be clearly recorded in the Sustainability Plan.
	Additional estimates required to: - demonstrate GHG emission reduction impact of initiatives implemented in the construction phase - demonstrate final performance against the project's GHG emission reduction requirement(s)	
Maintenance sustainability plan	Estimate of annual GHG emissions associated with Maintenance Works[#]	Include the following emission sources: - liquid fuels used in Contractor's vehicle fleet (A4)

(as required under Master Specification Part PC-ST3 Sustainability in Maintenance[#])	Emissions intensity of the Works must be calculated using the above emission estimate and expressed as annual t CO2-e per lane km of road maintained	- liquid fuels used in Contractor's plant and equipment (A5) - electricity used for charging Contractor's vehicle fleet (A4) - electricity used for charging Contractor's plant and equipment (A5) - electricity used in depots (B6) - product stage embodied emissions (A1-A3) of key purchased materials (aggregates, concrete, asphalt, binder, steel, aluminium); - the transportation of purchased materials and waste (A4); and - disposal of waste (A5) Upfront (A1-A5) emissions to be estimated in accordance with part 5 of the *Embodied Carbon Measurement for Infrastructure Technical Guidance*, using actual measured data. Emissions associated with grid-supplied electricity should use emission factors provided in Appendix 6 of this Manual.

* The *Embodied Carbon Measurement for Infrastructure Technical Guidance* (Appendix 7) provides asset carbon intensity benchmarks for common infrastructure typecasts, based on material spend. See section 7.1.1 of this Manual for further guidance. If the project involves more than one typecast it may be necessary to undertake multiple calculations. If the project does not fit any of the typecasts provided, and quantity information is not available, the requirement to estimate emissions may be waived (subject to agreement with the Department's Principal Sustainability Advisor).

^ Refer to *Embodied Carbon Measurement for Infrastructure Technical Guidance* for hierarchy of emission factors and intensity benchmarks. Refer also to section 7.3 of this manual for guidance on estimating emissions for asphalt, aggregate and concrete elements. Emission estimates prepared at options analysis stage may be based on carbon intensity benchmarks if quantity information is not available. It is expected that estimates prepared at reference design stage will be based on project-specific data obtained from bill of quantities or 3D model output (e.g. construction material quantities in m^3 or tonnes and construction diesel use (in kL), relevant design documentation and BAU assumptions (where appropriate). Minimum inclusions (in terms of asset elements to be included in emission estimates) are provided in Appendix 8 of the *Embodied Carbon Measurement for Infrastructure Technical Guidance*.

~*Base case estimate may need to be updated to account for scope changes/ adjustment events, or to include data that was not available at the time of submitting the preliminary plan.*

[#] *These requirements only apply to maintenance works being delivered under a maintenance contract and in accordance with PC-ST3 'Sustainability in Maintenance' (yet to be published). Emissions associated with delivering Maintenance Works under a maintenance contract are assigned to different lifecycle modules than they would be for WoL estimates undertaken as part of the design & construction of a new asset.*

7.1.1 Estimating upfront embodied emissions using asset level carbon intensity benchmarks

When estimating emissions in the proving phase, material quantity data may not yet be available. In the absence of better information, it is acceptable to use asset level carbon intensity benchmarks to estimate upfront embodied GHG emissions. The following formula may be used:

$$\textit{Total upfront carbon (tCO2e)} = \frac{(a+b+c)}{e} \times (d) \times (\$)$$

Where:

- a is the asset level benchmark for the product stage (A1-A3) module
- b is the asset level benchmark for the transport (A4) module
- c is the asset level benchmark for the construction and installation process (A5) module
- d is the percentage of project CAPEX which is typically allocated to materials
- e is the escalation value
- $\$$ is the project CAPEX

Inputs (a) – (d) can be found in the Embodied Carbon Measurement for Infrastructure Technical Guidance, *Appendix 7, Table A7.2 'Emissions intensities based on material spend'*.

As emission intensities are provided in FY2021 dollars it is necessary to adjust for cost escalation. To calculate (e):

1. Refer to the ABS Producer Price Index, catalogue #6427, to find the index values for heavy and civil engineering construction prices.
2. Divide the current index value by the June 2021 index value to obtain the escalation value.

7.2 Estimating operational GHG emissions

Where an estimate of operational GHG emissions is required, the following approach should be used:

1. identify material emission sources that fall into modules B6 (see Table 4 for examples)
2. estimate annual consumption (e.g. kWh of electricity) for these sources over the assessment timeframe
3. use appropriate emissions factors to estimate the annual GHG emissions associated with this consumption

Emission factors should be selected in accordance with the emission factor hierarchy in the *Embodied Carbon Measurement for Infrastructure: Technical Guidance*. Note that Scope 2 & 3 combined emissions factors for grid-supplied electricity in SA are updated annually in the National Greenhouse Accounts Factors. For projections of future grid emission intensity refer to current version of *Australia's emissions projections (DCCEEW)*).

Asset type	Examples of Operational GHG emission sources (B6)
Road	• Electricity used in road lighting, ITS, tunnel ventilation
Public transport and rail	• Energy (electricity or other fuels) used to operate bus fleet or rolling stock* • Energy used in depots, stations etc • Electricity used for signalling

** Rolling stock energy is classified as B6 where the fleet is owned by the Department, otherwise it is classified as B8.*

Table 4 Examples of sources operational GHG emissions

7.3 Estimating emissions for concrete, asphalt and aggregate

When estimating materials' GHG emissions from quantity data, emission factors should generally be selected in accordance with the emission factor hierarchy provided in the *Embodied Carbon Measurement for Infrastructure Technical Guidance* . The hierarchy prioritises use of product-specific emission factors wherever Environment Product Declarations (EPDs) are available. Where EPDs are not available, the hierarchy suggests using industry average emission factors, from:

- the NABERs Emissions Factors Database,
- Infrastructure Australia's Embodied Carbon Projections for Australian Infrastructure and Buildings study (appendices), or
- AusLCI emission factor database

Whilst this is appropriate for most materials, the emission factors for concrete are not representative of South Australian mixes with 30% cement replacement (the minimum required by the Department's Master Specifications). For this reason, where a product specific EPD is not available, the Department requires GHG emissions for concrete elements to be estimated as follows:

- Where the mix design is not known: use the BAU emission factors for the relevant strength grades, provided in Appendix 6 of this Manual.
- Where the mix design is known: use the method outlined in the Department of Climate Change, Energy, the Environment and Water's 'How to Calculate Embodied Carbon of a Concrete Mix' fact sheet.

For asphalt and aggregate, there is some variation in the emission factors provided by NABERS, Infrastructure Australia and AusLCI. For consistency, the Department preferences use of AusLCI emission factors[9] for these materials (where a product specific EPD is not available).

[9] When sourcing emission factor data from AusLCI database, use the figure that represents the Carbon Neutrality Assumption method, excluding infrastructure.

8 Green Infrastructure

The Department has committed to delivering increased greening on departmental land, with a target to increase canopy cover by 20% from 2018/19 levels (DIT Green Infrastructure Commitment). Infrastructure projects are one of the department's key delivery mechanisms for achieving this goal.

To realise good greening outcomes on infrastructure projects it is important that Green Infrastructure objectives/ targets form part of planning and design thinking from the outset of a project.

In line with the Department's Green Infrastructure Commitment, all projects in the Adelaide metropolitan area and townships must undertake a Green Infrastructure Assessment during planning investigations. Where a Green Infrastructure Assessment has not been undertaken in the planning phase, the standard Green Infrastructure targets in Table 5 will typically apply to the design phase.

Table 5 Standard Green Infrastructure targets
Provision of shade trees to achieve ≥20% increase in existing canopy cover[10] in the Site (measured at maturity).
Provision of shade trees to improve amenity for pedestrians, cyclists and public transport customers, targeting ≥50% canopy cover (at maturity) over all footpaths and bikeways included in the Site, including those existing prior to the Commencement Date.
Where new or upgraded car parking areas are included in the Works ≥50% of vehicle spaces must have some degree of canopy cover (at maturity).
Incorporation of WSUD elements to achieve the state WSUD policy performance targets for water quality, peak flow and flood risk, as set out in DEWNR 'Water Sensitive Urban Design'.
Minimum 50% of new landscape plantings to be local native species suited to local conditions, having regard to future impacts of climate change.

8.1 Green Infrastructure Assessment

The purpose of a Green Infrastructure Assessment is to identify desired greening outcomes (location, extent and type of greening to be delivered through the project), so that the outputs can be used to inform design and land acquisition decisions, project estimates and contract requirements for detailed design.

Where the Green Infrastructure assessment is being undertaken in the planning phase, it must be undertaken as part of the Task 2 planning investigations and submitted with the Investigation Report.

[10] Canopy cover refers to the percentage of a site that is covered by vegetation ≥3m in height. Existing canopy cover can be calculated using the LiDAR data available in the Urban Heat and Tree Mapping Viewer

The output of a Green Infrastructure Assessment is a short technical note that:

1. **Confirms the Green Infrastructure targets to be achieved within the project boundary**

   These may either be the standard Green Infrastructure targets in Table 5 or alternative project-specific targets. If project-specific targets are proposed, clear rationale must be provided.

   Establishing project-specific canopy cover targets

   One of the standard Green Infrastructure targets for infrastructure projects is a 20% increase in existing canopy cover (measured at maturity). This target may not be appropriate in all situations, e.g. where there is no existing canopy cover within a project site, or where existing canopy cover is very high and there are limited opportunities to provide additional canopy within the site.

   In such cases alternative project-specific canopy cover targets may be developed. Project-specific targets should still align with and contribute to achieving the Department's Green Infrastructure commitments to increase canopy cover on departmental land and improve amenity/liveability for pedestrians, cyclists and public transport customers.

   Where there is limited opportunity to provide additional canopy cover within the project site opportunities for delivering canopy cover beyond the site should be investigated and suitable targets developed. Targets should be expressed in terms of projected canopy cover (when trees reach maturity) as opposed to numbers of trees.

2. **Identifies priority locations for delivery of greening**

   Priority locations for delivery of greening should be identified on a concept plan / sketch showing the desired type of greening in each location.

   The Hierarchy of planting locations in Figure 9 should inform decisions about where to locate additional Green Infrastructure in order to maximise benefits to the Department's customers. For example, trees planted adjacent footpaths provide valuable shade to pedestrians, trees planted within station car parking areas mitigate heat gain and improve customer experience for public transport patrons.

3. **Identifies any next steps for the project team to ensure the Green Infrastructure targets can be realised**
   For example:

   - Specify minimum widths required for medians and/or verges in design basis report to ensure the type of Green Infrastructure envisaged can be accommodated (refer to Operational Instruction 19.8 'Trees in Medians and Roadsides in the Urban Environment' for minimum tree setbacks)
   - Make recommendations for land acquisition/ disposal plans to ensure adequate land is acquired/ retained to realise Green Infrastructure objectives
   - Make recommendations for cost estimates to ensure adequate budget is allowed for delivery and establishment of the desired green infrastructure
   - Ensure the recommended extent and outcomes of greening are defined in the Preliminary Business Requirements (refer PC-PL1).

An example is provided in Appendix 9.

			• Adjacent footpaths/ bike paths • Parking areas for public transport patrons • Medians	Other areas
Within the project site		Locations with high place value*	1	2
		Other locations	2	3
DIT land	Adjacent the project site#	Locations with high place value*	3	4
		Other locations	4	5
	Elsewhere within the relevant local council area(s)	Locations with high place value*	5	6
		Other locations	6	7
Non-DIT land	Adjacent the project site#	Locations with high place value*	7	8
		Other locations	8	9
	Elsewhere within the relevant local council area(s)	Locations with high place value*	9	10
		Other locations	10	11

Most desirable

Least desirable

** Areas with high place value include areas with high pedestrian activity, eg adjacent schools, shopping/ dining precincts, neighbourhood centres. For the purpose of the Greening location hierarchy, public transport interchanges are also included*

 # Adjacent land is defined as land ≤60m from the project site, in accordance with the Planning Development and Infrastructure Act

Figure 9 Hierarchy of Planting Locations

8.2 Delivering the Green Infrastructure objectives and targets

PC-ST1 ‘Sustainability in Design’, and the Landscape and Urban Design specifications (PR-LS-D1 and D2) require:

- the design basis report to include the design parameters necessary to achieve the Green Infrastructure targets that apply to the project. This may include, for example, provision for irrigation in medians, or minimum verge/ median widths needed to enable trees to be planted (whilst meeting the minimum setbacks from kerb and utilities).

- the design to incorporate sufficient and suitable Green Infrastructure to achieve the applicable Green Infrastructure targets.

Desired greening outcomes (in terms of what type of Green Infrastructure is needed where) should be considered as early as possible and integrated into other disciplines' decision making, to ensure design decisions support and don't prevent achievement of the desired outcomes. For example, a decision to locate a common service trench under the footpath may mean that trees cannot be planted adjacent the path, impacting the ability to achieve the department's greening objectives and the project's Green Infrastructure targets.

If there are insufficient viable planting locations within the site to achieve the applicable canopy cover target, the shortfall may be delivered on other land, in accordance with the hierarchy of planting locations (Figure 9).

Details of how the applicable Green Infrastructure targets have been achieved must be provided in the Landscape Design Report and Final Sustainability Plan.

8.3 Methodology for calculating canopy cover

The following method and assumptions must be used to demonstrate achievement of applicable canopy cover targets (unless otherwise agreed in writing with the Principal):

1. Define project site
2. Determine existing tree canopy cover for the project site (in m^2) using the most recent LiDAR canopy cover layer (accessed from Data SA)
3. Multiply the existing tree canopy cover by the applicable factor (for example, if the target is to achieve a 20% increase on existing canopy cover, multiply the existing canopy cover by 1.2). This will give you the total area (in m^2) that must be covered by tree canopy following implementation of the landscape design.

   Note that canopy cover targets are expressed in terms of desired canopy cover at maturity (assumed to be 15 years). Table 6 may be used for the purpose of estimating mature tree canopy cover.

Table 6 Assumed tree canopy size at maturity (15 years)

Tree size	Canopy span (m)	Canopy area (m2)
Large tree (Height 12+ metres)	9	64
Medium tree (Height 8-12 metres)	7	38
Small tree (Height 5-8 metres)	4	12.5

4. Categorise all new trees in the proposed landscape design as small, medium or large.
5. Estimate the canopy cover (at maturity) that will be delivered by the proposed new trees by applying the assumed mature tree canopy sizes in Table 6 and an assumed survival rate of 90% (irrigated trees) or 80% (non-irrigated trees)
6. Estimate the total canopy cover (in m^2) that will be achieved within the site (at maturity) by adding the area calculated at step 5 to the retained existing canopy cover.

