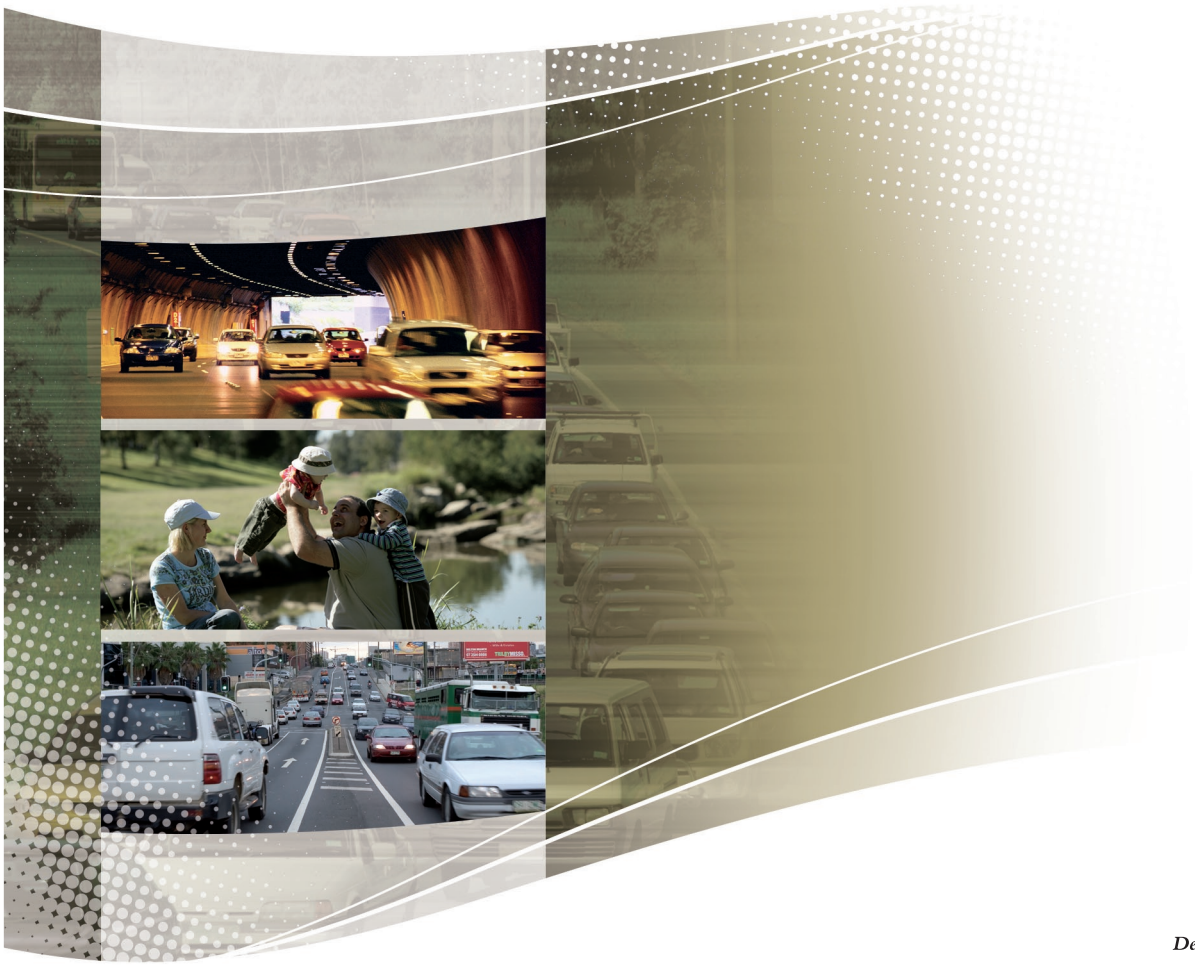
Northern Link

INITIAL ADVICE STATEMENT

September 2007



Dedicated to a better Brisbane

Northern Link

Detailed Feasibility Study

INITIAL ADVICE STATEMENT

- September 2007

Major Infrastructure Projects Office
Brisbane City Council
Level 2, 171 George Street
Brisbane QLD 4000
Phone: 07 3403 7330
Fax: 07 3403 7333

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Executive Summary

The Brisbane City Council recognises that further investment in the transport system is required as part of a balanced, overall response to the challenges of population growth, economic development and the resulting increases in travel demand, and to ensure the continued prosperity, accessibility and amenity of the City and South East Queensland. A safer and more efficient road network is one focus of the Brisbane City Council's investment strategy in transportation.

The *Transport Plan for Brisbane 2002-2016* and the *TransApex Prefeasibility Study 2005* proposed new infrastructure including Northern Link, to create an efficient system of orbital roads to bypass the central city of Brisbane for cross-city travel, and to relieve traffic congestion and create opportunities for public transport on the radial arterial routes serving the Brisbane CBD and central city.

Northern Link was assessed as part of the *TransApex Prefeasibility Study 2005* (BCC 2005) and found to be technically feasible. The study recommended that Northern Link should proceed to detailed feasibility stage. This involves the development of a concept design and a reference project, a detailed traffic study and an environmental impact assessment. Since then, the Council has examined Northern Link further through a process of preliminary assessment (BCC 2007). The Preliminary Assessment Report for Northern Link generally confirmed the findings of the Prefeasibility Study with regards the Project being technically feasible and financially viable. The preliminary assessment identified areas for further investigation in the detailed feasibility study, including design, traffic, environmental and planning issues.

Proponent

The Brisbane City Council is the proponent for Northern Link.

Council now seeks the concurrence of the Coordinator-General that the Project be declared as one of State significance, for which an Environmental Impact Statement (EIS) is required, under section 26 of the *State Development and Public Works Organisation Act, 1971* (SDA). This Initial Advice Statement (IAS) has been prepared to provide sufficient information to the Coordinator-General to:

- enable determination of the significance of the project to the State; and
- provide information to enable advisory agencies and the public to have input into preparation of the Terms of Reference for the EIS.

Project Information

The location of the Project including the possible route alignment extends from the Western Freeway across the lower south-eastern slope of Mt Coot-tha to the western end of the Inner City Bypass and Kelvin Grove Road as identified in the *Transapex Prefeasibility Report, March 2005* and in Figure 1. Consideration of other possible connections to the surface road system will be considered during the EIS study.

Northern Link is proposed to be constructed as two parallel road tunnels approximately 5.5 kilometres long, with associated connections to the surface road network. During development of the concept design and the reference project, the potential use of the tunnel system for public transport will be considered.

The Project would be equipped with a comprehensive system of fire and life safety measures, including a ventilation system to manage air quality, emergency exits and evacuation facilities, monitoring systems, tolling systems and telecommunications and security measures.

Level of Investment

A preliminary evaluation of costs has been undertaken, based on concept designs similar to those presented in the *TransApex Prefeasibility Study 2005*. Project costing will be refined as the project is further developed. The current capital cost estimate of the project is $1,600 million (2007 terms), but it will vary depending on a number of factors including the construction methodology and timing, as well as further development of the concept design and the reference project.

Policy and Planning Framework and Strategic Significance of the Project

Northern Link is part of an overall strategy to improve the efficiency of Brisbane's road network, consistent with established and accepted regional and citywide transport planning objectives. The project is recognised in the *South East Queensland Regional Plan 2005 - 2026* and *South East Queensland Infrastructure Plan and Program 2006 – 2026*, and in the *Transport Plan for Brisbane 2002 – 2016*, which all are outcomes of integrated local and regional transport planning processes carried out in recent years.

Complexity of Government Requirements

The detailed processes are outlined, demonstrating the range of potential interests, requirements and approvals for the Project at the local, State and Commonwealth levels. To ensure all requirements are met and addressed adequately, extensive agency consultation will be undertaken throughout the EIS process.

Effects on Relevant Infrastructure

Potential effects of Northern Link on existing road infrastructure include connections to the State road network at the Western Freeway, connections to the Inner City Bypass, possible connections to the Inner Northern Busway at Kelvin Grove, as well as changes in traffic volumes on local roads resulting from construction and potential changes in the road network (eg Frederick Street Toowong, Inner City Bypass and Kelvin Grove Road, Kelvin Grove).

