28 Sustainability

This chapter explains how sustainability aims and principles have been applied to the design, construction and operation of the project. The chapter:

- Provides an overview of the concept of sustainability as context for the sustainability principles that have been adopted
- Presents the sustainability policy framework that has been applied for the project
- Details the proposed Sustainability Management Plan for the project and specific sustainability initiatives that would be used to guide the management and implementation of sustainability objectives during construction and operation of the project.

The assessment of sustainability has been prepared to address the relevant requirements of the Secretary of the Department of Planning and Environment, as detailed in **Table 28-1**.

Table 28-1 Secretary's environmental assessment requirements – Sustainability

Secretary's environmental assessment requirement	Where addressed
Detail how the principles of ecologically sustainable development will be incorporated in the design, construction and ongoing operational phases of the proposal.	The principles of ecologically sustainable development and how they have been incorporated into the project throughout its design, construction and operation is discussed in **Section 28.4**.

28.1 What is sustainability?

The World Commission on Environment and Development report *Our Common Future* (Brundtland, 1987) identifies sustainable development as being 'development which meets the needs of the present, without compromising the ability of future generations to meet their own needs'. Although this early definition of sustainable development is succinct, the concept of sustainable development is actually dynamic; changing in response to the limitations imposed on environmental resources at any time as a result of technology, social organisation and by the ability of the biosphere to absorb the effects of human activities.

The Commonwealth Government refers to ecologically sustainable development as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased' (Commonwealth Department of the Environment, 1992).

The provision of properly functioning infrastructure is essential for sustained economic growth, international competitiveness, public health and overall quality of life (Mirza, 2006). The Infrastructure Sustainability Council of Australia (ISCA) defines sustainable infrastructure as that which is designed, constructed and operated to optimise environmental, social and economic outcomes over the long-term (ISCA, 2012).

28.2 Sustainability policy framework

The sustainability policy framework, relevant to the project, is made up of the following documents:

- Long Term Transport Master Plan (Transport for NSW, 2012a)
- NSW Government Resource Efficiency Policy (OEH, 2014a)
- NSW Waste Avoidance and Resource Recovery Strategy 2014-21 (EPA, 2014b)
- WestConnex sustainability strategy (WestConnex Delivery Authority, 2015).

Together these documents provide the sustainability principles which have informed the design of the project and against which the construction and operation of the project would be measured in terms of sustainability.

28.2.1 Long Term Transport Master Plan

The NSW Long Term Transport Master Plan (Transport for NSW, 2012a) is the guiding transport planning and policy document supporting NSW 2021. The Plan provides a framework for delivering an integrated, modern transport system by identifying NSW's transport actions and investment priorities for the next 20 years. Under the Plan, the WestConnex program of works is identified as a critical link in Sydney's motorway network and an immediate priority for the NSW Government.

The Plan states that 'promoting sustainability and protecting the environment in our transport planning, decisions and projects' is a state wide challenge that must be addressed. The Plan focuses on achieving the following environmental and sustainability objectives:

- Enhancing environmental and sustainability outcomes
- Minimising damage to our environment
- Adapting our transport infrastructure to be resilient (to climate change and natural disasters)
- Maintaining Sydney's air quality
- Reducing emissions and managing energy use.

In addition the Plan includes the following relevant specific environmental and sustainability 'actions':

- Develop and promote Transport Infrastructure Sustainable Design Guidance (includes trialling the Infrastructure Sustainability (IS) rating tool)
- Incorporate sustainability principles in procurement policy
- Consider the air quality impacts of transport projects
- Assess transport climate resilience
- Mitigate noise from road projects.

28.2.2 NSW Government Resource Efficiency Policy

The *NSW Government Resource Efficiency Policy* (July 2014) aims to drive resource efficiency, with a focus on energy, water and waste, and reducing harmful air emissions. The policy aims to ensure NSW Government agencies show leadership by incorporating resource efficiency in decision-making.

The policy includes specific measures, targets and minimum standards to drive resource efficiency. Refer to Chapter 22 (Greenhouse gas) for information regarding how the project aligns with the Resource Efficiency Policy.

28.2.3 NSW Waste Avoidance and Resource Recovery Strategy 2014-21

The *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (December 2014) provides a framework for waste management and aligns with the NSW Government's waste reforms in NSW 2021.

The *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* includes the following six key result areas: avoid and reduce waste generation; increase recycling; divert more waste from landfill; manage problem wastes better (including asbestos); reduce litter; and reduce illegal dumping.

Consistency of the project with the key result areas of the NSW Waste Avoidance and Resource Recovery Strategy 2014-21, is demonstrated in **Table 28-2**.

