

CHAPTER 18

Sustainability



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18. Sustainability

This chapter assesses Brisbane Metro against sustainability principles. It provides an overview of the sustainability outcomes achieved in Brisbane Metro planning to date, as well as future opportunities for sustainable outcomes during design and delivery of Brisbane Metro.

18.1 Background

Council has a strong commitment to sustainability, with one of its goals being that “more trips will be made by public and active transport, helping to reduce congestion, fossil fuel consumption and emissions”.

Similarly, Building Queensland and Infrastructure Australia support and encourage increased and more efficient use of public transport, as well as the incorporation of sustainability principles in the planning, design, construction and operation of public transport systems. Some of the actions identified by Infrastructure Australia in relation to transport infrastructure include:

- using existing networks more efficiently
- reducing emissions
- developing more resilient networks¹.

Incorporation of sustainability principles throughout planning processes such as Brisbane Metro:

- supports the effective use of resources
- allows investments to be ‘future-proofed’
- encourages innovation in options design
- provides assurance to decision-makers that decisions are based on a comprehensive view of economic, social and environmental considerations
- enables the analysis of costs and benefits to include sustainability factors².

The strategic objectives for Brisbane Metro – customer, city, place and stakeholders – guide all aspects of Brisbane Metro, including the sustainability outcomes.

18.2 Assessment methodology

The Infrastructure Sustainability Council of Australia (ISCA) defines infrastructure sustainability as ‘infrastructure that is designed, constructed and operated to optimise environmental, social and economic outcomes of the long term’. ISCA also notes that infrastructure is crucial to sustainability in both its role in configuring society and the way it functions; and the way it is planned, designed, constructed, operated and adapted.

Various frameworks are available to support the incorporation of sustainability principles into project planning and execution. This assessment has generally adopted the Building Queensland framework. Other policies and frameworks considered in this assessment included:

- Council Corporate Sustainability Policy
- *Brisbane. Clean, Green, Sustainable 2017-2031*
- Infrastructure Australia Sustainability and Resilience Fact Sheet³.

The assessment framework outlines 19 sustainability principles for evaluation. These are listed in Table 18.1.

¹ Infrastructure Australia (2016) Sustainability and Resilience Fact Sheet, Australian Government

² Building Queensland (2016) *Business Case Development Framework V2*, Queensland Government

³ Infrastructure Australia (2016)

Table 18.1: Building Queensland sustainability principles

Governance	Environment	Social	Economic
1. Context	5. Material use	14. Social return	17. Equity
2. Strategic planning	6. Climate change mitigation	15. Community and stakeholders	18. Whole-of-life impacts
3. Leadership, knowledge sharing and innovation	7. Water management	16. Heritage	19. Valuing externalities
4. Procurement and supply chain	8. Resource recovery		
	9. Land selection		
	10. Ecology		
	11. Green infrastructure		
	12. Sustainable procurement		
	13. Employees		

The first task involved reviewing background information to identify information that demonstrates how the sustainability principles have been considered, and future actions and opportunities. This included:

- investigations, studies and reports prepared for the Brisbane Metro Business Case (e.g. community and stakeholder engagement outcomes, business case chapters)
- relevant Council policies and procedures (e.g. procurement and contracting policies, access and inclusion plans, code of conduct).

A sustainability assessment workshop was conducted to address information gaps identified through the review background information and identify sustainability considerations for future phases of Brisbane Metro's planning and development.

The final step for the assessment involved assessing how well Brisbane Metro achieves each of the sustainability principles. Each principle was assessed in accordance with the Building Queensland sustainability assessment rating outlined in Table 18.2.

Table 18.2: Building Queensland sustainability assessment rating criteria⁴

Level	Criteria
Advanced	<ul style="list-style-type: none"> • Generates significant additional value and new opportunities not previously evident, such as changing a liability into an asset • 'Designs out' the problem up-front rather than relying on managing impacts later • Solutions generate flow-on benefits outside the project boundary
Moderate	<ul style="list-style-type: none"> • Solutions to significant issues result in multiple benefits through economic, social and/or environmental outcomes • Meets immediate community and user needs and will be resilient and efficient into the future • Significant innovation and leading practice incorporated into the project
Basic	<ul style="list-style-type: none"> • Avoids harm and negative effects • Solutions create project efficiencies • Solutions have an immediate or short-term focus
Compliant	<ul style="list-style-type: none"> • Meets legislative and regulatory requirements
Poor	<ul style="list-style-type: none"> • Fails to meet legislative and regulatory standards • Solutions may result in dis-benefits and negative effects

⁴ Building Queensland (2016) Building Queensland Detailed Business Case Guidance and Template, December 2016

18.3 Legislative and policy context

18.3.1 Australian Government

The *National Strategy for Ecologically Sustainable Development* provides broad strategic direction and a framework for government policy towards ecologically sustainable development, i.e. “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”. Core objectives of the strategy are to:

- enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations
- provide for equity within and between generations
- protect biological diversity and maintain essential ecological processes and life-support systems.

Sustainability is legislated by the EPBC Act which promotes the conservation and ecologically sustainable use of natural resources, particularly in relation to matters of national environmental significance and Commonwealth land. Five principles of ecologically sustainable development are defined in the EPBC Act.

- Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.
- 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 principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
- Conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.
- Improved valuation, pricing and incentive mechanisms should be promoted.

18.3.2 Queensland Government

ShapingSEQ provides goals and guidance for ecologically sustainable development in the region and summarises the characteristics of sustainable development. The overall intent of *ShapingSEQ* is to ensure South East Queensland’s growth is sustainable, makes the region globally competitive and builds a high standard of living. The plan is built on five key themes. The ‘sustain’ theme promotes ecological and social sustainability, including goals around carbon neutrality, biodiversity protection, and connected and resilient communities.