Despite its proximity to the rail infrastructure along the Exhibition Line, Northern Link is not expected to impact on rail infrastructure. The Northern Link corridor is remote from rail infrastructure elsewhere.

Other services, such as water supply, drainage, energy and telecommunications, may be affected by the Project.

Potential Environmental Effects

Northern Link will have substantial environmental, social and economic benefits at the regional, city and local levels, and potentially adverse environmental and social impacts, especially at the local level near the connections with the surface road network. Such potential impacts will need to be considered carefully and mitigated against, through Project design and management approaches. Benefits are expected to include:

- high quality bypass of the central city for cross-city trips, relieving congestion on inner city arterials as a consequence;
- improved network travel time and reduced traffic accidents and congestion, with associated social benefits;
- recaptured capacity on the surface road network which would be available for use for public transport (bus), and possibly high-occupancy vehicles;
- reduced noise levels and air quality impacts for properties along the existing congested arterial roads (Milton Road, Coronation Drive) as a consequence of reductions in traffic flows;
- reductions in traffic flows, particularly in the peak periods, would improve connectivity and accessibility, improved amenity and access and associated economic benefits with respect to property values and urban renewal in Milton, Auchenflower and Toowong;
- opportunities for urban regeneration in Milton, Auchenflower and Toowong around areas benefiting from reductions in traffic congestion and enhanced public transport services;
- increased economic activity as a consequence of construction and as a consequence of improved accessibility in the Brisbane metropolitan area for cross-city travel (eg linking the Western Corridor with the Australia TradeCoast, via the orbital road network.

Potential adverse impacts arising from the Project, and requiring either design interventions or mitigation and management measures, could include:

- traffic disruptions on the roads adjacent to the construction worksites and at congested intersections along material haulage routes;
- requirement for properties to accommodate the connections with the surface road network, particularly at Toowong, and possibly at Kelvin Grove, and the associated impacts on households and some communities;
- construction impacts such dust, noise, vibration, water quality, night lighting at worksites for properties in close proximity to the worksites, and the duration of the potential construction impacts;
- changes in air quality due to the operation of ventilation outlets and changes in road traffic noise along the arterial roads connected with Northern Link;
- visual impacts as a consequence of changed road arrangements and above-ground infrastructure such as elevated roadways and ventilation stations and outlets;

- potential to impact on places of cultural heritage significance and other places of local or historic character1, adjacent to the proposed connections with the surface road network

Employment Opportunities

The construction phase of Northern Link would generate direct and indirect employment benefits through design, construction and the supply of materials and equipment to the project. The construction phase could result in an average of 400 full-time equivalent jobs, peaking at approximately 1,500 jobs in direct employment, with many more people benefiting through indirect employment in the supply of goods, materials and services to the construction phase..

The operational phase of Northern Link would generate direct and indirect employment on-going management and maintenance of the infrastructure, the extension of essential services including emergency services, and through the urban regeneration opportunities that are expected to present with Project commencement

[1] Places of local character include the 'timber and tin' localities in Toowong adjacent to the possible connections at Frederick Street.

1. Introduction

1.1 Background

Sustainable growth in South East Queensland (SEQ) relies upon a safe, attractive and efficient transport system, including road transport. Brisbane City Council (BCC), the Queensland Government and Commonwealth Government have recognised the importance of developing the road transport system within the SEQ Region.

The SEQ Regional Plan anticipates sustained population growth and economic activity in the region through the planning period 2005 to 2026. This growth will lead to increased demand for the safe and efficient movement of people and goods between major activity centres, such as:

- Brisbane's central city including the Central Business District (CBD), Fortitude Valley, City West precinct and South Brisbane;
- the Australia TradeCoast (ATC) including Brisbane Airport,
- the Western Corridor and the industrial centres in northern Brisbane; and
- the regional activity centres of Indooroopilly, Springfield, Ipswich etc.

In planning for sustainable population growth and economic development, the Queensland Government prepared the *South East Queensland Infrastructure Plan and Program 2005 to 2026* (SEQIPP) as its program for infrastructure investment. At the local level, the BCC has updated and adopted the *Transport Plan for Brisbane 2002-2016*. This plan, incorporating the *TransApex* initiative, seeks to develop a balanced approach to investment in the City's transport infrastructure.

Regional and local transport planning identify a system of motorway-standard orbital (ring) roads to address the transport needs of Brisbane as well as the need for enhancing accessibility, travel time reliability, road safety, security and sustainability, and environmental amenity. These plans include initiatives for public transport and alternatives such as walking and cycling to support the desired urban environment for the predicted population increase in SEQ over the next two decades.

Northern Link is one of the key strategic infrastructure elements necessary to address deficiencies in the road network of Brisbane and SEQ. Northern Link also falls within the study area of the Western Brisbane Transport Network Investigation (WBTNI).

The Commonwealth Government provides strong support to regional and local transport infrastructure needs through a range of carefully-planned program initiatives. These include the AusLink National Land Transport Plan (DoTARS 2006) for development of the national road and rail infrastructure network to support regional industry, to respond to structural change and to strengthen local social and economic opportunities.

Northern Link is a key 'missing link' in an urban transport corridor connecting the Ipswich Motorway in the south-west via the Centenary Motorway, Western Freeway, the proposed Northern Link, Inner

City Bypass, the Airport Link Project now being procured, and the East-West Arterial to the Gateway Motorway in the north-east. The key location of Northern Link within the developing motorway system for the City is shown in Figure 2.

1.2 Need for the Project

Brisbane is the centre of the fastest growing urban region in Australia, and increasing pressure is being placed on developing an integrated transport network catering for accessibility and mobility demands, whilst meeting economic, environmental and social goals.

Increasing transport congestion will have a major detrimental impact on both the economic growth and urban amenity of Brisbane and South-East Queensland and urgent action is required at a State, regional and local level. Failure to provide the necessary infrastructure to alleviate these adverse impacts, including public transport and roads, will result in additional cost to the community and a decline in environmental and economic values.

The future economic and social development of the South East Queensland region, and in particular the City of Brisbane, will rely on the provision of an efficient and effective transport network supported by travel demand management strategies addressing public transport, traffic management, parking and travel behaviour.

Analysis undertaken for Brisbane City Council demonstrated that if no new road, public transport or travel demand management initiatives were implemented, extreme and untenable congestion would exist throughout the Brisbane metropolitan area by 2016. The number of private vehicle kilometres travelled is projected to double, reducing traffic flow on almost all road corridors to Level of Service (LOS) E or worse[2]. The number of new traffic lanes required to accommodate this traffic growth will exceed the physical ability to accommodate them, and the government's capacity to fund them. A significant residual road program will be required to deal with congestion, even with major shifts in public transport use.

A balanced transport strategy including public transport projects and services, orbital road improvements/river crossings and road pricing measures is needed over the next 15 years to ensure that congestion does not exceed acceptable levels. A system of radial and ring or orbital capabilities is a solution to those deficiencies and to the problems caused by growing demands. Brisbane City's road and public transport network has distinct gaps that complicate the establishment of a logical ring road network. These gaps have a significant impact on public transport performance due to a reliance on buses that necessarily use road space.

The *TransApex Prefeasibility Report* (March 2005) identified that Northern Link's primary function would be to provide a CBD bypass for cross-city trips by linking the Western Freeway at Toowong

[2] LOS E occurs when traffic volumes are at or close to capacity, flow is unstable, and minor disturbances will cause a breakdown of traffic flow.

with the Inner City Bypass and Kelvin Grove Road. The Project would remove significant volumes of traffic from the CBD and the radial arterials. Northern Link would also create opportunities for enhanced public transport for the inner western suburbs and opportunities for urban regeneration within these corridors.

Congestion on the western arterial roads approaching the Brisbane CBD is now constraining the competitive advantages, convenience and amenity that would normally be available from a CBD location. Congestion on these routes is also affecting travel times for cross-city trips mixing with central city peak traffic flows. Congestion on Milton Road and Coronation Drive is also constraining the level of service able to be delivered by public transport (bus services) caught in traffic during the morning and evening peak periods.

With continued population growth in the Western Corridor and anticipated economic development and employment growth in the regional activity centres, including the Australia TradeCoast, there is an increasing need for an alternative to the Brisbane Urban Corridor[3] between these major traffic generators. The Brisbane Urban Corridor is heavily constrained by local traffic, by interrupted flows due to 18 sets of traffic signals, and by the hazardous mix of local passenger vehicles and heavy traffic for freight.