7. If the total canopy cover calculated at step 6 is less than the required canopy cover calculated at step 3, and it is not feasible to plant additional trees within the site, then the shortfall may be delivered on other land, in accordance with the hierarchy of planting locations (Figure 9). The amount of additional canopy cover delivered within the site and the amount delivered off-site should be documented in the landscape design report.

8.3.1 Canopy cover targets over paths

Canopy cover over paths is calculated as the percentage of the path's surface area (m^2) that will be covered by tree canopy (at maturity), i.e. the area shown in green in the below diagram.

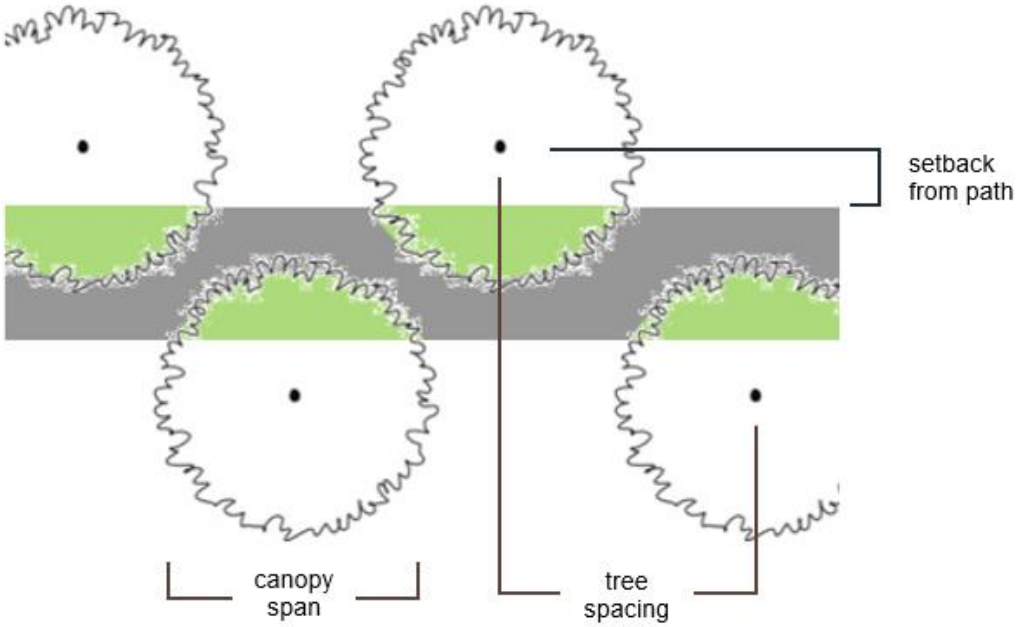


Table 7 provides an indication of the approximate tree spacing required to achieve ≥50% canopy cover to paths of different widths using trees of different canopy spans.

Table 7 Tree spacing required to achieve ≥50% canopy cover to paths

Path width	Setback from path	Canopy span	Tree spacing
1.5m	1.0m	4m	3m
		7m	12m
		9m	17m
	1.5m	4m	1m
		7m	10m
		9m	16m
1.8m	1.0m	4m	3m
		7m	12m
		9m	16m
	1.5m	4m	1m
		7m	10m

		9m	15m
2.4m	1.0m	4m	2m
		7m	10m
		9m	15m
	1.5m	4m	1m
		7m	8m
		9m	14m
3.0m	1.0m	4m	2m
		7m	8m
		9m	14m
	1.5m	4m	1m
		7m	6m
		9m	12m

Note the above figures do not consider survival rates.

To determine if canopy cover targets have been achieved:

1. calculate the total surface area of paths within the project area. This must include paths that exist prior to commencement, but can exclude paths on or directly under elevated structures where it is not practical to plant trees[11].
2. estimate the total surface area of paths that will be covered by tree canopy following implementation of the proposed landscape design by:
    a) calculating the canopy cover provided by existing trees (that will be retained) over the path (in m^2), using the most recent LiDAR canopy cover layer,
    b) calculating the canopy cover that will be provided by proposed new trees (at maturity) by applying the assumed mature tree canopy sizes in Table 6 and an assumed survival rate of 90% (irrigated trees) or 80% (non-irrigated trees)
    c) adding (a) and (b)
3. divide the area calculated at step 2 by the area calculated at step 1 and multiply by 100 to determine the average canopy cover over paths.

If the average canopy cover over paths is <50% and cannot practicably be increased, then the shortfall (in m^2) may be delivered on other land in the vicinity, using the planting location hierarchy in Figure 9.

[11] Where shade is required for pedestrian/ cyclist comfort and it is not practical to plant trees, alternative forms of shade (e.g. canopy structures) should be considered. Areas where path users are likely to pause should be prioritized.

9 Investigation and Assessment of Sustainability Initiatives

9.1 Assessment of Sustainability Initiatives

Robust and balanced assessment of sustainability initiatives or significant design decisions requires consideration of environmental, social and economic aspects, as well as technical criteria. The following information should be obtained and used to inform viability assessments and decision making:

Environmental

- Relative GHG emissions impact[12] / waste generation / virgin material use / mains water consumption / climate change risk (as relevant)
- Will implementation of the initiative hinder achievement of other sustainability objectives?

Economic

- Likely positive/ negative impacts on local industry participation
- Alignment with Government's objective to grow a climate smart economy by supporting climate smart businesses and developing a more circular economy[13]

Social

- Impacts or benefits to the local community (if relevant)
- Community perception / opportunity for positive or negative PR

Technical

- Any anticipated time or resource impacts on the design and construction program
- Any implications for durability
- Availability of products / materials

Relevant environmental, economic, social and technical merits/ risks of sustainability initiatives should be considered and documented in the Sustainability Progress Report and/or Final Sustainability Plan, along with the decision whether to implement the initiative and justification where it is decided not to implement the initiative. This information may be presented in the sustainability initiatives register (refer to Sustainability Plan templates in Appendix 4 & 5).

[12] When considering relative GHG emissions impact, it is important to consider impacts across whole of life (ie consider trade-offs between lower/higher upfront emissions vs shorter/longer design life and maintenance requirements). Also consider the emissions impact of any additional haulage distance (guidance on calculating emissions from haulage is provided in the *Embodied Carbon Measurement for Infrastructure Technical Guidance*).

[13] *South Australia's Net Zero Strategy* and *SA Government Climate Change Resilience and Adaptation Actions*

An example of a Multi-Criteria Analysis tool used for undertaking triple-bottom-line assessment of initiatives is provided in Appendix 2. This type of assessment can also be used for significant design decisions[14].

> Where an initiative is deemed viable to be implemented in the design phase, it is crucial that this is reflected in the final design drawings, so that it is clear to construction contractors and suppliers. See examples in Appendix 11. The sustainability initiatives register submitted with the final design-phase Sustainability Plan should confirm that initiatives are shown in the drawings.

9.1.1 Worked example: assessing relative GHG emissions impact of alternative materials (including transport to site)

A design team wants to determine the viability of recycled crushed concrete as a substitute for virgin quarried granular materials. They know that it is technically viable (as Master Specification part RD-PV-S1 allows up to 100% substitution of recycled crushed concrete) and would contribute to achieving the Government's goals for a more circular economy. They also know that recycled crushed concrete has lower embodied carbon than virgin quarried material. However, they are concerned that the additional haulage distance may cancel out any reduction in embodied carbon and may even result in an increase in project emissions.

1. They check the register of DIT prequalified pavement materials suppliers and note that the nearest prequalified supplier of recycled pavement material is 15km from site, compared to 10km for the nearest prequalified supplier of virgin quarried material.
2. They obtain the emission factors for recycled aggregate and virgin aggregate from AusLCI emission factor database.
3. They obtain the default transport emission factors from Appendix 3 of the Measurement of Embodied Carbon in Infrastructure Technical Guidance.
4. They calculate the combined product stage (A1-A3) and haulage (A4) emissions for both options:

[14] Note PC-EDM1 'Design Management' requires Contractors to establish processes for significant design decisions, including the criteria and weightings against which design options are assessed (which must include whole of life environmental, economic, social and technical criteria relevant to the decision).

Option 1: virgin aggregate

Product stage emissions		Transport emissions		Combined product & transport emissions
50 t aggregate × 0.09 t CO2-e = 0.45 t CO2-e	+	50 t aggregate × 10km × 0.00007 t CO2-e = 0.035 t CO2-e	=	0.485 t CO2-e

Option 2: recycled aggregate

Product stage emissions		Transport emissions		Combined product & transport emissions
50 t aggregate × 0.004 t CO2-e = 0.2 t CO2-e	+	50 t aggregate × 15km × 0.00007 t CO2-e = 0.053 t CO2-e	=	0.253 t CO2-e

5. Their calculations confirm that use of recycled aggregate would result in an overall reduction in embodied emissions.
6. They specify recycled material on the pavement schedule.

9.2 Identification of Additional Sustainability Initiatives

Projects undergoing a Level 1 sustainability assessment are required to identify and investigate additional initiatives, beyond the mandatory sustainability initiatives and Principal-nominated sustainability initiatives.

There is no minimum number of sustainability initiatives (beyond the Principal-nominated and Mandatory sustainability initiatives) that must be investigated or implemented by the project team – it will vary between projects. However, it is expected that initiatives are investigated for all significant impacts. The time allocated to investigating initiatives should also be proportionate to the scale of the impact. For example, if the largest sources of greenhouse emissions are from the use of concrete and steel, then there should be more focus on investigating strategies to reduce emissions from these materials than from other, less significant sources.

9.3 Applying the Waste Hierarchy to Achieve Circular Economy Outcomes

The principles of the waste hierarchy must be applied to all DIT projects. The following (or similar) process must be employed:

- List all the major material/ product categories in the proposed asset/ program;
- Identify opportunities for avoided/ reduced demand (e.g., reducing the volume of materials required through design optimisation);

- Identify which elements of the asset/ program offer potential to incorporate / substitute re-used or recycled materials and/or materials which have lower environmental impacts across their life cycle compared with competing materials/products;
- Identify possible sources / suppliers of recycled materials and/or materials which have lower environmental impacts across their life cycle compared with competing materials/products (including consideration of potential to re-use or recycle at end of life);
- Assess viability and whole of life costs and benefits to inform decisions on the optimum type(s) and amount(s) of recycled materials/products to be used;
- Specify recycled material or request pricing for recycled options. Ensure supplier evaluation criteria includes the extent to which the supplier can maximise achievement of the department's sustainability objectives (in particular use of recycled materials and reduction in whole of life emissions);
- Identify waste streams that will be generated by the project/ program;
- Investigate opportunities to re-use or recycle these materials;
- Where recycling is possible, put measures in place to ensure waste streams are kept separate;
- Dispose of surplus material to appropriate resource recovery facilities.

10 Sustainable Procurement

10.1 Department Procurement Practices

The Department's Sustainable Procurement Policy requires sustainability risks and opportunities to be identified as part of procurement planning, and appropriate requirements included in tender and contract documents to manage identified risks & realise opportunities. For infrastructure project delivery, this means:

- ensuring the Contract documents include requirements, Key Result Areas/ KPIs that respond to the key areas of impact/ opportunity, and
- obtaining relevant information in the tender phase to enable assessment of proponents' commitment and capacity to maximise achievement of the sustainability objectives (e.g. through use of a Sustainability Commitments Schedule).

These requirements and returnable schedules are informed by the assessment of risks/ opportunities undertaken in the planning investigations (refer to section 5.2.6 of this Manual).

10.2 Head Contractor Procurement Practices

Given the large spends involved in infrastructure projects, Head Contractors' procurement processes play an important role in fostering development of sustainable supply chains by creating demand for sustainable goods and services. Pro-actively engaging with suppliers / sub-contractors to request more sustainable materials or construction methodologies not only helps drives the transition to a low carbon, sustainable economy, but is often critical to achieving the project's sustainability requirements.

Supplier / sub-contractor procurement processes can be leveraged to maximise environmental and social sustainability outcomes such as:

- Reduction in GHG emissions / growth & development of low carbon businesses;
- Reduction in materials' lifecycle impacts/ growth & development of businesses that offer recycled products;
- Improved labour conditions, human rights and fair operating practices (by avoiding doing business with suppliers who do not demonstrate socially responsible employment practices);
- Local employment creation, skills development and opportunities for disadvantaged members of the community (note this is largely addressed via the Office of the Industry Advocate's Industry Participation Policy).

10.2.1 Organisational GHG emission reduction targets

In accordance with the Department's Sustainable Procurement Policy, Head Contractors may, during the Expression of Interest or Request for Tender period, be required to provide evidence that they have an organisational GHG emission reduction target(s) addressing:

- Scope 1 and 2 emissions (from their own fuel and electricity use)
- at least one Scope 3 embodied emission source in their supply chain.

The requirement to address at least one scope 3 embodied emission source is designed to ensure the Department's delivery partners are taking steps to manage emissions in their supply chains.

To comply with this requirement, tenderers must provide a URL link to the publicly available GHG emission reduction* target. The commitment or target can be any form of SMART target. Whilst the science-based target methodology is recognised as best practice, it is not mandated. Organisations can establish targets that work for their scale and level of experience. Some examples of organisational emission reduction targets can be found on the MECLA (Materials Embodied Carbon Leaders Alliance) website: MECLA Pledge Policy Outline.

** Please note that the requirement is for an emission reduction commitment or target, not offsetting. Offsetting GHG emissions is a strong interim step which we do not discourage, but suppliers must also have a commitment or target to reduce emissions.*

10.2.2 Addressing sustainability risks and opportunities in the supply chain

Master Specification PC-ST2 includes requirements for Head Contractors delivering certain projects to provide evidence of a formal commitment to address sustainability risks and opportunities in their supply chain. Such a commitment must:

- Be approved by senior management (e.g., project manager, procurement director, alliance leadership team);
- Be included in the project/ asset management framework.

Whilst it is expected that such a commitment will address greenhouse gas emissions, the commitment should cover broader sustainability risks and opportunities. The organisational GHG emission reduction target discussed in Section 10.2.1 may form part of this commitment.

