27 Sustainability

This chapter explains how sustainability aims and principles have been applied to the design, construction and operation of the M4-M5 Link project (the project). This chapter:

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

The Secretary of the NSW Department of Planning and Environment (DP&E) has issued environmental assessment requirements for the project. These are referred to as the Secretary's Environmental Assessment Requirements (SEARs). **Table 27-1** sets outs these requirements and the associated desired performance outcomes that relate to sustainability and identifies where they have been addressed in this environmental impact statement (EIS).

Table 27-1 SEARs – sustainability

Desired performance outcomes	SEARs	Where addressed in the EIS
15. Sustainability The project reduces the NSW Government's operating costs and ensures the effective and efficient use of resources. Conservation of natural resources is maximised.	1. The Proponent must assess the sustainability of the project in accordance with the Infrastructure Sustainability Council of Australia (ISCA) Infrastructure Sustainability Rating Tool and recommend an appropriate target rating for the project.	The assessment of the sustainability of the project in accordance with the ISCA Infrastructure Sustainability Rating Tool is discussed in **section 27.3**.
	2. The Proponent must assess the project against the current guidelines including targets and strategies to improve government efficiency in use of water, energy and transport.	Discussion of the sustainability framework and relevant documents is provided in **section 27.2**. The sustainable use of water and energy resources is discussed in **Table 27-3** in **section 27.2.11** and in **Chapter 23** (Resource use and waste minimisation).

27.1 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 dynamic, and changes in response to the limitations imposed on environmental resources as a result of technology, social organisation and the ability of the biosphere to absorb the effects of human activities.

The Australian 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' (Australian Government 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).

27.2 Sustainability policy framework

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

- *NSW Long Term Transport Master Plan* (Transport for NSW 2012a)
- *A Plan for Growing Sydney* (DP&E 2014)
- *Towards our Greater Sydney 2056* (Greater Sydney Commission 2016)
- *Draft Central District Plan* (Greater Sydney Commission 2016)
- *NSW Climate Change Policy Framework* (NSW Office of Environment and Heritage (OEH) November 2016)
- *NSW Government Resource Efficiency Policy* (OEH 2014a)
- *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW Environment Protection Authority (NSW EPA) 2014b)
- *Transport Environment and Sustainability Policy* (Transport for NSW 2015)
- *NSW Sustainable Design Guidelines Version 3.0* (Transport for NSW 2013)
- Roads and Maritime Environmental Sustainability Strategy *2015–2019* (NSW Roads and Maritime Services (Roads and Maritime) 2016)
- WestConnex Sustainability Strategy (Sydney Motorway Corporation 2015).

Together, these documents provide the sustainability principles that inform the design of the project and against which the construction and operation of the project would be measured in terms of sustainability. Strategic planning documents applicable to the project are also discussed in **Chapter 3** (Strategic context and project need).

27.2.1 Long Term Transport Master Plan

The *NSW Long Term Transport Master Plan* (Transport for NSW 2012a) (Transport Master Plan) is the guiding transport planning and policy document and aligns with objectives for metropolitan Sydney as outlined in A Plan for Growing Sydney. 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.

The WestConnex program of works is identified in the Transport Master Plan as a critical link in Sydney's motorway network and an immediate priority for the NSW Government. The Transport Master 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 Transport Master 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 Transport Master Plan includes the following relevant specific environmental and sustainability 'actions':

- Develop and promote *Transport Infrastructure Sustainable Design Guidance* (including application of the Infrastructure Sustainability 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.

27.2.2 A Plan for Growing Sydney

The *Greater Sydney Region Plan, A Plan for Growing Sydney* (NSW Government 2014), presents the NSW Government's vision and goals for the metropolitan Sydney area for the next 20 years. The plan outlines key directions and actions to guide Sydney's growth, and defines four goals. The most relevant goals to sustainability and the project are:

- Goal 1: A competitive economy with world-class services and transport
- Goal 4: A sustainable and resilient city that protects the natural environment and has a balanced approach to the use of land and resources.

Goal 1 – A competitive economy with world-class services and transport

Several directions under Goal 1 of A Plan for Growing Sydney are relevant to the project and WestConnex more broadly. The project, in combination with the M4 East and the M4 Widening projects, would support access for goods and services to the new 'priority growth area' that extends from Greater Parramatta to the Olympic Peninsula, identified in Direction 1.3 of A Plan for Growing Sydney.

Direction 1.5.2 seeks to minimise the impacts of the movement of freight on the communities through which that freight travels. The project would assist in reducing these impacts by providing a motorway alternative for heavy freight trucks and other through traffic, reducing the use of Parramatta Road between Haberfield and the Sydney central business district (CBD). This is expected to lead to associated improvements in local air quality and lower traffic noise. The Iron Cove Link would reduce traffic, including freight vehicles, on Victoria Road between Iron Cove Bridge and City West Link.

For Sydney to continue to be a competitive economy, improved transport connections are required between all the major centres that form part of Sydney's economic corridor (termed the 'global economic corridor' in Direction 1.6), which includes areas such as the Sydney CBD, Parramatta CBD, Sydney Airport, Port Botany and Sydney Olympic Park. WestConnex would assist in increasing productivity between centres in the global economic corridor by improving road connections and reliability of journey times for the transport of goods and services and business travel.

WestConnex, along with the M4 Motorway, M5 Motorway, M7 Motorway and the proposed M12 Motorway (between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham), would provide a motorway standard link to the Western Sydney Airport, which is a key focus for economic growth in Sydney over the medium to long term.

Goal 4 - A sustainable and resilient city that protects the natural environment and has a balanced approach to the use of land and resources

The project is being designed in line with the WestConnex Sustainability Strategy (Sydney Motorway Corporation 2015), which outlines an integrated approach to sustainability through design, delivery and operation. In construction, the project would be required to achieve a rating of 'Excellent' under the ISCA rating system. Resilience to climate change has been taken into account as part of the design of the project.

The overarching sustainability objectives for the project are summarised in **Table 27-3**. **Chapter 24** (Climate change risk and adaptation) outlines potential project adaptation measures. **Chapter 4** (Project development and alternatives) describes the design considerations in the evolution of the project and the options and alternatives considered to minimise environmental and social impacts. Further discussion of how the project aligns with each of the four goals is provided in **Chapter 3** (Strategic context and project need).

27.2.3 Towards our Greater Sydney 2056

Towards our Greater Sydney 2056 (Greater Sydney Commission 2016) is the proposed amendment to A Plan for Growing Sydney and was released as a draft for public exhibition in November 2016. Due to the magnitude of the changes associated with the new 'three cities' approach, and the expected population and commercial growth in western Sydney, *Towards our Greater Sydney 2056* identifies the need for a sustainable supporting transport network.