Traffic congestion on arteries such as Milton Road and to a lesser extent Coronation Drive has led to significant decline in urban amenity along those routes. Parts of the Milton Road corridor in particular are becoming much less desirable for redevelopment in step with declining accessibility and convenience related to increasing traffic congestion.

In response to these and other related issues, Northern Link would:

- reduce surface road traffic on Milton Road and Coronation Drive by providing an attractive alternative route for cross-city trips;
- facilitate access to the CBD for public transport (bus services) from the western suburbs generally, and possibly provide for express bus services from the western suburbs via a connection with the Inner Northern Busway;
- provide an alternative route to the heavily-constrained Brisbane Urban Corridor for regional freight and other regional trips;
- provide significant traffic relief on many north-south urban arterials, such as Metroad 5, in the city's north-western suburbs which are catering for longer distance cross-city movements as well as steadily increasing suburban traffic;
- cater for travel to/from major employment generators outside the CBD such as Brisbane Airport, Australia Trade Coast (North), and the Western Corridor; and

[3] The Brisbane Urban Corridor forms part of the AusLink national road network and links the Ipswich Motorway at Rocklea with the Gateway Motorway at Capalaba, via Granard Road, Kessels Road, and the Mt Gravatt – Capalaba Road.

- improve local traffic conditions to support development of urban regeneration, possibly in the form of transit oriented developments (TODs) in Milton, Auchenflower and Toowong.

1.3 Proponent

The Brisbane City Council is the proponent for Northern Link.

The Brisbane City Council has identified the potential for Northern Link to contribute to the transport needs of Brisbane. The detailed feasibility study will include the development of a business case in accordance with the Value for Money Framework. It will also include the development of the concept design, a reference project and Environmental Impact Statement.

1.4 Purpose of Initial Advice Statement

The Brisbane City Council seeks to have the environmental assessment required for the project carried out under the *State Development and Public Works Organisation Act, 1971* (SDA). This Initial Advice Statement has been prepared to provide sufficient information to:

- enable determination of the significance of the Project to the State; and
- enable advisory agencies and the public to have input into the Terms of Reference for the Environmental Impact Statement (EIS).

The SDA enables the Coordinator-General to declare certain developments to be "significant projects", for which an EIS is required.

In making a declaration about a significant project, the Co-ordinator General must have regard to one or more of the following[4]:

(a) *detailed information about the project given by the proponent in an initial advice statement;*

(b) *relevant planning schemes or policy frameworks, including those of a relevant local government or of the State or the Commonwealth;*

(c) *the project's potential effect on relevant infrastructure;*

(d) *the employment opportunities that will be provided by the project;*

(e) *the potential environmental effects of the project;*

(f) *the complexity of local, State and Commonwealth requirements for the project;*

(g) *the level of investment necessary for the proponent to carry out the project;*

(h) *the strategic significance of the project to the locality, region or the State.*

[4] *State Development & Public Works Organisation Act 1971, section 27*

This report is the Initial Advice Statement (IAS) required of the Proponent and addresses items listed as (a) to (h) above. If the Project is declared to be "significant" under the Act, Section 29 of the SDA notes:

The Coordinator-General must—

(a) advise the proponent that an EIS is required for the project; and

(b) publicly notify—

(i) that an EIS is required for the project; and

(ii) where copies of the draft terms of reference may be obtained; and

(iii) that comments on the draft terms of reference are invited.

This IAS is intended to provide an overview of the existing environment of the area of influence of the proposal, and to identify the level of potential impacts that will be investigated in the EIS. An EIS is to be prepared as part of the approval process. The Terms of Reference (ToR) for the EIS will be developed, based on the outcomes of this report and the requirements of relevant agencies.

2. Project Information

2.1 Location

The location of the corridor under study for Northern Link is shown in Figure 3. Northern Link is a predominantly underground toll road proposed between the Western Freeway adjacent to the Brisbane Botanic Gardens at Toowong and the Inner City Bypass at Herston. This underground roadway is part of the major orbital road network from the west across the northern suburbs to link with the main north-south routes and would also form part of the CBD bypass network shown in Figure 2.

2.2 Studies to Date

Since 2000, Brisbane City Council has been active in defining and developing a strategic response to the traffic and transport challenges arising from population growth and economic development in the City and in the adjacent local government areas. In 2002, the Council undertook the *Strategic Transport Opportunities for Brisbane* study to identify appropriate means of addressing the impacts of regional and cross-city travel on the City's arterial road network and on the accessibility of the Brisbane CBD. That investigation identified that at least 40% of all trips to the CBD had their destination elsewhere but were directed through the CBD by the radial road pattern and the limited capacity and location of the crossings of the Brisbane River.

From these investigations, the Brisbane City Council developed its *Transport Plan for Brisbane* in which it proposed, among other things, to intercept regional and cross-city trips with a system of road tunnels bypassing the CBD. Other measures related to increasing patronage on public transport, travel demand management through integrated planning of land use and transport, and support for active or personal transport (walking, cycling).

Flowing from the *Transport Plan for* Brisbane, the Council undertook the *TransApex Prefeasibility Report*. The *TransApex Prefeasibility Report*, released in March 2005, proposed a system of underground tolled roads, including the North South Bypass Tunnel, Airport Link and Northern Link, as well as the Hale Street Link as a surface tolled road, to provide an effective bypass system for the Brisbane CBD and its congested arterial approach roads.

Since then, detailed feasibility studies have been completed in respect of the North South Bypass Tunnel and Airport Link. Airport Link investigations were conducted in parallel with similar studies[5] into the feasibility of the Northern Busway linking the Inner Northern Busway at Herston to the northern suburbs at Kedron.

The *TransApex Prefeasibility Report* (March 2005) found that Northern Link was technically and financially viable and that it would:

[5] TransLink, 2006, *Northern Busway Concept Design and Impact Management Plan*, TransLink, Brisbane

- provide part of an inner orbital road system to bypass the Brisbane CBD and therefore reduce traffic congestion caused by cross-city trips on the arterial approach roads to the CBD
- assist in the efficient movement of cross-city traffic, leading to environmental and economic benefits for the community;
- benefit the freight industry by facilitating improved access via an unconstrained alternative to the Brisbane Urban Corridor, to the Brisbane Airport and Australia Trade Coast (North);
- help deliver a transport system that achieves integrated land use and sustainable transport outcomes;
- improve access to Brisbane's middle and inner ring suburbs;
- improve journey times for motorists and public transport;
- complement Council's desired land use and economic outcomes by assisting inner-city urban renewal; and
- support Council's vision as outlined in *Living in Brisbane 2026*.

The *TransApex Prefeasibility Report* investigated two primary route corridor options. One followed a direct alignment between Towoong and Herston and would be constructed as a bored tunnel. The other option followed a less direct option, close to the alignment of the Western Railway, between Toowong and Paddington and would be constructed by a combination of cut and cover and road header techniques. Prefeasibility work undertaken by Council concluded that Northern Link should be advanced to the Preliminary Assessment stage.

In August 2007, Council completed the Northern Link Preliminary Assessment. This Preliminary Assessment Report identified the strategic need for and benefits of proceeding with Northern Link, as well as identifying a range of technical, community and environmental issues to be addressed through a detailed feasibility study process. The preliminary assessment generally confirmed the findings of the *TransApex Prefeasibility* Study and recommended progression of the Project through to the detailed feasibility stage.

The detailed feasibility phase of the Project will revisit all earlier work and will develop route options within the Northern Link corridor. The detailed feasibility studies will encompass route concept development, consider feasible and relevant options, and undertake the environmental assessment of a preferred option.

2.3 Project Objectives

Objectives for Northern Link have been developed, having regard to The Council's Corporate Vision as expressed in *Living in Brisbane* 2026, and the State and local planning strategies for land use and infrastructure. The primary Project objectives are:

- provide an effective and convenient bypass of the Brisbane CBD for cross-city movement of people and freight;

- address, in part, deficiencies in the national freight network to improve freight distribution in and around Brisbane;
- improve safety and reliability of the regional road network and provide relief to congested roads in Brisbane's inner western suburbs;
- provide opportunities for additional public transport network capacity; and
- support the achievement of a sustainable urban environment for the inner western suburbs.