Where Head Contractors are required to undertake a risk/opportunity assessment and implement appropriate procurement actions to mitigate/realise material risks / opportunities:

- the risk and opportunity assessment must address environmental and social sustainability risks / opportunities, and be provided to the Principal and reviewed and updated annually;
- appropriate procurement actions must be implemented to mitigate material sustainability risks and realise sustainability opportunities. This should include, as a minimum:
  - embedding environmental and sustainability objectives and targets throughout all relevant subcontracts and tender schedules
  - market engagement to establish suppliers' capacity and ability to meet minimum sustainability requirements (and stretch targets as applicable)
  - requesting Environmental Product Declarations (EPDs) and other relevant information from suppliers to facilitate consideration of sustainability in supplier evaluation/ selection
  - ensuring that sustainability criteria are used in procurement activities.

Box 10.1 provides examples of questions that could be incorporated into subcontractor/ supplier prequalification, specifications and evaluations (depending on the nature of the goods/services being procured).

Box 10.1 Example questions for inclusion in subcontractor/ supplier prequalification, specifications and evaluation to mitigate/ realise material social sustainability risks/ opportunities in the supply chain

- What level of certification does your organization currently hold under the Steel Sustainability Australia (SSA) certification scheme? Please describe your commitment/ targets and timeframes for decarbonisation.
- Please provide a copy of your certified Asphalt Plant Sustainability Score for the nominated asphalt plant(s).
- Please provide information on your capability to supply low carbon concrete mixes, including details of % cement replacement and carbon footprint (kgCO2-e/m3) for each nominated mix.
- Please provide information on your capability to supply low carbon materials/ fuels/ equipment, including details of the carbon footprint (kgCO2-e/m3) for each nominated material/ fuel/ equipment, and description as to how each nominated item offers GHG emission reductions relative to the business as usual.
- Are you able to provide Environmental Product Declaration(s), or credible information on the embodied (cradle to gate) emissions of your products?
- Please specify the % post-consumer recycled content in your products
- Are your products certified under any accredited Product Stewardship Schemes? Please provide details.
- Has your organization made a public commitment to reduce its carbon footprint? Please provide details of your organization's GHG emission reduction targets or strategy to reduce the GHG emissions generated from your operations.
- Please provide your organisation's Corporate Social Responsibility (CSR) statement or equivalent.
- Has your company published a statement under the Modern Slavery Act 2018? If not, how does your organisation ensure appropriate social and environmental standards are adhered to in your value chain?

10.3 Sustainable Site Accommodation

Site accommodation not only has an environmental impact, but can also impact the well-being and productivity of its occupants. Appendix 7 lists a suite of requirements for more sustainable site facilities.

Where the contract requires site accommodation to be in accordance with this section of the Sustainability Manual, the contractor must implement a minimum of 50% of the requirements listed at Appendix 7.

11 Climate Change Risk Assessments

All projects must apply the screening criteria in the Department's Climate Change Adaptation Guidelines, (accessed from the *Technical Documents: Standards and Guidelines* webpage) and, if required, undertake a Climate Change Risk Assessment.

An important design and maintenance consideration for the Department's assets is resilience to future climate conditions. Designing a climate resilient project assists local communities to become more resilient to shocks and stresses by maintaining a safe, operational transport corridor.

During detailed design and construction, PC-PM4 requires climate change risks to be recorded in a Contract specific Risk Register, and PC-ST1 and PC-ST2 include a requirement to demonstrate that appropriate risk treatments have been incorporated into the design, residual risks entered in the project risk register and any relevant treatments documented in the project's handover documents.

Appendix 1. Key DIT and SA Government sustainability commitments, obligations, and programs

1. GHG Emissions reduction

- Net zero greenhouse emissions in SA by 2050 and 50% reduction on 2005 levels by 2030 (South Australia's Net Zero Strategy 2024-2030 (SANZS))
- Action 7.3: Support measures to reduce the emissions intensity of freight and heavy vehicle transport (SANSZ)
- Action 8.1: Develop a South Australian Transport Strategy aligned to net zero outcomes (SANZS)
- Action 8.2: Align transport planning with net zero emissions outcomes (SANZS)
- Action A1: Agencies to identify, document and implement emissions reduction actions in carbon management plans (CMPs) to position agencies to reduce their emissions across scope 1, 2 and 3 emissions sources (Net Zero Emissions for Government Operations program (NZEGOP))
- Policy Priority 15: Government to lead by example through embedding emissions reduction in policy and practice (SANZS)
- Action 1.5: Integrate emissions reduction into whole-of-government and agency corporate policies and procedures (NZEGOP)
- Action 15.1: Aim for net zero South Australian Government operations (SANZS)
- Action 15.4: Deliver low emissions infrastructure and operations (SANZS)
- Facilitate and enable a holistic and integrated approach to decarbonisation, supporting a path towards net zero (SA Freight and Supply Chain Strategy 2024: Strategic Response)
- Provide direction and strategic support, including through regulatory frameworks, to promote sector-wide decarbonisation that aligns with net zero commitments, coordinating with industry to identify needs and challenges and ensure commercial viability (SA Freight and Supply Chain Strategy 2024: Strategic Action 3.2)

2. Public transport and active travel

- Transition Adelaide Metro rail and buses to zero tailpipe emissions (Action 7.1 SANZS, Action 3.4 NZEGOP)
- Policy Priority 9: Support a shift to lower emissions modes of transport, including public transport and active travel (SANZS)
- Action 9.1: Develop a South Australian passenger transport strategy that positions public transport as a key travel mode of choice (SANZS).
- Action 9.2: Develop an active transport and personal mobility strategy (SANZS)
- Increase the share of work trips made by active transport modes by 25% by 2045 (30 year plan for Greater Adelaide)
- Maintain, extend and improve Adelaide's Bikedirect network, including the development of greenways (30 year plan for Greater Adelaide)
- Priority 1.2: Plan for integrated public transport and walking (SA Walking Strategy 2022-32)

- Priority 2.1: Create connected and pleasant walking networks (SA Walking Strategy 2022-32)
- Priority 2.2: Balance the needs for all travellers on our roads and footpaths (SA Walking Strategy 2022-32)

3. Climate change adaptation

- Action 3.10: Assess and address climate change risk in government infrastructure decisions, risk assessment and audit processes (SA Government Climate Change Resilience and Adaptation Actions)

4. Green Infrastructure (including water sensitive urban design)

- Action 3.8: Increase implementation of green infrastructure on public and private land [including] leveraging the infrastructure delivery process to deliver improved greening (SA Government Climate Change Resilience and Adaptation Actions)
- Deliver a 20% increase in canopy cover on departmental managed land by 2045 (measured from the 2018/19 baseline) (DIT Green Infrastructure Commitment)
- Provide shade trees to improve amenity for pedestrians, cyclists and public transport customers, targeting ≥50% canopy cover over footpaths and bikeways (DIT Green Infrastructure Commitment)
- Implement WSUD on infrastructure projects to achieve the state WSUD policy performance targets for water quality, peak flow and flood risk (DIT Green Infrastructure Commitment)
- Minimise impacts to existing natural ecosystems to maintain ecological value and preferentially retain mature trees including Regulated and Significant trees (DIT Green Infrastructure Commitment)
- Identify and pursue opportunities to improve biodiversity, fauna habitat and connectivity through landscape design and species selection (DIT Green Infrastructure Commitment)
- Minimum 50% of new landscape plantings need to be local native species suited to local conditions (DIT Green Infrastructure Commitment)
- Reduce demand on mains water supply from new development through the introduction of water-sensitive urban design (30 year plan for Greater Adelaide)
- Minimise the discharge of stormwater, pollution and nutrients to freshwater, coastal and marine environments through the adoption of appropriate water-sensitive urban design (WSUD) policies and targets (30 year plan for Greater Adelaide)
- Achieve the following minimum reductions in total pollutant load, compared with that in untreated stormwater runoff, from the development part of the site: 80% total suspended solids, 60% total phosphorus, 45% total nitrogen, 90% litter/ gross pollutants (SA WSUD Policy)
- Manage the rate of runoff discharged from development sites so that it does not exceed the pre-urban development 1 year ARI peak flow (SA WSUD Policy)
- Manage runoff from development sites such that the capacity of the existing drainage system is not exceeded and there is no increase in the 5 year and 100 year ARI peak flow, compared to existing conditions (SA WSUD Policy)
- Support the enhancement of the urban biodiversity of metropolitan Adelaide through a connected and diverse network of green infrastructure. (30 year plan for Greater Adelaide)
- Protect 115,000 hectares (13% of Greater Adelaide) of existing natural areas identified as areas of high environmental significance (shown in Map D19, (30 year plan for Greater Adelaide)

5. Circular Economy/Waste

- 95% diversion of construction and demolition waste by 2025* (SA Waste Strategy 2020-25)
- Our aspiration is to foster a green transformation of the South Australian economy (SA Economic Statement)

** Metropolitan Area only. Targets for non-metropolitan areas are set in Regional Waste Management Plans*

6. Land use planning

- Incorporate greenways in all transit-oriented developments and along major transit corridors (30 year plan for Greater Adelaide)
- 60% of all new housing in metropolitan Adelaide will be built within close proximity to quality public transport (rail, tram, O'Bahn and bus) by 2045 (30 year plan for Greater Adelaide)
- Increase the percentage of residents living in walkable neighbourhoods in metropolitan Adelaide by 25% by 2045 (30 year plan for Greater Adelaide)
- Locate more than 50% of Greater Adelaide's net dwellings growth and about 35% of Greater Adelaide's new jobs in transit corridors. (30 year plan for Greater Adelaide)

7. Internal and external programs to consider

- Does the project support travel behaviour change?
- Are there any local Council structure plans, economic development strategies, placemaking objectives that can be realised through the project?
- Is the project consistent with (or can it facilitate/enhance) plans/ precinct requirements for 14 transit oriented developments (Map D5 in 30 year plan)?
- Is the project consistent with (or can it facilitate/enhance) plans to designate 24 transit corridors serving areas of high regeneration potential (30 year plan)?
- Is the project consistent with (or can it facilitate/enhance) the Strategic Cycling network, including greenways and cycling boulevards (Cycling Strategy)?
- Are there opportunities to contribute to/ take advantage of a third party water reuse scheme/ WSUD infrastructure?

Appendix 2. Example MCA tool for decision making

The below example is taken from Transport & Main Roads Queensland's *Guide to incorporating sustainability into project decision making: Sustainability Decision-Making Tool*. *Aspects, criteria and weightings should be customised to suit the decision.*

Decision	[insert name of decision]	**Forecast useful life of asset (decision timeframe)**	[# years]

Aspect	Criteria	Weightings		Option 1		Option 2		Option 3		Option 4	
				Description		*Description*		*Description*		*Description*	
	Customisable		Aspect	Response	Score (1-5)	Response	Score (1-5)	Response	Score (1-5)	Response	Score (1-5)
Environmental	Construction environmental impact (habitat loss, water quality, air quality, noise,	20%	15%								
	Operational environmental impact (noise, vibration, air quality, water quality)	20%									
	Climate-change related risk or impact	20%									
	Ecological impact	20%									
	Carbon footprint	20%									
	Environmental criteria total	**100%**			0		0		0		0
Social	Community connectivity	25%	15%								
	Cultural values and heritage	25%									
	Construction impacts	25%									
	Community interest in options	25%									
	Social criteria total	**100%**			0		0		0		0
Economic	Construction impacts to local businesses	40%	15%								
	Permanent impacts to local businesses	60%									
	Economic criteria total	**100%**			0		0		0		0
Financial	Capital expenditure	40%	20%								
	Operational expenditure	40%									
	Value engineering opportunities	20%									
	Financial criteria total	**100%**			0		0		0		0
Constructability	Staging	30%	20%								
	Timing (duration)	35%									
	TTM	35%									
	Constructability criteria 4										
	Constructability criteria total	**100%**			0		0		0		0
Functionality	Delivery timeframe	25%	15%								
	Future proofing / adaptability	25%									
	Transport network improvement	25%									
	Planning and permits required	25%									
	Functional criteria 5										
	Functionality criteria total	**100%**			0		0		0		0
TOTALS			100%		0 0%		0 0%		0 0%		0 0%

SCORING: 1 = Unacceptable, requires mitigation activity
2 = Below average benefits
3 = Average benefits
4 = Above average benefits
5 = Significant benefits

Appendix 3. Template for Planning Phase Sustainability Plan

Project Name	**XXX**
Date	

This preliminary Sustainability Plan has been prepared in accordance with Master Specification Part PC-PL1, to:

- ensure sustainability risks and opportunities are included in the planning phase Project Risk Register to enable these to be addressed in detailed design;
- provide recommendations for [Principal-nominated sustainability initiatives / minimum IS credit levels and overall IS rating score] for inclusion in the tender/ contract documents to drive sustainable outcomes for the project; and
- maximise likelihood of achievement of the Department's sustainability objectives (contained in Master Specification PC-ST1 and PC-ST2).

1 Carbon Management Plan

1.1 GHG emissions estimates

Whole of life GHG emissions have been estimated in accordance with section 7 of the DIT Sustainability Manual and are presented in Table 1. [Describe any sustainability initiatives that have been implemented into the design and included in the emissions estimate. Provide any additional details on methodology, design and data used, assumptions, limitations, exclusions].

These preliminary results indicate that a total of XX,XXX tCO2-e will be generated from construction, operation and maintenance of the preferred concept design. The majority of these emissions (XX%) are attributed to [XXXXX].

Table 1 Breakdown of Whole of life GHG emissions by lifecycle module

Lifecycle module	GHG emissions (tCO2-e)	% of total Whole of Life GHG emissions
Materials: Product stage (A1-A3)		
Materials: Transport to site (A4)		
Construction (A5)		
Land use change (A5)		
Repair, refurbishment and replacement (B3-B5)		

Operational energy use (B7)		
TOTAL		

Further analysis of upfront and in-use emissions is provided below, indicating [emission source] is the most significant source of GHG emissions. Compared to the estimate of upfront GHG emissions completed at the business case stage for the preferred option, [include brief comparative assessment of estimated upfront emissions demonstrating difference in estimates. Differences in GHG emissions are expected due to differences in estimation methodology. However, any changes in GHG emissions resulting from changes in project scope, and/or design and constructability decisions (since the business case stage) should be highlighted].