The project, as part of the WestConnex program of works, complements this vision by providing improved connectivity between the Sydney CBD and western Sydney. Further discussion on *Towards our Greater Sydney 2056* is provided in **Chapter 3** (Strategic context and project need).

Towards our Greater Sydney 2056 identifies three metropolitan priorities for a sustainable Greater Sydney. These metropolitan priorities and their aims are summarised below:

- A city in its landscape: associated with improving the health of waterways; protecting and enhancing biodiversity, local open space systems and scenic and cultural landscapes; increasing access to open space; conserving the natural environment and enabling heathy lifestyles
- An efficient city: aims to minimise and mitigate environmental impacts though the efficient use of energy and resources
- A resilient city: associated with adapting to climate change, minimising exposure to natural hazards and strengthening social, organisational and infrastructure capacity.

The project complements these aims by minimising impacts on environmental values such as water, biodiversity and heritage through the design of the project; recommending management measures to further minimise residual impacts and minimise resources use and waste generation; assess the risk and vulnerability of the project to climate change; creating new active transport links and the provision of new open space.

Further discussion of these environmental values and the proposed management measures is provided in **Chapter 15** (Soil and water quality), **Chapter 18** (Biodiversity), **Chapter 20** (Non-Aboriginal heritage), **Chapter 21** (Aboriginal heritage), **Chapter 23** (Resource use and waste minimisation) and **Chapter 24** (Climate change risk and adaptation).

27.2.4 Draft Central District Plan

In late 2016 the Greater Sydney Commission released draft District Plans to allow for integrated planning of land use, transport and infrastructure between state and local governments, in alignment with the *Towards our Greater Sydney 2056*. The *draft Central District Plan* (Greater Sydney Commission 2016) sets out priorities and actions across the areas of productivity, liveability and sustainability for Greater Sydney's Central District, which encompasses the project and most of the broader WestConnex program of work. Outcomes for each of these priority areas, as relevant to the project, include:

- Productivity:
  - Options for east- west public transport connections
  - Improved connections and amenity along the WestConnex corridor, with increased walking and cycling connectivity and greater open space provision
- Liveability:
  - Coordinated infrastructure planning and delivery for growing communities
  - Design-led planning to support high quality urban design

- Improved health outcomes and increased walking and cycling
- Conservation and enhancement of environmental heritage including Aboriginal, European and natural
- Planning for shared spaces, increasing the provision of community facilities, including open space

· Sustainability:

- Embedding the *NSW Climate Change Policy Framework* into local planning decisions for improved energy efficiency, reduced emissions and improved environmental performance
- Supporting the development of environmental performance targets and benchmarks
- Improved land use and transport decision making
- Increased provision of open space.

27.2.5 NSW Climate Change Policy Framework

The *NSW Climate Change Policy Framework* (OEH 2016a) aims to maximise the economic, social and environmental wellbeing of NSW in the context of a changing climate. The framework outlines policy directions for implementing the government's long-term objectives of achieving net zero emissions by 2050, and improving the resilience of NSW to a changing climate.

As part of the implementation of this framework, two additional draft plans have been released for public consultation:

· *Draft Climate Change Fund Strategic Plan 2017–2022* (OEH 2016b)

· *A Draft Plan to Save NSW Energy and Money* (OEH 2016c).

The *Draft Climate Change Fund Strategic Plan 2017–2022* sets out priority investment areas for funding over the next five years, including the provision of up to $100 million in new funding for actions to prepare NSW for a changing climate.

As part of this priority investment area, the draft plan identifies actions for reducing the costs to public and private assets arising from climate change; reducing the impacts of climate change on health and wellbeing, particularly for vulnerable communities; and managing the impacts of climate change on natural resources, natural ecosystems and communities. **Chapter 24** (Climate change risk and adaptation) and **Appendix X** (Climate change risk assessment framework) identify climate change risks to the project and the adaptation measures implemented during design to improve the resilience of the project to climate change.

The *Draft Plan to Save NSW Energy and Money* is proposed to meet the NSW Government's energy efficiency target of 16,000 gigawatt hours of annual energy savings by 2020, and contribute to achieving net zero emissions by 2050.

The draft plan summarises the preferred options for achieving the state's energy savings target, which include opportunities for implementing energy standards for State significant developments and major infrastructure projects such as road tunnels. **Chapter 22** (Greenhouse gas) and **Chapter 23** (Resource use and waste minimisation) outline the proposed energy efficiency measures to reduce the project's energy consumption and contribution to greenhouse gas emissions.

27.2.6 NSW Government Resource Efficiency Policy

The *NSW Government Resource Efficiency Policy* (NSW Government 2014) aims to drive resource efficiency, with a focus on energy, water and waste, and a reduction in 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) and **Chapter 23** (Resource use and waste minimisation) for information regarding how the project aligns with the policy.

27.2.7 NSW Waste Avoidance and Resource Recovery Strategy 2014-21

The *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (NSW Government 2014) provides a framework for waste management.

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.

Chapter 23 (Resource use and waste minimisation) provides information regarding how the project aligns with the key result areas of the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*, particularly for the avoidance, recycling and recovery of waste generated during the construction period. The management of contaminated waste, including contaminated spoil, in accordance with this strategy is discussed in **Chapter 16** (Contamination) and **Chapter 23** (Resource use and waste minimisation), along with mitigation measures, including the ways in which disposal of contaminated waste would be managed.

27.2.8 Transport Environment and Sustainability Policy Framework and Statement

The *Transport Environment and Sustainability Policy* (Transport for NSW 2015) outlines the commitment of Transport for NSW and its key agencies to deliver transport services, projects, operations and programs in a manner that balances economic, environmental and social issues to ensure a sustainable transport system for NSW. Roads and Maritime is one of the key agencies identified in this policy. Specific sustainability commitments for Roads and Maritime, in line with the *Transport Environment and Sustainability Policy Framework,* are discussed in **section 27.2.8**.