2.4 Project Details

The brief description below presents the scope and the scale of the Project in its conceptual form within the Northern Link corridor. The purpose of Northern Link is to connect the Western Freeway at Toowong with the Inner City Bypass at Herston. Additional connections to the surface road network may be included if the need exists and the benefits of doing so can be balanced against the impacts. Also, the detailed feasibility study will investigate the potential for public transport use of Northern Link, with connections for express bus services via the Inner Northern Busway station at Kelvin Grove.

The Project may be expected to change through more detailed design development as well as through environmental assessment and community input.

2.4.1 Project Corridor

Northern Link would be a tolled road about 5.5km long and would run mostly in tunnels from the Western Freeway beneath the suburbs of Toowong, Auchenflower, Paddington, Red Hill and Kelvin Grove to connect with the Inner City Bypass near Victoria Park Road in Herston. The Project would be constructed mostly in driven tunnels except for short sections of cut-and-cover constructions near the connections to surface roads at each end.

2.4.2 Network Connections

The primary western connection of Northern Link would be with the Western Freeway adjacent to the Brisbane Botanic Gardens. Other connections may be considered further, and could include connections with Frederick Street or with Croydon Street. Detailed investigations may determine more suitable connections in addition to the connection with the Western Freeway. The primary northern connection would be with the Inner City Bypass in the vicinity of Kelvin Grove Road and Victoria Park Road. Investigations will determine the feasibility of a secondary connection with the Inner Northern Busway to allow BCC buses rapid access to the CBD from the western suburbs. Other connections will also be investigated, including connections with Kelvin Grove Road.

2.4.3 Ventilation

Options for ventilation management of the tunnels and location of ventilation outlets and emergency smoke ducts will be considered during the detailed feasibility study. The ventilation system would need to address both in-tunnel air quality and ambient air quality for a range of traffic conditions.

The choice of the ventilation outlet sites would be governed by the potential environmental and social impacts associated with their location, as well as engineering requirements during both construction and operation, and operating considerations including energy requirements and cost. Investigations will include the potential effects of treatment systems for in-tunnel air prior to release to the ambient environment.

2.4.4 Other Works

Works that are not part of the Project, but which form an important element, need to be considered and assessed in the detailed feasibility studies, including the environmental impact statement. Of note would be surface works associated with construction, ramp connections to the existing road network, intersection and other improvements to the existing surface network (eg the Mount Coot-tha Road/Western Freeway intersection), and reconfiguration of surface areas to provide for potential improvements to public transport, cycleways and community use areas.

The location and size of construction worksites will be investigated in the context of their potential impact on existing land uses, urban amenity and environmental values. A balance will need to be achieved between worksite requirements for construction and community and environmental values.

Careful consideration is required of the methods and potential impacts of removal and disposal of construction spoil, as well as selection of haul routes and spoil placement sites. The transportation of construction materials, and particularly large pre-fabricated materials such as concrete segments for tunnel lining and the movement of large excavation machines, will be investigated and documented.

2.5 Sustainability

During concept design and development of the reference project, opportunities for implementing sustainability measures will be investigated for the design, construction and operation of Northern Link. Such measures could include water savings, energy savings, re-use of spoil and other construction materials, employment and training opportunities, options for workforce transportation, recognition and appropriate integration of community and cultural values, opportunities for urban regeneration and enhanced public transport within the inner western suburbs.

3. Level of Investment

3.1 Project Cost and Timing

A preliminary estimation of Project costs has been undertaken on the basis of the assumptions adopted in the *TransApex Prefeasibility Report*. Cost estimates will be refined as the Project is further developed. The current capital cost estimate of the Project presented in the prefeasibility studies is in the order of $1,600 million in 2007 terms. The cost estimates will depend on the construction methodology and time as well as further development of the concept design and the reference project.

Construction could take up to four years, subject to construction methodology and engineering and environmental constraints. It is anticipated the Project would be operational by the end of 2014.

3.2 Financial Issues

The *TransApex Prefeasibility Report* considered issues associated with technical feasibility and affordability of the Project. To this end it considered the financial viability of Northern Link, on a whole of project life basis, the ability to service debt obligations, funding options and project risks.

A financial analysis model was developed with assumptions made on borrowing sources, project life, tolled traffic volumes and growth, toll rate per vehicle, operation and maintenance costs and debt financing. Scenarios modelled delivered positive, whole-of-life, net present values, and the report concluded that the project was financially viable. Further financial analyses were conducted for the *Preliminary Assessment Report* and generally confirmed the findings of the *TransApex Prefeasibility Report* with regards Project affordability.

Separately, the economic assessment conducted for the *Preliminary Assessment Report* found that Northern Link would have a positive net present value.

A “user pays” system was considered appropriate for Northern Link as it would contribute to construction costs, assist in the control of traffic demand and allow investors to recover financial outlays.

Concurrent with the development of the concept design, the reference project and the environmental impact assessment, the Brisbane City Council is preparing a business case which is developing a full financial analysis of the Project and assisting the evaluation of the means by which the Project can be delivered, including mechanisms to involve private investment in the Project.

4. Planning and Policy Framework

4.1 Transport Strategy

The *South East Queensland Regional Plan 2005-2026*[6] (SEQRP) and the Brisbane *City Plan 2000* establish objectives for maintaining the primary role of the Brisbane CBD, and objectives for desired urban forms in inner-western suburbs. These objectives may not be achieved without stronger emphasis travel demand management via integrated transport – land use solutions in key movement corridors. There is a strategic need to integrate transport planning and land use planning initiatives in the corridor for local and regional benefit. Northern Link, as part of the broader *Transport Plan for Brisbane*, is part of the Brisbane City Council's balanced response to this need.

The *South East Queensland Infrastructure Plan and Program* (SEQIPP) provides for the orderly roll-out of essential physical and social infrastructure in South East Queensland as the means of achieving sustainable development. SEQIPP identifies key regional transport infrastructure projects needed to support the desired urban footprint, local growth management population targets and employment targets within a connected and accessible region. The detailed feasibility study for Northern Link is anticipated in SEQIPP.

The *Integrated Regional Transport Plan* and its successor, *Transport 2007* provide a strategic framework for a balanced approach to the SEQ Region's transport challenges, including:

- implementing measures for travel demand management, such as integrated land use and transport planning to reduce the numbers of trips required to access employment, services and entertainment, and to integrate public transport within major activity centres;
- facilitating a shift in travel mode for 'journeys to work' from the private passenger vehicle to public transport through on-going investment in public transport (rail, bus, ferry);
- improving the network of motorways and arterial roads to accommodate intra-regional travel and the safe and efficient movement of freight between major activity centres, and to enhance the accessibility of the major activity centres;
- supporting personal transport options (walking, cycling) for non-essential trips and journeys to work for some.

The *Transport Plan for Brisbane* is consistent with the over-arching strategic objectives for the SEQ Region. The transport plan anticipates the implementation of Northern Link as part of the overall balanced response to the transport challenges of the City and the Brisbane metropolitan area. This plan developed a set of coordinated actions and strategies aimed at achieving a range of transport outcomes for Brisbane to 2016, including:

[6] *South East Queensland Regional Plan 2005-2026*, Queensland Government, June 2005

- providing quality public transport that everyone can use and which encourages people to leave their cars at home;
- managing travel demand so that traffic growth is kept below population growth;
- coordinating transport and land use to make it easy to travel across Brisbane using sustainable forms of travel;
- providing a safe and efficient road network that minimises traffic impact on neighbourhoods and the environment;
- the delivery of goods on time to the right place so that freight moves efficiently and safely throughout Brisbane while protecting residential areas;
- providing more clean and green transport as safe and attractive alternatives to driving.

Northern Link is identified as an element of major infrastructure that could be delivered and financed by the private sector to address deficiencies in the orbital road network of Brisbane. Northern Link thus fulfills the intended outcome identified in the Transport Plan for Brisbane as one element considered necessary to deliver a safe and efficient road network for Brisbane.

The Brisbane City Council plays the major role in the management of the Greater Brisbane road network including the delivery of the majority of the public transport system throughout the urban area. Council's role is complemented by the services and infrastructure provided by Queensland Transport and the Department of Main Roads, ensuring connectivity and service with the regional and wider state transport network.