Table 2 GHG emissions from materials use

	Construction phase (A1-A3)		**Haulage (A4)**	**% total A1-A4 emissions**	**In use phase (B3-B5)**		
Material	Quantity	GHG emissions (tCO2-e)	GHG emissions (tCO2-e)		Quantity	GHG emissions (tCO2-e)	% total B3-B5 emissions
Concrete – in situ							
Concrete – precast							
Steel – reinforcing							
Steel – structural							
Asphalt							
Aggregate							
etc...							
TOTAL	-				-		

Table 3 GHG emissions from construction activities

Resource	**Quantity**	**GHG emissions (tCO2-e)**	**% total A5 emissions**
Electricity			
Grid electricity			
Renewable electricity (onsite, behind the meter)			
Renewable (offsite, Greenpower, LGCs etc)			
Fuel use			
Diesel			

Biodiesel (specify %)			
LPG			
Waste			
Waste to recycling			
Waste to landfill			
Land use change			
Land clearing			
TOTAL	-		

The assessment of operational phase GHG emissions is summarised in Table 4. These preliminary results indicate that a total of XX,XXX tCO2-e will be generated from operation of the design. The majority of these emissions (XX%) are attributed to [insert most significant source].

Note that enabled emissions from third-party users' fuel consumption has been excluded from the assessment, per the Department's Sustainability Manual part 7.

Table 4 GHG emissions from operational electricity use

Emission source	Grid/ renewables	Quantity	GHG emissions (tCO2-e)
Lighting			
ITS, signals			
Tunnel ventilation			
Other…			
TOTAL			

1.2 GHG emission reduction opportunities

[Summarise investigations undertaken into alternative design and constructability decisions, material and technology opportunities (e.g., concrete vs steel structure, flexible vs rigid pavement, electric plant and equipment, and mandatory initiatives specified by Master Specification parts PC-ST1 and PC-ST2) and how the outcome of these investigations has informed concept design development. GHG emission reduction investigations should be focussed on minimising GHG emissions for the project's most significant sources.]

Initiatives implemented in the reference design, and opportunities which could be further investigated during detailed design and construction to further reduce the project's whole of life GHG emissions, are provided in Table 5.

Table 5 Summary of key GHG emission reduction opportunities

Emission source	BAU approach	Reduction opportunity	Estimated emission reduction potential	Implementation status	Key comments (i.e. examples of implementation, cost and program implications, co-benefits [e.g., circular economy outcomes])

[Provide additional details, including assessment of initiatives not deemed viable, in a sustainability initiatives register, referring to Attachment 1 of Appendix 4 of the Department's Sustainability Manual for a template]

1.3 Proposed GHG emission reduction target(s)

Based on assessment of GHG emission reduction opportunities, the following SMART targets for GHG emission reduction are proposed:

- [Outline proposed targets in dot points. Energy use reduction targets must be proposed for projects where significant operational electricity use is anticipated.]

Key risks to achieving the targets are identified below, along with suggested management measures:

- [Describe key risks and management measures].

1.4 Procurement levers

The following supply chain participants have significant influence over the project's GHG emissions:

[Identify relevant supply chain participants]

It is recommended that, as part of early market engagement, [provide recommendations for how and when key supply chain participants should be involved in early market engagement].

To promote innovative decarbonisation approaches, it is recommended that the procurement strategy [provide recommendations].

2 Circular economy opportunities

A Circular economy assessment was undertaken as part of the planning investigations, in accordance with the requirements of Master Specification Part PC-PL2 and part 9.3 of the Sustainability Manual

[Summarise any investigations undertaken into:

- alternative material options (e.g., recycled plastic vs concrete noise walls, recycled plastic-wood composite vs timber decking)
- avoided/ reduced demand (e.g., reducing the volume of materials required through design optimisation);
- waste streams that will be generated by the project/ program and opportunities to re-use or recycle these materials

and how the outcome of these investigations has informed concept design development.]

The major categories of materials/ products that will be used in the project, and their potential to incorporate/ substitute recycled materials are shown below:

Table 1 Circular economy opportunities

Material / product	Material quantity (tonnes)	Is there potential to incorporate/ substitute recycled materials/ products? (detail upper limits/ conditions as relevant)	Possible sources/ suppliers of recycled materials/ products	Preliminary assessment of viability including tonnes or % of recycled content / recommendation to pursue

3 Climate change risks and mitigation measures

A climate change risk assessment was undertaken as part of the planning investigations, in accordance with the requirements of Master Specification Part PC-PL2. [Explain where the full climate change risk assessment has been documented (e.g., within the Planning Study, EHIAR)].

[X] high and extreme risks were identified. These have been included in the Project Risk Register, and are summarised in Table [X], along with proposed mitigation measures.

Table 2 High and extreme climate change risks and proposed mitigation measures

Risk ID	Risk description	Risk rating	Proposed mitigation measure	Residual risk rating	Next steps	Responsibility for next steps

4 Green Infrastructure Assessment

A Green Infrastructure assessment was undertaken as part of the planning investigations, in accordance with the requirements of Master Specification Part PC-PL2 and Sustainability Manual part 8.

[Describe the green infrastructure objectives and canopy cover targets identified for the project in the Green Infrastructure Assessment OR provide the Green Infrastructure Assessment/ Concept Plan as an attachment.]

[List the recommended actions to be implemented by the project team to ensure priority objectives for green infrastructure are realised.]

5 Recommended Principal-nominated Sustainability Initiatives

Based on our assessment of the key sources of emissions for the project, the potential GHG emissions reduction opportunities that are considered most applicable and/or cost effective, and other potential opportunities identified (e.g., through the Climate change risk assessment, Green Infrastructure assessment and assessment of circular economy opportunities) to achieve the Department's sustainability objectives, the following Principal-nominated Sustainability Initiatives are recommended for inclusion in the contract documents for detailed design and construction:

- [Provide suggested Principal-nominated sustainability initiatives (or IS rating score and minimum levels to be achieved for individual credits), in accordance with part 9 of the Department's Sustainability Manual. Do not duplicate the Mandatory sustainability initiatives.]

6 Recommended targets, Key Result Areas, performance indicators and bid-back items

[Provide recommendations regarding targets (including the GHG emission reduction targets listed in the Carbon Management Plan), Key Result Areas, performance indicators and bid-back items].

Appendix 4. Template for Preliminary Sustainability Plan (Design & Construction Phase)

Project Name	XXX
Date	

This preliminary Sustainability Plan has been prepared in accordance with Master Specification Part [PC-ST1 / PC-ST2]. It meets the requirements for a Level [1 / 2] assessment.

1 Sustainability Workshop (Level 1 assessment only)

A sustainability workshop was held on [date] to identify and confirm sustainability initiatives to be further investigated and/or implemented for the contract. The workshop was attended by:

- [list all Contractors' personnel, Principal's personnel and other relevant stakeholders who attended the workshop]

2 Sustainability Initiatives

The following Sustainability Initiatives have been nominated or identified for the project:

2.1 Principal-nominated sustainability initiatives

- [list Principal-nominated sustainability initiatives as detailed in the Contract requirements]

2.2 Mandatory sustainability initiatives

- [list mandatory sustainability initiatives that apply to the contract (from Master Specification part PC-ST1 or PC-ST2 as relevant]

2.3 Contractor-nominated sustainability initiatives

- [list any Contractor-nominated sustainability initiatives included in the Contractor's tender submission (unless excluded by the Principal)]
- [list any sustainability initiatives that have been identified in accordance with clause 5 of Master Specification part PC-ST1 or PC-ST2, including any design/ construction phase sustainability initiatives identified in sustainability plans prepared for previous design phases]

These initiatives are presented in the Initiatives Register contained in Attachment 1, which will be updated throughout the project to reflect progress, implementation status and next steps.

3 Sustainability management framework

[Outline the sustainability management framework, including:
- interfaces with other project processes and milestones to ensure integration of sustainability requirements in design;
- the decision making process that will be used to assess sustainability initiatives to determine whether they will be implemented (refer to part 9 of this Manual); and
- the processes and methodologies for assurance, monitoring auditing, corrective action and reporting on sustainability performance (including performance against sustainability targets)].

4 Carbon Management Plan (Level 1 assessment only)

4.1 GHG emissions estimates

4.1.1 Approach

[Describe the approach to developing the base case, preliminary and final emissions estimate, completed in accordance with part 7 of the Department's Sustainability Manual, including:

- the design(s) and data used,
- the business-as-usual assumptions adopted,
- the methodology to account for data not available for the base case,
- how scope change will be managed, and
- a list of exclusions.]

4.1.2 Whole of life emissions (Base case)

Whole of life GHG emissions for the Base Case have been estimated in accordance with section 7 of the DIT Sustainability Manual and are presented in Table 1. Compared to the estimate of upfront GHG emissions completed in the planning phase sustainability plan, [include brief comparative assessment of estimated upfront emissions highlighting any difference in estimates].

These preliminary results indicate that a total of XX,XXX tCO2-e will be generated from construction, operation and maintenance of the preferred concept design. The majority of these emissions (XX%) are attributed to [XXXXX].

Table 1 Whole of life GHG emissions by lifecycle module

Lifecycle module	GHG emissions (tCO2-e)	% of total Whole of Life GHG emissions
Materials: Product stage (A1-A3)		
Materials: Transport to site (A4)		

Construction (A5)		
Land use change (A5)		
Repair, refurbishment and replacement (B3-B5)		
Operational energy use (B7)		
TOTAL		

4.1.3 GHG Emissions from material use (Base case)

A break-down of upfront and in-use emissions is provided below, indicating that [emission source] is the most significant source of GHG emissions.

Table 2 GHG emissions from materials use

	Construction phase (A1-A3)		**Haulage (A4)**	**% total A1-A4 emissions**	**In use phase (B3-B5)**		
Material	Quantity	GHG emissions (tCO2-e)	GHG emissions (tCO2-e)		Quantity	GHG emissions (tCO2-e)	% total B3-B5 emissions
Concrete – in situ							
Concrete – precast							
Steel – reinforcing							
Steel – structural							
Asphalt							
Aggregate							
etc...							
TOTAL	-				-		

4.1.4 GHG Emissions from construction activities (Base case)

A break-down of emissions from construction activities is provided below, indicating that [emission source] is the most significant source of GHG emissions.

Table 3 GHG emissions from construction activities

Resource	**Quantity**	**GHG emissions (tCO2-e)**	**% total A5 emissions**
Electricity			

Grid electricity			
Renewable electricity (onsite, behind the meter)			
Renewable (offsite, Greenpower, LGCs etc)			
Fuel use			
Diesel			
Biodiesel (specify %)			
LPG			
Waste			
Waste to recycling			
Waste to landfill			
Land use change			
Land clearing			
TOTAL	-		

4.1.5 Operational GHG Emissions (Base case)

A break-down of operational emissions is provided below, indicating that [emission source] is the most significant source of GHG emissions.

Table 4 GHG emissions from operational electricity use

Emission source	Grid/ renewables	Quantity	GHG emissions (tCO2-e)
Lighting			
ITS, signals			
Tunnel ventilation			
Other…			
TOTAL			

4.2 GHG emission reduction target(s)

The following GHG emission reduction targets apply to the contract:

- [list applicable targets – these should reflect any emission reduction targets nominated in the Contractor's bid and accepted by the Principal]

[Provide a preliminary assessment of the estimated GHG emission reduction impact of implemented initiatives and the expected performance against the project's GHG emission reduction requirements. If

the overall emission reduction target has been broken down into targets for individual packages (eg concrete, pavement etc), describe this here].

Key risks to achieving the targets are identified below, along with suggested management measures:

- [Describe key risks and management measures].

4.3 Methodology and responsibility for measuring and monitoring GHG emissions and reductions

[Describe the methodology/ tool(s) that will be used to measure and monitor GHG emissions and reductions.]

[Identify who in the project team is responsible for measuring and monitoring GHG emissions and reductions].

4.4 GHG emissions reduction opportunities

- [Summarise investigations undertaken into alternative design and constructability decisions, material and technology opportunities (e.g., concrete vs steel structure, flexible vs rigid pavement, electric plant and equipment, and mandatory initiatives specified by Master Specification parts PC-ST1 and PC-ST2) and how the outcome of these investigations has informed design development. GHG emission reduction investigations should be focussed on minimising GHG emissions for the project's most significant sources.]
- Initiatives implemented in the 30% design, and key opportunities which will be further investigated to reduce the project's whole of life GHG emissions, are provided in Table 5.

Table 5 Summary of key GHG emissions reduction opportunities

Emission source	BAU approach	Reduction opportunity	Estimated emission reduction potential	Implementation status	Key comments (i.e. examples of implementation, cost and program implications, co-benefits [e.g., circular economy outcomes])

Additional details, including assessment of initiatives not deemed viable, are included in the sustainability initiatives register.

4.5 Procurement levers

[Identify key packages in terms of opportunity to deliver significant GHG emissions reduction. Describe how and when suppliers will need to be engaged in order maximise achievement of GHG emission reduction goals/ reduce risk of not being able to realise GHG emission reduction opportunities (e.g. it may be necessary to allow time for mix design approval if a low carbon concrete mix has not previously been used on Departmental projects).]

5 Circular economy

The major categories of materials/ products that will be used in the project, and their potential to incorporate/ substitute recycled materials are shown below:

Table 6 Circular economy opportunities

Material / product	Material quantity (tonnes)	Is there potential to incorporate/ substitute recycled materials/ products?	Proposed recycled content quantity (tonnes and/or %)	Possible sources/ suppliers of recycled materials/ products	Included in sustainability initiative register?

** provide justification for opportunities not included in the sustainability initiatives register*

[Describe the procurement mechanisms that have or will be used to preference suppliers of materials/ products with high recycled content and/or those with lower environmental impacts across their life cycle compared with competing materials/ products.]

The main waste streams that will be generated by the project and the potential for re-use/ recycling are shown below:

Material / product	Potential to re-use the material/ product?	Potential to recycle the product?	Included in sustainability initiative register?*

** provide justification for opportunities not included in the sustainability initiatives register*

6 Potable water use

[Describe the situation with regard to non-potable water sources (e.g., is there a recycled water network in proximity of the project?), and any relevant information (current at the time of developing the Plan) regarding feasibility of connecting to the network for operational use (e.g., irrigation) or using recycled water or rainwater for the construction phase. Include possible actions to minimise use of potable water for construction and/or operational use in the sustainability initiative register.]