The *Transport Environment and Sustainability Policy Framework* provides a collective and coordinated approach to deliver the NSW Government's environmental and sustainability agenda across the transport network. The framework outlines a number of indicators and targets across three themes: energy management, pollution control and resource management. Actions relevant to the project as outlined in the *Transport Environment and Sustainability Policy Framework* include:

- Pollution control:
  - Establish practices, where practicable, to mitigate noise from transport (an assessment of potential noise impacts from the project has been carried out and management measures have been recommended for the project – refer to **Chapter 10** (Noise and vibration))
- Climate change resilience:
  - High level analysis of climate change risks to transport operations and projects (an assessment of climate change risks for the project has been carried out – refer to **Chapter 24** (Climate change risk and adaption))
  - Develop climate change risk and action plan (a detailed climate change risk assessment would be carried out during detailed design and mitigation measures implemented - refer to **Chapter 24** (Climate change risk and adaption))
- Resource management:
  - Implement best resource management practices (resource management for the project is discussed in **Chapter 23** (Resource use and waste minimisation))
- Biodiversity:
  - Develop and implement practices that mitigate transport's impact on biodiversity (an assessment of potential impacts on biodiversity has been carried out and management measures have been recommended for the project - refer to **Chapter 18** (Biodiversity))

- Heritage:
  - Develop and implement practices that mitigate transport's impact on heritage (an assessment of potential impacts on heritage has been carried out and management measures have been recommended for the project - refer to **Chapter 20** (Non-Aboriginal heritage) and **Chapter 21** (Aboriginal heritage))
- Liveable communities:
  - Develop and implement practices which integrate transport with surrounding land use activities (an assessment of potential impacts on land use has been carried out and management measures have been recommended for the project - refer to **Chapter 12** (Land use and property), **Chapter 13** (Urban design and visual amenity) and **Appendix N** (Technical working paper: Active transport strategy))
- Corporate sustainability:
  - Measure and report on transport environment and sustainability annually (the project would report on sustainability performance through the use of the Infrastructure Sustainability Rating Tool).

27.2.9 NSW Sustainable Design Guidelines

The *NSW Sustainable Design Guidelines* (Transport for NSW 2013) provide guidance to embed sustainability initiatives into the design and construction of transport infrastructure projects and are aimed at projects being delivered by Transport for NSW, namely rail infrastructure projects.

While these guidelines and the corresponding checklist are not specifically applicable to road projects, the sustainability initiatives outlined in the guidelines are consistent with sustainability objectives identified by Roads and Maritime (see **section 27.2.10**) and as part of the WestConnex Sustainability Strategy (see **section 27.2.11**). The compulsory sustainability initiatives identified in the guidelines address the following sustainability themes:

- Energy and greenhouse gases
- Climate resilience
- Materials and waste
- Biodiversity and heritage
- Water
- Pollution control
- Community benefit.

Discussion of how the project would meet each of these themes, in line with the corresponding Roads and Maritime focus areas and WestConnex Sustainability Strategy targets and commitments, is provided in **section 27.2.10** and **section 27.2.11** respectively.

27.2.10 Roads and Maritime Services Environmental Sustainability Strategy 2015–2019

The *Roads and Maritime Services Environmental Sustainability Strategy 2015–2019* (Roads and Maritime 2016) outlines nine sustainability focus areas for integrating sustainability into Roads and Maritime operations and services, and aligns with the *Transport Environment and Sustainability Policy Framework* (Transport for NSW 2013).

Table 27-2 presents the Roads and Maritime sustainability focus areas and outlines how the project is consistent with these.

Table 27-2 Project consistency with Roads and Maritime sustainability focus areas

Sustainability focus area	Comment
Energy and carbon management	An energy efficiency and greenhouse gas emissions strategy would be prepared as part of the project's Sustainability Management Strategy, as discussed in **Chapter 22** (Greenhouse gas). The strategy would identify initiatives to be implemented during design and construction of the project to reduce carbon emissions, energy use and embodied life cycle impacts.
Climate change resilience	A climate change risk assessment has been prepared as part of the environmental impact assessment for the project to identify risks and adaptation opportunities to improve the project's resilience to future climate change and is included in **Chapter 24** (Climate change risk and adaptation).
Air quality	Details of how the project 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 9** (Air quality).
Resource use and waste management	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. The management of construction waste would include reuse, recycling, and reprocessing of waste, where possible. Further details are provided in **Chapter 23** (Resource use and waste minimisation).
Pollution control	An acoustic impact assessment has been prepared for the project to identify and mitigate potential noise impacts (refer to **Chapter 10** (Noise and vibration)). An assessment has also been prepared for the project to identify and mitigate potential air quality impacts (refer to **Chapter 9** (Air quality)). The EIS includes an assessment of the project's potential impact on soil and water and is provided in **Chapter 15** (Soil and water quality). The project would also include measures for the abatement, avoidance and/or containment of pollution and waste.
Biodiversity	A biodiversity assessment has been prepared for the project to identify and consider measures to avoid and minimise potential impacts on biodiversity. Project impacts would be managed in accordance with the Roads and Maritime Biodiversity Guidelines. Additional detail is provided in **Chapter 18** (Biodiversity) and **Appendix S** (Technical working paper: Biodiversity).
Heritage	Items of Aboriginal and non-Aboriginal heritage significance were identified early in the project design and assessment. Impacts on these items have been minimised, avoided and mitigated where practicable and management measures to be implemented throughout construction of the project have been provided. Refer to **Chapter 20** (Non-Aboriginal heritage) and **Chapter 21** (Aboriginal heritage). The Technical working paper: Non-Aboriginal heritage and Technical working paper: Aboriginal heritage are provided in **Appendix U** and **Appendix V** respectively.
Liveable communities	The project would contribute to reducing traffic on the existing road network and improve connectivity across Sydney (refer to **Chapter 8** (Traffic and transport)). The project would provide and facilitate improvements in pedestrian and cyclist connections, creating new active transport linkages and linking existing active transport networks with new connections. The project would also improve the amenity of streetscapes, providing a net increase in publicly accessible open space and creating opportunities for future urban renewal. Additional detail is provided in **Chapter 8** (Traffic and transport), **Chapter 12** (Land use and property), **Chapter 13** (Urban design and visual amenity) and **Appendix N** (Technical working paper: Active transport strategy).

Sustainability focus area	Comment
Sustainable procurement	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 an ISCA Infrastructure Sustainability (IS) rating of 'Excellent' (refer to **section 27.3** for discussion of the IS rating scheme).

27.2.11 WestConnex Sustainability Strategy

The WestConnex Sustainability Strategy (Sydney Motorway Corporation 2015) describes how sustainability initiatives are being integrated into the design, construction and operation of projects across the WestConnex program of works. The WestConnex 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 Environment and Sustainability Policy Framework* (Transport for NSW 2013) as well as other relevant government sustainability instruments (as described in the sections above).

Due to the large scale of the WestConnex program of works, and because it would be delivered as a series of projects over several years, the WestConnex Sustainability Strategy aims to ensure that sustainability is consistently applied across all projects and teams.

The WestConnex Sustainability Strategy provides a framework for implementing sustainability objectives and targets through the project's contract requirements, competitive tender evaluation process and project specific sustainability management plans/strategies during the design and construction stage.

The WestConnex Sustainability Framework is shown in **Figure 27-1**. Details of the project sustainability measures, how the project is consistent with the WestConnex Sustainability Framework, and how the project would meet or, where possible, exceed the objectives and targets outlined in the WestConnex Sustainability Strategy, are summarised in **Table 27-3**.The measures identified in **Table 27-3** include a summary of management measures identified for other technical disciplines, as relevant to sustainability. Environmental management measures for the project are further summarised in **Chapter 29** (Summary of environmental management measures).