Table 28-2 Project consistency with key result areas of the NSW Waste Avoidance and Resource Recovery Strategy 2014-21

Key result area	Comment
Avoid and reduce waste generation	During construction of the project, unnecessary resource consumption would be avoided by making realistic predictions of the required quantities of resources such as construction materials. Resource recovery would be applied to the management of construction waste and would include for reuse, recycling, and reprocessing. Further details are provided in **Chapter 24** (Resource use and waste minimisation).
Increase recycling; divert more waste from landfill	
Manage problem wastes better (including asbestos)	During construction of the project, there would be potential to encounter contaminated soil, which would require remediation or disposal. This potential impact is discussed in **Chapter 17** (Contamination) and **Chapter 24** (Resource use and waste minimisation), along with mitigation measures, including the ways in which disposal of contaminated waste would be managed.
Reduce litter	Waste generated by the construction workforce would be disposed of appropriately.
Reduce illegal dumping.	Waste generated by the project would be managed and disposed of in accordance with relevant State legislation and government policies including the *Protection of the Environment Operations Act 1997*, *Waste Avoidance and Resource Recovery Act 2001*, and the *Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW EPA, 2014b).

28.2.4 WestConnex sustainability strategy

The WestConnex Sustainability Strategy (the Sustainability Strategy) (WestConnex Delivery Authority, 2015) describes how sustainability initiatives will be integrated into the design, construction and operation of projects across the WestConnex program of works. The Sustainability Strategy outlines a sustainability vision, commitments, guiding principles, objectives and overarching targets across a range of sustainability themes, and was prepared to align with the Transport for NSW Sustainability Framework as well as other relevant Government sustainability instruments.

Due to the large scale of the WestConnex program of works, and by virtue of the fact that it will be delivered in discrete stages over several years, the Sustainability Strategy aims to ensure that sustainability is consistently applied across all projects and teams.

The Sustainability Strategy provides a framework to implement sustainability objectives and targets through the project's contract requirements, competitive tender evaluation process and project specific Sustainability Management Plans during the design and construction stage. The Sustainability Strategy also shows the relationship between the sustainability vision, commitments, guiding principles and broader NSW Government sustainability instruments.

The project would achieve an Infrastructure Sustainability rating of 'Excellent' for the design and construction phases of the project. The Sustainability Strategy has been prepared to guide the implementation of sustainability across the WestConnex program of works and to facilitate the ISCA rating process.

The IS rating scheme was developed and is administered by ISCA. The IS rating scheme is a comprehensive rating system for evaluating sustainability across the design, construction and operation of infrastructure.

A project-specific Sustainability Management Plan would be prepared to guide the implementation of sustainability throughout the design and construction phases, and to facilitate the achievement of the ISCA rating.

The WestConnex Sustainability Strategy Framework is shown in **Figure 28-1**. Details of how the project is consistent with WestConnex Sustainability Strategy Framework, and how the project would meet or where possible, exceed the objectives and targets outlined in the Sustainability Strategy is summarised in **Table 28-3**.

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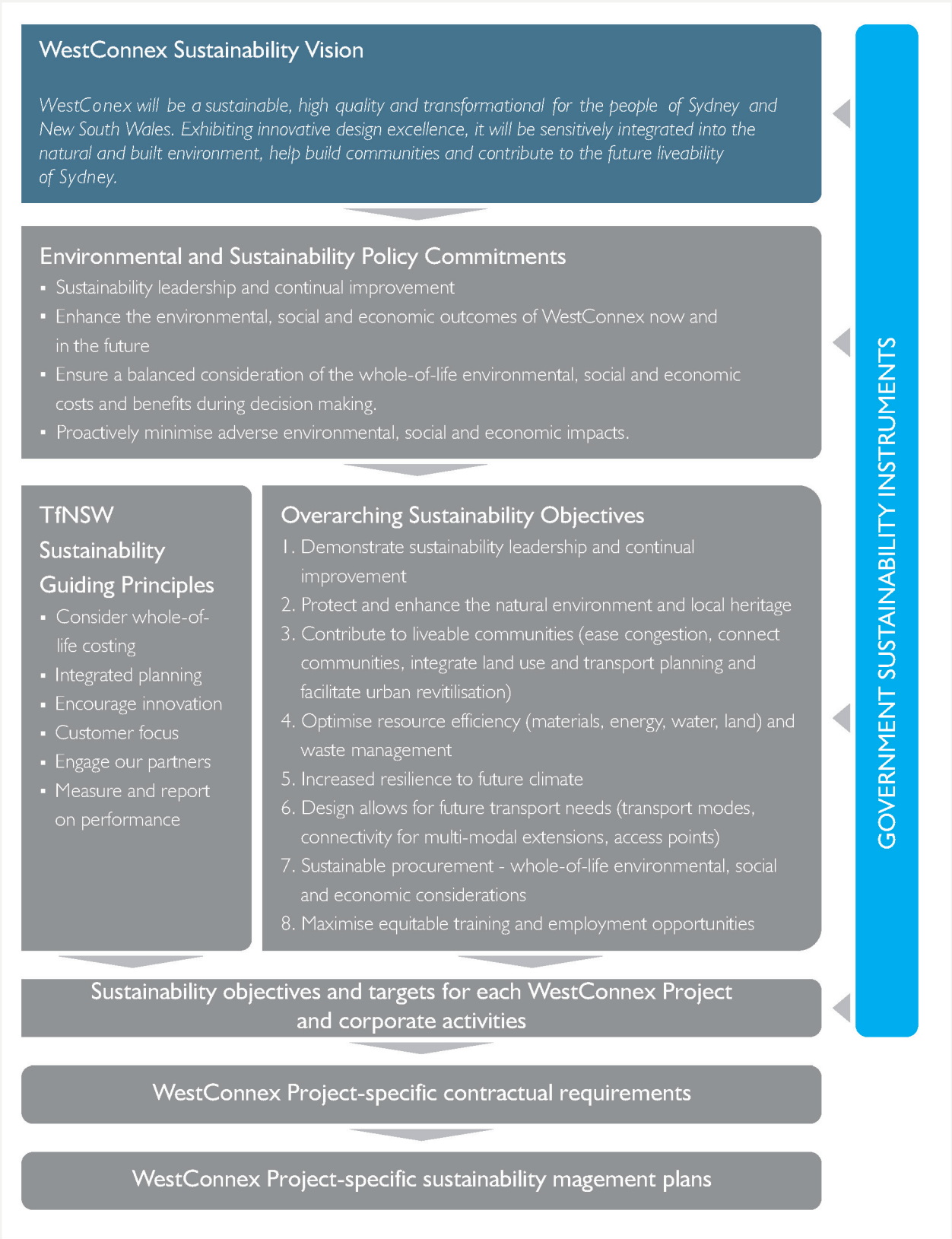