Building Queensland specifies that the “impacts of sustainability should be reflected in the deliverability assessment, the environmental assessment, the social impact evaluation, the risk assessment and the project cost estimates”. Building Queensland requires consideration of sustainability to support effective resource use, future-proof investments, encourage innovation, provide assurance that decisions are based on thorough consideration of economic, social and environmental considerations, and incorporate sustainability factors into cost/benefit analysis.

The *State Planning Policy* (July 2017) supports sustainable transport infrastructure and land use patterns. The document defines seven policies to be integrated in transport planning and development, including consideration of compatible land uses, integration with development, development to support public and active transport, and minimise transport-related emissions.

18.3.3 Brisbane City Council

Council’s *Corporate Sustainability Policy* aims to embed sustainability into Council’s work and decision making. The sustainability policy identifies four target areas for initial focus: resource efficiency, sustainable places and urban form, biodiversity conservation, and health and wellbeing. It recognises that environmental, economic and

community considerations need to be considered together, and calls to combine short-term with long-term thinking.

Brisbane. Clean, Green, Sustainable 2017-2031 is Council's sustainability strategy and aims to put environmental sustainability and climate resilience at the heart of all Council does. Green transport is one of the nine themes identified, with a priority action requiring investment in new and upgraded public transport infrastructure, such as Brisbane Metro. Also relevant to Brisbane Metro are the themes relating to low carbon, clean air, waste and resource recovery, watersmart city, and sustainable cityshape.

Brisbane Vision 2031 is Council's long-term community plan for the city. One of the three main priorities for the plan is to "ensure that Brisbane has the services and infrastructure to meet the liveability and sustainability challenges of the future". Part of the vision is for an integrated efficient and safe transport system, encouraging residents and visitors to make travel choices other than private cars. Inherent to this vision is improvements in public transport and its interface with other modes of transport.

City Plan is Council's plan for future development of Brisbane. City Plan identifies the strategic framework for the city, which sets the policy direction and forms the basis for ensuring appropriate development occurs in Brisbane. Theme 4 of the strategic framework plans for Brisbane's highly effective transport and infrastructure, with land, facilities and services that support economic growth while meeting environmental and social needs.

18.3.4 Sustainability frameworks

ISCA is the peak industry body for advancing sustainability outcomes in infrastructure in Australia and New Zealand. The ISCA infrastructure sustainability rating scheme evaluates sustainability initiatives and potential environmental, social and economic effects of infrastructure projects and assets across design, construction and operation of infrastructure. The rating scheme considers the integration of sustainability drivers and outcomes in all aspects of project delivery and asset operations including:

- management systems
- procurement
- climate change adaptation
- energy and carbon
- water
- materials
- discharges to air, land and water
- land use, contamination and flooding
- waste
- ecology
- community health, well-being and safety
- natural and cultural heritage
- stakeholder participation
- urban and landscape design
- innovation.

The Building Queensland assessment framework draws on the ISCA rating scheme in defining sustainability and prescribing a set of considerations and principles for embedding sustainability into project planning and design. The assessment framework provides a strong basis for a later assessment against the full ISCA Infrastructure Sustainability Rating Scheme.

18.4 Sustainability assessment

This section outlines the findings of the assessment against each of the 19 sustainability principles.

18.4.1 Governance

Table 18.3 to Table 18.6 summarises the assessment relating to governance principles including context; strategic planning; leadership, knowledge sharing and innovation; and procurement and supply chain.

Table 18.3: Context assessment

Principle 1 – Context	
<p><i>All infrastructure projects sit within a broader context, and should be planned, designed and operated to connect with the wider system (including other infrastructure, economic activity, landscapes, population hubs and movements, flows of resources, materials, goods and people). This could occur at neighbourhood, town, city, region or state scales.</i></p> <ul style="list-style-type: none"> • What is the service need being addressed by Brisbane Metro? Have social, environmental and economic issues been considered? • What are the key elements, interrelationships and interdependencies of the wider system or network for this project that are fundamental to its long-term effectiveness? • How will Brisbane Metro integrate with, or respond to, these elements? 	
Achievement level	Advanced
Discussion	<ul style="list-style-type: none"> • The key service need for Brisbane Metro has been thoroughly investigated and articulated. Brisbane’s forecast population growth is expected to drive significant increases in demand for bus and rail transport, particularly in the morning and afternoon peaks. At the same time, the transport network is experiencing increasingly constrained capacity and reliability issues including reduced strategic accessibility and connectivity, constraints to economic growth and productivity, and network and services problems on both bus and rail. In the absence of significant improvements to the bus network, to complement other improvements, it is predicted that large parts of the city will experience a significant deterioration in public transport travel times and reliability, leading to reduced accessibility, increased congestion costs as well as lost productivity and a less competitive city. • Social, environmental and economic issues and risks have been considered through the development of Brisbane Metro and are documented in various assessments. • Seven key principles have been used to guide the development of the Brisbane Metro solution: accessibility and connectivity; capacity; journey time and reliability; customer experience; operational efficiency; protecting and shaping the city; and identity and legacy. In relation to accessibility and connectivity, Brisbane Metro: <ul style="list-style-type: none"> • interchanges with the existing bus and rail network at 11 locations and the proposed CRR project at two locations • connects the inner city and suburbs • interacts with and supports Brisbane’s Cultural Centre precinct • provides better public transport connections between key health, knowledge, education and entertainment hubs • addresses inner city constraints of the busway network, flow-on socio-economic benefits/addressing impacts. • Chapter 20 outlines how Brisbane Metro integrates with and responds to these elements, including: <ul style="list-style-type: none"> • integration with the proposed CRR project and other major projects • opportunities and impacts at important inner city precincts • detailed planning for changes to the bus network • managing changes to general traffic at Victoria Bridge and North Quay • understanding the impacts of construction at key worksites and planning appropriate mitigation measures.