4.2 Strategic Planning Framework

State and Council policies for integrated land use and transport planning are contained within various planning instruments and policy statements, including the *South East Queensland Regional Plan 2005 – 2026,* the Brisbane *City Plan 2000* and Council's recently updated *Living in Brisbane 2026*. Community aspirations are identified in the Brisbane City Council's Draft CityShape[7].

Having regard to all these expressions of planning policy and intent, desired outcomes at the highest level for transport planning can be summarised as follows:

- **Liveable communities** – a land use and transport system that improves and supports our urban environment with appropriate connectivity on suitable transport networks that are fit for purpose;
- **Safer communities** – land use and transport forms that support the safety and security of users;
- **Sustainable communities** – land use and transport forms that value, conserve and support the continuity and health of human and ecological processes; and

[7] Brisbane City Council, 2006, *The Draft Brisbane CityShape 2026*, the Council, Brisbane

- **Economic communities** – a land use and transport system that supports economic prosperity and growth through the efficient and effective exchange of goods and services.

Northern Link's primary function would be to bypass the Brisbane central city with a motorway standard connection between the Western Freeway at Toowong in the west and the Inner City Bypass at herston in the north. Northern Link would also fulfil a regional function due to the planned connection to the Airport Link, via the Inner City Bypass.

Furthermore, Northern Link would:

- remove a significant amount of traffic from the Toowong Roundabout improve its operation;
- act as a bypass of Brisbane's inner western suburbs together with the State Controlled Western Freeway and the Airport Link and reduce traffic on the existing ring road known as Metroad5;
- reduce traffic on Coronation Drive and Milton Road by providing an alternative for Western Freeway traffic travelling to and from the Inner City Bypass;
- create opportunities for urban regeneration and enhanced public transport outcomes on the surface road network.

The South East Queensland Regional Plan and its supporting Infrastructure Plan and Program (SEQIPP) includes support for the feasibility study for Northern Link in the Infrastructure Plan within the Greater Brisbane area: "Further TransApex Investigation – Northern Link" (GB5-4) with a preliminary estimate of $5 million towards the investigation.

4.3 Strategic Significance of the Project

Northern Link would be an important component of a planned future transport system for Brisbane and would:

- support the primary strategic role of the Brisbane CBD and enhance its competitive advantages by removing cross-city trips from the congested arterial approach roads and by providing a high quality motorway link with major activity centres in the SEQ Region, including the Australia Trade Coast and the Western Corridor;
- connect with State road infrastructure being the Western Freeway at Toowoong, and supplement the State road network in the City;
- allow for more efficient and thus potentially greater use of public transport to the CBD from the western suburbs;
- support the principal centre at Indooroopilly and the major centre at Toowong, in the inner western suburbs and provide the opportunity to enhance cross-city public transport between major activity centres;

- support alternative transport modes (cycling, walking) by providing reduced traffic demands on the local street system, and provide opportunities on key links to provide for enhanced public transport;
- improve safety and efficiency in the movement of freight between major activity centres; and
- support desired land use and economic outcomes that can assist in urban regeneration and improvements to the amenity of benefiting streets.

Northern Link is part of a motorway-standard orbital road intended to improve the efficiency of Brisbane's road network, consistent with established and accepted regional and city-wide transport planning objectives.

The Project is one part of the implementation of the *Transport Plan for Brisbane* and is consistent with both the *SEQ Regional Plan 2005 - 2026* and the *SEQ Infrastructure Plan and Program 2007 - 2026*. These are public policies and statutory instruments of both the Queensland Government and Brisbane City Council, with the aim of providing sustainable transport outcomes for South East Queensland and, in particular, the Greater Brisbane area.

5. Complexity of Government Requirements

5.1 Planning Approvals Framework

5.1.1 Introduction

Northern Link is a major project for the City in terms of its capital cost, its beneficial impacts on the City's road and transport network and its benefits to inner city communities, as well as the City's accessibility and liveability.

Brisbane City Council wishes to proceed with the Project under the *State Development and Public Works Organisation Act 1971* (SDA), and seeks declaration as a 'significant project' requiring an EIS under the SDA. Certain development approvals may also be required under the *Integrated Planning Act, 1997* (IPA).

The EIS process under the SDA will involve an extensive process of consultation, integrated with the technical environmental studies and concept development. The consultation process will include a comprehensive range of preliminary consultation activities to build community awareness and understanding of the Project, as well as the statutory notifications for the draft Terms of Reference and the EIS.

5.1.2 State Development and Public Works Organisation Act

The Brisbane City Council is seeking declaration of Northern Link as a 'significant project' requiring an EIS under the SDA. This Act sets out the requirements for preparation, documentation and public review of an EIS, and associated processes as specified. It also outlines the relationship of the environmental impact assessment process with the *Integrated Planning Act, 1997* (IPA).

Matters to be addressed in an EIS prepared under the SDA are prescribed in Schedule 1 of the *State Development and Public Works Organisation Regulation 1999*.

The EIS process includes provision for:

- the public notification and development of the Terms of Reference (ToR) for the EIS;
- public notification of the EIS which must address the finalised ToR;
- the receipt and review of public submissions on the EIS; and
- the evaluation of the EIS and public submissions and preparation of an Evaluation Report by the Coordinator-General, (the Coordinator-General's Report)[8].

5.1.3 The Integrated Planning Act

The *Integrated Planning Act 1997* (IPA) seeks to achieve ecological sustainability through:

[8] The Coordinator-General may require the Proponent to submit a supplementary report addressing matters raised in submissions by the community and agencies.

- the coordination and integration of planning at the local, regional and State levels;
- managing the process by which development occurs; and
- managing the effects of development on the environment.

The IPA provides a process for environmental impact assessment[9] for 'prescribed development'. The IPA environmental impact statement process is one of three EIS processes in Queensland that are accredited under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) and the associated bilateral agreement with the Queensland Government.

The IPA environmental impact statement provisions are intended to be used for Queensland-based projects that the Commonwealth Minister for Environment and Water Resources has decided are controlled actions under the Commonwealth Government's EPBCA.

For the IPA's EIS provisions to apply, the Northern Link Project would need to be:

(a) either subject to a development application or proposed to be subject of a development application; or

(b) on land intended to be designated for community infrastructure; and

(c) the State has been notified by the Commonwealth Minister, under the EPBCA, that the proposed action is a controlled action; and

(d) a decision has been made that assessment of the controlled action will use the IPA EIS process.

Development that, in the opinion of the chief executive of Department of Infrastructure and Planning, do not satisfy these criteria will not be assessed under Part 5.8[10].

It is not considered that Northern Link requires assessment under the IPA environmental impact assessment provisions, because the Project is not likely to affect matters of national environmental significance. Consequently the Commonwealth is not likely to declare an interest under the EPBCA and the assessment process does not need to follow a process provided for in a bilateral agreement.

The SDA explicitly provides for a widely accepted process for environmental impact assessment, including previous BCC TransApex projects such as the North South Bypass Tunnel and Airport Link, and is considered to be more appropriate to Northern Link owing to its significance to Brisbane and Queensland.

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[9] *Integrated Planning Act 1971*, section 5.8.1

[10] Department of Local Government, Planning, Sport and Recreation (March 2007) "Guidelines for Environmental Impact Statements under the *Integrated Planning Act 1997* Version 1".

5.1.4 Development and Other Approvals

Those aspects of Northern Link, which require an application for development approval, will be identified during the EIS process. Those components of the Project that are 'assessable development' will be determined by the relevant planning scheme (Brisbane City Plan, 2000) and by the IPA (Schedule 8).

Northern Link may be delivered as:

- a road which is not assessable under City Plan, although other development approvals necessary under IPA must still be obtained; or
- if required, community infrastructure through a designation under IPA such that development within the scope of "community infrastructure" would be exempt from assessment under City Plan[11].

With either of these approaches, conditions recommended by the Coordinator-General would be imposed to the extent they are relevant, as concurrence agency conditions on approvals sought under the IPA. The Project may require one or more of the following approvals under the IPA:

- development approval for material change of use involving land included on the Environmental management Register or the Contaminated land register – assessed by the Environmental Protection Agency (EPA) under the *Environmental Protection Act, 1994*;
- development approval for material change of use involving an environmentally relevant activity – assessed by the EPA under the *Environmental Protection Act, 1994*;
- development approval for aspects of the development on a registered place – assessed by the Queensland Heritage Council under the *Queensland Heritage Act, 1992*;
- development approval for building works associated with the Project, including work sheds and maintenance buildings.