Figure 28-1 WestConnex sustainability strategy framework

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Table 28-3 Project consistency with the WestConnex Sustainability Strategy Framework objectives and targets

Sustainability targets	Project consistency
Overarching sustainability objective: Demonstrate sustainability leadership and continual improvement.	
• Achieve an IS rating of at least Excellent for the design and construction phases • Prepare quarterly project progress reports and an annual WestConnex Sustainability Report. Annual review of the WestConnex Sustainability Report and WestConnex Environment and Sustainability Policy by Senior Management. • Share sustainability knowledge and lessons learnt across WestConnex component projects and other Roads and Maritime projects. Participate in sustainability workshops during design and construction phases and document lessons learnt • Appoint a Sustainability Representative with relevant experience to drive the achievement of sustainability outcomes.	• An IS rating of at least Excellent would be achieved for the design and construction phases of the project. • Quarterly project progress reports and an annual WestConnex Sustainability Report would be prepared during the design and construction phases. • During the design and construction phases, knowledge and lessons learned would be shared across the WestConnex component projects through participation at regular sustainability workshops. • The Environment and Sustainability Manager and Sustainability Advisor will drive the achievement of sustainability outcomes during design and construction phases.
Overarching sustainability objective: Protect and enhance the natural environment and local heritage	
• Ensure no serious pollution incidents occur during construction • Proactively manage any impacts to flora and fauna in accordance with the RMS Biodiversity Guidelines • Heritage items are avoided where possible and proactively managed during construction.	Construction activities would be managed in line with the mitigation measures outlined in this EIS to avoid serious pollution incidents. A biodiversity assessment has been prepared in accordance with the *Framework for Biodiversity Assessment* (OEH, 2014b) and the *NSW Biodiversity Offset Policy for Major Projects* (OEH, 2014c). This considers measures to avoid and minimise impacts to biodiversity in a biodiversity assessment report (BAR), and the preparation of a biodiversity offsets strategy (BOS) to offset residual impacts. Project impacts would be managed in accordance with the Roads and Maritime biodiversity guidelines. Additional detail is provided in **Chapter 21** (Biodiversity), **Appendix S** and **Appendix T**. Items of Aboriginal and non-Aboriginal heritage significance were identified early in the project design and assessment. Impacts to these items have been avoided and mitigated where practicable and management measures to be implemented throughout construction of the project have been provided. An assessment of potential impacts and proposed mitigation and management measures with regards to non-Aboriginal and Aboriginal heritage are provided in **Chapter 20** and **Chapter 23** respectively. The Technical working paper: Non-Aboriginal heritage and Technical working paper: Aboriginal heritage are provided in **Appendix R** and **Appendix V** respectively.