Table 18.4: Strategic planning assessment

Principle 2 – Strategic planning	
<p><i>Design infrastructure as the solution to the identified service need, taking into consideration the strategic goals and objectives. Focus on longer term use and outcomes so that the infrastructure leaves a positive legacy. Consider adaptability to respond to future changes, challenges and trends.</i></p> <ul style="list-style-type: none"> • Has a full range of options been considered including non-infrastructure solutions? • How will Brisbane Metro solve the identified service need? How does it align with departmental and/or Queensland Government goals and objectives? • Does Brisbane Metro respond to the most significant drivers of change over the next two decades (i.e. those with greatest impact and most probable) including technological, demographic, political, environmental, and economic trends? 	
Achievement level	Advanced
Discussion	<ul style="list-style-type: none"> • An options assessment process was undertaken, which involved detailed analysis and investigation, and stakeholder and community engagement. Options considered ranged from better use of existing infrastructure to the construction of new infrastructure. Options were assessed against a range of customer-focused criteria, as

Principle 2 – Strategic planning	
	<p>well as Council's project objectives – Customer, City, Place, Stakeholders.</p> <ul style="list-style-type: none"> • Brisbane Metro aligns with the identified service need and priority problems. It is also consistent with key plans and policies at all levels of government for improved public transport, for example the <i>Australian Infrastructure Plan</i>, <i>Smart Cities Plan</i>, <i>State Infrastructure Plan</i>, <i>ShapingSEQ</i>, the Master Plan and Council's future transport network initiatives (e.g. Connecting Brisbane and Transport Plan for Brisbane). • Brisbane Metro is being planned with an understanding of, and in response to, the most significant drivers of change over the next two decades, including: <ul style="list-style-type: none"> • utilising existing infrastructure represents an efficient use of increasingly scarce resources • increasing the capacity of the busway network responds to expected future growth in population and employment, and the resulting public transport demand • providing more frequent, reliable and accessible public transport to cater for an ageing population • reducing congestion on the busway in the CBD and inner city and reducing the number of buses on CBD streets, supports predicted population and economic growth • smarter use of technology and systems is expected to help improve efficiency and reliability of operations • the introduction of new metro vehicles provides opportunities for energy efficient and low-emission operations • planning for new infrastructure is considering climate change adaptation, including ensuring design elements provide a certain level of flood immunity • future-proofing is being incorporated into elements of the design, with underground stations being designed to not preclude potential future upgrading.

Table 18.5: Leadership, knowledge sharing and innovation assessment

Principle 3 – Leadership, knowledge sharing and innovation	
<p><i>The leadership team is responsible for implementing, measuring and reporting on the sustainability performance as well as creation of a culture of innovation and knowledge-sharing.</i></p> <ul style="list-style-type: none"> • How will Brisbane Metro engage a committed leadership team to embed sustainability into the planning, design, building and operation of this infrastructure project? • How will a culture of innovation be created across Brisbane Metro life cycle and include both proponent and contractor? • How will knowledge and lessons be shared with the project team, other projects and the supply chain? How will lessons learnt from previous projects be incorporated? • How will the supply chain be prepared for the sustainability and innovation requirements of this project? • How will you consider and respond to local Indigenous and other cultural elements in the design, delivery and operation of this project? (refer to Principle 16) 	
Achievement level	Moderate
Discussion	<ul style="list-style-type: none"> • Council has a strong commitment to sustainability evidenced through its sustainability policy and <i>Brisbane. Clean, Green, Sustainable 2017-2031</i>. • Planning for Brisbane Metro has involved an integrated project team with diverse and relevant skills and experience from Council and specialist consultants. • A culture of innovation and sustainability is evidenced through various existing and potential future decisions and initiatives including: <ul style="list-style-type: none"> • intelligent systems, on-board information, off-board ticketing, and use of technology to promote reliability • design for the new Cultural Centre station considers the various constraints and includes allowance for a potential future low-rise development over the station • busway platform extensions have been incorporated into the concept design to provide more effective capacity (considering proposed operations and patronage forecasts in 2041) • innovative construction techniques will be considered to minimise disruption. • Innovation is being considered to determine the future delivery model, on that basis that 'output-based service requirements tend to create an environment that encourages innovation from the private sector'. • Planning for Brisbane Metro is considering a range of other initiatives such as the proposed CRR project. Council has commenced and will continue to consult with stakeholders, including the CRR Delivery Authority. • The options analysis looked at other priority projects (BaT project, the proposed CRR project), work on which

Principle 3 – Leadership, knowledge sharing and innovation	
	<p>informed planning for Brisbane Metro.</p> <p>Potential opportunities for consideration in future project planning and development.</p> <ul style="list-style-type: none"> • Continue to consider innovation and sustainability in future phases of Brisbane Metro’s development, particularly detailed design. • Develop and execute a procurement process for future phases (e.g. vehicle selection and procurement, selection of construction contractors) that rewards (or at least encourages) innovation and sustainability.

Table 18.6: Procurement and supply chain assessment

Principle 4 – Procurement and supply chain	
<p><i>Procurement activities are responsible and they consider human rights, society and the environment.</i></p> <ul style="list-style-type: none"> • How will sustainable procurement, including human rights, society and the environment be incorporated into Brisbane Metro’s procurement activities? 	
Achievement level	Basic
Discussion	<ul style="list-style-type: none"> • Council’s approach to procurement and contracting is outlined in its <i>Annual Procurement Policy and Contracting Plan 2016-17</i>. The principles applied to contracting activities are: value-for-money; open and effective competition; the development of competitive local business and industry; environmental protection; ethical behaviour and fair dealing. • The procurement plan contains a sustainable procurement policy, which adopts the Queensland Government working definition of sustainable procurement: “sustainable procurement is a process whereby organisations meet their needs for goods, services and capital projects, in a way that achieves value-for-money on a whole-of-life basis in terms of generating benefits not only to the organisation, but also to society, the economy and the natural environment.” The procurement plan outlines specific economic, environmental and social objectives for contracting. • Procurement and contracting activities for Brisbane Metro have been, and will continue to be, conducted in accordance with the procurement plan. <p>Potential opportunities for consideration in future project planning and development.</p> <ul style="list-style-type: none"> • Consider sustainability opportunities in future procurement and contracting including: <ul style="list-style-type: none"> • opportunities for elements of local procurement, including sub-contractors • including environmental management requirements in contracts, with a strong focus on sustainability outcomes and performance • providing performance based specifications and high benchmarks for operational performance (e.g. ‘better than standard’ or ‘best practice’) • encouraging low-emissions, sustainable materials, innovative design and other sustainability outcomes in procurement of new vehicles. • Review the new <i>ISO 20400: 2017 Sustainable procurement</i> guidance, and incorporate any lessons where appropriate.