Development approvals would be required prior to the commencement of works involving assessable development. These may include operational works for filling and excavation for spoil placement that materially affects premises or their use.

5.1.5 Commonwealth Requirements

As the Project would be unlikely to impact on a feature of national environmental significance, it is not proposed to refer the Project formally to the Commonwealth Department of Environment and Heritage for determination as to whether it is a controlled action under the *Environment Protection*

[11] If Northern Link was to be designated as community infrastructure, the EIS process under the *State Development and Public Works Organisation Act 1971* would be taken to have addressed the IPA requirements to assess the environmental impacts of the Project.

and Biodiversity Conservation Act, 1999. However, the Commonwealth will be provided with this initial advice statement for information and consultation purposes. Approval would only be required from the Commonwealth Minister for Environment if the activity is likely to have a significant impact on a matter of national environmental significance.

Possible locations for the placement of spoil would be identified during the investigations and studies leading to development of the reference project. There would be a number of options for spoil placement, including nearby extractive industry sites, as well as sites at the Port of Brisbane. With spoil placement proposed at the Port of Brisbane for both the North South Bypass Tunnel and Airport Link, the Commonwealth found there to be no feature of national environmental significance likely to be impacted by such placement.

5.2 Agency consultation

Given the range of potential approvals, there may be a variety of local and State requirements for the project. To ensure all requirements are met and addressed adequately, extensive agency consultation will be undertaken throughout the EIS process.

Some further consultation with the Commonwealth Government may be undertaken in relation to the National Road Transport Plan and AusLink 2 initiatives.

In relation to the EIS, the following referral agencies and advisory groups would be contacted during the preparation of the EIS, in addition to local groups, residents and community associations:

Local Government

- Brisbane City Council (internal branches including City Planning, Brisbane Transport, Office of Economic Development).

State Government

- Department of the Premier and Cabinet;
- Department of Infrastructure and Planning including the Office of the Coordinator General;
- Environmental Protection Agency including the Queensland Heritage Council;
- Department of Communities;
- Queensland Health;
- Queensland Treasury;
- Department of Natural Resources and Water;
- Department of Local Government, , Sport and Recreation;
- Department of Main Roads;
- Queensland Police;
- Queensland Transport (including Translink and Queensland Rail);
- Department of Public Works;
- Department of Primary Industries and Fisheries;

- Department of Housing;
- Department of Emergency Services.

Commonwealth Government

- Department of Transport and Regional Services;
- Department of the Environment and Water Resources.

Other Stakeholders

These include but are not limited to:

- Electricity authorities (including Energex), gas supply agencies, communication service agencies;
- Public transport user groups;
- Indigenous / Native Title representatives;
- Road user groups, including Taxi Council of Queensland, RACQ, Queensland Trucking Association;
- Local business groups and Chambers of Commerce;
- Bicycle Queensland;
- Environmental groups, including Queensland Conservation Council; and
- Other community groups such as: Friends of Toowong Cemetery, School P&C Associations, Toowong Historical Society etc.

6. Effects on Relevant Infrastructure

6.1 Transport Infrastructure

6.1.1 Road Network

Preliminary traffic modelling suggests that there would continue to be traffic growth on the road network, regardless of whether or not Northern Link proceeds. There would also be redistributions of traffic within the metropolitan road network to accommodate changes in user travel requirements once Northern Link became operational. While it is likely that the Project would result in reductions in traffic on Milton Road and to a lesser extent Coronation Drive, there would likely be increases in traffic flows on the State-controlled Western Freeway and the Inner City Bypass. Some other streets may have some increase in traffic volume.

The construction phase of the Project has potential to generate additional traffic, including heavy vehicle traffic, on the regional road network. Of particular note would be the possible use of heavy vehicles to remove spoil from the site to an appropriate placement location. Alternative options for transport of construction spoil will be investigated during the development of the reference project. Other traffic movements during construction would be related to the delivery of construction equipment and materials to the worksites.

6.1.2 Rail Network

The proximity of the rail network to the northern connections raises the possibility for transporting construction equipment and spoil by rail. Options for this would be considered during agency consultations in preparation of the reference project. At this stage of concept development it is unlikely the rail network would be affected directly by the construction of Northern Link.

6.2 Public Utility Services

6.2.1 Water Supply and Drainage

Water will be required for concreting, to assist compaction of road base and embankments, for dust suppression during construction activities and for amenity use at construction compounds. It is likely that water will be drawn from Brisbane Water supplies would be disposed of to the storm water system (following appropriate treatment). The development of the reference project would consider alternative supplies of water for construction purposes within the context of a range of sustainability measures for the Project.

Water supply, sewer and stormwater pipes may need to be relocated during construction. In particular, the drainage system from the Brisbane Botanic Gardens, which passes beneath the Western Freeway, may require relocation to accommodate Project works. Similarly, there are complex drainage works adjacent to the potential surface connections with the Inner City Bypass, which will also be considered in the development of the Project designs.

The provision of a fire emergency system in the operating tunnel may require augmentation of the water supply system in the area.

6.2.2 Energy Usage

Energy usage during construction would be of some significance if equipment such as tunnel boring machines (TBMs) are used. Similarly, the operation of ventilation systems in tunnels of this size require significant energy usage. The EIS will need to assess the extent to which the energy requirements can be met by energy suppliers and the availability of suitable infrastructure for its distribution to the construction site.

Transmission lines and underground cables and gas mains will be considered for relocation throughout the project.

6.2.3 Telecommunications

It is possible that telecommunications infrastructure would be affected by Project works, with a consequential requirement to relocate. Further work will be undertaken in consultation with the relevant entities during concept development to assess the extent of this.

7. Potential Environmental Effects

Environmental effects listed in SDA Section 27 include environmental, social and economic effects, both positive and negative. Northern Link would have potential environmental, social and economic benefits at the regional, city and local levels. A number of potential environmental and social impacts are also likely, especially at the local level in the vicinity of the connections with the surface road network. Such impacts will need to be carefully considered and mitigated against through design and management approaches.

The potential benefits of Northern Link are expected to include:

- improved efficiency for the Brisbane CBD through the removal of cross-city vehicle trips from the approach arterial roads;
- opportunities for enhanced public transport services and related urban regeneration along the arterial roads likely to benefit from reductions in daily traffic flows;
- improved network travel time and reduced traffic accidents and congestion, with associated social benefits;
- provision of an attractive and efficient alternative route for freight and cross-city trips, linking the major activity centres with the Brisbane CBD, the Western Corridor, and the Australia Trade Coast (North);
- reduced traffic noise levels and general improvements in urban amenity on arterial roads likely to experience reduced daily traffic flows;
- a reduction in severance effects, amenity and access improvements, with associated economic benefits;
- provision of an enhanced road network, without the disruptions and impacts on the environment, land use patterns, economic activities and community activities that would accompany the construction and operation of a limited access motorway on the surface; and
- opportunity to realise the strategic objectives of integrated land use and transport planning in the inner western suburbs.

It is proposed that Northern Link adopt, to the extent practicable, sustainability measures in its design, construction, operation and maintenance. Such measures would greatly enhance the environmental outcomes for road transportation in the inner western suburbs.

The potential environmental impacts arising from the Project can be characterised as either construction impacts or operational impacts. If there was to be no mitigation or environmental management measures implemented for the Project, the potential construction impacts could include:

- impacts on groundwater, surface water and drainage patterns;
- impacts on soils and contaminated land;

- increased noise during above-ground works, and vibration in areas close to or above shallow tunnel construction works;
- increased noise and dust from activities at the worksites;
- increased traffic flows, and heavy vehicle traffic, in and around the worksites;
- requirements for properties to make way for above ground construction, including construction worksites, and ventilation stations and outlets.

Potential operational impacts, if no mitigation or management measures were to be implemented, could include:

- impacts on ambient air quality due to the operation of the ventilation system;
- increases in road traffic noise on the arterial roads connecting with the Project;
- changes in traffic flows on some local roads as traffic flows redistribute to accommodate and take advantage of the new infrastructure;
- changes in community movement patterns in the vicinity of the surface connections; and
- changes in urban landscapes with the introduction of new road infrastructure.

