8 Sustainable development

This chapter describes the key sustainability benefits that the CBD Metro would deliver. It also presents how sustainability aims and principles have been used to develop and embed sustainability into the design, construction, and operation of the project.

8.1 Overview

8.1.1 What is sustainability?

Cities are the primary source of global consumption, which is rapidly exhausting the Earth's natural resources. Therefore, a key challenge for our society is to make our cities more sustainable. As 'hotspots' of consumption, production and waste generation, cities (and the infrastructure that goes into making them) possess an unparalleled potential to increase the energy efficiency and sustainability of society as a whole (Sinclair Knight Merz 2009).

In this respect, it is essential that a major infrastructure project, such as the CBD Metro, responding in particular to the future challenges Sydney faces, should be developed with sustainable design, policy and decision making at its core.

The concept of sustainability is considered to consist of actions that support existing and future social sustainability (individual and community well-being), economic sustainability (economic prosperity) and environmental sustainability (NSW Department of Premier and Cabinet 2009). Sustainable development challenges the notion that 'all development is good' and requires policy makers and approval bodies to assess both the short-term and long-term environmental, social and economic consequences of a particular development.

In addition, the concept of ecologically sustainable development (ESD) is also referred to in the *Environmental Planning and Assessment Act* 1979 (EP&A Act) (as defined in the EP&A Regulation) and *Protection of the Environment Administration Act 1999* (PEA Act), both of which govern the CBD Metro project. Sustainable Development is development that improves the total quality of life, both now and in the future, in a way that maintains functional ecological processes.

Both the EP&A Act and the PEA Act include principles of ESD and the requirement for these principles to be considered in environmental and economic decision-making processes of projects in NSW. ESD principles include:

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

The application of these four tenets of sustainability to the CBD Metro project is also detailed in Chapter 22.

8.1.2 Sustainability and the CBD Metro

As a major public transport infrastructure project, the CBD Metro being the first stage of a metro network for Sydney represents a significant strategy for improving the sustainability of Sydney's transport network. As indicated in Chapter 4, all key NSW Government strategic planning policy documents recognise that investment in public transport is vital to achieve sustainable communities. These documents include *City of Cities: A Plan for Sydney* (2005), Urban Transport Statement (2006), *Action for Air* (update 2006) and *NSW Greenhouse Plan* (2005), as well as sub-regional and local planning strategies.

Sydney's complex network of road, rail and bus is already at capacity on key points of the network – points that are also experiencing high rates of population and employment growth. The CBD Metro would deliver additional mass transit capacity to an area currently experiencing transport strain. Key sustainability benefits of the CBD Metro would include:

- Improving the attractiveness of public transport compared to private vehicle by:
  - Relieving pressure on existing public transport modes by providing additional public transport capacity.
  - Integrating with the existing public transport system to improve commuter choice and travel experience (for example, through shorter travel and interchange time).
- Allowing complementary changes to the broader transport network, such as the rerouting of train and bus services to minimise traffic congestion within the city and provide more frequent services between suburban centres and metro stations.
- Enhancing access for different social groups between and within the City of Sydney and Leichhardt local government areas. The provision of an accessible, reliable and affordable metro line would cater to the broad range of socio-economic groups that live in the serviced locations and would enhance social equity by improving access for the disabled, elderly, and for parents with young children.
- Supporting more sustainable land use and lifestyle options around the metro stations (such as Barangaroo-Wynyard) by creating the capacity for transit-oriented infill development around higher quality public transport to accommodate increases in population and employment. Sustainability benefits of transit oriented development include increasing housing affordability, decreasing congestion and improving health and physical activity within the community.
- Providing a positive public transport legacy for future generations. The metro network would ensure that future generations receive at least the same, if not better, public transport opportunities than current generations.

While the operation of the CBD Metro would provide substantial sustainability benefits, the construction and operation of the project has the potential to consume resources (such as energy, water, land and materials) and produce waste (such as spoil, wastewater and air pollutants, including greenhouse gases). While these impacts would be offset in the longer term by the operational benefits, Sydney Metro has made a commitment to ensure that best-practice sustainability principles are built into the Metro design to reduce this consumption of resources. The following section outlines Sydney Metro's sustainability strategy for the project for both the construction and operational stages.

8.2 Sustainability strategy

Sydney Metro's sustainability strategy involves a number of different reporting and tracking mechanisms to ensure that all metro projects are planned, designed, constructed and operated with maximum consideration of sustainable opportunities. The tracking and reporting structure is shown in Figure 8.1.