18.4.2 Environment

Table 18.7 to Table 18.15 describe the assessment of environment principles including material use, climate change mitigation, water management, resource recovery, land selection, ecology, green infrastructure, sustainable procurement and employees.

Table 18.7: Material use assessment

Principle 5 – Material use	
<p><i>Materials used on Brisbane Metro have a low life cycle impact and low toxicity.</i></p> <ul style="list-style-type: none"> • How will Brisbane Metro assess the materials used in terms of their environmental life cycle impact and toxicity? 	
Achievement level	Moderate
Discussion	<ul style="list-style-type: none"> • Design of Brisbane Metro maximises use of existing assets, including specifying a metro vehicle that does not require early replacement or maintenance of busway pavement. This approach dramatically reduces the quantity

Principle 5 – Material use	
	<p>of materials required for construction.</p> <ul style="list-style-type: none"> Brisbane Metro's procurement strategy will be conducted in accordance with Council's procurement policy (refer to Principle 4). <p>Potential opportunities for consideration in future project planning and development.</p> <ul style="list-style-type: none"> Reduce material use during design and construction through: <ul style="list-style-type: none"> efficient design to minimise materials required investigating operational solutions instead of infrastructure solutions where appropriate minimising the temporary infrastructure required sourcing materials locally to minimise transport costs using recycled materials where possible re-using clean excavated material using recycled water for construction where possible (e.g. dust suppression). The material used in the greatest quantities during operation is expected to be fuel. Current Council policies require Council operations to be carbon-neutral, and to manage the cost per kilometre and the tonnes of carbon emissions per kilometre to minimise fuel use. Maintenance activities will require material use through the operation of Brisbane Metro. The design should incorporate measures to minimise the need for maintenance and repairs.

Table 18.8: Climate change mitigation assessment

Principle 6 – Climate change mitigation	
<p><i>Brisbane Metro will mitigate climate change through identifying an infrastructure solution to reduce global carbon emissions.</i></p> <ul style="list-style-type: none"> How will this project mitigate climate change? 	
Achievement level	Advanced
Discussion	<ul style="list-style-type: none"> Council is a carbon-neutral organisation. The intent behind Brisbane Metro is to improve the efficiency of Brisbane's public transport network. Key outcomes include: <ul style="list-style-type: none"> reduced and more reliable travel times fewer buses in the CBD reduced congestion in the CBD. Removing buses and relieving congestion on CBD streets should see associated reductions in carbon from bus emissions. It is expected that more efficient travel (i.e. reduced and more reliable travel times) will contribute to a mode shift from private to public transport across the network in the future. This is particularly important in considering Brisbane's projected population growth. The use of existing infrastructure for much of the metro alignment reduces the materials and land disturbance. The planned specifications for the metro vehicle is not expected to reduce the busway pavement's life, minimising carbon emissions associated with repairing or replacing the pavement. Flood protection has been an important consideration in designing the tunnels and underground station. Flood planning takes into account projected changes in flood risk associated with climate change. The Cultural Centre station has been designed to allow the bus lanes to reopen as soon as possible following a flood event. The cost-benefit analysis has captured a range of externalities, including greenhouse gas emissions. <p>Potential opportunities for consideration in future project planning and development.</p> <ul style="list-style-type: none"> Make the system as adaptable as possible, allowing it to respond to changes over time; considering temperature extremes as well as rainfall variability. Investigate opportunities to improve drainage of areas near to Brisbane Metro through appropriate design responses. Investigate the use of electric/diesel engines for the metro vehicles, as an alternative to diesel engines. The distances involved along the metro alignment support rapid charging of electric vehicles.

Table 18.9: Water management assessment

Principle 7 – Water management	
<i>Managing water consumption and discharge according to local conditions now and in the future.</i>	
<ul style="list-style-type: none"> • Will Brisbane Metro use large amounts of water in construction and operation? • Is Brisbane Metro located in an area of water scarcity? If not, how will water scarcity in the future affect its construction and operation? • Will Brisbane Metro discharge water into sensitive environments during construction and/or operation? 	
Achievement level	Basic
Discussion	<ul style="list-style-type: none"> • Brisbane Metro is expected to use water during construction for dust suppression. The amount of water required for construction is unknown, but is not expected to be significant. • Construction is expected to require dewatering of below-ground excavations, including in areas with known contamination. Contaminated water, as well as water used for construction, will be contained and treated before discharge, to ensure it meets relevant water quality standards for the receiving environment. • The construction environmental management plan will define measures for storage and handling of litter, toxicants and spills. Water management will consider the impact to groundwater. • Construction vehicles will use dedicated washdown areas to avoid runoff. <p>Potential opportunities for consideration in future project planning and development.</p> <ul style="list-style-type: none"> • Incorporation of water sensitive urban design into the buildings and public spaces built or altered by Brisbane Metro.

Table 18.10: Resource recovery assessment

Principle 8 – Resource recovery	
<i>Reducing waste generated and increasing re-use in construction and operation.</i>	
<ul style="list-style-type: none"> • How will Brisbane Metro manage waste and resource recovery? 	
Achievement level	Advanced
Discussion	<ul style="list-style-type: none"> • Use of existing busway infrastructure will help to minimise potential waste generated by Brisbane Metro. • The majority of waste generated by the metro is expected to relate to construction and demolition. It is expected that much of this waste can be recycled (refer to Chapter 21). • Construction wastes are likely to include hazardous materials that cannot be recovered (e.g. acid sulfate soils, contaminated water, and asbestos). These will be handled and disposed of appropriately to minimise the risk to construction workers and the public. • Waste generated during operation and maintenance is expected to be considerably less than that resulting from construction, and will depend on operational frequencies, customer numbers, and maintenance regimes. • A waste management strategy will be developed for Brisbane Metro, including the metro depot, in accordance with the waste hierarchy.