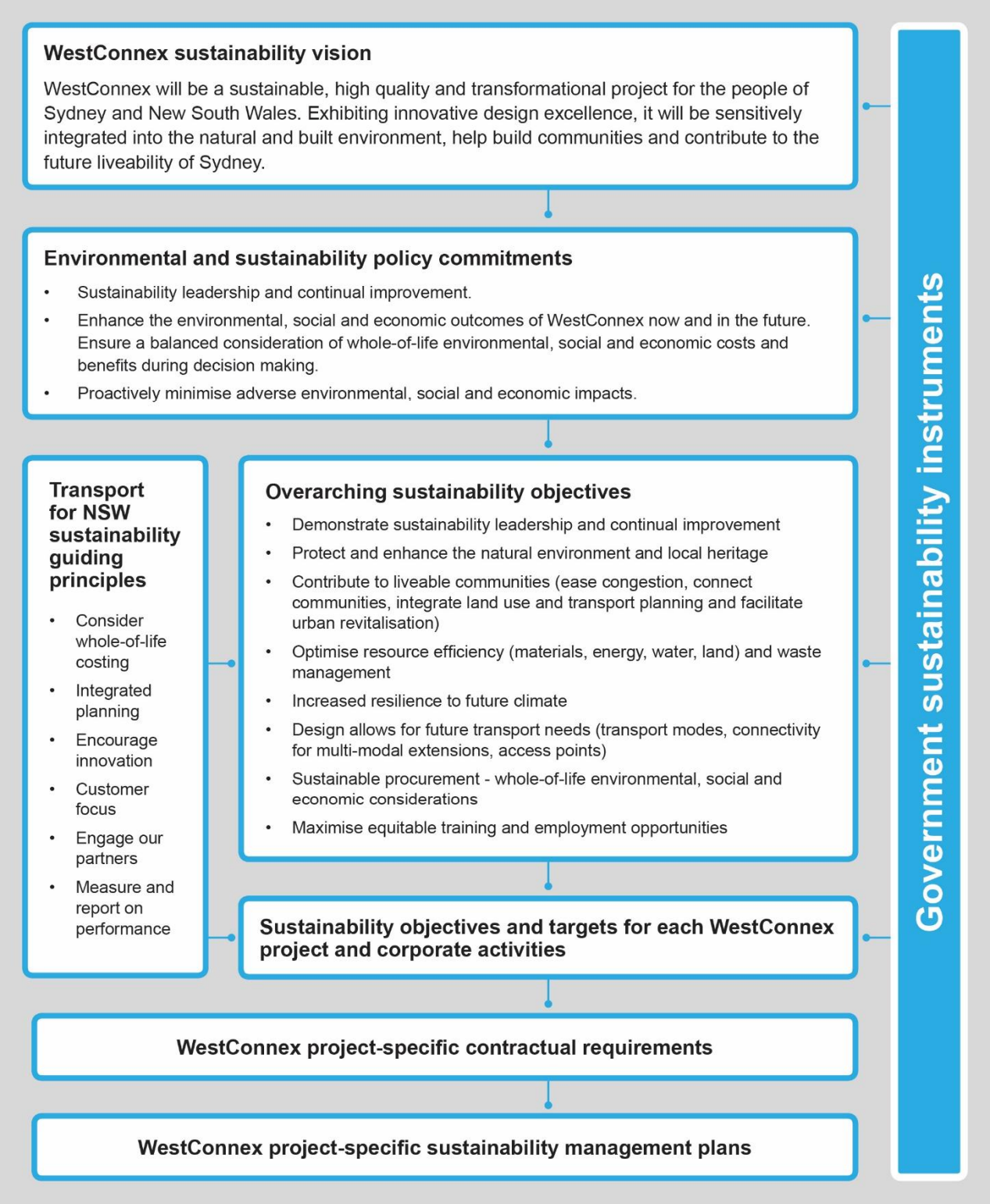

Figure 27-1 WestConnex Sustainability Framework

Table 27-3 Project consistency with the WestConnex Sustainability 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 · Senior Management would review the WestConnex Sustainability Report and WestConnex Environment and Sustainability Policy on an annual basis · During the design and construction phases, knowledge and lessons learnt would be shared across the WestConnex component projects through participation at regular sustainability workshops · The Sustainability Representative would 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 on flora and fauna in accordance with the Roads and Maritime 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 · Development of detailed design would include consideration of biodiversity and heritage values, in order to avoid or minimise potential impacts · The project's design considers opportunities for an increase in publicly accessible open space, parkland and community uses at the Rozelle Rail Yards site · Easton Park was removed from the project footprint to minimise impacts on open space and heritage, and the Blackmore Park wetland was avoided to minimise potential biodiversity impacts · 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 on biodiversity in a biodiversity assessment report (BAR) · While the project would have minimal impact on biodiversity, as assessed in **Chapter 18** (Biodiversity), project impacts would be managed in accordance with the Roads and Maritime Biodiversity Guidelines. Additional detail is provided in **Chapter 18** (Biodiversity) and in **Appendix S** (Technical working paper: Biodiversity) · The removal of the Camperdown interchange component of the project was influenced

Sustainability targets	Project consistency
	by potential impacts on heritage conservation areas and heritage items such as the University of Sydney and Victoria Park (both nominated for state heritage listing) and a locally listed sandstone retaining wall on the northern side of Parramatta Road. Its removal facilitated the realignment of the mainline tunnels, which avoid potential impacts on these items · Items of Aboriginal and non-Aboriginal heritage significance were identified early in the project design and assessment. Impacts on identified items have been avoided and mitigated where practicable and management measures would be implemented throughout construction to minimise unavoidable impacts of the project, as described in this EIS · An assessment of potential impacts and proposed mitigation and management measures with regards to non-Aboriginal and Aboriginal heritage are provided in **Chapter 20** (Non-Aboriginal heritage) and **Chapter 21** (Aboriginal heritage) respectively. The Technical working paper: Non-Aboriginal heritage and Technical working paper: Aboriginal heritage are provided in **Appendix U** and **Appendix V** respectively. A discussion of refinements to the project design and a description of alternatives are provided in **Chapter 4** (Project development and alternatives).
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 for the WestConnex program of works would be designed and operated to comply with best practice criteria for in-tunnel and ambient air quality · Maintain or improve pedestrian and cyclist paths and connections · Create/enhance public open space.	· The project would contribute to reducing traffic on the existing road network and increasing road capacity and travel times on certain roads · The project would link the M4 East and the New M5, improving connectivity across Sydney · The project would facilitate improvements to the broader road network as part of ongoing network evaluations to manage traffic congestion on local roads · Consideration has been given to the potential traffic changes resulting from the project to ensure that the project is effectively integrated with the road network. Refer to **Chapter 8** (Traffic and transport) for more information · Details of how the project 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 9** (Air quality) · The project would provide and facilitate improvements in pedestrian and cyclist connections, linking existing connections by integrating the Iron Cove active transport network with a dedicated active transport corridor along Victoria Road, and creating new pedestrian and cyclist links within the Rozelle Rail Yards for connection to the