Sustainability targets	Project consistency
Overarching sustainability objective: Contribute to liveable communities (ease congestion, connect communities, integrate land use and transport planning and facilitate urban revitalisation)	
• Design the motorway to reduce road congestion and travel times • Ensure appropriate air quality outcomes. The tunnel ventilation systems of the WestConnex program of works will be designed and operated to comply with best-practice criteria for in-tunnel and ambient air quality • Maintain or improve pedestrian and cycle paths and connections. • Create/enhance public open space.	The project would contribute to reducing congestion on the existing road network and would save time on a typical journey along the M5 Motorway corridor. Details of how the project and ventilation design ensures that concentrations of air emissions meet NSW, national and international best practice for in-tunnel and ambient air quality are presented in **Chapter 4** (Project development and alternatives) and **Chapter 10** (Air quality). Existing pedestrian and cycle paths would be modified during construction to maintain the existing connections provided at Kingsgrove and Mascot. Cycling and pedestrian facilities at St Peters and Mascot would be improved as part of upgrades to the local road network; including the construction of a regional cycling connection between Mascot and Marrickville, a grade separated pedestrian and cycle bridge along Campbell Road with connections into Sydney Park, and cycling provisions along all local roads which are to be upgraded as part of the project.
Overarching sustainability objective: Optimise resource efficiency (materials, energy, water, land) and waste management.	
Materials • Identify and implement opportunities to reduce material use and maximize the use of materials with low embodied environmental impact • Maximise the use of all timber products from either reused/recycled timber or from sustainably managed forests that have obtained Forest Management Certification • Optimise the amount of cement replacement material (measured by mass) used in concrete • Optimise the amount of recycled material used in road base and sub base.	Recycled products would be used during construction of the project to reduce the demand on resources, in instances where the use of such materials is cost and performance competitive. This may include the use of fly ash and slag within concrete mixes. Resource recovery principles would be applied to the construction of the project, including recovery of resources for reuse, recycling and reprocessing, where possible. It is anticipated that up to 10 per cent of the pavement would comprise reclaimed asphalt, sourced from existing road pavements to be removed / replaced as part of the project and up to 10 per cent of virgin materials may be able to be substituted with recycled materials during construction. Additionally, geopolymer concrete (a low calcium, fly-ash based concrete product) would be considered for use in structural elements of the project, such as pre-cast, high-strength box culverts. Additional detail is provided in **Chapter 22** (Greenhouse Gas) and **Chapter 24** (Resource use and waste minimisation) .

Sustainability targets	Project consistency
Energy and carbon • Prepare an Energy Efficiency and Greenhouse Gas Emissions Strategy detailing processes and methods to improve energy efficiency and reduce greenhouse gas emissions • Percentage of energy sourced from renewable energy generated onsite and/or accredited GreenPower. The current target is to source a minimum of six per cent of energy from renewable energy generated onsite and/or accredited GreenPower • Optimise the design and operation of the motorway to minimise energy used by vehicles using the motorway.	At least six per cent of construction energy required for the project would be sourced where possible from an accredited GreenPower energy supplier. It is expected about two per cent of construction phase power requirements would be offset in accordance with the Commonwealth Government's National Carbon Offset Standard. This would be reviewed during detailed design to refine the approach to offsetting energy requirements and to identify whether additional power consumption can be offset. An Energy Efficiency and Greenhouse Gas Emissions Strategy would be prepared as an attachment to the Sustainability Management Plan during detailed design. The strategy would identify initiatives to be implemented during construction of the project to reduce carbon emissions, energy use and embodied life cycle impacts. The main alignment tunnels would be designed to minimise fuel use for motorists using the road. For example, the project would provide a vertical alignment that allows consistent vehicle speeds to be maintained. Further, low carbon energy generation options would be investigated as part of the design process in order to reduce the demand on mains electricity where feasible. Additional detail regarding energy efficiency is provided in **Chapter 22** (Greenhouse gas).

Sustainability targets	Project consistency
Water • Undertake a Water Balance Study and identify opportunities to reduce water use (in particular potable water use) and reuse water (eg rainwater, stormwater, wastewater, and groundwater) during construction and operation • Reuse, recycle or reclaim water (eg rainwater, stormwater, wastewater, groundwater, tunnel inflow water) generated/collected.	Water efficiency measures would be implemented with a focus on achieving water savings and targeting water recycling and re-use. Rainwater would be harvested on-site at construction compounds and re-used as part of the project where possible. It is anticipated that about five per cent of water generated / collected during construction would be re-used, recycled or reclaimed including truck wash water which would be treated and recycled and any rainwater collected on site. During construction, non-potable water sources would be given preference over potable sources where appropriate. Non-potable water would be obtained from other non-potable sources where possible, although this is expected to be limited to about three per cent of the overall water use. This is because the two main sources of non-potable water are: • Water from the treatment plant (including both groundwater and first use construction water), which is expected to be too saline to use for purposes other than dust suppression, • Collected rainwater, which would not generate the quantities needed to meet the non-potable water demand for the project. The extent to which non-potable water can be used during the project would be reviewed and refined during detailed design. Construction water would either be re-used on site wherever feasible, or discharged into the local stormwater system in accordance with the requirements of an Environment Protection Licence. Preference would be given to reusing as much water as is practicable before discharging. Additional information regarding surface water and water quality is provided in **Chapter 16** (Soils and water quality). An updated water balance would be prepared during the detailed design stage of the project. The outcomes of this study would be used to further improve water efficiency throughout construction and operation of the project.