Table 18.11: Land selection assessment

Principle 9 – Land selection	
<i>Brisbane Metro is located on previously disturbed land and limits impacts to local habitat.</i>	
<ul style="list-style-type: none"> • Will this project be located on previously disturbed land? 	
Achievement level	Advanced
Discussion	<ul style="list-style-type: none"> • Brisbane Metro will generally be located within previously disturbed land, being the existing South East Busway, Inner Northern Busway and Eastern Busway or existing road reserves, minimising land use change. Permanent land use change will generally be limited to the metro depot at Rochedale and small areas of land adjacent to the existing busway, including mainly vacant land at 125 Grey Street. • Major construction areas will be associated with the new underground Cultural Centre station and Adelaide Street tunnel, with smaller worksites associated with the station modifications. Construction laydown areas will also be required for the storage of materials, plant and equipment. Worksites and laydown areas are generally located on previously disturbed land. The construction area and construction laydown area at Griffith University station is expected to require clearing of approximately 0.5 hectares of remnant vegetation within the busway corridor and

Principle 9 – Land selection

	<p>Griffith University Mt Gravatt campus. The construction laydown area is proposed to use a section of existing car park and adjacent cleared land, helping to minimise the amount of vegetation to be disturbed. Minimising the extent of vegetation clearing and disturbance required will be a key consideration in finalising the laydown area.</p> <ul style="list-style-type: none"> • Impacts on surrounding land uses will be managed through the implementation of environmental management measures outlined in the environmental management plan.
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Table 18.12: Ecology assessment

Principle 10 – Ecology

The local and regional habitat and ecology will be enhanced.

- How will Brisbane Metro improve ecology within the local region?
- Will Brisbane Metro impact on critical natural capital (irreplaceable natural features, species, habitats, etc.)?

Achievement level	Basic
Discussion	<ul style="list-style-type: none"> • Chapter 12 assess potential impacts on flora and fauna values in the study area. Impacts on flora and fauna will generally be low due to the limited ecological value within the study area and the metro alignment located within the existing busway corridor. • The construction area and construction laydown area at Griffith University station is expected to require clearing of approximately 0.5 hectares of remnant vegetation within the busway corridor and Griffith University Mt Gravatt campus. Vegetation in this area is highly disturbed, having been modified by past clearance and being currently located between the Pacific Motorway to the west and cleared open space to the east and south. With mitigation, construction of Brisbane Metro is not expected to result in significant impacts to species or ecosystems protected under State or Federal legislation. • Proposed works at Ernie’s Roundabout are in close proximity to Breakfast Creek. No native vegetation is expected to be disturbed as part of the works, and mitigation measures will be in place to prevent surface water runoff and potential contamination of the waterway. No significant impacts are expected as a result of Brisbane Metro’s construction and operation. • Establishment of the metro depot is expected to require clearing of some large native trees, with potential to impact the habitat value of the site. Further survey and assessment of habitat values in this area will be undertaken prior to construction. • Mitigation measures to protect ecological values near Brisbane Metro are outlined in Chapter 12. They include: <ul style="list-style-type: none"> • minimise area of vegetation disturbance • where clearing is required, use a staged approach to allow fauna movement • spotter/catcher present during vegetation clearance • spill containment and runoff management measures • dust and emission reduction measures including site watering • weed hygiene and post-construction weed control • minimise night works lighting beyond work area.

Table 18.13: Green infrastructure assessment

Principle 11 – Green infrastructure

Traditional infrastructure is replaced with natural processes to do the same job. The term ‘green infrastructure’ refers to an interconnected network of landscape assets that is intertwined with engineered (grey) infrastructure and buildings (all the natural, semi-natural and artificial networks of multifunctional ecological systems within, around, and between urban areas, at all spatial scales).

- Describe the opportunities to replace traditional infrastructure (grey) with green infrastructure.

Achievement level	Moderate
Discussion	<ul style="list-style-type: none"> • Brisbane Metro is consistent with, and supports the concept of green infrastructure through: <ul style="list-style-type: none"> • reinforcing lifestyle and employment corridors • improving inner city amenity • enhancing city image and liveability. • Opportunities and enhancements for the key precincts include ‘greening’ the Cultural Centre precinct, introducing

Principle 11 – Green infrastructure	
	<p>more trees to the public space, and opening the precinct to more pedestrian traffic.</p> <ul style="list-style-type: none"> Brisbane Metro complements the proposed CRR project. The combined projects also provide for place-making benefits, as together they are catalysts to reimagine station precincts and provide a better and more consistent customer experience, particularly at Roma Street and Boggo Road. <p>Potential opportunities for consideration in future project planning and development.</p> <ul style="list-style-type: none"> Consider the incorporation of water sensitive urban design into the new stations, depot and public spaces. These can potentially catch and treat stormwater and improve public amenity during operation.

Note: In defining the term 'green infrastructure' the assessment has adopted the definition of the European Commission. 'Green infrastructure is a strategically-planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation and climate mitigation and adaptation. This network of green (land) and blue (water) spaces can improve environmental conditions and therefore citizens' health and quality of life. It also supports a green economy, creates job opportunities and enhances biodiversity⁵.