Sustainability targets	Project consistency
	Bays Precinct and the Sydney CBD · The project would increase active transport connectivity as discussed in **Appendix N** (Technical working paper: Active transport strategy), and would capitalise on the reduction in traffic to improve the amenity of local streets for pedestrians and cyclists, including: - Across the intersection of City West Link and The Crescent, providing improved access to the Rozelle Bay light rail stop - Through Rozelle Rail Yards, in a north–south direction linking Easton Park and Bicentennial Park, and from east–west to provide connection between the proposed Lilyfield Road Regional Bike Route and The Bays Precinct - A connection along Victoria Road to the existing Iron Cove active transport network - New connections through the St Peters interchange (that would be delivered as part of the New M5 project) · The Iron Cove Link masterplan and Rozelle Rail Yards masterplan are discussed in **Chapter 13** (Urban design and visual amenity) and **Appendix L** (Technical working paper: Urban design). Potential traffic and active transport impacts are discussed in **Chapter 8** (Traffic and transport) and **Appendix H** (Technical working paper: Traffic and transport) and an active transport strategy report is provided in **Appendix N** (Technical working paper: Active transport strategy) · A commitment has been made that the project would provide new open space for the community (up to 10 hectares), including areas of open space within the Rozelle Rail Yards · New open space would be provided at St Peters as part of the New M5 project, which would, in addition to the landscaping that would be carried out as part of the project at this location, result in a substantial amount of open space being created by the WestConnex program of works · The types of recreational uses for the new open space generated by the project would be decided in consultation with local communities, UrbanGrowth NSW and relevant councils during detailed design and documented in an Urban Design and Landscape Plan. A discussion of usage options for residual land is provided in **Chapter 12** (Land use and property).

Sustainability targets	Project consistency
Overarching sustainability objective: Optimise resource efficiency (materials, energy, water, land) and waste management	
Materials: · Identify and implement opportunities to reduce material use and maximise the use of materials with low environmental impact · Maximise the use of 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.	· The use of construction materials to optimise resource efficiency and waste management would be considered in detailed design. Locally sourced materials and prefabricated assets would be selected where possible, to reduce greenhouse gas emissions · In instances where it is cost and performance competitive, recycled products would be used during construction of the project. This would reduce the demand on resources. This may include the use of fly ash and slag within concrete mixes · All wastes would be managed using the hierarchy approach of waste avoidance and waste reuse before consideration of waste disposal · Resource recovery principles would be applied to the construction of the project, including recovery of resources for reuse, recycling and reprocessing, where possible · The project would seek to reuse or recycle at least 95 per cent of uncontaminated spoil generated for beneficial purposes, either within the project or at other locations. A Construction Waste Management Plan would be prepared for the project, detailing appropriate procedures for waste management, as discussed in **Chapter 23** (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 · During construction, non-potable water sources would be given preference over potable sources where appropriate (see below). Additional detail is provided in **Chapter 22** (Greenhouse gas) and **Chapter 23** (Resource use and waste minimisation).
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 20 per cent of construction energy and six per cent of operational energy from renewable energy generated onsite and/or accredited GreenPower · Optimise the design and operation of the motorway to	· A Sustainability Strategy including strategies for energy efficiency and greenhouse gas emissions would be prepared 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 · Initiatives would include the selection of energy efficient equipment for tunnelling and construction activities, including the selection of roadheaders for tunnel excavation as opposed to a tunnel boring machine, thereby reducing energy consumption, material use and spoil generation · Where possible, a minimum of 20 per cent of electricity required for construction of the project would be sourced from renewable sources and/or an accredited GreenPower energy supplier. A target minimum of six per cent of construction electricity requirements would be offset, with any offset undertaken in accordance with the Australian Government National Carbon Offset Standard

Sustainability targets	Project consistency
minimise energy used by vehicles using the motorway.	· A minimum of six per cent of operational electricity requirements for the project would be sourced from renewable sources and/or an accredited GreenPower energy supplier. Opportunities for operational energy offset, in accordance with the Australian Government National Carbon Offset Standard, would be considered during detailed design. Measures to improve energy efficiency are discussed in **Chapter 22** (Greenhouse gas) and design development of the project is discussed in **Chapter 4** (Project development and alternatives).
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.	· A water balance for surface water for construction and operation of the project is summarised in **Chapter 17** (Flooding and drainage) and detailed in **Appendix Q** (Technical working paper: Surface water and flooding). Refer to **Chapter 19** (Groundwater) and **Appendix T** (Technical working paper: Groundwater) for the detailed groundwater balance · Water efficiency measures would be implemented with a focus on achieving water savings and targeting water recycling and reuse · During construction, non-potable water sources would be given preference over potable sources where appropriate. Water would be sourced from: - Non-potable sources including stormwater harvesting at construction ancillary facilities, and on-site construction water treatment and reuse - The mains supply (potable water) · 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 reused on site wherever feasible, or treated and 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 practicable before discharging. Additional information regarding surface water and water quality is provided in **Chapter 15** (Soil and water quality). Indicative wastewater reuse volumes are provided in **Chapter 23** (Resource use and waste minimisation) · The indicative layouts of the temporary construction ancillary facilities have taken into consideration the flood risk posed to the land. This includes identifying opportunities to provide setback from areas at risk of flooding or considering locating uses considered more vulnerable to flooding - such as stockpile areas, storage of chemicals, tunnel dives and deep excavations - away from areas of highest risk. Refer to **Chapter 17** (Flooding and drainage) and **Appendix Q** (Technical working paper: Surface water and flooding) for further detail

