

## 15. Economic Environment



# Northern Link

## Phase 2 – Detailed Feasibility Study

### CHAPTER 15

#### ECONOMIC ENVIRONMENT

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## 15. Economic Environment

*This chapter addresses Part B, Section 5.10 of the Terms of Reference (ToR). It describes the existing economic environment and evaluates the benefits and impacts of the Project. An evaluation framework for the assessment includes:*

- *a definition of economic objectives and scope of the project;*
- *a timeframe for the analysis that reflects the economic life of the principal asset;*
- *identification of an appropriate project-specific discount rate*
- *an outline of all costs and benefits of the Project for users and the broader community in terms of transport network effects, employment and the environment;*
- *examination of the impact of timing of delivery of the project on its commercial viability; and*
- *identification of the distribution of net benefits and net costs to key stakeholders residing or operating within the study corridor.*

*All efforts are made to quantify costs and benefits including social and environmental. Consideration has been given to major transport projects in the vicinity of the Project that are under construction or have proceeded to the tender process. The analysis generally adheres to the Queensland Treasury Project Evaluation Guidelines.*

### 15.1 Economic objective

The overriding economic objective of the Northern Link Project is to enhance the economic efficiency of transport in the Brisbane road network, particularly between the western suburbs and Brisbane north/Australia TradeCoast (ATC) and at the same time providing broader economic benefits to industry and the community in Brisbane and the region. From an economic perspective, the Northern Link aims to achieve the following:

- Improved transport efficiency (i.e. travel time savings, reduced vehicle operating costs, reduced congestion and enhanced road safety) for the community, business and transport suppliers;
- Improved journey time reliability of the network so that it will enhance the competitiveness of regional and state economies;
- Enhanced road connectivity to/from the western suburbs and Toowong and the CBD; and
- Wider economic impacts including better accessibility and corridor investment.

### 15.2 Study area

The economic assessment has been undertaken by comparing the existing and future economic environment, with the Northern Link constructed and operational over the proposed concession period. The following approach has been adopted to identify and assess the economic benefits and costs of the project:

- Identification of existing economic activities in the project corridor and key economic activity localities elsewhere that currently are influenced by the existing road network;
- Description and assessment of future economic activities in the proposed Northern Link corridor including an assessment of potential areas for future development;
- Review of public planning documents that impact on the corridor including the National Institute of Economic and Industry Research (NIEIR) Brisbane Long Term Planning Economic Indicators study;

- Development of a Northern Link Cost Benefit Analysis Model to provide investment findings to assess the economic viability of the Project in terms of travel time savings, vehicle operating costs savings, road safety savings, environmental and external benefits; and
- Simulation of the Monash University's Centre of Policy Studies (COPS) CGE Model to assess the broader regional and state economic impacts for both the construction and operational phases of the project.

The study area extends from the project corridor to the Brisbane local government area through to the state of Queensland depending on the form of analysis, as specified above, that has been adopted for the economic assessment.

### 15.3 Existing Economic Environment

Northern Link is being proposed at a time of unprecedented growth in Queensland and South East Queensland in particular. In 2006-2007 Queensland's economic growth was at an eight-year high of 6.8%, well above the growth of 2.5% in the rest of Australia. Queensland's average annual growth rate for the past 10 years is 5.1% compared with 3.2% for the rest of Australia.

Queensland's prosperous economy has also created significant employment opportunities across the state and in particular in SEQ. Over the past year, employment in Queensland increased by 4.6% and accounted for more than 92,000 persons or about one-third of all jobs created in Australia. Queensland's unemployment rate is at an all time low of 4%.

The success of each major economic centre described below depends on high capacity transport access and connectivity. Performance and projected future of each centre must be identified to understand the broader improvements to regional prosperity that may be able to be supported by the project.

#### 15.3.1 Milton's Economic Environment

Milton is approximately 2km west of Brisbane's CBD and is approximately 1.2km<sup>2</sup> in area and has a population of 1,782 persons. Milton primarily provides service functions to business activities in the CBD. The suburb is a mixture of light industry, warehouses, commercial offices, retail and single and multiple occupancy residences. The main roads are Milton Road, which runs beside the Ipswich rail line and Coronation Drive, which runs along the Brisbane River.