Sustainability targets	Project consistency
Land • Minimise the project's surface land footprint and acquisition of properties • Identify contaminated sites within the project's construction footprint and remediate to a standard for post construction use (as applicable).	The project has been designed to maximise the use of land already owned by Roads and Maritime, and operational elements of the project would be located within existing road corridors as much as feasible. A number of additional known and potentially contaminated sites would be impacted by the project, including the Alexandra Canal. The project would enhance land where possible, including the closure of the Alexandria Landfill site. The Alexandria landfill site would be subject to a Landfill Closure Management Plan, and would be made suitable for redevelopment of the site for a road.
Waste and Spoil • Reuse/recycle a minimum of 80 per cent usable spoil (uncontaminated surplus excavated material) • Reuse/recycle a minimum of 80 per cent of construction and demolition waste (uncontaminated) • Implement packaging take-back arrangements with suppliers (lead contractor to pass target onto sub-contractors, where practical).	Where possible, and fit for purpose, spoil would be beneficially re-used within the project before off-site re-use or disposal options are investigated. A spoil management strategy would be developed for the project prior to the commencement of construction and would identify spoil disposal sites and the management of excess spoil. Usable spoil (uncontaminated surplus excavated material) would be re-used and / or recycled as part of the project, where possible. The management and disposal of excess spoil is discussed further in **Chapter 24** (Resource use and waste minimisation). About 80 per cent of construction and demolition waste is anticipated to be reused and / or recycled as part of the project. A Waste Management Plan would be prepared as part of the Construction Environmental Management Plan for the project, detailing the appropriate procedures for waste management. Residual waste that cannot be re-used or recycled would be disposed of to a suitably licenced landfill or waste management facility. Additional detail regarding resource management and waste minimisation is provided in **Chapter 24** (Resource use and waste minimisation).
Overarching sustainability objective: Increased resilience to future climate	
• Undertake a climate change risk assessment • Identify and implement adaptation measures to mitigate all high and extreme residual climate change risks.	A climate risk assessment has been prepared as part of the environmental impact assessment for the project in line with relevant standards and current guidelines and is included in **Chapter 25** (Climate change risk and adaptation). The risks of future climate change would be further considered during the detailed design of the project. Mitigation and measures relating to climate change risk and adaptation are provided in **Chapter 25** (Climate change risk and adaptation).

Sustainability targets	Project consistency
Overarching sustainability objective: Design allows for future transport needs (transport modes, extensions, access points)	
• Preserve an area of land for future safe pedestrian and cyclist connectivity across and adjacent to the motorway. • Allow for future extensions to the road network and access points.	The project has been designed to maintain and improve pedestrian and cycling paths, and does not preclude potential future upgrades of or additions to pedestrian and cycling paths. The main alignment tunnels include stub tunnels to provide potential access to the future Southern extension and the future M4-M5 Link. Further, the St Peters interchange would include the construction of ramps to provide access to and from local roads to the potential future Sydney Gateway and M4-M5 Link (refer to **Chapter 5** (Project description) for more detail).
Overarching sustainability objective: Sustainable procurement - whole of life environmental, social and economic considerations	
• Incorporate sustainability criteria into project contracts and tender evaluation criteria • Prepare and implement an Australian Industry Participation Plan.	A number of sustainability-specific criteria were used as part of the evaluation of tender designs during the competitive design and construct tender process for the project. Specifically, tenderers were required to: • Demonstrate how the project would meet an 'excellent' rating for the design and As-built components of the project under the ISCA IS rating scheme. • Detail how sustainability initiatives would be implemented throughout the project. • Explain how sustainability targets would be achieved or improved on throughout the project. • Provide a Sustainability Management Plan, describing how the overarching sustainability objectives for the WestConnex program of works would be achieved. An Australian Industry Participation Plan would be developed for the overall WestConnex program of works.

Sustainability targets	Project consistency
Overarching sustainability objective: Maximise equitable training and employment opportunities	
• Employ the equivalent of 155 apprentices/trainees for 18 months during the design and construction phases of the project • Maximise employment and training opportunities for young people, disadvantaged groups, Aboriginal and Torres Strait Islanders, the unemployed, locals and people who live in Western Sydney and along the project's alignment • Provide structured training to 20 per cent of the construction workforce • Provide initiatives to improve Aboriginal and Torres Strait Islander participation in construction and provide opportunities to Aboriginal and Torres Strait Islander enterprises.	About 155 apprentices/trainees would be employed during the design and construction phase. A Training Management Plan would be prepared before construction, detailing initiatives to maximise employment and training opportunities (including apprenticeships/traineeships/structured training), in particular for young people, disadvantaged groups, Aboriginal and Torres Strait Islanders, the unemployed, locals and people who live in Western Sydney. An Aboriginal Participation Plan would be prepared before construction, detailing initiatives to improve Aboriginal and Torres Strait Islander participation in construction of the project and provide opportunities to Aboriginal and Torres Strait Islander enterprises during the design and construction phases.

28.3 Sustainability management on the project

The overarching sustainability objectives for the project (**Table 28-3**) would be met through the implementation of a sustainability management plan and project-specific sustainability initiatives. The implementation of these initiatives would contribute to the project achieving an IS rating of Excellent.