Table 18.14: Sustainable procurement assessment

Principle 12 – Sustainable procurement	
<p><i>Creating positive social outcomes through procurement spend and processes.</i></p> <ul style="list-style-type: none"> How will Brisbane Metro use procurement spend to create socially and environmentally beneficial outcomes (e.g. the procurement of environmentally friendly products and services)? 	
Achievement level	Basic
Discussion	<ul style="list-style-type: none"> Council's approach to procurement and contracting is outlined in its procurement plan. The principles applied to contracting activities are: value-for-money; open and effective competition; the development of competitive local business and industry; environmental protection; ethical behaviour; and fair dealing. The procurement plan contains a sustainable procurement policy, which adopts the Queensland Government working definition of sustainable procurement (refer to Principle 4). The procurement plan outlines specific economic, environmental and social objectives for contracting. Procurement and contracting activities for Brisbane Metro have been, and will continue to be, undertaken in accordance with this plan. <p>Potential opportunities for consideration in future project planning and development are outlined in Principle 4.</p>

Table 18.15: Employees assessment

Principle 13 – Employees	
<p><i>Supporting and improving the lives of all employees, including sub-contractors of the infrastructure project.</i></p> <ul style="list-style-type: none"> How will Brisbane Metro support and improve employee outcomes especially for marginalised and disadvantaged groups? 	
Achievement level	Basic
Discussion	<ul style="list-style-type: none"> During construction, Brisbane Metro is expected to generate employment in construction, professional, administrative, technical and trade services. The operation phase is expected to require workers to operate the metro vehicles, as well as administrative and maintenance workers. Indirect benefits of Brisbane Metro include employment in businesses and industries that support construction and operation activities. Brisbane Metro is expected to improve public transport efficiency and reliability across the network, providing better access to employment, services and facilities. This will have benefits for workers. Improvements to Brisbane's public transport network would be expected to particularly benefit groups vulnerable to transport disadvantage (e.g. students and youth, elderly, low-income households, non-drivers, households without access to or limited access to private vehicles) Across its operations, Council provides support and improved employee outcomes through mechanisms such as: <ul style="list-style-type: none"> all employees and sub-contractors on Brisbane Metro are expected to abide by Council's Code of Conduct, which promotes a respectful and ethical workplace Council has specific initiatives to provide employment opportunities for Aboriginal and Torres Strait Islander

⁵ European Commission (2016) *Green Infrastructure*, accessed August 2017 at http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

Principle 13 – Employees

	<p>peoples, which may include roles on Brisbane Metro.</p> <ul style="list-style-type: none"> • Council is, and will continue to aim to be an Employer of Choice for people with disability. The target is for 10.7% of Council's workforce to be people with a declared disability. This is likely to include involvement in Brisbane Metro. <p>Potential opportunities for consideration in future project planning and development.</p> <ul style="list-style-type: none"> • Implementation of training opportunities (particularly during construction), allowing specific groups (e.g. young people) to gain skills in the construction industry.
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18.4.3 Social

Table 18.16 to Table 18.18 describe the assessment of social principles including social return, community and stakeholders and heritage.

Table 18.16: Social return assessment

Principle 14 – Social return	
<p><i>Brisbane Metro will have a positive social return on investment meaning that for every dollar spent, there will be over one-dollar worth of social outcomes.</i></p> <ul style="list-style-type: none"> • What will be the social return of this project? Describe how Brisbane Metro will benefit society (e.g. reduced travel times, increased well-being, improved air quality, increased social cohesion). 	
Achievement level	Advanced
Discussion	<ul style="list-style-type: none"> • The benefits of Brisbane Metro in relation to access and connectivity include: <ul style="list-style-type: none"> • shorter journey times across Brisbane Metro and bus network • increased connectivity across public transport modes • more reliable journey times. • Benefits for road users, public transport users as well as operational benefits and other benefits (e.g. environmental externalities including air pollution, urban separation) are quantified in the CBA. • Chapter 14 identifies a range of social benefits of Brisbane Metro, including enhanced public transport access. Impacts on community health and wellbeing are also expected to be positive (e.g. access to education and employment, enhanced opportunities for social interaction, increased physical activity, improved access to health and medical facilities).

Table 18.17: Community and stakeholders assessment

Principle 15 – Community and stakeholders	
<p><i>Understanding and incorporating community and stakeholder views including marginalised and affected groups, to increase the social license to operate</i></p> <ul style="list-style-type: none"> • How will community and stakeholder views be considered and incorporated into the decision making processes throughout Brisbane Metro? • How will marginalised and affected groups be included in the engagement? • What is the legacy left behind beyond the legacy of the project itself (e.g. a bike path to connect two existing bike paths, enhanced community space, restoration of a heritage area etc.)? 	
Achievement level	Moderate
Discussion	<ul style="list-style-type: none"> • Community and stakeholder engagement has played an important role in the development of Brisbane Metro. In particular, community and stakeholder feedback has assisted in identifying community features, values and issues that are important in the study area; understanding how people live, visit, work and travel in the study area and identifying possible benefits and impacts. • Three rounds of communication and engagement have been conducted to date. <ul style="list-style-type: none"> • Round 1 (early 2016) involved communication to introduce Brisbane Metro to residents and industry. • Round 2 (August to November 2016) identified issues and concerns of key stakeholders and sought feedback from the broader community to help inform the selection of a preferred option. Round 2 involved a range of