Milton Road is a busy arterial with mostly residential buildings in the west of the suburb and large industrial, commercial and entertainment establishments in the east (eg: Suncorp Stadium and the Castlemaine Perkins Brewery).

#### 15.3.2 Toowong/Auchenflower's Economic Environment

Toowong is about 5km west of the CBD, covers 5.2km<sup>2</sup> and has a population of 15,858. The commercial precinct around the Toowong Village Shopping Centre includes a number of multi-storey office buildings along Coronation Drive, High Street and Sherwood Road. However, the suburb is predominantly residential with a mix of medium density dwellings and detached houses.

Toowong is well connected as a major transport node accessible by public transport, such as CityTrain (Toowong and Auchenflower railway stations), Brisbane Transport buses and CityCat ferry services, and via roads and bicycle paths. Toowong's major access roads from the north/east are Coronation Drive and Milton Road. Other main roads are High Street and Sherwood Road. However, the road network is suffering from general traffic congestion particularly in the peaks, reducing the flow between the CBD and the western corridor.

The Bicentennial Bikeway runs along the Brisbane River allowing access to the Brisbane CBD to Toowong for pedestrian and bicycle traffic and continues to the University of Queensland. Another bicycle path runs from Coronation Drive via Sylvan Road to the Mt Coot-tha area and continues along the Western Freeway.

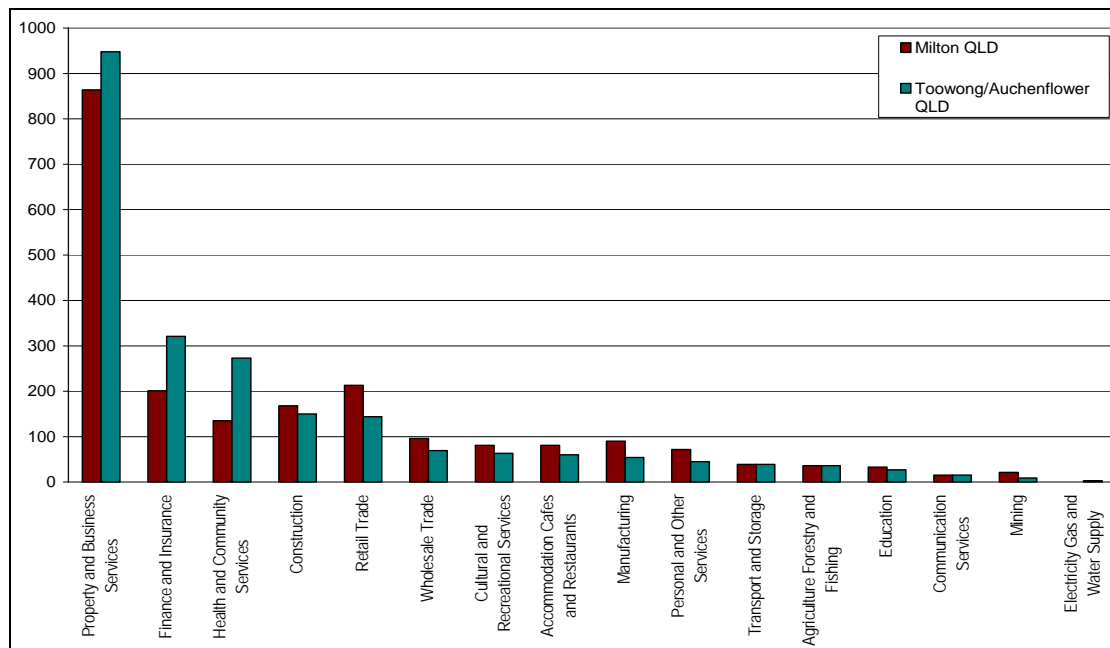
Toowong Village and Tower has 86 specialty stores, anchored by a David Jones department store, Coles Supermarket and Kmart discount department store. In addition, the centre provides a wide range of services including banks, travel agency, post office, medical centre, hair salons, a Brisbane City Council Library and a 350 seat food-court. The gross lettable area is 46,275m<sup>2</sup> on three levels with an annual turnover of \$154 million. Toowong Tower is a 13 level office building including serviced office facilities. The centre has 10 undercover car parking levels including a commuter car park with more than 1,600 spaces, accessible from the intersection of Sherwood Road and High Street.