28.3.1 Sustainability management plan

The WestConnex sustainability objectives and targets would be met through the implementation of a project specific Sustainability Management Plan and sustainability initiatives.

The construction contractor would develop and implement a Sustainability Management Plan during detailed design. The Sustainability Management Plan would establish governance structures, processes and systems that ensure integration of all sustainability considerations (vision, commitments, principles, objectives and targets), initiatives, monitoring and reporting during the detailed design and construction phases of the project.

The aims of the Sustainability Management Plan would be to:

- Demonstrate sustainability leadership and continuous improvement
- Protect and enhance the natural environment and local heritage
- Contribute to liveable communities and facilitate urban revitalisation by easing congestion, connecting communities and integrating land use and transport planning
- Optimise resource efficiency (materials, energy, water and land) and waste management
- Increase resilience to future climate
- Design for future transport needs
- Procure sustainably, considering whole of life environmental, social and economic factors
- Maximise equitable / fair training and employment opportunities.

Principles in the Sustainability Management Plan would extend across the whole project, through both the design and construction phases. These principles would also be embedded across all management disciplines throughout detailed design and the construction contractor's project team, ensuring that decision making processes consider whole-of-life, environmental, social and economic costs and benefits over the life of the project.

The Sustainability Management Plan would form part of the project's integrated management system to be implemented on the project. The plan would be revised and updated regularly to reflect changing designs and sustainability initiatives through each of the project phases.

The Sustainability Management Plan would include an ISCA IS Management Sub-plan to guide the achievement of an IS rating of excellent for the project. The Sub-plan would detail implementation protocols, including:

- ISCA IS assessment and registration process and timeframes
- Proposed consultation and engagement with ISCA and other stakeholders
- The IS rating process and requirements for the provision of documentation to ISCA
- Key sustainability management roles and responsibilities.

In addition to the key project sustainability management roles, there would be a sustainability 'champion' within the construction contractor's construction, design, community involvement, procurement and commercial teams. These champions would engage with the sustainability advisor and sustainability and environment manager regarding sustainability initiatives associated with the design and construction of the project.

28.3.2 Project-specific sustainability initiatives

Project-specific sustainability initiatives have been identified during the design of the project. These initiatives aim to improve sustainability performance during construction and operation of the project. Sustainability targets incorporated into the design of the project in accordance with the WestConnex Sustainability Strategy are provided in **Table 28-3**.

In addition to those discussed in **Table 28-3**, the following sustainability initiatives were identified during the design of the project to improve sustainability performance throughout construction and operation:

- Excavation using a roadheader as opposed to a tunnel boring machine, reducing energy consumption, material use and spoil generation
- Incorporation of energy efficient equipment for tunnelling activities, including variable speed drives, power correction, efficient fans, pumps, conveyors, compressors and cooling systems to reduce operational energy use
- Selection of larger diameter, low flow fans for tunnel ventilation to reduce the amount of noise attenuation and operational power requirements during operation
- Incorporation of energy efficient tunnel lighting to reduce operational energy requirements
- Selection of locally sourced materials and pre-fabricated assets where possible, to reduce greenhouse gas emissions
- Consideration of climate change projections and risks, in particular as part of the flooding assessment, and associated recommended mitigation and management measures
- Establishment of a wetland as part of the surface water treatment for the project
- Use of water efficient fixtures and reuse of water where possible during construction and operation
- Using plants with low water requirements as part of landscaping and site rehabilitation for the project, thereby minimising irrigation requirements and supporting local biodiversity
- Enhanced reflectivity and luminance as part of the tunnel design so as to reduce the required level of lighting and associated power requirements
- Six per cent of the total electricity requirements for construction would be Green Power (renewable energy) purchased.

28.4 Ecologically sustainable development

The Commonwealth Government refers to ecologically sustainable development as ‘using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased’ (Commonwealth Department of the Environment, 1992).

In NSW, the commitment to the concept of environmental sustainability is expressed in current legislation. It is an object of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (section 5 ((a) vii) to encourage ecologically sustainable development through the implementation of the four principles of ecologically sustainable development:

- The precautionary principle
- Inter-generational equity
- Conservation of biological diversity and ecological integrity
- Improved valuation and pricing and incentive mechanisms.

The principles of ecologically sustainable development have been an integral consideration throughout the design of the project. This includes the effective integration of the economic and environmental considerations in the decision making process, as defined by Section 6(2) of the *Protection of the Environment Administration Act 1991* (PEA Act).

The four main principles of ecologically sustainable development, including how they have been recognised and incorporated throughout the design, construction and ongoing operation phases of the project are discussed below.