Principle 15 – Community and stakeholders	
	<p>activities, including establishing four reference groups of affected stakeholders: Government, Industry, River North, River South.</p> <ul style="list-style-type: none"> • Round 3 (March to May 2017) focused on informing the community about the revised Brisbane Metro, demonstrating how Council had listened to community and stakeholders to refine and evolve Brisbane Metro, identifying issues and concerns of key stakeholders and seeking feedback from the broader community. • Access for people with disability is a key consideration in planning. Vision Australia is represented on the River South Reference Group. The Cerebral Palsy League has also been invited to participate in the reference group. • Community and stakeholder feedback has indicated strong support for Brisbane Metro, particularly the expansion of metro services to more areas and the ability for bus and metro services to share the busway. • The assessment of social impacts has been informed by the outcomes of engagement. Construction and operation of Brisbane Metro is expected to have a range of impacts, both positive and negative, on various stakeholders, including government agencies, property owners, local businesses, road users and public transport users. Council will continue to engage with the community and stakeholders through the planning and development of Brisbane Metro. • Further engagement with key stakeholders such as Queensland Rail, Queensland Urban Utilities, the Queensland Government and stakeholders near the Queensland Cultural Centre (QPAC, Queensland Museum) and other project teams (i.e. the proposed CRR project), has been identified to assist in managing identified project risks. • The legacy of Brisbane Metro beyond the project itself is the contribution it makes to a better public transport system in Brisbane, the improved connectedness of important cultural and education precincts as well as potential improvements to the public realm. <p>Potential opportunities for consideration in future project planning and development.</p> <ul style="list-style-type: none"> • Consult with stakeholders and community on the design of public realm changes and improvements, as well as design and deployment of apps and passenger information systems. • Explain the various aspects of Brisbane Metro (objectives, benefits etc.), as well as how it interfaces with the other large infrastructure and development projects e.g. the proposed CRR project and Queen’s Wharf Brisbane. • Consider a change management process for bus management, including all relevant stakeholders.

Table 18.18: Heritage assessment

Principle 16 – Heritage	
<i>Protecting Indigenous and non-Indigenous heritage and sites that are highly valued by the community.</i>	
<ul style="list-style-type: none"> • Will Brisbane Metro affect heritage site or areas highly valued by the community? Are there any opportunities to enhance heritage? 	
Achievement level	Moderate
Discussion	<ul style="list-style-type: none"> • Brisbane Metro is not expected to impact on any known Indigenous cultural heritage values where it utilises existing busway infrastructure. • Brisbane Metro has the potential to impact on residual sub-surface Indigenous cultural heritage material or intangible cultural heritage values in areas of new development (e.g. Cultural Centre precinct and Adelaide Street). Historic heritage values that are anticipated to be affected by Brisbane Metro include: <ul style="list-style-type: none"> • South Brisbane railway station • Queensland Cultural Centre • Early streets of Brisbane (archaeological remains potentially located underground, impacted through tunnel construction). • Management measures identified to date include: <ul style="list-style-type: none"> • consultation with relevant Aboriginal Parties (Turrbal People and Jagera People #2) through future phases of Brisbane Metro’s planning and development • recognition of Indigenous and historic heritage values in the design of project infrastructure • avoiding cultural heritage places (Indigenous and historic), and where possible avoiding impacts on heritage values • preparation and implementation of a cultural heritage management plan prior to construction in consultation and negotiation with the relevant Aboriginal Party for the area and in accordance with the ACH Act, where impacts are unavoidable.

Principle 16 – Heritage	
	<p>Potential opportunities for consideration in future project planning and development.</p> <ul style="list-style-type: none"> • Re-configuration of the existing Cultural Centre station has the opportunity to enhance the heritage values of the Cultural Centre precinct, potentially increasing community value. • For any archaeological finds, record their history, preserve and incorporate as an element of design where possible etc. • Improve the public interface with the South Brisbane railway station, and enhance its heritage value through its inclusion in an improved public realm in that area.

18.4.4 Economic

Table 18.19 to Table 18.21 describe the assessment of economic principles including equity, whole-of-life impacts and valuing externalities.

Table 18.19: Equity assessment

Principle 17 – Equity	
<p><i>Share the benefits and costs of infrastructure development in a fair and equitable way.</i></p> <ul style="list-style-type: none"> • Who will be disadvantaged or made vulnerable through Brisbane Metro? How is this being addressed? • How are the benefits shared equitably? 	
Achievement level	Moderate
Discussion	<p>Chapter 14 identifies and assesses potential impacts, both beneficial and adverse, of Brisbane Metro in terms of equity. The key findings for different stakeholder groups are as follows.</p> <ul style="list-style-type: none"> • Communities across Brisbane – improved economic and social outcomes through improved public transport access and connections to key employment, health, education, leisure and entertainment destinations and precincts within Brisbane’s inner city and south-eastern suburbs. • Communities in middle and outer suburbs – potential for more bus services and enhanced public transport access, as Brisbane Metro will free up buses. • People with mobility challenges – new station design will comply with the DDA, ensuring that this is fully accessible. This will improve public transport access, safety and travel opportunities for people with disability, the elderly and children, and may encourage some people who would otherwise avoid making trips to access public transport. • Customers, particularly students, pensioners and the elderly – Brisbane Metro will operate under the existing TransLink integrated ticketing system, which calculates fares at either an adult or concession rate based on the number of zones travelled. Concessional fares for students, pensioners and elderly public transport users will maintain equitable access to transport. • Communities closest to construction works – many of Brisbane Metro’s construction impacts will generally be localised around key locations and are expected to be relatively short-term and temporary in the context of Brisbane Metro’s operation. Following construction, these communities are expected to experience benefits in the form of more frequent and reliable public transport access to the CBD and key inner city locations.

Table 18.20: Whole-of-life impact assessment

Principle 18 – Whole-of-life impacts	
<p><i>Making decisions based on the whole-of-life impacts and benefits of a project.</i></p> <ul style="list-style-type: none"> • How will the whole-of-life impacts and benefits be incorporated into Brisbane Metro’s decision-making processes? 	
Achievement level	Advanced
Discussion	<ul style="list-style-type: none"> • Brisbane Metro is being planned to assist in meeting the long-term transport requirements of the Brisbane region, including consideration of the key elements of Brisbane’s future transport network. • The draft Design Report describes potential impacts (positive and negative) associated with construction and operation of Brisbane Metro and possible mitigation measures has been undertaken. • The need for a vehicle management system that makes the best use of available technology is recognised and being included in planning for Brisbane Metro.