Toowong has two large hotels, the Regatta Hotel and the Royal Exchange Hotel. The Wesley Hospital in Auchenflower is one of Queensland's largest private hospitals, with over 430 beds, >1900 fulltime, part time and casual staff and a range of other health services across 35 specialties with over 900 accredited doctors. The Wesley Hospital has plans to develop a multi-storey car park and build a nine storey complex which will include a day surgery floor of 34 beds and a total of 178 acute care beds on four other floors.

The University of Queensland at St Lucia, on the fringe of the Toowong area has approximately 37,740 students, 5,660 staff and generates an estimated \$937 million annual revenue.

The distribution in industry sectors of the 2,145 business in Milton and 2,256 businesses in Toowong/Auchenflower is shown in **Figure 15-1**.

■ **Figure 15-1 Number of businesses in Milton and Toowong/Auchenflower**



**Table Note:** Source: Australian Bureau of Statistics, 8165.0 Jun 2003 to Jun 2006 Counts of Australian Businesses, including Entries and Exits Table 3.1 Businesses by Postcode by Industry Division, by Employment Size Ranges: June 2006. Postcodes: 4064 and 4066.



Most businesses in Milton and Toowong/Auchenflower are small and medium size enterprises. Of all businesses in the area, 50% have a turnover of less than \$200,000. However, there are six businesses in Milton with a turnover of more than \$200 million.

A band of businesses is established along Coronation Drive in a line of multi storey office buildings between Hale Street and the Toowong Village Shopping Centre. It is difficult to clearly recognise clusters of certain industry sectors (Table 1 in *Technical Report No. 16 - Economics in Volume 3* of the EIS). In addition, there are multi-storey residential buildings, hotels, and retail shops. Most of the land along this major local arterial is fully developed with some recently constructed commercial buildings.

Smaller existing shopping centres in the wider precinct that would be influenced by the Project include:

- a small cluster of businesses at the junction of Milton Road and Baroona Road;
- Auchenflower Shopping Precinct (Milton Road, Auchenflower);
- Bardon Shopping Centre (MacGregor Terrace, Bardon);
- Paddington Shopping Centre (Given Terrace and Latrobe Terrace, Paddington)
- Indooroopilly Shopping Centre (Moggill Road, Indooroopilly), 6km west of the CBD, over 250 shops on three levels, with parking available; and
- Taringa Shopping Centre (Moggill Road, Taringa).

### 15.3.3 Economic Profile: Milton and Toowong/Auchenflower

Population growth is one of the major drivers of economic prosperity including consumption growth and freight demands. Based on Australian Bureau of Statistics figures the estimated population in Milton and Toowong/Auchenflower grew from 14,476 in 1996 to 15,243 in 2001 and 17,640 in 2006, which represents an annual average growth rate of 3.1% over the last five years. The growth rate for 2001/2006 was more than double the rate for the period 1996 – 2001 and overall higher than the annual average growth rate for Brisbane which was 2.1% for the five year period from 2001 to 2006.

Milton and Toowong/Auchenflower are affluent suburbs with a young population and a below state average household size as shown in **Table 15-1**.

#### ■ **Table 15-1 Milton and Toowong/Auchenflower – Community profile**

	Milton	Toowong/ Auchenflower	Brisbane	Queensland
Median age of persons	29	28	35	36
Median individual income (\$/weekly)	658	612	516	476
Median family income (\$/weekly)	1,723	1,705	1,262	1,154
Median household income (\$/weekly)	1,198	1,196	1,111	1,033
Median housing loan repayment (\$/monthly)	1,613	1,635	1,300	1,300
Median rent (\$/weekly)	250	260	220	200
Average number of persons per bedroom	1.1	1.1	1.1	1.1
Average household size	2.1	2.2	2.6	2.6

**Table Note:** Source: ABS 2006 Census Community Profile Series.

Based on 2006 Census data, the sectors offering the most employment opportunities for persons living in Milton and Toowong/Auchenflower are professional, scientific and technical services as well as health care and social

assistance and education and training. Proximity to the CBD contributes to the similar employment profiles in both suburbs. However, Milton's employment profile is relatively stronger in:

- arts and recreation services;
- information media and telecommunications;
- rental, hiring and real estate services; and
- public administration and safety.

Whereas Toowong's employment profile is stronger in:

- education and training;
- professional, scientific and technical services;
- health care and social assistance; and
- accommodation and food services.