28.4.1 Precautionary principle

The precautionary principle deals with certainty in decision making. It provides that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

The precautionary principle has been applied during the design and development of the project. Potential environmental impacts associated with the New M5 were considered in the alternatives and options analysis as part of the M5 Transport Corridor Feasibility Study, the industry partners design program and the design and construct tender process for the project. This included identifying opportunities to avoid and minimise surface disturbance, and potential impacts to national parks and reserves and other ecologically sensitive areas (refer to **Chapter 4** (Project development and alternatives) for additional detail regarding the options considered as part of the project's design).

The design and construct tender process for the project aimed to avoid, to the greatest extent practicable, known areas or items of environmental value. These areas included the Cooks River / Castlereagh Ironbark Forest of the Sydney Basin Bioregion at Kingsgrove, the Wolli Creek Regional Park and the Green and Golden Bell Frog Key Population of the Lower Cooks River. Where it has not been possible to avoid these environmentally sensitive areas, practicable measures have been identified to mitigate and manage these risks.

This EIS details the evaluation of environmental impacts associated with the project. The EIS was prepared adopting a conservative approach, which included assessing the worst case impacts and scenarios It has been undertaken using the best available technical information and has adopted best practice environmental standards, goals and measures to minimise environmental risks. The environmental assessment has been undertaken in collaboration with key stakeholders and relevant statutory and agency requirements.

The threat of serious or irreversible environmental damage is one of the essential preconditions to the engagement of the precautionary principle. Potential environmental risks associated with the project were identified and considered to ensure that an appropriate amount of time was afforded for detailed specialist reports as part of the environmental assessment (refer to **Chapter 29** (Environmental risk analysis) for more detail). Safeguards and management measures have been developed to manage impacts identified in these assessments. In addition, impacts to threatened ecological communities and threatened fauna as a result of construction and operation of the project would be offset in accordance with the biodiversity offsets policy (OEH, 2014c) (refer to **Chapter 21** (Biodiversity) for more detail). The safeguards and management measures would result in an acceptable residual risk and no significant serious or irreversible environmental harm.

28.4.2 Inter-generational equity

In broad terms, the notion of inter-generational equity refers to the premise that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit or future generations. The project has been considered in terms of intergenerational equity, with the management of potential environmental impacts discussed throughout this environmental impact statement.

During construction and operation of the project, opportunities would be taken to reduce material use and maximise the use of materials with low embodied environmental impact where practical. For example:

- Recycled products would be used during construction of the project to reduce the demand on resources, in instances where the use of such materials is cost and performance competitive
- At least six per cent of construction energy required for the project would be sourced from an accredited GreenPower energy supplier
- Water efficiency measures would be implemented with a focus on achieving water savings and targeting water recycling and re-use
- About 80 per cent of construction and demolition waste is anticipated to be reused and / or recycled as part of the project.

The project would benefit current and future generations by improved air quality within the existing M5 East Motorway tunnel and a reduction in greenhouse gas emissions.

Under expected traffic conditions the contribution of project tunnel ventilation outlets to pollutant concentrations was found to be negligible for all sensitive receivers identified. Exceedances of some air quality criteria were predicted to occur at a small proportion of sensitive receivers both with and without the project. However, the total number of receivers with exceedances decreased slightly with the project. The exception to this was annual mean $PM_{2.5}$ for which concentrations were already above the relevant criterion. There are predicted to be substantial reductions in concentrations of criteria pollutants along the M5 East Motorway, both to the east and west of the M5 East Motorway tunnels, as well as along General Holmes Drive and other roads around the airport. Reductions in concentrations have also predicted along the section of King Georges Road to the north of the M5 East Motorway, around the northern perimeter of Sydney Park, and on a number of other roads.

Some small increases in concentration of criteria pollutants were predicted for King Georges Road to the south of the M5 East Motorway, Stoney Creek Road, Bexley Road to the south of the M5 East Motorway, Harrow Road, Forest Road, and around the southern perimeter of Sydney Park, amongst other roads. Some small increases in concentration were also predicted for Bay Street near the future Southern extension. Impacts associated with the Southern extension are based on a strategic concept and are therefore indicative only, would be subject to further design, as well as separate planning and approval. More detail regarding the air quality assessment is provided in **Chapter 10** (Air quality) and **Appendix H**.

The project aims to reduce construction and operational greenhouse gas emissions. A greenhouse gas assessment has been undertaken to quantify emissions and identify mitigation measures to reduce emissions. With reference to the project, traffic modelling has indicated that the project would improve network performance along the M5 Motorway corridor. The operational road use assessment undertaken as part of the greenhouse gas assessment (refer to **Chapter 22** (Greenhouse gas)) notes that emissions estimated to be generated during construction and the annual emissions from the operation and maintenance of road infrastructure would be offset against emissions savings as a result of improved road performance in 2031. Further information on greenhouse gas emissions and savings are provided in **Chapter 22** (Greenhouse gas) and **Appendix U**.