Sustainability targets	Project consistency
	· The layout of the operational sites has taken into consideration the flood risk posed to the sites and how to manage these risks. The process for establishing flood risk for the project is outlined in **Chapter 17** (Flooding and drainage). Mitigation measures have already been included as a consequence of the evolution of the concept design, as discussed in **Chapter 17** (Flooding and drainage) and **Appendix Q** (Technical working paper: Surface water and flooding) · The design includes a number of bioretention basins and wetlands, including a 4,300 square metre wetland within the Rozelle Rail Yards site which would receive and treat stormwater runoff from the Rozelle Rail Yards as well as groundwater effluent from the water treatment plant · Opportunities to reuse treated groundwater during project operation would be considered in preference to discharge to the stormwater system or receiving waterbodies. This could include irrigation of landscaped areas within the project such as the new open space at the Rozelle interchange.
Land: · Minimise the project's surface land footprint and acquisition of properties · Identify contaminated sites within the project 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 the NSW Government, and operational elements of the project would be located within existing road corridors as much as feasible · The project has been designed to maximise use of land currently being used for construction of the M4 East and New M5 projects. Additional land required to accommodate the project is discussed in **Chapter 12** (Land use and property) · The project has been designed to minimise the number of additional known and potentially contaminated sites that would be impacted by the project · Design optimisation included the refinement of the Rozelle interchange to reduce the impact of tunnelling through sites of contaminated fill, including at the Rozelle Rail Yards · Contaminated land within the project footprint would be rehabilitated to a standard suitable for post-construction use. Potential future uses of land are described in **Chapter 12** (Land use and property) and **Chapter 16** (Contamination).
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-	· The project would seek to reuse or recycle at least 95 per cent of uncontaminated spoil, above the minimum target of 80 per cent as identified in the WestConnex Sustainability Strategy · Usable spoil (uncontaminated surplus excavated material) would be reused and/or recycled as part of the project, where possible. 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. The management and disposal of excess spoil is discussed further in **Chapter 23** (Resource use and waste

Sustainability targets	Project consistency
contractors, where practical).	minimisation) · At least 80 per cent of construction and demolition waste is anticipated to be reused and/or recycled as part of the project · A Construction Waste Management Plan would be prepared as part of the Construction Environmental Management Plan for the project, detailing the appropriate procedures for waste management. All wastes would be managed using the hierarchy approach of waste avoidance and waste reuse before consideration of waste disposal. Resource recovery principles would be applied to the construction of the project, including recovery of resources for reuse, recycling and reprocessing, where possible. Residual waste that cannot be reused 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 23** (Resource 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' rated residual climate change risks.	· An initial climate change 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 24** (Climate change risk and adaptation) · The climate change risk assessment will be reviewed and updated during detailed design and where extreme, high or medium risks are identified, a review of the design will occur. Climate change adaptation measures incorporated into this stage of the design and additional measures to manage potential climate risks are provided in **Chapter 24** (Climate change risk and adaptation).
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 cyclist paths and connections between existing assets, and does not preclude potential future upgrades of, or additions to, pedestrian and cyclist paths · The project would increase active transport connectivity as discussed in **Appendix N** (Technical working paper: Active transport strategy), including: - Across Victoria Road, providing improved access to bus services - Across the intersection of City West Link and The Crescent, providing improved access to the Rozelle Bay light rail stop - Through Rozelle Rail Yards, in a north–south direction linking Easton Park and Bicentennial Park, and from east–west to provide connection between the proposed Lilyfield Road Regional Bike Route, The Bays Precinct and the CBD - A connection along Victoria Road to the existing Iron Cove active transport network

Sustainability targets	Project consistency
	- New connections through the St Peters interchange (being constructed as part of the New M5 project) · Future revitalisation and growth would be made possible as a result of the project reducing traffic on parts of Victoria Road, including improved local amenity, improved public transport services, upgraded active transport facilities, generation of residual land along Victoria Road and increased accessible public open space at Rozelle · The Iron Cove Link masterplan and Rozelle Rail Yards masterplan are discussed in **Chapter 13** (Urban design and visual amenity) and **Appendix L** (Technical working paper: Urban design) · The Rozelle interchange would include tunnels to provide for connections to the proposed future Western Harbour Tunnel and Beaches Link, ensuring future opportunities for improved connectivity can be realised.
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 in the design development for the project. Specifically, the design has been developed to consider: - How the project would meet an 'Excellent' rating for the Design and As-Built components of the project under the ISCA IS rating scheme - How sustainability initiatives would be implemented throughout the project - How sustainability targets would be achieved or improved on throughout the project · A project specific Sustainability Management Plan would be prepared to guide the implementation of sustainability throughout the design and construction phases, to ensure the IS rating of Excellent is achieved (refer to **Figure 27-1**) · An Australian Industry Participation Plan has been developed for the overall WestConnex program of works.
Overarching sustainability objective: Maximise equitable training and employment opportunities	
· Maximise employment and training opportunities for young people, disadvantaged groups, Aboriginal and Torres Strait Islanders, the unemployed, local residents 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.	· 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 · Sydney Motorway Corporation is in the process of developing a Reconciliation Action Plan to guide activities needed to improve outcomes for Aboriginal and Torres Strait Islander people, to align with the NSW Government's Plan for Aboriginal Affairs, Opportunity, Choice, Healing, Responsibility, and Empowerment.

27.2.12 Additional strategic planning documents

In line with the integrated planning principles identified in the strategies above, the project has been designed with consideration of additional strategic planning documents:

- The *NSW Freight and Ports Strategy* (Transport for NSW 2013) outlines two main objectives: to deliver a freight network that efficiently supports the projected growth of the NSW economy, and to balance freight needs with those of the broader community and the environment
- The *Parramatta Road Corridor Urban Transformation Strategy* (UrbanGrowth NSW 2016) identifies WestConnex as a catalyst for the restoration of the Parramatta Road corridor and aims to guide urban renewal opportunities to create an environment with good design, land use mix, housing choice and infrastructure, as well as improved access to community facilities and services and access to public and active transport
- The *Transformation Plan: The Bays Precinct Sydney* (UrbanGrowth NSW 2015) outlines the NSW Government's ambition for The Bays Precinct, which is intended to be staged and coordinated with the planning and delivery of WestConnex, the Inner West Light Rail line and the long term considerations of The Bays Precinct's port uses. The project is expected to improve accessibility to the precinct, with improvements to local amenity and user experience
- The *City of Sydney's Sustainable Sydney 2030 Plan* outlines the City's vision for a green, global and connected city and presents 10 strategic directions for the achievement of these goals towards 2030 and beyond. The project corresponds with the City's vision for:
  - Integrated transport for a connected city, with the project contributing to a reduction in traffic on some roads, and improved management of freight through Sydney as part of an integrated motorway network
  - A city for pedestrians and cyclists, with the project providing and facilitating improved pedestrian and cyclist connections, linking existing and proposed active transport networks, increasing publicly accessible green space and improving amenity for users
  - Sustainable development, renewal and design, with the project's design developed to create improved urban design opportunities (as discussed in **Chapter 13** (Urban design and visual amenity)), including a reduction in traffic which would enhance the amenity of streetscapes and create opportunities for urban renewal in some areas, such as Parramatta Road
- The City of Sydney currently hosts Resilient Sydney, a project to develop and implement a resilience strategy for metropolitan Sydney, as part of the Rockefeller Foundation's 100 Resilient Cities initiative. Outcomes of the Resilient Sydney project to date include the preparation of a *City Context Report* (Resilient Sydney 2016a) and the development of a Preliminary Resilience Assessment (Resilient Sydney 2016b), which identifies the key shocks and stresses facing Sydney, including acute shocks such as extreme weather events and infrastructure failures (such as power outages), and chronic stresses such as a lack of transport diversity. The project's contribution to improving Sydney's resilience is discussed in **section 27.4.2**.