7 Green Infrastructure

The following green infrastructure objectives and canopy cover targets apply to the project:

- [list the applicable Green Infrastructure objectives and target(s) from the Contract requirements, Green Infrastructure Assessment (if one has been undertaken), or the standard Green Infrastructure objectives in PC-ST1 OR provide the Green Infrastructure Assessment as an attachment.]
- [Comment on whether/ how the next steps identified in the Green Infrastructure assessment (if applicable) have/ will be implemented to ensure realisation of the objectives.]
- [Confirm that the design basis includes design parameters required to achieve the applicable Green Infrastructure targets (such as minimum verge/ median widths to accommodate street trees)]
- [Identify any areas where the design does not achieve the Green Infrastructure objectives and provide justification or actions to rectify. Provide any relevant information regarding progress/ next steps]

8 Climate change resilience

The project's climate change risk assessment (completed in the previous phase) has been reviewed, and the following changes made:

- [include details and justification]

OR

A climate change risk assessment has been undertaken in accordance with the Department' Climate Change Adaptation Guidelines (accessed from the *Technical Documents: Standards and Guidelines* webpage).

The following high or extreme risks have been identified in the climate change risk assessment:

Table 3 High and extreme climate change risks and proposed mitigation measures

Risk	Risk rating	Proposed mitigation/ adaptation measure	Updated risk rating	Next steps	Responsibility for next steps

[Confirm that all high or extreme risks will be mitigated, if applicable]

9 Sustainable site accommodation and equipment (only required construction phase sustainability plan)

The following table demonstrates the path to compliance with Master Specification part PC-ST2 clause 10, ie, 50% of the sustainable site facility requirements have or will be achieved:

Requirement		Status *A = Achieved* *P = Proposed to be achieved* *N = not proposed to be achieved*
1	Insulation in walls = R2.0 for new facilities, R1.8 for existing facilities, R2.5 for facilities built on site	
2	Insulation in ceilings = R3.0	
3	Low VOC paints where applicable for all internal surfaces	
4	Low VOC adhesives and sealants throughout	
5	Low VOC carpets, and / or use of recycled carpet where applied	
6	LED lighting	
7	Provide effective lighting control to eliminate the energy consumption from lighting during inactive periods. Acceptable control methods are sensors, timers, master control switches or equivalent	

8	Chain of custody FSC or AFS timber throughout	
9	Door closers on all external doors (to air-conditioned spaces)	
10	Weather seals at all doors and windows (to air-conditioned spaces)	
11	Use of blinds, tinting or external shading for all windows to office spaces	
12	Provide effective air conditioning control to eliminate the energy consumption from air conditioning during inactive periods. Acceptable control methods are sensors, timers, master control switches or equivalent	
13	A deconstruction plan of the site facilities and amenities, or a product stewardship policy by supplier/manufacturer that demonstrates end-of-life treatment of the site facility	
14	Push button taps with aerators (to be 3.5L/min or less) to ablution blocks hand basins.	
15	Toilets to be 3/4.5L dual flush and shower heads to be 7.5L/min.	
16	Building Manufacturers to operate an accredited ISO 14001 Environmental Management System	
17	Solar PV and/ or Greenpower for site office/ compound	
18	Low formaldehyde joinery and / or recycled FF&E	
19	Rainwater collection/reuse	
20	FSC timber for all temporary uses – e.g. stairs, decks and covered walkways	
21	Minimum 4-star energy rated fridges	
22	Minimum 5-star energy rated TVs	
23	Minimum 4-star energy rated dishwashers	
24	Sub-metering of electricity and water (monitoring site and site office / amenities separately)	
25	Elimination of single-use crockery and cutlery	
26	Paper, bottle, plastic (co-mingle) and printer cartridge recycling	

27	Bike racks to facilities area	
28	a waste disposal system which separates food waste, recycling, and co-mingled waste	
29	use of re-used or recycled products in place of virgin materials for wheel stops	

The following table demonstrates the path to compliance with Master Specification part PC-ST2 clause 10 to reduce the environmental and community/ workforce health impacts of vehicles, plant and equipment:

Measure		**Status** ***A = Achieved*** ***P = Proposed to be achieved*** ***N = not proposed to be achieved****
1	purchasing or hiring mobile non-road diesel plant and equipment that complies with highest practicable EU or US EPA emissions standards (for plant over 19kW)	
2	requiring sub-contractors to provide information on the emissions standards of the mobile non-road diesel plant and equipment they propose to use on site, and applying a weighting for air emission standards (in conjunction with other environmental considerations) in tender selection processes (for plant over 19kW). *(Only required for Level 1 assessments)*	
3	ensuring engines are correctly repaired and regularly serviced to ensure efficiency and to prevent / minimise spills and leaks	
4	restricting unnecessary idling time of vehicles, plant and equipment	
5	improving an engine's emission performance by fitting it with an anti-pollution control device	
6	ensuring fuel conforms with relevant quality standards	
7	locating plant and equipment away from sensitive populations such as schools, hospitals, and / or using lowest emission equipment near these areas	
8	locating plant and equipment away from residential areas	

9	restricting site access to essential vehicles and machinery only	
10	avoiding onsite use of diesel or petrol powered generators by substituting for / or combination of mains, renewables or battery powered options	

** provide justification for measures not proposed to be achieved*

10 Sustainable procurement (Level 1 assessment only - only required for construction phase sustainability plan)

[Provide/ attach the commitment to address sustainability risks and opportunities in the supply chain]

[Describe the approach that will be taken to identify material sustainability risks and opportunities in the project's supply chains, and any procurement actions that have been taken (at the time of developing this plan) to mitigate these risks/ realise these opportunities, in accordance with part 10 of the Sustainability Manual].

Attachment 1 - [Project name] Sustainability Initiatives Register

[date]

Table 4 xxx

Initiative ID	Sustainability initiative *(description)*	Sustainability objective *(which of the Department's sustainability objectives does the initiative relate to?)*	Initiative category *(Mandatory, Principal-nominated, Contractor-nominated)*	Anticipated benefits/ risks/ impacts/ constraints *Assessment to be quantified as much as possible* *Refer to part 9 of this manual for examples of sub-criteria*					Value-for-money *How the initiative offers value-for-money for the specified objective*	Priority rating *Describe how next steps should be prioritised relative to other initiatives, especially those relating to the same objective(s)*	Current status *Viable/ not viable/ under evaluation* *If an initiative is deemed not viable, provide justification, in accordance with part 9 of this manual.*	Next steps *(e.g., describe any actions required to obtain information on benefits/ risks/constraints, seek approval (if required), ensure initiative is reflected in drawings etc)*	Responsibilities *Describe responsibilities for next steps and ensuring follow up for implementation of viable initiatives*
				Environmental	Economic	Social	Technical	Cost					

Appendix 5. Template for Final Sustainability Plan (Design & Construction Phase)

Project Name	**XXX**
Date	

This final Sustainability Plan has been prepared in accordance with Master Specification Part [PC-ST1 / PC-ST2]. It meets the requirements for a Level [1 / 2] assessment.

1 Sustainability Workshop (Level 1 assessment only)

A sustainability workshop was held on [date] to identify and confirm sustainability initiatives to be further investigated and/or implemented for the contract. The workshop was attended by:

- [list all Contractors' personnel, Principal's personnel and other relevant stakeholders who attended the workshop]

2 Sustainability Initiatives

The following Sustainability Initiatives have been nominated or identified for the project:

2.1 Principal-nominated sustainability initiatives

[list Principal-nominated sustainability initiatives as detailed in the Contract requirements]

2.2 Mandatory sustainability initiatives

[list mandatory sustainability initiatives that apply to the contract (from Master Specification part PC-ST1 or PC-ST2 as relevant]

2.3 Contractor-nominated sustainability initiatives

- [list any Contractor-nominated sustainability initiatives included in the Contractor's tender submission (unless excluded by the Principal)]
- [list any sustainability initiatives that have been identified in accordance with clause 5 of Master Specification part PC-ST1 or PC-ST2, including any design/ construction phase sustainability initiatives identified in sustainability plans prepared for previous design phases]

These initiatives are presented in the Initiatives Register contained in Attachment 1, which has been updated to reflect the outcomes of investigations and final implementation status.

3 Sustainability management framework

[Outline the sustainability management framework, including:

- interfaces with other project processes and milestones to ensure integration of sustainability requirements in design;
- the decision making process that was used to assess sustainability initiatives to determine whether they would be implemented (refer to part 9 of this Manual); and
- For each initiative, provide justification for the selection of the final approach (in accordance with part 9 of this Manual). This may be provided in the sustainability initiatives register, but if there is a lot of information to convey it should be documented here]

4 Carbon Management Plan (Level 1 assessment only)

4.1 GHG emissions estimates

4.1.1 Approach

[Describe the approach to developing the base case, preliminary and final emissions estimate, completed in accordance with part 7 of the Department's Sustainability Manual, including:

- the design(s) and data used,
- business-as-usual assumptions adopted,
- the methodology to account for data not available for the base case,
- how scope change was managed, and
- a list of exclusions.]

4.1.2 Whole of life emissions (Final)

Whole of life GHG emissions have been measured in accordance with section 7 of the DIT Sustainability Manual and are presented in Table 1, alongside the Base Case estimates.

Table 5 Base case and final estimate of whole of life GHG emissions

Emission source	Base case emission estimate (t CO2-e)	Final emission estimate (t CO2-e)	Reduction in GHG emissions achieved (t CO2-e)	Percentage reduction in GHG emissions (%)
Materials: Product stage (A1-A3)				
Materials: Transport to site (A4)				

Construction (A5)				
Land use change (A5)				
Repair, refurbishment and replacement (B3-B5)				
Operational energy use (B6)				
TOTAL				

4.1.3 GHG Emissions from material use (Final)

A break-down of upfront and in-use emissions is provided below for the final as-constructed asset, alongside Base Case estimates.

Table 2 GHG emissions from materials use (construction phase)

	BASE CASE			**FINAL**			**REDUCTIONS ACHIEVED (A1-A4)**
	Materials use (A1-A3)		Haulage (A4)	Materials use (A1-A3)		Haulage (A4)	
Material	Quantity	GHG emissions (tCO2-e)	GHG emissions (tCO2-e)	Quantity	GHG emissions (tCO2-e)	GHG emissions (tCO2-e)	**%**
Concrete – in situ							
Concrete – precast							
Steel – reinforcing							
Steel – structural							
Asphalt							
Aggregate							
etc...							
TOTAL	-			-			

Table 3 GHG emissions from materials use (in-use phase)

	BASE CASE	**FINAL**	
	In use phase (B3-B5)	**In use phase (B3-B5)**	

Material	Quantity	GHG emissions (tCO2-e)	Quantity	GHG emissions (tCO2-e)	**REDUCTIONS ACHIEVED (B3-B5) %**
Concrete – in situ					
Concrete – precast					
Steel – reinforcing					
Steel – structural					
Asphalt					
Aggregate					
etc...					
TOTAL					

4.1.4 GHG Emissions from construction activities (Final)

A break-down of emissions from construction activities is provided below for the final as-constructed asset, alongside Base Case estimates.

Table 4 GHG emissions from construction activities

	BASE CASE Construction activities (A5)		**FINAL Construction activities (A5)**		**REDUCTIONS ACHIEVED (A5) %**
Resource	**Quantity**	**GHG emissions (tCO2-e)**	**Quantity**	**GHG emissions (tCO2-e)**	
Electricity					
Grid-supplied electricity					
Renewable electricity (onsite, behind the meter)					
Renewable (offsite, Greenpower, LGCs etc)					
Fuel use					
Diesel					

Biodiesel (specify %)					
LPG					
Waste					
Waste to recycling					
Waste to landfill					
Land use change					
Land clearing					
TOTAL	-				

4.1.5 Operational GHG Emissions (Final)

A break-down of operational emissions is provided below, for the final as-constructed asset, alongside Base Case estimates.

Table 4 GHG emissions from operational electricity use

	BASE CASE Operational energy use (B6)		FINAL Operational energy use (B6)		REDUCTIONS ACHIEVED %
Emission source	**Quantity**	**GHG emissions (tCO2-e)**	**Quantity**	**GHG emissions (tCO2-e)**	
Lighting					
ITS, signals					
Tunnel ventilation					
Other…					
TOTAL					

Provide justification for all emission sources for which the final estimate is found to result in an increase in whole of life GHG compared to the base case estimate.

4.2 Performance against GHG emission reduction target(s)

The following GHG emission reduction targets applied to the contract:

- [list applicable targets – these should reflect any emission reduction targets nominated in the Contractor's bid and accepted by the Principal]

[For each target, describe:

- whether the target was achieved,
- the actual emissions reduction achieved,
- the emission reduction initiative(s) that were implemented to achieve the target and their relative contribution.

Describe any barriers faced in minimising the project's whole of life GHG emissions and describe how they were overcome. For any barriers which could not be overcome, where relevant, provide recommendations on how they could be on future projects.]

4.3 Emissions reduction initiatives

[Summarise the process for identifying, investigating and assessing alternative design and constructability approaches, material and technology opportunities.]

All sustainability initiatives investigated as part of the project are included in the Sustainability Initiatives Register, which summarises the outcome of the investigations, implementation status and justification for any initiatives not implemented.

5 Circular economy

The major categories of materials/ products used in the project, their potential to incorporate/ substitute recycled materials, and the extent to which recycled materials/products were used is shown in the table below:

Material / product	Material quantity (tonnes)	Potential to incorporate/ substitute recycled materials/ products?	Sources/ suppliers of recycled materials/ products	Included in sustainability initiative register?*	Outcome (to what extent were recycled materials/ products used, % or in units tonnes?)

** provide justification for opportunities not included in the sustainability initiatives register*

[Describe the procurement mechanisms that were used to preference suppliers of materials/ products with high recycled content and/or those with lower environmental impacts across their life cycle compared with competing materials/ products.]

The main waste streams that were generated from the project, the potential for re-use/ recycling and the extent to which waste materials/ products were re-used/ recycled is shown in the table below:

Material / product	Is there potential to re-use the material/ product?	Is there potential to recycle the product?	Included in sustainability initiative register?*	Outcome (to what extent were waste streams diverted from landfill, % or in units tonnes?)

** provide justification for opportunities not included in the sustainability initiatives register*

5.1 Recycled materials record (only required for construction phase final sustainability plan)

Material category	Amount of recycled material received on the project (tonnes) and the source of the recycled material	Amount of site-won material reused on the project (tonnes)	Amount of material removed from the site for recycling (tonnes, and destination)	Amount of material removed from the site for disposal to landfill (tonnes)
Steel				
Masonry (including concrete)				
Soil/ fill				
Plastic				
Glass				
Rubber crumb				
Pavement material				

6 Potable water use

- [Describe the investigations and actions undertaken to assess feasibility of using non-potable water sources for construction and/or operation.
- Describe the extent to which non-potable water was/ will be used during construction and/or operation of the asset, including justification for the final approach.]