For further information on this, refer to Figure 3 in *Technical Report No. 16 - Economics in Volume 3* of the EIS.

Almost 70% of the employed persons in Milton work full-time while in Toowong/Auchenflower the figure is 64%. In Toowong there are more people working part-time at 30%, compared to 26% in Milton. More details are provided in Table 4 in *Technical Report No. 16 - Economics in Volume 3* of the EIS.

The increase in population in SEQ and the trend towards smaller household size, changing household structures and the demand for a diversity of housing forms will require about 575,000 new dwellings by 2026 in the region. As both suburbs are close to Brisbane's CBD, it is not surprising that Milton and Toowong have more flats, units or apartment dwellings compared to Queensland generally. As there are neighbourhoods in Milton which are still largely residential in character, Milton has a higher percentage of separate houses.

In Milton about 50% of occupied private dwellings are owned or being purchased by the occupiers and about 47% are rented. In Toowong the percentage of dwellings occupied by the owners or purchasers is slightly higher at almost 58%, with Northern Link 40% of dwellings being rented.

### 15.3.4 Major Economic Growth Centres Outside the Northern Link Corridor

Ongoing economic prosperity and an increase of economic activities will promote continuous movements of people and goods from one economic growth centre toward other growth areas and the CBD. Northern Link would become an important component of the necessary transport network to facilitate these developments. How Brisbane's transport network will be extended and developed further is outlined in the South East Queensland Infrastructure Plan and Program 2007-2026 (SEQIPP). Not including Northern Link (in SEQIPP subject to Federal funding contributions), estimated investment in Western Corridor transport infrastructure projects over the next 10 years according to SEQIPP is approximately \$5,203 million.

The *South East Queensland Regional Freight Network Strategy 2007 – 2012* highlights the importance of the transport network to the movement of freight for the regional, Queensland and national economies. The SEQ freight network consists of five corridors and two key inter-modal terminals. One of the corridors is the Western Freight Corridor, which comprises the Warrego and Cunningham Highways. Increased road freight activities are identified in:

- Brisbane's Central Business District;
- the Australia Trade Coast;
- new industrial and urban development in the Western corridor; and
- new industrial land areas such as Ebenezer and Purga.

A 2004 freight demand study on freight generation within South East Queensland (SEQ) showed that businesses in the region produced approximately 45 million tonnes of freight annually, consumed 18 million tonnes of locally produced goods and 15 million tonnes of goods sources from outside the region. Households consume approximately 15 million tonnes of freight, sourced from inside and outside SEQ. Goods not consumed within the region are exported, typically through the Port of Brisbane and to a minor extent through Brisbane Airport.

The following is an outline of the economic environment in the above growth centres within the Northern Link Study Corridor.

### **Brisbane CBD**

Brisbane City Council released its 2026 vision as the Brisbane Economic Development Plan 2006 – 2011 with strategies based on a clustering approach identifying and fostering 13 industry clusters. Clusters offer the opportunity to develop and enhance comparative and competitive advantages to firms. Clusters increase the interconnectivity and interdependence of businesses and institutions creating positive external effects and synergy effects. In addition, they are offering people advanced employment opportunities. A most important prerequisite for a cluster is its endowment on which the market participants can build. Milton and Toowong benefit from their proximity to the CBD and from their existing service industries which play an important role in expanding the economy.

Brisbane's key economic hubs are the CBD and the Australia TradeCoast (ATC). Forecasts expect about 190,000 people to be employed in 2026 in the CBD and 80,000 people in the ATC area. Significant employment growth is also projected for Milton and Toowong/Auchenflower. Brisbane City Council's productive precincts strategy identifies Milton and Toowong/Auchenflower as key economic zones which are areas to be considered for prioritised infrastructure provision and land use facilitation.

The forecast provided by the National Institute of Economic and Industry Research (NIEIR) for Brisbane's Economic Development Plan showed that employment in Brisbane City will grow to 850,000 by 2026 and to about 1.2 million in the Brisbane Urban Footprint. The five largest industries in terms of total employment will be property and business services, retail, health and community services, manufacturing and construction. The growth in employment will be restricted to certain areas, including the industrial areas promoted by Northern Link, the CBD, ATC and the Western Corridor.