27.3 Infrastructure Sustainability Rating Scheme

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.

The project is seeking an IS 'Design' and 'As-Built' rating of 'Excellent' in line with the WestConnex Sustainability Strategy targets. An 'Excellent' rating is the second highest rating level.

Sustainability workshops and meetings were held during EIS development with planning and design teams to assess and progress initiatives for achieving IS Design and As-Built rating criteria, and sought to preserve opportunities in future detailed design development. Specific workshops were held to drive sustainable outcomes for key components of the project design, including:

- The M4-M5 Link tunnelling works
- The M4-M5 Link surface works, with particular focus given to the Rozelle interchange and Iron Cove Link portals.

The workshops instigated discussion of applicable urban design initiatives and their impact on achieving project sustainability targets and requirements, with initiatives identified under the following headings:

- Energy and water, including initiatives for achieving efficiencies in energy and water use, as well as the management and reuse of spoil during construction
- Access and movement, including initiatives for active transport and improved connectivity
- Natural landscape and environment, including initiatives for the protection or provision of green space
- Cultural heritage and identity, including initiatives for the preservation of heritage values.

A number of actions were documented for planning and design consideration to embed specific sustainability commitments and targets for implementation by the construction contractor, with requirements for regular sustainability inspections and reporting during the construction period. Commitments and targets align with those identified in the WestConnex Sustainability Strategy, outlined in **Table 27-3**. The construction contractor would be responsible for ensuring that enough credits are achieved to meet the IS 'Excellent' rating.

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 IS rating.

27.4 Ecologically sustainable development

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* (NSW) (EP&A Act) (section 5(a)(vii)) to encourage ecologically sustainable development through the implementation of the following four principles:

- 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* (NSW).

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

27.4.1 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 project were considered in the alternatives and options analysis. This included identifying opportunities to avoid and minimise surface disturbance. Refer to **Chapter 4** (Project development and alternatives) for additional detail regarding the options considered as part of the project's design.

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 28** (Environmental risk analysis) for more detail). Safeguards and management measures have been developed to manage and reduce impacts identified in these assessments.

Sustainability workshops and meetings were held during EIS development with planning and design teams, which sought to preserve opportunities for the implementation of sustainability initiatives in future detailed design development. Specific workshops were held to drive sustainable outcomes for key components of the project design, as discussed in **section 27.3**.

27.4.2 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 of future generations.

The project tunnels would have a design life of about 100 years and would be designed to meet the needs of both current and future generations. The project has been considered in terms of inter-generational equity, with the management of potential environmental impacts discussed throughout this EIS.

As part of WestConnex, the project delivers on the NSW Government's plans to deliver an integrated transport solution, comprising roads and public transport, to address congestion on Sydney's roads and to cater for the diverse travel needs of Sydney's growing population. Improvements to road infrastructure remain a critical part of the overall solution, with the project proposed to contribute to inter-generational equity through improved connectivity, reduced congestion, and facilitating urban renewal and future economic growth.

The project, as part of the WestConnex program of works, would contribute to improving Sydney's transport network, accommodating forecast traffic growth, allowing for connections to the proposed future Sydney Gateway project (via the St Peters interchange) and proposed future Western Harbour Tunnel and Beaches Link.

By providing a motorway link between the M4 East at Haberfield and the New M5 at St Peters, the project would help to connect major employment centres, which are critical in supporting the creation of jobs and businesses. As a result, the project would improve access to employment centres for people living in western Sydney, with spatial inequality recognised as one of the key socio-economic challenges for the city. East–west connectivity and access to established and emerging employment areas in western Sydney would also improve. Improved connectivity to employment centres would include the 'global economic corridor', which extends from Port Botany and Sydney Airport to the Norwest Business Park and Parramatta CBD via the Sydney and North Sydney CBDs, as well as the future Western Sydney Airport at Badgerys Creek.

The project would support Sydney's long-term economic growth through improved motorway access and connections linking Sydney's international gateways and western Sydney and places of business across the city. With improved connectivity, the project would also enhance the productivity of commercial and freight generating land uses located near and along transport infrastructure.

The project would contribute to building the resilience of metropolitan Sydney by addressing some of the key chronic stresses facing the city, including the need for improved connectivity and reduced congestion.

The project would give consideration to redundancy in power supply through provision of back-up power for operation of the project's essential equipment, as discussed in **Chapter 5** (Project description). Additional redundancy in drainage infrastructure designed to meet or improve the capacity of existing drainage systems and account for future climate change would also be provided as part of the project, The project's resilience to future climate change is considered in **Chapter 24** (Climate change risk and adaptation), which identifies potential climate risks to the project, adaptation incorporated in the project's design development and recommended next steps for the development of adaptation options during detailed design.

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 20 per cent of electricity required for construction and at least six per cent of electricity required for operation of 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 reuse, with a minimum target of five per cent of water (rainwater, stormwater, wastewater, groundwater, tunnel inflow water) proposed to be reused, recycled or reclaimed during operation of the project
- The project would seek to reuse or recycle around 95 per cent of uncontaminated spoil generated for beneficial purposes, either within the project or at other locations
- At least 80 per cent of construction and demolition waste is anticipated to be reused and/or recycled as part of the project.

The project ventilation system has been designed and would be operated so that it would achieve some of the most stringent standards in the world for in-tunnel air quality, and would be effective at maintaining local and regional ambient air quality. A large mainline tunnel cross-sectional area would permit greater volumetric air throughput and reduce the pollutant concentration for a given emission into the tunnel volume. Increased tunnel height would reduce the risk of incidents involving high vehicles blocking the tunnel and disrupting traffic, reducing the risk of higher pollutant concentrations associated with traffic flow breakdown.

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 and in the cumulative scenarios. Where increases in pollutant concentrations at receptors were predicted, these were mostly small.

There are predicted to be substantial reductions in concentrations of criteria pollutants along Dobroyd Parade/City West Link and Parramatta Road to the southeast of the Parramatta Road ventilation facility due to traffic being diverted through the M4-M5 Link tunnel, as well as along General Holmes Drive, the Princes Highway and the M5 East Motorway. There would also be substantial reductions in pollutant concentrations along the Victoria Road corridor south of Iron Cove at Rozelle, due to traffic being diverted through the Iron Cove Link.