Notwithstanding the benefits of the project for intergenerational equity, the project may impact on intergenerational equity through the consumption of fuel resources during operation, potentially resulting in the decline of available fuel resources. Roads and Maritime note that it is prudent to consider that oil production may peak and then decline which could increase the cost and reduce the availability of transport fuels and construction materials derived from oil. For transport, the solutions to the problem of “peak oil” are similar to those for climate change. Alternatives to fossil fuels need to be found and transport must become more energy efficient. There are moves to establish alternatives to oil as a fuel for transport and to improve energy efficiency. This would enable the economic benefits provided by road transport to continue to be delivered with a reduced need for fossil fuels.

Roads and Maritime is also participating with Austroads and industry in research and trials with the goal of developing more practices and reducing reliance on products derived from oil. As road transport is a significant and necessary element of the NSW economy, that also provides many social benefits, Roads and Maritime will continue to ensure that all potential impacts on this system, such as peak oil, are identified and action is taken to manage these risks. Peak oil in the context of operational resource consumption is discussed in **Chapter 24** (Construction resource use and waste minimisation).

28.4.3 Conservation of biological diversity and ecological integrity

Conservation of biological diversity and ecological integrity is a fundamental consideration of the project. The design and assessment of the project has been undertaken with the aim of identifying, avoiding, minimising and mitigating impacts.

The construction of the project would result in the clearance of:

- 1.4 hectares of the Cooks River / Castlereagh Ironbark Forest of the Sydney Basin Bioregion at Kingsgrove and indirectly affect 0.4 hectares of this critically endangered ecological community
- 0.09 hectares of Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest in sandstone gullies of western Sydney, Sydney Basin
- 1.82 hectares of Paperbark Swamp Forest of the Coastal Lowlands of the NSW North Coast Bioregion and the Sydney Basin Bioregion
- 7.45 hectares of urban native and exotic vegetation.

The current project design avoids impacts to areas of high ecological value where practical. For example, the design has avoided direct impacts to Wolli Creek Regional Park (refer to **Section 4.3** of **Chapter 4** (Project development and alternatives) for more information about motorway options development).

This environmental impact statement provides a detailed biodiversity assessment which identifies impacts to biodiversity, and provides a range of mitigation measures which would be implemented in order to further avoid and minimise potential impacts to biodiversity.

Additionally, preliminary calculations have been provided in order to offset the impacts identified to the Cooks River / Castlereagh Ironbark Forest of the Sydney Basin Bioregion at Kingsgrove. The Biodiversity Offset Strategy addresses residual impacts that cannot be mitigated; particularly in relation to the clearance of 1.4 hectares of the Commonwealth listed critically endangered Cooks River / Castlereagh Ironbark Forest of the Sydney Basin Bioregion vegetation community at Kingsgrove as well as impacts to the Green and Golden Bell Frog Key Population of the Lower Cooks River.

Potential impacts to biodiversity are detailed further in **Chapter 21** (Biodiversity). The technical paper: Biodiversity is provided in Appendix J.

28.4.4 Improved valuation and pricing of environmental resources

Environmental factors should be included in the valuation of assets and services, including:

- Polluter pays (ie those who generate pollution and waste should bear the cost of containment, avoidance or abatement).
- The users of goods and services should pay prices based on the full life cycle of costs of providing the goods.
- Environmental goals, having been establishment, should be pursued in the most cost effective ways.

Environmental factors have been considered throughout the feasibility assessment and tender evaluation process for the detailed design and construction and operation of the project.

As a consequence, environmental impacts have been avoided or minimised where practical during the design development for the project. Mitigation measures outlined in this environmental impact statement would be implemented during construction and operation of the project.

The value placed on avoiding and minimising environmental impacts is demonstrated in the design features incorporated into the project, as well as the extent of environmental investigations undertaken to inform this environmental impact statement. Additionally, the costs associated with the planning and design of measures to avoid / minimise adverse environmental impacts and the costs to implement them have been included in the overall project costs.

The location of the eastern interchange at St Peters within the Alexandria Landfill site was identified as the preferred location over alternative sites north of the Princes Highway, within the Cooks River container terminal site, west of Canal Road or along Burrows Road (refer to **Section 4.4** of **Chapter 4** (Project development and alternative) for more information). Locating the eastern interchange at the Alexandria Landfill site would result in increased construction costs. However, this site was preferred as:

- Construction could largely be undertaken offline from the local road network,
- Property acquisition would be minimised
- The preferred location would provide connectivity to the wider WestConnex program of works and the local road network
- Impacts of the project on the local social environment, including reducing impacts on homes and open spaces would be minimised.

The closure of the Alexandra Landfill site, as part of the project, would result in the beneficial reuse of the site as the St Peters interchange, enhancing pedestrian and cycle path connectivity between Sydney's south and Sydney Park.

Including a toll on the project supports the concept of users of goods and services paying prices based on the full life cycle of costs of providing the goods. While upfront capital costs would be provided by a combination of funding by the New South Wales and Commonwealth Governments, this funding would be recouped through a toll to cover the upfront construction, and ongoing operational and maintenance costs.

The project would also include measures for the abatement, avoidance and / or containment of pollution and waste, including works associated with the Alexandria Landfill closure.

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