Principle 18 – Whole-of-life impacts	
	<ul style="list-style-type: none"> The longer-term impacts and opportunities/benefits of Brisbane Metro have been considered in the planning phase, particularly the opportunities to ‘future-proof’ elements of the design. Design for the new underground Cultural Centre station includes allowance to accommodate a potential future low- to mid-rise development over the station entry and conversion of the station for potential future tracked vehicles. Busway platform extensions have been incorporated into the concept design to provide more effective capacity (considering proposed operations and patronage forecasts in 2041). <p>Potential opportunities for consideration in future project planning and development.</p> <ul style="list-style-type: none"> Investigate the potential for re-use (or sale for repurposing) of any vehicles that are made redundant or decommissioned as a result of Brisbane Metro. Review pedestrian and cyclist accessibility between the Cultural Centre precinct and the CBD. Design new infrastructure, particularly stations, to be resilient (e.g. stations can be closed quickly in the event of flooding and also cleaned and re-opened as soon as possible, to minimise disruption to services). Consider whether infrastructure, systems and vehicles will allow for (or at least not preclude) remote operations, autonomous vehicles etc. in the future.

Table 18.21: Valuing externalities assessment

Principle 19 – Valuing externalities	
<p><i>Putting a value on material externalities and incorporating them into the decision-making process.</i></p> <ul style="list-style-type: none"> What are the material externalities of Brisbane Metro? How will they be valued (including monetised and non-monetised values) in the decision-making process? 	
Achievement level	Moderate
Discussion	<ul style="list-style-type: none"> The CBA for Brisbane Metro includes the following benefits: <ul style="list-style-type: none"> road users – travel time savings, vehicle operating cost savings, accident cost savings, reliability benefits and road user VOC correction public transport users – travel time savings other benefits – environmental externality benefits, incremental fare box revenue, residual value operational – operating expense savings, road maintenance cost savings. Externalities captured include air pollution, greenhouse gas emissions, noise and water pollution, nature and landscape, urban separation, road damage (surface wear and tear). Other benefits that have not been monetised include: <ul style="list-style-type: none"> improved economic and social outcomes for communities across Brisbane through enhanced public transport access and connections. Improved public transport access is expected to particularly benefit those groups that may be particularly vulnerable to transport disadvantage such as elderly people, youth, students, families with young children, low-income households, non-drivers, or households without access or with limited access to a private vehicle increased pedestrian traffic near to stations, providing benefits to businesses that rely on passing trade development and revitalisation of areas around stations, creating opportunities for new businesses and subsequent indirect employment opportunities business agglomeration and enhanced business-to-business interaction increased demand for goods and services required for construction and operation of Brisbane Metro increased community cohesion improved long-term economic opportunities through better access to education and employment opportunities enhanced opportunities for social interaction, by encouraging some people to take trips they may have avoided due to unacceptable travel times and improved access to meeting places in the inner city suburbs increased physical activity and community well-being through improved access to sport, recreation and leisure facilities at Mt Gravatt, Greenslopes, South Brisbane, the CBD, and Herston. Improved public transport access is also likely to encourage increased walking trips, with many trips by public transport involving an element of walking, which is expected to have beneficial impacts on community health outcomes enhanced community health outcomes through improved access to hospitals and healthcare and medical

Principle 19 – Valuing externalities	
	facilities at Greenslopes, Woolloongabba, South Brisbane, Herston and within the CBD <ul style="list-style-type: none"> increased activity and changes to the urban environment and public places around stations is expected to impact positively on people’s perceptions of safety.

18.4.5 Overall project assessment

The overall achievement level of Brisbane Metro across the 19 principles is considered to be ‘moderate’. This is based on the individual assessment against each of the 19 principles for which:

- seven of the principles have been assessed as having an advanced level of achievement
- seven of the principles have been assessed as having a moderate level of achievement
- five of the principles have been assessed as having a basic level of achievement.

Brisbane Metro is well-placed to gain a higher level of achievement against the sustainability principles in future phases.

- Brisbane Metro had an ‘advanced’ or ‘moderate’ level of achievement for most of the governance principles indicating that the foundation elements for good sustainability outcomes – context, strategic planning, commitment and leadership – are in place and have already resulted in good sustainability outcomes. The sustainability policy, commitment and leadership of Council are an important element of this foundation upon which Brisbane Metro can continue to build.
- Opportunities to incorporate some principles in the planning phase have been limited, resulting in some having a ‘basic’ or ‘moderate’ level of achievement, and there may be opportunities for some principles to be further incorporated into future phases of Brisbane Metro, resulting in a higher level of achievement. The principles that present the most opportunities in this regard are procurement, material use, green infrastructure, heritage and community and stakeholders.

For some principles, ‘potential future opportunities’ have been identified based on the outcomes of the sustainability workshop. These have not informed the assessment of level of achievement, but are included for consideration in future phases.

18.5 Summary

This assessment captures the sustainability outcomes achieved in planning of Brisbane Metro to date, as well as future sustainability opportunities for consideration in future planning and development.

The level of achievement against each principle is outlined in Table 18.22. Brisbane Metro has been assessed as having an ‘advanced’ level of achievement against seven sustainability principles. The overall achievement level of Brisbane Metro is considered to be ‘moderate’, although Brisbane Metro is well-placed to gain a higher level of achievement in future phases as many of the foundation principles for good sustainability outcomes are already in place, and are reinforced by Council’s policy and leadership on sustainability.

Table 18.22: Brisbane Metro achievement against each principle

Area	Principle	Level of achievement
Governance	1. Context	Advanced
	2. Strategic planning	Advanced
	3. Leadership, knowledge sharing and innovation	Moderate
	4. Procurement and supply chain	Basic
Environment	5. Material use	Moderate
	6. Climate-change mitigation	Advanced
	7. Water management	Basic

Area	Principle	Level of achievement
	8. Resource recovery	Advanced
	9. Land selection	Advanced
	10. Ecology	Basic
	11. Green infrastructure	Moderate
	12. Sustainable procurement	Basic
	13. Employees	Basic
Social	14. Social return	Advanced
	15. Community and stakeholders	Moderate
	16. Heritage	Moderate
Economic	17. Equity	Moderate
	18. Whole-of-life impacts	Advanced
	19. Valuing externalities	Moderate