Some preliminary views are provided below to indicate the possible areas of environmental benefit, environmental concern, and the risks that may need to be managed.

7.1 Land Use, Land Acquisition and Urban Renewal

7.1.1 Direct changes in use and acquisition

As the Project is to be constructed primarily in tunnel, land use impacts are likely to be centred on portal areas and along the corridors of the benefiting arterial roads (eg Milton Road, Coronation Drive). Some properties at the surface connections would be required for the proposed portals and ventilation outlets.

As well as the requirement for some land at the surface, land acquisition in strata would be needed where the Project passes beneath properties. The process of acquisition and change of title on the surface and in strata (tunnel) would be undertaken through the provisions of the *Land Acquisition Act, 1967*.

7.1.2 Local Planning

Being development for a road, Northern Link is exempt development under *City Plan 2000*. However, the development of Northern Link would influence and impact upon land use patterns regulated by *City Plan 2000*. The City Plan Areas designations and land uses for the Northern Link corridor are:

- Community Use includes the Toowong Cemetery, Miskin Street Bus Depot, Victoria Park including the rail corridor beside the ICB, Brisbane Grammar School, Brisbane Girls Grammar

School, Milton Primary School, Marist College Rosalie, Neal Macrossan Playground and other scattered areas of parkland;

- Character Housing in Auchenflower, Paddington, Milton and Red Hill.;
- Medium density residential in Toowong between the railway corridor and Milton Road, in Red Hill along Musgrave Road and Kelvin Grove Road and in Paddington on both sides of Baroona Road for two or three blocks;
- Light industrial on the west of Kelvin Grove Road north from the Normanby Hotel and adjacent to the Toowong Roundabout;
- Convenience centres in Milton Road at the Croyden Street intersection and in Auchenflower, in Baroona Road at the Nash Street intersection and on Kelvin Grove Road near L'Estrange Terrace; and
- Suburban Centres along Given Terrace at Paddington and the Kelvin Grove Urban Village.

Local plans overlay the Areas to provide direction for future development. There are four local plans that overlap the Northern Link corridor, namely:

- Toowong/Indooroopilly District Local Plan;
- Ithaca District local Plan;
- Latrobe/Given Terrace Local Plan; and
- Kelvin Grove Local Plan.

These local plans have been prepared in advance of the Transport Plan for Brisbane incorporating the *TransApex* initiatives. They were also prepared in consultation with the local community and government stakeholders and provide an integrated plan for each locality. These local plans do not include any specific provisions to manage land use change as a consequence of Northern Link. Council is reviewing City Plan to implement the local growth management strategy for the inner western suburbs consistent with the requirements of the SEQ Regional Plan, and to address the directions established through the CityShape process[12].

The EIS will need to assess the consequences of the proposed works on the continuing planning process, either directly where land use changes may result from Project construction or indirectly where land use changes may be induced through improved amenity and economic development.

[12] The Draft CityShape Plan is the outcome of a series of consultative neighbourhood planning fairs conducted in 2005 – 06 to identify community aspirations for future growth management.

7.1.3 Urban Regeneration

Locations where traffic volumes would reduce as a consequence of Northern Link, resulting in reduced congestion and improved amenity for residents and/or businesses, will be considered in the context of the community and economic impacts on neighbourhoods and businesses, and the general opportunities for urban regeneration.

Other areas where traffic flows are likely to increase, such as near the portals at Toowong and Herston, will also require careful consideration to ensure the urban environment does not deteriorate and that enduring and acceptable outcomes are achieved for the local communities.

The EIS process will need to engage with local communities including residents, businesses and other interest groups, to identify matters of local value or significance, and matters of concern now and upon commencement of Project operations. There are a number of communities, major landowners and interest groups in the Northern Link corridor who need to be consulted in the concept design, the development of the reference project and impact assessment stages of the process.

7.2 Urban Design, Landscape and Visual Effects

The Northern Link corridor has been assessed against the criteria of:

- urban precincts - supporting opportunities for urban regeneration;
- connections - preserve and enhance movement patterns;
- landscape values - preserve and enhance the integrity of existing open space; and
- urban character - preserve and enhance existing urban character.

Within the Northern Link corridor would be opportunities for urban regeneration and rejuvenation of the activity centres. Such opportunities would be strengthened if integrated with a public transport response to the reductions in traffic on Milton Road and Coronation Drive.

Local connections to places of community value and local movement patterns potentially would be changed in the vicinity of the connections at Toowong. These potential changes need to be addressed in the concept design stage. There would also be potential impacts on visual amenity adjacent to the Toowong connections, however, there would be relatively low impacts on low density residential areas.

Landscape mitigation measures, including appropriate urban design, would be required where the proposed works would have an impact on existing surface features. The direct impact areas such as connections to the existing road network would require landscape works to minimise the visual impacts of the Project on the surrounding areas. A detailed assessment will be undertaken to determine the nature and extent of such impacts on residents and surrounding areas, and how those potential impacts might be avoided, or minimised and mitigated. Similarly, the design and sitting of the ventilation outlets will be considered in their urban context to ensure their integration into the built urban form.

7.3 Geology and Soils

For most of their length, the tunnels would be bored through Bunya Phyllite, a low grade metamorphic rock composed principally of quartz, sericite mica and chlorite with significant cleavage, foliation and quartz veining. East of Musgrave Road, low grade metamorphosed sandstones of the Neranleigh-Fernvale Formation are likely to be encountered. Geological mapping of the Brisbane area has identified a NNW/SSE trending lineament, the so-called Normanby Fault, at right angles to the tunnel alignment. More recent study of this feature and some 1970s and 1980s drilling suggest that it may not be a tectonic thrust fault as earlier suggested but rather a line separating different rock facies. Further assessment of this zone will be undertaken to identify the geology more accurately.

Quaternary Alluvium would likely be encountered in transition structures and in cut and cover sections of the construction near the Brisbane Botanic Gardens. East of the northern portal and east of Victoria Park Road further Quaternary Alluvium would likely be encountered. This material has been almost certainly disturbed and overlain with fill during construction of the ICB.

Surface soils would be affected by the Project in the immediate vicinity of the portals but nowhere else. Acid sulphate soils (ASS) or potential acid sulphate soils (PASS) are not expected because the Northern Link corridor is above 5 m AHD and the only alluvium that may be disturbed is deposited from freshwater sources.

Assessment will be undertaken throughout the Northern Link corridor for potentially contaminated land sites.

7.4 Hydrology and Water Quality

The proposed alignment of Northern Link would follow generally the watershed ridge between the Brisbane River and Ithaca Creek. The upper sections of several small drainages to the Brisbane River would be traversed, but at depth beneath the surface. The Toowong portal would be situated within or near upper sections of a small catchment in the foothills of Mt Coot-tha and the Herston portal would be in the upper section of a small catchment that ran through Victoria Park to the Brisbane River at Newstead, but which is now diverted into Enoggera Creek.

Water quality in these waterways may be affected by the construction works if site management measures were not implemented. Potentially, water quality would be affected through erosion of areas of surface disturbance delivering sediment to the stormwater system and nearby waterways.

There would be the likelihood of encountering groundwater when constructing the tunnels. Groundwater disposal during construction and operation of the Project would require careful management. Alteration of the groundwater regime could occur if the tunnels were not lined. Further investigation will be undertaken to determine groundwater resources. An environmental management plan would be required for disposal of groundwater from any unlined sections of the tunnels.

The potential for flooding impacts will be considered near the portals in respect of local catchments and the Brisbane River. The concept design for the Project will address the potential for flood inundation and avoid detrimental effects on the existing flood regime.

7.5 Environment

The surface environment would only be affected in the vicinity of the portals. The area around the northern portal has been significantly urbanised and highly disturbed by urban settlement, and a number of infrastructure projects such as the North Coast Railway Line, the Inner City Bypass and the Inner Northern Busway. The western portal would be in an area adjacent to the Brisbane Botanic Gardens at the eastern edge of Brisbane Forest Park. An assessment of flora and fauna values in both areas will be undertaken. Where necessary, mitigation measures would be proposed to avoid adverse impacts from construction and operation of the Project on flora, fauna or ecology.