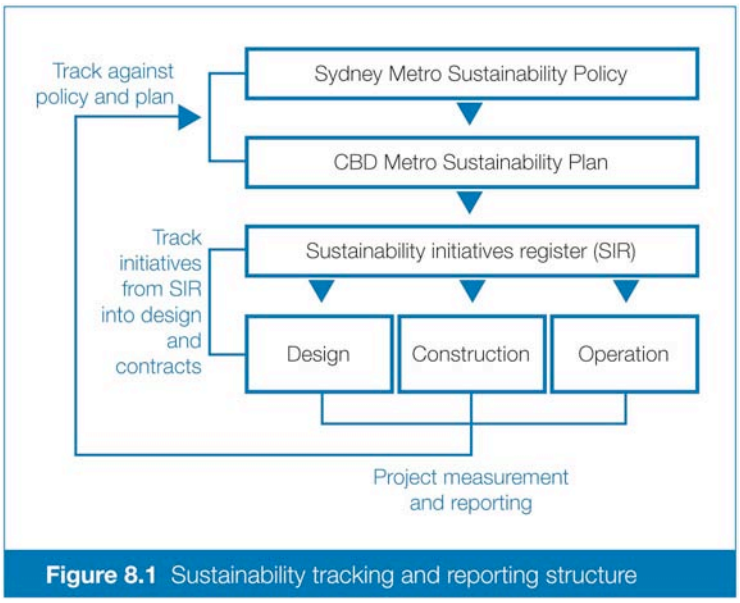

Figure 8.1 Sustainability tracking and reporting structure

Sydney Metro is currently developing the Sydney Metro Sustainability Policy, which will become the overarching guideline for sustainability within the organisation and within all of its projects. In accordance with the development of this policy, Sydney Metro is also developing the CBD Metro Sustainability Plan, which contains a management framework of 10 sustainability themes that have been identified as the key sustainability issues for the project. These themes are:

- Governance.
- Involvement of community and stakeholders.
- Community benefit.
- Adaptation to climate change.
- Greenhouse gas emissions.
- Energy use.
- Resource minimisation/recycling.
- Water and flooding.
- Biodiversity.
- Economic viability.

Corresponding principles and objectives have been developed for each theme. These are outlined in Table 8.1 and, together, form the sustainability framework for the project.

To ensure that the development of the project is based on the sustainability framework, a Sustainability Initiatives Register (SIR) has been developed to identify all opportunities for sustainable design to be incorporated into the project. Many of the sustainability initiatives have been considered through a value engineering process as part of iterative design development and enhancement. Members of the Sydney Metro sustainability team have been included in this process through attendance at design option workshops, to ensure the consideration and development of sustainable initiatives in the design.

The initiatives that are incorporated into the Reference Design would be written into the contracts for construction and operation of the CBD Metro as project commitments. The implementation of these sustainability commitments would be tracked and reported in accordance with the requirements of the Sydney Metro Sustainability Policy and the CBD Metro Sustainability Plan.

8.3 Sustainability initiatives

Table 8.1 provides an account of how the project design has been developed in accordance with the sustainability framework and in response to the Sustainability Initiatives Register. While some of the initiatives raised will require further assessment during the detailed design phase of the project to determine their feasibility, other initiatives have been embedded into the current Reference Design. For this reason, the initiatives outlined in the table are only a summary of those measures proposed and more detailed measures and commitments are described where relevant within chapters 9 to 19 and within Chapter 21. These measures would continue to be reviewed and updated throughout all stages of the project.

Table 8.1 CBD Metro – sustainability principles, objectives and initiatives

Sustainability principle	Sustainability objective	Practical application/initiative	Section in EA
Governance			
Implement good project governance.	• Maximise beneficial outcomes through effective and efficient project management. • Highlight corporate social responsibility.	**Design phase** • Integrate sustainability advisors into the project design process. **All phases** • Audit sustainability initiatives and assess performance. • Adhere to Sustainability Plan, project sustainability charter and framework.	Chapter 8
Involvement of community and stakeholders			
Actively engage community and stakeholders with design development and increase awareness of facilities to maximise patronage.	• Actively engage the local community in developing the project to maximise patronage.	**Design phase** • Undertake ongoing survey of community members on what would encourage them to use the station and to walk, cycle or catch public transport to the station. **Construction phase** • Undertake ongoing consultation with the local community to monitor construction impacts. **All phases** • Include consultation specialists within the project team. • Prepare and implement a comprehensive Construction Community Involvement Plan.	Chapter 3

Sustainability principle	Sustainability objective	Practical application/initiative	Section in EA
Community benefit			
Maximise community benefit.	• Facilitate healthy living. • Maximise access and connectivity. • Promote and enhance culture, diversity and heritage. • Maximise safety. • Maximise employment and opportunity.	**Design phase** • Apply design principles to create stations that are safe, legible and attractive (e.g. CPTED). • Apply design principles to create stations that promote transit-oriented development surrounding station sites (where appropriate). • Ensure the design maximises access to other public transport opportunities. • Ensure the accessibility of stations and rolling stock for people with disabilities. • Implement mitigation measures to minimise impacts on the community. • Ensure the project functions as both a facilitator and creator of employment opportunities within Sydney. • Include a pedestrian link over the former Rozelle Marshalling Yard, creating safer, more connected suburbs and communities on either side.	Chapter 19 Chapter 6 Chapter 17 Chapter 16 Chapter 6
Adaptation to climate change			
Adapt to the effects of anticipated climate change.	• Maximise environmental comfort for passengers and workers. • Ensure infrastructure is designed to withstand the effects of climate change. • Ensure landscaping is appropriate to future climate change.	**Design phase** • Select suitable materials for infrastructure exposed to changing climatic conditions. • Select design standards to cope with expected extreme events. • Use technologies to meet required standards of performance or service under changed climatic conditions. **Operational phase** • Provide maintenance regimes to accommodate acceleration in the degradation of materials and structures.	Chapter 19