Some small increases in concentration of criteria pollutants were predicted to the north of Iron Cove Link and near Anzac Bridge as a result of the general increase in traffic due to the project. Pollutant concentrations were also predicted to increase along Canal Road, which would be used to access the St Peters interchange, and other roads associated with the proposed future Sydney Gateway project. Impacts associated with the proposed future Sydney Gateway project 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 9** (Air quality) and **Appendix I** (Technical working paper: Air quality).

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. 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 2033.

Despite increases to overall daily vehicle kilometres travelled (VKT) on motorways, improvements to traffic flow and congestion are achieved through increased speeds and reduced frequency of stopping, as well as reduced daily VKT and vehicle hours travelled (VHT) on alternate routes and non-motorway roads, which results in improved fuel efficiency and subsequently reduced greenhouse gas emissions associated with road use. Further information on greenhouse gas emissions and savings is provided in **Chapter 22** (Greenhouse gas).

Traffic analysis identifies a number of key benefits and improvements as a result of the project:

- Non-motorway roads in the Inner West local government area are forecast to experience faster trips with the daily average speed increasing by about 10 per cent. Similarly, the vehicle distance travelled on non-motorway roads is forecast to reduce by about 12 per cent. This indicates that on average, these trips are fewer in number and faster
- Improved network productivity on the metropolitan network, with more trips forecast to be made or longer distances travelled on the network in a shorter time. The forecast increase in VKT and reduction in VHT is mainly due to traffic using the new motorway, with reductions in daily VKT and VHT also forecast on non-motorway roads
- Reduced travel times are forecast on key corridors, such as between the M4 Motorway corridor and the Sydney Airport/Port Botany precinct
- Reduced traffic is forecast on sections of major arterial roads including City West Link, Parramatta Road, Victoria Road, King Street and Sydenham Road
- Almost 2,000 heavy vehicles are forecast to be removed from Parramatta Road, east of the M4 East Parramatta Road ramps, each weekday.

Where the project would connect to the existing road network, increased congestion is forecast in parts of Mascot, along Frederick Street at Haberfield, Victoria Road north of Iron Cove Bridge, Johnston Street at Annandale and on the Western Distributor. A number of these areas are forecast to improve when the WestConnex program of works and the proposed future Sydney Gateway and Western Harbour Tunnel and Beaches Link project are completed. Roads and Maritime proposes to investigate the use of queuing and capacity monitoring, management of lane use and lane utilisation and 'Smart Motorway' operations to manage the forecast demand, where required.

A Smart Motorway uses technology to monitor, provide intelligence and control the motorway to ease congestion and keep traffic flowing more effectively. Technology, including lane use management signs, vehicle detection equipment, closed-circuit television cameras and entry ramp signals, allows road operators to manage, in real time, traffic using the motorway. Further detail regarding the scenarios modelled and the operational performance of the project is provided in **Chapter 8** (Traffic and transport) and **Appendix H** (Technical working paper: Traffic and transport).

Notwithstanding the project benefits and the renewable energy targets that would apply, the project may have an impact on inter-generational equity through the consumption of non-renewable fuel resources during operation.

Roads and Maritime understands 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 are needed 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. For example, the *Australian Bureau of Statistics Motor Vehicle Census* published on 31 January 2016 reports an increase in the number of hybrid and electric vehicles registered in Australia. The NSW State Transit bus fleet uses compressed natural gas to power buses (State Transit 2014), and the CBD and South East Light Rail project would include a fleet of around 30 electric-powered

light rail vehicles (Parsons Brinckerhoff 2013). This would enable the economic benefits provided by road transport to continue to be delivered with a reduced need for fossil fuels.

Government and industry initiatives relevant to peak oil, but outside the scope of this project, include the *NSW Government Resource Efficiency Policy* (OEH 2014a) and the participation of Roads and Maritime, Austroads and industry in research, with the goal of developing more sustainable road construction materials and practices, thereby 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 would 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 23** (Resource use and waste minimisation).

27.4.3 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 biodiversity study area is entirely modified and disturbed and contains exotic species, weeds and planted native or non-indigenous species. The project footprint is considered to be in a poor ecological condition, with little ecological value and unlikely to have any native resilience or recovery potential.

These facts notwithstanding, construction of the project may impact potential foraging habitat of non-native vegetation for the Grey-headed Flying-fox, Eastern Bentwing-bat and Yellow-bellied Sheathtail-bat, and may have indirect impacts on Microchiropteran bat species. However, these residual impacts are not expected to have a significant negative effect on any local populations of native biota, including any threatened fauna species that may occur in the study area.

This EIS provides a detailed biodiversity assessment, which identifies potential impacts on biodiversity, and provides a range of mitigation measures to further avoid and minimise potential impacts on biodiversity.

Potential impacts on biodiversity are detailed further in **Chapter 18** (Biodiversity) and **Appendix S** (Technical working paper: Biodiversity).

27.4.4 Improved valuation and pricing and incentive mechanisms

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 established, should be pursued in the most cost-effective ways.

Environmental factors have been considered throughout the concept design stage for the design, 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 EIS will be implemented during construction and operation of the project. These mitigation measures would be revised and updated as required during the detailed design stage of the project and as the project passes through the assessment process.

The value placed on avoiding and minimising environmental impacts is demonstrated in the design features incorporated into the project, including opportunities for the creation of additional green space and the realignment of the mainline tunnels to avoid impacts on heritage conservation areas and heritage items (as discussed in **Table 27-3**), as well as the extent of environmental investigations undertaken to inform this EIS. 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 project creates the potential for improvements in local amenity and opportunities for urban revitalisation. Opportunities for improved urban design created by the project include the beneficial reuse of remaining land not required by the project along Victoria Road and at the Rozelle Rail Yards. Reuse and renewal of these areas would allow opportunities for future revitalisation and growth, increasing publicly accessible green and/or community space and improving access and amenity for users.

The Iron Cove Link masterplan and Rozelle Rail Yards masterplan are discussed in **Chapter 13** (Urban design and visual amenity) and **Appendix L** (Technical working paper: Urban design). The project would also contribute to the delivery of the Residual Land Management Plan for the M4 East project at Haberfield and the New M5 project at St Peters, through ensuring compliance with the conditions of approval related to residual land for those projects (refer to **Chapter 12** (Land use and property)).

The project would also provide improvements to pedestrian and cyclist connections, linking existing active transport networks with new connections or improving existing connections through a reduction in traffic, which would improve the amenity of streetscapes and create opportunities for urban renewal. The project would also include measures for the abatement, avoidance and/or containment of pollution and waste.

27.5 Sustainability management on the project

The overarching sustainability objectives for the project (see **Table 27-3**) 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'.

27.5.1 Sustainability Management Plan

While sustainability is considered throughout design, 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 the detailed design, construction and operation 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 environmental, social and economic costs and benefits over the life of the project.

The Sustainability Management Plan would form part of the 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 Rating 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.