7 Green Infrastructure (if applicable)

The following Green Infrastructure objectives and canopy cover targets applied to the project:

- [list the applicable Green Infrastructure objectives and canopy cover target/s from the contract requirements, Green Infrastructure Assessment (if undertaken) or the standard Green Infrastructure objectives in PC-ST1 OR provide the Green Infrastructure Assessment as an attachment.]

[Describe how the Green Infrastructure objectives and targets have been achieved. Provide justification if any of the objectives or targets were not achieved.]

8 Climate change resilience

The following summarises key actions and outcomes undertaken since submission of the Preliminary Sustainability Plan to finalise the assessment of climate change risks and implement adaptation measures:

- [include relevant detail]

The following table describes the high or extreme risks that were identified in the final climate change risk assessment, the current risk status, and any required ongoing management of residual risks.

Risk	Risk rating	Proposed mitigation/ adaptation measure	Has the mitigation/ adaptation measure been implemented?	Updated risk rating	Management for residual risk	Responsibility for managing residual risk

9 Sustainable site accommodation and equipment (only required for construction phase sustainability plan)

The following table demonstrates how the requirements of Master Specification part PC-ST2 clause 10 have been achieved (ie, 50% of the sustainable site facility requirements implemented):

Requirement		Status *A = Achieved* *N = Not achieved*
1	Insulation in walls = R2.0 for new facilities, R1.8 for existing facilities, R2.5 for facilities built on site	
2	Insulation in ceilings = R3.0	
3	Low VOC paints where applicable for all internal surfaces	
4	Low VOC adhesives and sealants throughout	
5	Low VOC carpets, and / or use of recycled carpet where applied	
6	LED lighting	
7	Provide effective lighting control to eliminate the energy consumption from lighting during inactive periods. Acceptable control methods are sensors, timers, master control switches or equivalent	
8	Chain of custody FSC or AFS timber throughout	
9	Door closers on all external doors (to air-conditioned spaces)	
10	Weather seals at all doors and windows (to air-conditioned spaces)	
11	Use of blinds, tinting or external shading for all windows to office spaces	
12	Provide effective air conditioning control to eliminate the energy consumption from air conditioning during inactive periods. Acceptable control methods are sensors, timers, master control switches or equivalent	
13	A deconstruction plan of the site facilities and amenities, or a product stewardship policy by supplier/manufacturer that demonstrates end-of-life treatment of the site facility	

14	Push button taps with aerators (to be 3.5L/min or less) to ablution blocks hand basins.	
15	Toilets to be 3/4.5L dual flush and shower heads to be 7.5L/min.	
16	Building Manufacturers to operate an accredited ISO 14001 Environmental Management System	
17	Solar PV and/ or Greenpower for site office/ compound	
18	Low formaldehyde joinery and / or recycled FF&E	
19	Rainwater collection/reuse	
20	FSC timber for all temporary uses – e.g. stairs, decks and covered walkways	
21	Minimum 4-star energy rated fridges	
22	Minimum 5-star energy rated TVs	
23	Minimum 4-star energy rated dishwashers	
24	Sub-metering of electricity and water (monitoring site and site office / amenities separately)	
25	Elimination of single-use crockery and cutlery	
26	Paper, bottle, plastic (co-mingle) and printer cartridge recycling	
27	Bike racks to facilities area	
28	A waste disposal system which separates food waste, recycling, and co-mingled waste	
29	Use of re-used or recycled products in place of virgin materials for wheel stops	

The following table demonstrates the actions taken to reduce the environmental and community/ workforce health impacts of vehicles, plant and equipment (per Master Specification part PC-ST2 clause 10):

Measure	**Status** ***A = Achieved*** ***N = Not achieved******

1	Purchasing or hiring mobile non-road diesel plant and equipment that complies with highest practicable EU or US EPA emissions standards (for plant over 19kW)	
2	Requiring sub-contractors to provide information on the emissions standards of the mobile non-road diesel plant and equipment they propose to use on site, and applying a weighting for air emission standards (in conjunction with other environmental considerations) in tender selection processes (for plant over 19kW). *(Only required for Level 1 assessments)*	
3	Ensuring engines are correctly repaired and regularly serviced to ensure efficiency and to prevent / minimise spills and leaks	
4	Restricting unnecessary idling time of vehicles, plant and equipment	
5	Improving an engine's emission performance by fitting it with an anti-pollution control device	
6	Ensuring fuel conforms with relevant quality standards	
7	Locating plant and equipment away from sensitive populations such as schools, hospitals, and / or using lowest emission equipment near these areas	
8	Locating plant and equipment away from residential areas	
9	Restricting site access to essential vehicles and machinery only	
10	Avoiding onsite use of diesel or petrol powered generators by substituting for / or combination of mains, renewables or battery powered options	

** provide justification for measures not achieved*

10 Sustainable procurement (Level 1 assessment only - only required for construction phase sustainability plan)

[Provide/ attach the commitment to address sustainability risks and opportunities in the supply chain]

The following approach was taken to identify material sustainability risks and opportunities in the project's supply chains:

[Describe the approach to risk/opportunity identification].

The table below shows the risks and opportunities identified in the project's supply chains, and the procurement actions taken to mitigate these risks/ realise these opportunities (in accordance with part 10 of the Sustainability Manual):

Risk / opportunity	Procurement measure(s) taken to mitigate risk / realise opportunity

[Attach evidence/ examples showing:

- how sustainability objectives and targets were embedded throughout relevant subcontracts and tender schedules
- how sustainability criteria were considered in tender evaluation]

[Describe how Environment Product Declarations (EPDs) were sought, and state what percentage of products used (by cost) have a valid EPD complying to EN 15804.]

Attachment 1 - [Project name] Sustainability Initiatives Register

[Date]

Initiative ID	Sustainability initiative *(description)*	Sustainability objective *(which of the Department's sustainability objectives does the initiative relate to?)*	Initiative category *(Mandatory, Principal-nominated, Contractor-nominated)*	Anticipated benefits/ risks/ impacts/ constraints *Assessment to be quantified as much as possible* *Refer to part 9 of this manual for examples of sub-criteria*					Value-for-money *How the initiative offers value-for-money for the specified objective*	Priority rating *Describe how next steps should be prioritised relative to other initiatives, especially those relating to the same objective(s)*	Current status *Viable/ not viable/ under evaluation* *If an initiative is deemed not viable, provide justification, in accordance with part 9 of this manual.*	Next steps *(e.g., describe any actions required to obtain information on benefits/ risks/constraints, seek approval (if required), ensure initiative is reflected in drawings etc)*	Responsibilities *Describe responsibilities for next steps and ensuring follow up for implementation of viable initiatives*
				Environmental	Economic	Social	Technical	Cost					

Appendix 6. Business as Usual Assumptions

<table>
<tr><th>Aspect</th><th>Business as usual assumptions</th></tr>
<tr><td>Asphalt</td><td>Hot mix asphalt
Polymer modified binders used in wearing course
30% RAP (4% virgin bitumen) for all courses except for wearing course
20% RAP (4.5% virgin bitumen) for wearing course in fine dense mix asphalt
10% RAP (5% virgin bitumen) for wearing course in coarse dense mix asphalt
Asphalt planings taken back to asphalt plant for incorporation into new asphalt (ie no in-situ recycling)
0% recycled soft plastic
0% crumbed rubber (derived from recycled tyres)
0% manufactured or reprocessed sand or aggregates.</td></tr>
<tr><td>Concrete</td><td>
<table>
<tr><th rowspan="2">Strength grade (MPa)</th><th colspan="10">Quantity of mix constituents (kg/m³)</th><th rowspan="2">Total mass kg/m3</th><th rowspan="2">Emission factor (kg CO2-e/m³)</th></tr>
<tr><th>Cement</th><th>Fly Ash</th><th>GGBF Slag</th><th>Total cementitious content</th><th>Fine aggregates</th><th>Manufactured sand</th><th>Coarse aggregates</th><th>Recycled aggregates</th><th>Mains water</th><th>Recycled water</th></tr>
<tr><td>20</td><td>196</td><td>42</td><td>42</td><td>280</td><td>918</td><td>0</td><td>990</td><td>0</td><td>210</td><td>0</td><td>2398</td><td>213</td></tr>
<tr><td>25</td><td>217</td><td>47</td><td>47</td><td>310</td><td>881</td><td>0</td><td>1000</td><td>0</td><td>207</td><td>0</td><td>2398</td><td>234</td></tr>
<tr><td>32</td><td>252</td><td>54</td><td>54</td><td>360</td><td>812</td><td>0</td><td>1010</td><td>0</td><td>216</td><td>0</td><td>2398</td><td>269</td></tr>
<tr><td>40</td><td>308</td><td>66</td><td>66</td><td>440</td><td>707</td><td>0</td><td>1030</td><td>0</td><td>220</td><td>0</td><td>2397</td><td>326</td></tr>
<tr><td>50</td><td>385</td><td>83</td><td>83</td><td>550</td><td>556</td><td>0</td><td>1070</td><td>0</td><td>220</td><td>0</td><td>2396</td><td>403</td></tr>
<tr><td>65</td><td>385</td><td>83</td><td>83</td><td>550</td><td>561</td><td>0</td><td>1100</td><td>0</td><td>183</td><td>0</td><td>2394</td><td>404</td></tr>
<tr><td>80</td><td>427</td><td>92</td><td>92</td><td>610</td><td>499</td><td>0</td><td>1100</td><td>0</td><td>183</td><td>0</td><td>2392</td><td>446</td></tr>
<tr><td>100</td><td>462</td><td>99</td><td>99</td><td>660</td><td>465</td><td>0</td><td>1100</td><td>0</td><td>165</td><td>0</td><td>2390</td><td>481</td></tr>
</table>
Note: The above mix designs are based on 30% cement replacement (50:50 fly ash and slag)
Source for concrete mix composition: Infrastructure Sustainability Council Materials Calculator v2.0.13
Source for emission intensity of mix constituents: DCCEEW ‘How to Calculate Embodied Carbon of a Concrete Mix’
</td></tr>
<tr><td>Concrete maintenance</td><td>Concrete rehabilitation required for kerbs, drains and secondary pavement every 50 years.
100% of volume requires replacement</td></tr>
<tr><td>Construction and</td><td>90% diversion of construction and demolition waste from landfill (Metropolitan Adelaide)</td></tr>
</table>

demolition waste	70% diversion of construction and demolition waste from landfill (non-Metropolitan Adelaide)
Drainage pipes and culverts	Reinforced concrete with 30% cement replacement
Electricity (design and construction)	100% grid supplied electricity for design and construction offices and construction activities 0% Green Power Scope 2 & 3 combined emissions factors for grid-supplied electricity in SA (t CO2-e per MWh): refer to current version of *Australia's emissions projections (DCCEEW)*
Fuel	100% mineral diesel fuel for all construction and maintenance plant, site vehicles, haulage vehicles, mobile lighting towers, variable message boards and generators.
Granular pavement materials	0% manufactured or reprocessed sand or aggregates
Haulage distance	Refer to Embodied Carbon Measurement for Infrastructure: Technical Guidance
Noise barriers	Constructed from reinforced concrete with 30% Portland cement replacement
Pavement maintenance	Pavement rehabilitation required at the end of pavement design life (specified in the concept pavement design report). Replacement of wearing course every 15 year (OGA) or 25 years (SMA). Crack sealing required every 10 years and applied to 10% of all pavement. Thickness of crack/new asphalt is 15 mm
Railway sleepers	Reinforced concrete with 30% cement replacement
Spray seal	0% by mass of crumbed rubber (derived from recycled tyres)
Supply of signs, station/ road furniture and public realm elements	0% reuse 0% recycled content

(e.g., bollards, wheel stops, lawn edging)	
Vegetation loss/ gain	New and replacement planting in accordance with DIT vegetation impact assessment guideline and project landscaping/ urban design requirements.
Water	100% mains water for all construction and operational uses.

Appendix 7. Sustainable Site Facility Requirements

1. Insulation in walls = R2.0 for new facilities, R1.8 for existing facilities, R2.5 for facilities built on site
2. Insulation in ceilings = R3.0
3. Low VOC paints where applicable for all internal surfaces
4. Low VOC adhesives and sealants throughout
5. Low VOC carpets, and / or use of recycled carpet where applied
6. LED lighting
7. Provide effective lighting control to eliminate the energy consumption from lighting during inactive periods. Acceptable control methods are sensors, timers, master control switches or equivalent
8. Chain of custody FSC or AFS timber throughout
9. Door closers on all external doors (to air-conditioned spaces)
10. Weather seals at all doors and windows (to air-conditioned spaces)
11. Use of blinds, tinting or external shading for all windows to office spaces
12. Provide effective air conditioning control to eliminate the energy consumption from air conditioning during inactive periods. Acceptable control methods are sensors, timers, master control switches or equivalent
13. A deconstruction plan of the site facilities and amenities, or a product stewardship policy by supplier/manufacturer that demonstrates end-of-life treatment of the site facility
14. Push button taps with aerators (to be 3.5L/min or less) to ablution blocks hand basins.
15. Toilets to be 3/4.5L dual flush and shower heads to be 7.5L/min.
16. Building Manufacturers to operate an accredited ISO 14001 Environmental Management System
17. Solar PV and/ or Greenpower for site office/ compound
18. Low formaldehyde joinery and / or recycled FF&E
19. Rainwater collection/reuse
20. FSC timber for all temporary uses – e.g. stairs, decks and covered walkways
21. Minimum 4-Star Energy Rated fridges
22. Minimum 5-Star Energy Rated TVs
23. Minimum 4-Star Energy Rated dishwashers
24. Sub-metering of electricity and water (monitoring site and site office / amenities separately)
25. Elimination of single-use crockery and cutlery
26. Paper, bottle, plastic (co-mingle) and printer cartridge recycling
27. Bike racks to facilities area
28. A waste disposal system which separates food waste, recycling, and co-mingled waste
29. Use of re-used or recycled products in place of virgin materials for wheel stops

Appendix 8. Template Sustainability Commitments Schedule

The purpose of this Section is to demonstrate your commitment and capacity to deliver on the Principal's objectives to:

- minimise whole of life GHG emissions associated with the asset;
- contribute to circular economy outcomes through greater use of re-used or recycled materials and diversion of waste from landfill; and
- reduce whole of life environmental impacts by prioritising products or services that have lower adverse impacts associated with any stage in their production, use or disposal
- support the development of low emissions and climate smart industries and services in South Australia.