7.6 Air Quality

7.6.1 Construction

Air quality issues associated with construction could include dust generation due to wind erosion of excavated areas, and motor exhaust emissions from increased traffic and machinery use around the portals.

Soil types in these two areas have a potential for dust generation, especially during dry weather. Potential impacts on residential and other properties near the Project worksites will be assessed using dust gauging and dispersion prediction techniques. Adverse impacts identified would need to be mitigated against by appropriate site management practices and dust monitoring programs.

Emissions from construction machinery would be managed by appropriate maintenance and control of vehicle exhausts in accordance with an environmental management plan.

7.6.2 Operation

Brisbane's air quality is generally good when considered against the health-based goals of the National Environment Protection Measures (NEPM). Traffic congestion on the adjacent arterial roads and motorways, namely the Western Freeway, Milton Road and Coronation Drive, would have some impact on local air quality, but such impacts would not be expected to result in exceedances of these health-based goals.

Ventilation of each of the tunnels is necessary to ensure that air quality levels are safe for motorists and maintenance personnel. The Project would include a ventilation system that would manage air quality to achieve safety levels in all traffic conditions. The operation of this system would be integrated with an in-tunnel traffic management system for that purpose. The proposed ventilation system would minimise, and in most cases, avoid releases of motor vehicle emissions from the portals.

Areas around entry and exit portals may experience increases in surface traffic, with consequent impacts on local air quality. Nevertheless, careful assessment of impacts on sensitive land uses around

the portals, including but not limited to Brisbane Botanic gardens, Brisbane Grammar School, Brisbane Girls Grammar School and Queensland University of Technology, Kelvin Grove campus, will be considered.

Potential effects of the ventilation outlets on the surrounding community will be assessed using dispersion modelling and assessment of concentrations of potential pollutants and background levels against established health-based goals for those pollutants. Changes in air quality on the surface road network resulting from increased or reduced traffic volumes will be assessed. In areas where surface traffic volumes are significantly reduced, it is expected that local air quality would be improved.

7.7 Noise and Vibration

Several noise-sensitive areas along the Northern Link corridor, including the residential areas near portals and feeder roads, schools such as Brisbane Grammar School, Brisbane Girls Grammar School and QUT Kelvin Grove campus, along with a range of community facilities such as the Brisbane Botanic Gardens, Toowong Cemetery and Anzac Park near the Toowong portal may be potentially impacted by noise from construction works. Construction equipment used on such large earthmoving projects may be expected to generate high noise levels. A detailed assessment of construction noise impacts will be undertaken as well as consultation with potentially affected institutions and residents to inform them of likely construction noise issues.

With the majority of the Project to be constructed underground limited risk exists for long-term noise impacts in the operational phase. Reductions in traffic flows would result in reduced traffic noise levels in local areas and along arterial roads such as Milton Road and Coronation Drive. A detailed noise assessment will be undertaken to determine impacts and to provide measures to mitigate noise, if required.

Vibration of the ground at surface as a result of construction works below may potentially impact on sensitive equipment and heritage sites. A detailed assessment will be undertaken to determine the likely impacts and appropriate measures to avoid or to manage any potentially negative effects.

7.8 Cultural Heritage

7.8.1 Non Indigenous

The Brisbane City Council's Heritage list includes sites on the Queensland Heritage Register, pursuant to the *Queensland Heritage Act 1992*, and those listed for significance to Brisbane City. The Northern Link corridor may pass by or beneath a number of listed heritage sites. The potential for direct or indirect (vibration) effects during construction will therefore be assessed with formulation of mitigation measures as required. A detailed assessment of the potential impacts of the proposed works on specific heritage listed structures, including those in the Toowong Cemetery, or other sensitive buildings of merit will be undertaken during the EIS.

7.8.2 Indigenous

Arrival of Europeans in the Brisbane area and complete urbanisation of the Northern Link corridor has wrought significant changes to traditional cultural systems. Nevertheless, areas of known Aboriginal cultural significance, such as the Victoria Park area, are well known. An assessment of the Aboriginal cultural heritage values will be undertaken to identify potentially affected sites of indigenous significance.

A detailed consultation process will be undertaken with the local Aboriginal parties, the Turrbal and Jagera Registered Native Title Claimants, as part of the EIS.

7.9 Socio-economic Effects

The existing social conditions of the Northern Link corridor will be assessed during the EIS, although it is clear that the community is densely populated, culturally diverse and from a wide range of socio-economic backgrounds.

As outlined at the beginning of this chapter there are many potentially positive social outcomes, which may result from this Project. These may include:

- improved access to services and public transport;
- improved amenity, especially in terms of air quality, noise, visual effects and urban renewal;
- reduced severance;
- employment opportunities and economic development.

Potentially negative effects which may occur in the Project area, during construction and operation may relate to:

- land acquisition and potential displacement;
- disruption of local access during construction;
- effects on community structure and functioning, including severance;
- effects on residential amenity;
- effects on workplace amenity;
- psychological effects; and
- socio-economic impacts.

A social impact assessment will be undertaken to assess social changes, or effects on the local community, which may result from the proposed works. This process will assess the significance of those changes and identify the means for mitigating those potential impacts. The social costs will also be evaluated along with impacts of the Project on local businesses. In addition, the socio-economic assessment will identify and evaluate likely opportunities for local businesses in the context of broader opportunities for urban renewal in the Northern Link corridor.

7.10 Waste Management

There is the potential for a significant amount of waste to be generated during both the construction and operational phases of the Project. This would include construction and demolition waste. Appropriate waste management strategies will be developed for maximising the recycling of as much waste as practicable, and appropriately disposing of the rest. The waste management strategy would be developed within the context of an overall sustainability strategy for the Project.

8. Employment Opportunities

Northern Link may require for its construction, the employment of an average of 400 full-time equivalent jobs, with a peak of approximately 1500 jobs directly on the design, management and construction of the infrastructure, and indirectly through the opportunities for the supply of materials and equipment to the project.

When Northern Link becomes operational a smaller number of direct employees will be required in management and maintenance roles. However, operation of Northern Link will generate wider employment opportunities through the City of Brisbane, the South East Queensland region and in Queensland generally, through improved transport opportunities, improved connectivity, urban renewal, and multiplier effects from the economic activity generated by the Project.

A detailed assessment of job creation, skills development and training opportunities will be included in the EIS.

9. Consultation

Northern Link was initially communicated to the general public in the context of the *TransApex Prefeasibility Report*, released in March 2005. Community awareness of Northern Link will be raised through a comprehensive consultation program that will continue throughout the detailed feasibility study. It will inform both impact assessment and design development phases.

Consultation is an essential element in the EIS program as it will assist in identifying issues and potential impacts, in providing information on the project to the community and stakeholders and in building relationships between Council, the community and Government agencies. It will assist community members with explanation and understanding of the benefits, impacts and issues affecting the Project's ability to meet its objectives. This will be achieved by providing information about issues, impacts and benefits, facilitating community participation in scoping and reviewing study outputs and enabling community review of project documentation. This, in turn, will assist in ensuring the project's design has the advantage of community insight to provide the best "fit" for local needs.

The Northern Link consultation program includes:

- establishment of two community reference groups. These will meet about six to eight times to provide input to the project design and EIS;
- community information sessions in several appropriate locations, dealing separately with Project design, impact assessment and the EIS. Information sessions will be held in or near to the affected areas;
- briefings with relevant community stakeholder groups and industry representatives to discuss local benefits and impacts of proposed construction works and Project infrastructure;
- provision of Project newsletters, information sheets and access to a web site specific to this project;
- several direct mail-outs of information and updates to affected property owners, adjacent residents and local businesses, supplemented where appropriate by face-to-face briefings with affected property owners;
- an 1800 project information line for ease of contact between the community and the study team;
- public exhibition by the Coordinator-General of the draft Terms of Reference for the EIS;
- public exhibition by the Coordinator-General of the EIS; and
- continued contact with the community through later phases of the Project.

10. References

Brisbane City Council (2007) *Northern Link Preliminary Assessment Report*, The Council, Brisbane

Brisbane City Council (2006) *Our Shared Vision - Living in Brisbane 2026*, The Council, Brisbane

Brisbane City Council (2003) *Transport Plan for Brisbane 2002 – 2016*, The Council, Brisbane

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