Sustainability principle	Sustainability objective	Practical application/initiative	Section in EA
Greenhouse gas emissions			
Minimise contributions to climate change through reducing the greenhouse gas emissions of the project and increasing patronage.	• Minimise direct emissions and indirect emissions from consumption of purchased electricity, heat or steam. • Minimise upstream indirect emissions. • Minimise downstream indirect emissions and maximise patronage with transit-oriented development. • Maximise carbon sequestration.	**Design phase** • Incorporate passive design measures into station, tunnel and depot designs. • Apply design principles to create stations that promote transit-oriented development surrounding station sites. **Construction phase** • Investigate measures to reduce the embodied energy of construction materials. • Assess spoil reuse and disposal options with consideration to transport-related emissions. • Apply energy-reducing strategies at construction sites. • Purchase renewable energy during construction. **Operational phase** • Investigate opportunities to use renewable energy technology. • No use of greenhouse gas potential refrigerants. • Purchase renewable energy during operation.	Chapter 6 Chapter 7 Chapter 19

Sustainability principle	Sustainability objective	Practical application/initiative	Section in EA
Energy use			
Minimise energy demand, increase efficiency and maximise use of clean energy sources.	• Maximise energy efficiency • Minimise energy demand • Use low carbon and renewable energy sources	**Design phase** • Assess the origin and quality of materials used in terms of transport requirements, durability, sustainability of resource, etc. • Incorporate energy-efficient fixtures where practicable. • Incorporate energy-efficient designs. **Construction phase** • Purchase renewable energy during construction. **Operational phase** • Purchase renewable energy during operation.	Chapter 19
Resource minimisation/recycling			
Maximise efficiency of resource use over the project lifecycle.	• Minimise construction volumes. • Maximise beneficial use of spoil. • Use and source materials efficiently and from sustainable sources. • Reduce waste generation and recycle all waste and spoil whilst minimising greenhouse gas emissions. • Design for end of life of project. • Avoid production of hazardous waste. • Minimise land take. • Maximise opportunities for recycling by passengers and workers.	**Design phase** • Assess the life cycle of materials used and the structures produced. • Establish sustainability targets for construction and operation of the project during the detailed design stage. • Include sustainability in relevant procurement documentation (e.g. invitations to tender, tender assessment criteria etc). **Construction phase** • Implement waste management strategies. • Investigate opportunities for the sustainable management of spoil. • Take sustainability into account in the specification and procurement of materials.	Chapter 19 Chapter 9

Sustainability principle	Sustainability objective	Practical application/initiative	Section in EA
Water and flooding			
Manage water to maximise its beneficial use.	• Minimise demand on potable water supply. • Maximise efficiency in water use. • Reclaim and reuse wastewater. • Maximise reuse of stormwater.	**Design phase** • Incorporate water saving opportunities into the design. • Incorporate opportunities to reuse/recycle water. **Construction phase** • Seek partnerships for the reuse of water.	Chapter 19
Minimise flood risk.	• Avoid increasing the risk of flooding.	**Design phase** • Design measures to minimise stormwater accumulation onsite (also see 'Adaptation to climate change' above).	Chapter 6 Chapter 7
Biodiversity			
Achieve a net increase in biodiversity.	• Minimise impact on biodiversity, and enhance existing biodiversity. • Deliver new habitat. • Minimise habitat for feral animals and weeds. • Increase connectivity of habitat.	**Design phase** • Create 'green space' and 'green corridors' within the redeveloped former Rozelle Marshalling Yard. • Use native species in preference to introduced species in landscaping.	Chapter 6 Chapter 19

Sustainability principle	Sustainability objective	Practical application/initiative	Section in EA
Economic viability			
Maximise community benefit in return for investment.	• Establish self-sustaining management regimes. • Maximise economic benefit.	**Design phase** • Improve interchange with different modes of transport, including heavy rail, Light Rail and buses. • Provide additional mass transit capacity where it is needed most – in and around Sydney CBD. • Enable best use of the CityRail network and create a wider range of timetable and investment choices for the commuter rail network.	Chapter 4 Chapter 14 Chapter 22
Maximise opportunities for future growth.	• Maximise flexibility for the future.	**Design phase** • Provide the hub of a wider metro network that allows future extensions to the west and north-west, and the south-east and north-east. • Future-proof the CBD Metro to enable an expanded metro or heavy rail network through the Sydney CBD.	Chapter 4 Chapter 5 Chapter 22
Create enhanced land values and development opportunities around the metro corridor.	• Provide well integrated master planning of station precincts • Maximise opportunities for increased economic value of the project to benefit the economic sustainability of the project.	**Design phase** • Apply design principles to create stations that promote transit-oriented development surrounding the station sites.	Chapter 22