Construction contractor's commitment to reducing emissions	
Does your organisation have an organisational emission reduction target(s) that: • is publicly available (e.g., published on company website) • is reported against regularly • addresses scope 1, 2 and significant scope 3 embodied emission sources	*YES /NO* *If yes, provide a link.*

Sustainability outcome *NB: these are examples and should be modified to reflect project scope and project-specific targets (if applicable)*	**Master Spec /CSCR reference**	**Mandated minimum requirement**	**Project commitment (included in price)**	**Justification for bid-back**	**Optional value-add details (not included in price)** ***Price must be stated below, GST incl.***
Reduction in whole of life GHG emissions associated with energy use, compared to base case	PC-ST1, cl 7 PC-ST2, cl 7	10%			
Reduction in whole of life GHG emissions associated with	PC-ST1, cl 7 PC-ST2, cl 7	10%			

materials use, compared to base case					
Recycled material substitutes for virgin materials (% by tonne for imported granular pavement materials)	PC-ST1, cl 4 & 8 PC-ST2, cl 4 & 8	Optimise			
Average Reclaimed Asphalt Pavement (% by volume)	PC-ST1, cl 4 & 8 PC-ST2, cl 4 & 8	Optimise			
Recycled material substitutes for virgin materials (% by tonne for noise walls)	PC-ST1, cl 4 & 8 PC-ST2, cl 4 & 8	-			
Increase in tree canopy at maturity (%) compared to 2018/19 baseline	PC-ST1, cl 10 PR-LS-D1 cl 10 / PR-LS-D2, cl 3	20%			
Average cement replacement (% by volume) - in-situ concrete	ST-SD-D1, cl 4 ST-SC-S7, cl4 PC-ST1, cl 4 PC-ST2, cl 4	30%			
Average cement replacement (% by volume) - pre-cast concrete	ST-SD-D1, cl 4 ST-SC-S7, cl 4 PC-ST1, cl 4 PC-ST2, cl 4	30%			
Products (% by cost) with an Environment Product Declaration	-	-			
Diesel-fuelled technologies* (#)	PC-ST2, cl 4	2			

replaced with solar/ hybrid/ electric/ hydrogen					

**** Refers to how many different types of equipment (not how many individual items) will be replaced with solar/ hybrid/ electric options. E.g. if you propose to use 2 x solar mobile lighting towers, 1 x hybrid excavator, 5 x electric site vehicles, you would nominate 3 technologies. Note this may include sub-contractor vehicles/ equipment. You may wish to provide details of the specific types of equipment for which you propose to use solar/ hybrid/ electric/ hydrogen in the section below***

Contractor's proposed innovative trials					
Trial brief description	**Included in price or optional value-add[1]?**	**Justification for proposed trial[2]**	**Proposed extent/location of trial**	**DIT/stakeholder input requirements**	**Any additional details**

[1] Include price (GST inclusive) if optional value-add

[2] Justification needs to include environmental and social impacts, durability risks, previous use in South Australia, interstate or overseas, cost implications and potential schedule impacts compared to business-as-usual products, product availability.

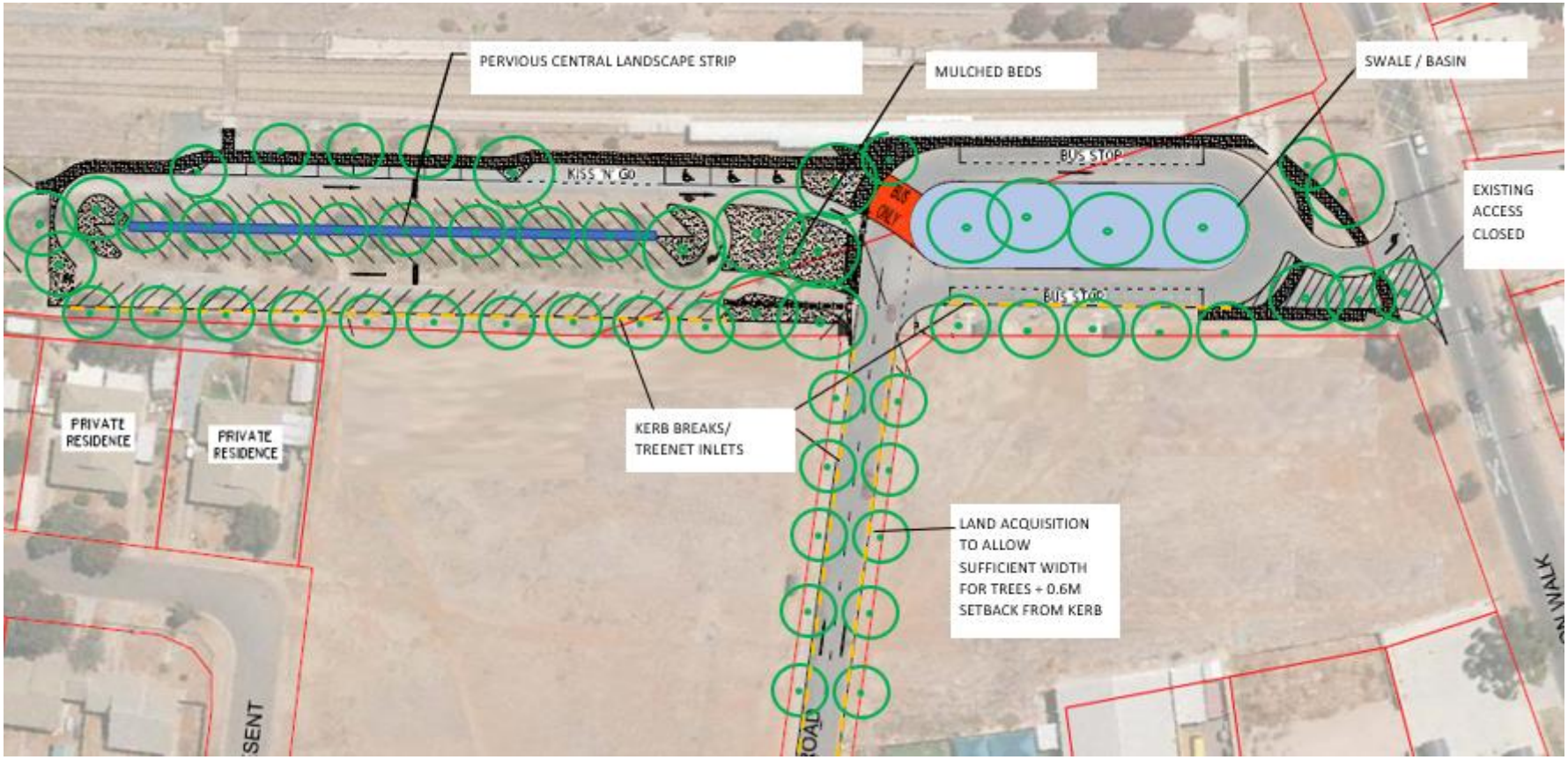
Appendix 9. Example Green Infrastructure Assessment

Project Name	**XXX**
Date	

GI Objectives	Desired Characteristics	Target (if applicable)	Next Steps (if applicable)
Increase canopy cover across the project area	• Large canopy trees in central landscape strip, detention basin, around perimeter of car park, interchange and in road verge	• ≥20% canopy cover (at maturity) across project area	• Design basis report and concept design to provide min 1.5m wide landscape strip around and within carpark • Include project-specific Green Infrastructure targets in CSCR • Include canopy cover % in Sustainability Commitments schedule • Obtain Council input for proposed tree planting locations on access road • Land acquisition to allow sufficient width for trees + 0.6m setback from kerb of new access road
Increase shade and amenity for pedestrians and public transport patrons	• Large canopy trees adjacent footpaths and in car park	• ≥50% shade cover (at maturity) to footpaths • ≥75% of vehicle spaces to have some degree of canopy cover (at maturity)	
WSUD incorporated into asset to achieve passive irrigation and achieve performance targets for water quality and runoff	• Treenet inlets or kerb breaks along both sides of road and southern edge of car park/ interchange • Pervious central landscape strip to car park • Swale/ detention basin in centre of interchange	WSUD performance targets	
Minimise ongoing landscape maintenance requirements	• Landscaping to comprise trees and mulched beds. No understorey planting.	100% new plantings to be local native species suited to local conditions, having regard to future climate conditions	

	• Local drought-tolerant species which do not require irrigation after initial establishment		
GI that improves amenity without unduly compromising security	• Clean-stemmed trees with high canopies. No shrubs		• Consider CPTED and CCTV locations when undertaking detailed landscape design • Seek design departure from CCTV camera coverage requirements in PI4-DOC-000897

Green Infrastructure Concept Plan:



Appendix 10. Maintenance Plans and Reporting

All sustainability plans and progress reports submitted as part of a maintenance contract must use the templates below to record targets, actions and progress toward achieving them, and to report consumption and emissions data.

Sustainability Objectives, Targets and Actions

					ANNUAL PROGRESS REPORTING	
Sustainability Objective	Target	Action(s) *(include timeframes)*	Responsibility	KPIs	Implementation status of actions	KPIs - Current status
Minimise the generation of greenhouse gases	*Example:* *Reduce diesel consumption by 60% by 2030*	*From 2025: All new light vehicles to be battery electric*	*xxx*	• *emissions intensity of road maintenance activity (tCO2-e / lane km road / year)* • *% light vehicle fleet that is battery electric* • *annual emissions from depot operation* • *annual embodied carbon from key purchased materials*		
		2025: Plan developed for staged installation of EV chargers at depots *(timing of EV charger roll-out to be provided following completion of plan)*	*xxx*			
		2026: Investigate low/ zero emission options for trucks and construction plant	*xxx*			
		Ongoing: Use solar powered portable traffic signals, light towers & VMS	*xxx*			
		etc…				
	Net zero emissions from depot electricity use	*2025: Replace current lighting with LEDs and install timer switches*	*xxx*			
		2026: undertake Type 2 energy audit and solar feasibility assessment for depot building	*xxx*			

					ANNUAL PROGRESS REPORTING	
	>10% reduction in embodied carbon from materials use	*Ongoing: Use warm mix for all asphalt work (where conditions permit)*	*xxx*			
		Ongoing: Use recycled aggregate in place of virgin quarried aggregate for all work undertaken within x km radius of prequalified supplier.	*xxx*			
	Etc…					
Optimise resource efficiency through re-use of materials and the use of recycled and recyclable materials						
Minimise waste disposed to landfill						
Mitigate sustainability risks and drive improved sustainability performance in supply chains						

Annual Emissions Data

Table for annualised consumption and emissions data. Data is to be reported by financial year (FY). Remove rows not relevant, modify cells as required (i.e. specify the FY), add emission sources as required, include consumption and emissions data.

GHG emissions category	Emission source	Units for consumption	Annual consumption			Annual estimated emissions (t CO2-e)		
			Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Diesel use	Stationary sources (include brief description)	kL						
	Mobile sources (include brief description)	kL						
Electricity use	Vehicles (include brief description)	kWh						
	Depots (include brief description)	kWh						
Use of other fuels	Include brief summary for uses of other fuel types such as gas	[to be filled out]						
Loss of carbon sequestration	Area of vegetation clearance	ha						
Materials use	Aggregate type 1 (i.e. crushed rock, sand, recycled crushed concrete)	tonnes						
	Aggregate type 2 (i.e. crushed rock, sand, recycled crushed concrete)	tonnes						
	Aggregate type 3 (i.e. crushed rock, sand, recycled crushed concrete)	tonnes						
	Aggregate type 4 (i.e. crushed rock, sand, recycled crushed concrete)	tonnes						
	Asphalt type 1 (i.e. hot mix or warm mix, % RAP, other recycled content with %)	tonnes						
	Asphalt type 2 (i.e. hot mix or warm mix, % RAP, other recycled content with %)	tonnes						
	Asphalt type 3 (i.e. hot mix or warm mix, % RAP, other recycled content with %)	tonnes						
	Concrete type 1 – specify strength grade, structural or non-structural, insitu or precast, SCMs content, Portland cement content, recycled aggregates content	tonnes						

GHG emissions category	Emission source	Units for consumption	Annual consumption			Annual estimated emissions (t CO2-e)		
			Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
	Concrete type 2 – specify strength grade, structural or non-structural, insitu or precast, SCMs content, Portland cement content, recycled aggregates content	tonnes						
	Concrete type 3 – specify strength grade, structural or non-structural, insitu or precast, SCMs content, Portland cement content, recycled aggregates content	tonnes						
	Steel type 1 – specify if reinforcement, stainless, structural etc, and imported or Australian-produced	tonnes						
	Steel type 2 – specify if reinforcement, stainless, structural etc, and imported or Australian-produced	tonnes						
	Steel type 3 – specify if reinforcement, stainless, structural etc, and imported or Australian-produced	tonnes						

Table for annual emission factors. Data is to be reported by financial year (FY). Remove rows not relevant, modify cells as required (i.e. specify the FY), add emission factors and references.

GHG emissions category	Emission source	Units for emission factor	Reference for emission factor	Emission factor for each FY		
				Year 1	Year 2	Year 3
Diesel use	Stationary sources (include brief description)					
	Mobile sources (include brief description)					
Electricity use	Vehicles (include brief description)					
	Depots (include brief description)					
Use of other fuels	Include brief summary for uses of other fuel types such as gas					

GHG emissions category	Emission source	Units for emission factor	Reference for emission factor	Emission factor for each FY		
				Year 1	Year 2	Year 3
Loss of carbon sequestration	Area of vegetation clearance					
Materials use	Aggregate type 1 (i.e. crushed rock, sand, recycled crushed concrete)					
	Aggregate type 2 (i.e. crushed rock, sand, recycled crushed concrete)					
	Aggregate type 3 (i.e. crushed rock, sand, recycled crushed concrete)					
	Aggregate type 4 (i.e. crushed rock, sand, recycled crushed concrete)					
	Asphalt type 1 (i.e. hot mix or warm mix, % RAP, other recycled content with %)					
	Asphalt type 2 (i.e. hot mix or warm mix, % RAP, other recycled content with %)					
	Asphalt type 3 (i.e. hot mix or warm mix, % RAP, other recycled content with %)					
	Concrete type 1 – specify strength grade, structural or non-structural, insitu or precast, SCMs content, Portland cement content, recycled aggregates content					
	Concrete type 2 – specify strength grade, structural or non-structural, insitu or precast, SCMs content, Portland cement content, recycled aggregates content					
	Concrete type 3 – specify strength grade, structural or non-structural, insitu or precast, SCMs content, Portland cement content, recycled aggregates content					

GHG emissions category	Emission source	Units for emission factor	Reference for emission factor	Emission factor for each FY		
				Year 1	Year 2	Year 3
	Steel type 1 – specify if reinforcement, stainless, structural etc, and imported or Australian-produced					
	Steel type 2 – specify if reinforcement, stainless, structural etc, and imported or Australian-produced					
	Steel type 3 – specify if reinforcement, stainless, structural etc, and imported or Australian-produced					

Appendix 11. Examples of embedding sustainability initiatives into drawings

NEW FDA PAVEMENT

DCBR = 3%, N_{DT} = 5.4 X10^5 HVAGs, 20 YEAR DESIGN LIFE, DESIGN SPEED = 30KM/H, LDF = 1, PR = 90%

DESIGN LEVEL OF LOWER SURFACE OF COURSE IN RELATION TO FINISHED DESIGN LEVELS (MM)	LEVEL TOLERANCE (MM)	NOMINAL COMPACTED THICKNESS (MM)	LAYER	MATERIAL	RELEVANT MASTER SPECIFICATION AND ADDITIONAL REQUIREMENTS
0	+5,-0 (K&G) ±5 (ELSEWHERE)				
-40	±10	40	WEARING COURSE	AC10M (A5E) 10% RAP [2,3]	AS PER DIT SPECIFICATION RD-BP-S2 AND RD-BP-C3 REFER GN (8, 10, 12) AND PCN (1, 4, 8)
-80	±10	40	LEVELLING COURSE	AC10M (A5E) 10% RAP [2,3]	AS PER DIT SPECIFICATION RD-BP-S2 AND RD-BP-C3 REFER GN (8, 10, 12) AND PCN (1, 4, 8)
-160	+0, -10	80	BASE COURSE	AC14M (C320) 30% RAP [2,3]	AS PER DIT SPECIFICATION RD-BP-S2 AND RD-BP-C3 REFER GN (10, 11, 12) AND PCN (2, 3, 4, 8)
-335	+0, -20	175	SUBBASE	PM2/20RG (CLASS 2)[4]	AS PER DIT SPECIFICATION RD-PV-S1 AND RD-PV-C1
MINIMUM TOTAL PAVEMENT DEPTH			SUBGRADE	DESIGN CBR3%	AS PER DIT SPECIFICATION RD-EW-C1. SUBGRADE TREATMENT / COMPACTION TO BE COMPLETED TO PASS PROOF ROLL AND ACHIEVE MINIMUM 98% MDD STD COMPACTION (EARTHWORKS NOTE 15) REFER TO EN14 ON SHEET 2404

NOTES:

1. FOR GENERAL NOTES (GN), PAVEMENT CONSTUCTION NOTES (PCN) AND LEGENDS, REFER SHEETS 2402 TO 2406.
2. LOWER RAP CONTENT MAY BE ACCEPTABLE SUBJECT TO APPROVAL BY THE ALLIANCE SUSTAINABILITY MANAGER.
3. ALL ASPHALT MIXES ARE TO USE WARM MIX ASPHALT CONFORMING WITH THE DIT SPECIFICATION RD-BP-S2 AND RD-BP-C3. WHERE CONDITIONS DO NOT PERMIT THE PLACEMENT OR USE OF A WARM MIX ASPHALT, THE CONTRACTOR IS TO SEEK FORMAL APPROVAL FROM THE ALLIANCE SUSTAINABILITY MANAGER FOR USE OF THE EQUIVALENT HOT MIX ASPHALT CONFORMING WITH THE DIT SPECIFICATION RD-BP-S2 AND RD-BP-C3.
4. ALL CLASS 2 AND 3 GRANULAR PAVEMENTS ARE TO USE RECYCLED MATERIAL IN ACCORDANCE WITH DIT SPECIFICATION RD-PV-S1 AND RD-PV-C1. WHERE CONDITIONS DO NOT PERMIT THE PLACEMENT OR USE OF RECYCLED PAVEMENT MIX, THE CONTRACTOR IS TO SEEK FORMAL APPROVAL FROM THE ALLIANCE SUSTAINABILITY MANAGER FOR USE OF THE EQUIVALENT VIRGIN GRANULAR PAVEMENT MIX CONFORMING WITH THE DIT SPECIFICATION RD-PV-S1 AND RD-PV-C1.

CONCRETE

C1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE PROJECT SPECIFICATION AND THE AUSTRALIAN STANDARD BRIDGE DESIGN CODE AS5100.5

C2. UNO, CONCRETE CLASS AND COVERS FOR INDIVIDUAL ELEMENTS SHALL BE AS PER THE FOLLOWING:

ELEMENT	CONCRETE GRADE	REQUIRED COVER (mm)	MINIMUM PORTLAND CEMENT REPLACEMENT LEVEL
PIERS	S40	45	50%
BEARING PLINTHS	S50	40	N/A
BLINDING	N25	N/A	N/A
CFA PILES	S40	90	30%
BORED PILES	S40	90	30%
IN SITU CONCRETE RAMP	S40	45	30%
RAMP ON GROUND	S40	45	30%
IN SITU RETAINING HEADWALL	S40	45	30%
LIFT FOOTINGS	S40	45	30%
LIFT PRECAST PANELS	S50	35	30%
PILE CAPS	S40	45	50%
POLE FOOTING (BORED PILE)	S40	75	30%
RETAINING WALL PRECAST PANELS	S40	35	30%
ALL OTHER PRECAST ELEMENTS (ABOVE GROUNDWATER WATER)	S50	30	30%
MASS CONCRETE	N40	N/A	N/A

Appendix 12.Glossary

Term	Definition
Activity data	Data based on a unit quantity of input or output of the studied system or a process within, including materials, energy, waste, transport and land clearing.
Base Case	A realistic representation of a business as usual scenario for the level of carbon emissions in the absence of additional measures to reduce emissions levels. It should be based upon consistent data sets from prior project or comparable projects that reflect the time, scale, and scope (refer to the Estimating Manual for accepted methodologies).
Business-as-Usual (BAU)	A 'business as usual' approach to design, materials and technologies, reflective of standard practice (some BAU assumptions are defined in Appendix 6 of this Manual).
Carbon Intensity Benchmarks	Estimates of typical carbon emissions for an asset, element or process which is based off actual data from comparable projects. The Embodied Carbon Measurement for Infrastructure: Technical Guidance provides Asset level carbon intensity benchmarks for a number of different infrastructure typologies, which can be used to estimate an asset's upfront emissions from high-level cost estimates, when more granular data on material quantities is not available for the asset type.
Carbon Management Plan (Project Level)	A project carbon management plan is a framework designed to identify and manage greenhouse gases (in the form of CO2-e) for the identified project, asset or organisation. It is intended to be a living document that is revised and updated over the project lifecycle. It allows agencies and their delivery partners to: • define their approach to and opportunities for carbon management and reduction at procurement, design and construction stages • demonstrate who will be responsible for driving, tracking and reporting carbon reductions achieved at various stages of project delivery document the methodologies used to assess carbon reductions
Carbon Management Plan (Organisational Level)	An organisation carbon management plan identifies material sources of emissions (current and projected) for which the organisation is responsible, establishes emission reduction target(s), identifies short and medium term actions that the organisation will implement in order to achieve its target(s) and describes how the organisation will measure progress. The planning timeframe for an organisation carbon management plan is typically 3-5 years.
Carbon or Carbon Emissions	Emissions of greenhouse gases, measured in kilograms or tonnes of carbon dioxide equivalent emissions (CO2-e)
Carbon Reduction Hierarchy	The Carbon Reduction Hierarchy is a decision-making process or framework to minimise carbon emissions in the development of new, or the refurbishment of existing, assets or network. (Adapted from British Standards Institution, PAS 2080: 2023 Carbon management in infrastructure, BSI Standards Limited, 2023)
Circular economy	An economy that is restorative and regenerative by design, and which aims to keep products, components and materials in circulation through processes like reuse, refurbishment, and recycling (as opposed to a linear "take-make-dispose" model).

Term	Definition
Data hierarchy	1. Actual construction data – resource use quantities reported or collected during the construction stage. 2. Estimated quantities – resource use quantities estimated from design e.g., Quantity surveyor estimates or material take-offs from a digital model. 3. Early asset details (linked to sub-asset or element specific carbon intensity benchmarks) – project scope information broken down to the sub-asset element, for example, m2 of road pavement. 4. Material/capital spend (asset level carbon intensity benchmarks) – project scope information at the asset level e.g., $ capex or material spend for the asset.
Declared Unit	The greenhouse gas emissions and removals associated with the creation, maintenance and end-of-life disposal of an asset. This includes the emissions associated with the production and transportation of materials, construction related emissions and end-of-life emissions. In-use stage material-related emissions associated with maintenance, repair, replacement and refurbishment over the asset life are also considered part of embodied carbon.
Do nothing	This represents not acting on the case for change or deferring investment, with no intervention to address problems identified. This is distinct from the non-build solution.
Ecologically Sustainable Development (ESD)	Environmentally Sustainable Design (ESD) in building design refers to the practice of creating buildings that are energy-efficient, environmentally friendly, and sustainable. The goal is to minimize the environmental impact of buildings throughout their lifecycle, from construction to operation and eventual demolition.
Embodied emissions / Embodied carbon	The greenhouse gas emissions and removals associated with the creation, maintenance and end-of-life disposal of an asset. This includes the emissions associated with the production and transportation of materials, construction related emissions and end-of-life emissions. In-use stage material-related emissions associated with maintenance, repair, replacement and refurbishment over the asset life are also considered part of embodied emissions/ embodied carbon.
Emissions life cycle module	The different periods of an asset's life are known as its life-cycle stages. Life cycle modules provide standardised designations for each life cycle stage, from A1 to D. They are referred to as product (A1-A3), construction (A4-A5), in-use (B1-B5), end-of-life (C1-C4), operational carbon (B6-B7), user carbon (B8), and benefits beyond the asset life cycle (D).
Enabled (user) emissions / enabled (user) carbon	GHG emissions associated with activities enabled by an asset (e.g. GHG emissions from third-party vehicles driving on a road).
Functional Unit	The reference quantity or performance measure of the product, process, or service being assessed. It defines the primary function or purpose of the system under analysis, allowing for comparison of different alternatives that fulfil the same function, e.g., generation of one MWh of electricity. Where relevant to make a comparison, a functional unit must also specify a time dimension, e.g., one m2 of conditioned floor area for one year, with a minimum floor-to-ceiling height of 2.4m.
Greenhouse Gas (GHG) Emissions	Greenhouse gases are gaseous constituents of the atmosphere, natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere and clouds. The term "carbon" is often used (e.g., capital carbon, user carbon, operational carbon) as a shorthand for "GHGs", and GHG emission are usually reported as the carbon equivalent (CO_2e). The UNFCC Kyoto Protocol [7] (and Doha Amendment) seven main greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6) and nitrogen trifluoride (NF_3).

Term	Definition
	GHG emissions are the total mass of GHG released to the atmosphere over a specified period of time(reported as tCO2e).
National Carbon Values	A set of time-sensitive monetary values per tCO2-e used to monetise the greenhouse gas emissions generated or avoided by a transport infrastructure proposal. The values are based on the estimated future costs of abatement necessary for the Australian economy to meet national emissions reduction targets as per the Infrastructure Australia, 2024, Valuing emissions for economic analysis: Guidance note, Valuing emissions for economic analysis | Infrastructure Australia.
Net Zero Aligned	The action or decision would result in reduction in greenhouse gas emissions and/or would positively contribute to achieving a zero emission transport system or economy, e.g. by enabling/ facilitating greater use of sustainable transport modes (rail and public and active transport)
Net Zero Agnostic	The action or decision will neither contribute nor hinder the transition to a zero emission economy. In the context of transport infrastructure, it will not significantly facilitate use of public or active transport modes, but neither will it encourage greater use of private vehicles.
Not Net Zero Aligned	The action or decision would result in an increase in greenhouse gas emissions and/or does not support the transition to a zero emission transport system or economy. For example, an investment decision that facilitates greater use of private vehicles by making these forms of transport more convenient/ attractive is not supporting a shift to low emission transport modes and is therefore considered not to be Net Zero Aligned.
Non-build solutions	Solutions to problems that do not involve building new infrastructure. This can include: policy interventions, technology or behaviour change, or different use of existing infrastructure (e.g. changing a traffic lane to a dedicated bus lane).
Operational emissions / operational carbon	GHG emissions associated with operation of assets (e.g.electricity used in ITS, lighting, ventilation, etc). Excludes in-use stage material-related emissions.
PAS 2080:2023 Carbon management in buildings and infrastructure	Specifies requirements for the management of whole life carbon emissions in buildings and infrastructure in the provision, operation, use and end-of-life of new projects or programmes of work as well as the management or refurbishment of existing assets and networks.
SMART Targets	'SMART' targets used for setting clear and achievable goals. The 'SMART' refers to: targets that are Specific, Measurable, Achievable, Relevant and Time-bound.
Supply chain	A network of organisations that convert raw materials into finished products and deliver them to the consumer.
Sustainable Procurement	Sustainable procurement is 'procurement that has the most positive environmental, social and economic impacts possible over the entire life cycle' (ISO 20400:2017 Sustainable Procurement – Guidance).
Upfront emissions / upfront carbon	The carbon emissions and removals associated with the creation of an asset, network or system up to practical completion. This includes the emissions associated with the production and transportation of materials and construction-related emissions. It excludes emissions generated during the use and end-of-life stage of an asset.

Term	Definition
Upscaling	A technique which can be applied to carbon calculations to account for emissions that are not quantified. It involves determining the coverage of the calculated emissions (for instance, covering 80% of all materials used), and scaling the measured emissions up to 100% for a more accurate representation of the complete carbon account.
Value chain	The organisations, agencies, and industry stakeholders involved in creating, operating, and managing assets.
Whole of Life (WoL) Emissions / Whole of Life (WoL) Carbon	The total greenhouse gas emissions and removals associated with the creation, operation, maintenance and end-of-life disposal of an asset. *NB: Emissions associated with end-of-life disposal are excluded from WoL emission estimates on Departmental projects.*