Brisbane's CBD displays a strong office market with ongoing construction activities on new buildings and extensions. As of July 2007 a record low vacancy rate in the CBD of 1.2% or 20,174 m<sup>2</sup> was recorded, with average rents increasing by 41% over the previous 12 months. The mid-year Office Market Report from the Property Council also stated that the office vacancy rate in the CBD fringe had fallen to a record low of 1.3%. However, almost 200,000 m<sup>2</sup> of new floor space is expected in the Near-city area over the next 18 months, bringing some release in a very tight market and offering businesses the choice to expand their search for office space into Milton and/or Toowong/Auchenflower.

### **Australia TradeCoast**

ATC is SEQ's trade and industrial hub located at the mouth of the Brisbane River encompassing the Port of Brisbane and Brisbane Airport. Its industries include, among others, transport, logistics, aviation and aerospace. ATC covers about 8,000ha, with over 1,300ha for future development.

ATC is a major economic and employment driver in Brisbane and SEQ and is expected to provide up to 100,000 jobs in 2026. Over the past 12 months, investment in infrastructure and other developments has exceeded \$660 million.

The link between the ATC transport hub with its integrated air, sea, road and rail facilities, and the Western Corridor industrial hub and its interstate transport centre, will be strengthened by the Project.

### **Port of Brisbane**

The Port of Brisbane is Australia's fastest-growing container port, generating an annual contribution to the Queensland economy of \$770 million. During the 2006-2007 year more than 2,600 ships loaded or unloaded over 28 million tonnes of cargo at the Port of Brisbane wharves. In that year, import and export of containers through the port, increased (by 14.2%) for the fifth consecutive year.

### **Brisbane Airport**

Brisbane Airport Corporation (BAC) operates the Brisbane Airport and plans to invest about \$2.2 billion over the next 10 years. A further \$2 billion is expected to be invested by BAC's tenants and partners on the 2,700-hectare site with more than 1,000 hectares available for commercial development. More than 100 businesses employing about 16,000 people are operating directly at Brisbane Airport.

At Brisbane Airport, annual growth in domestic airline passenger activity averaged 5.7% annually over the past ten years. The international sector experienced average annual growth rate of 5.9%. The total number of passengers increased to more than 16 million in 2006, which represents a 6% increase on the 2005 data. Total passengers are forecast to grow to 35 million by 2025. This is the largest percentage increase of all major Australian airports.

The annual air freight task in 2005-2006 was 85,154 tonnes (44,879 tonnes on incoming and 40,275 tonnes on outgoing flights). This represents an increase of 5.15% over 2004-2005.

### **Western Corridor**

The Western Corridor is an extension of Brisbane's Outer South-West, stretching generally from Wacol in the east through Ipswich to Amberley and also including Ebenezer, Swanbank, Ripley Valley and Springfield.

In 2006 more than 16,000 businesses were located in the Western Corridor region. More than one fifth of the businesses operate in property and business services, followed by construction (about 17%) and retail (13%).

More than 80% of the businesses in the Western Corridor have an annual turnover of less than \$500,000 making most of them small and medium size enterprises. There are 33 businesses in the area with an annual turnover of between \$50 million and \$200 million.

Current growth patterns show that since 2001, Ipswich has experienced a significant increase in population growth rates. Managing growth in the Western Corridor is a key feature of the South East Queensland Regional Plan 2005 – 2026 (SEQ Regional Plan) and will involve dealing with the increased demand for transportation of people and freight between the west, the Brisbane CBD and the ATC.

As a major new urban growth area likely to more than double its population in the next 20 years, the Western Corridor gains from the availability of residential and industrial land. There is the opportunity to create a large number of jobs, through economic growth and investments in infrastructure and services. Aerospace, freight, training and education have been identified as industries with high growth potential due to the proximity to Amberley airbase and existing campuses.

By identifying the Western Corridor as a future urban development area, the SEQ Regional Plan's strategies give priority to infrastructure and services in the area aiming to facilitate an increasing proportion of the forecast population growth and economic activities to move to the Western Corridor.

## 15.4 Future Economic Environment

### 15.4.1 Easing of Traffic Congestion

Growth of Brisbane as a prosperous and sustainable city will include the agglomeration of economic activities that are fundamentally dependent on mobility and accessibility. Any impedance of movement and accessibility can create significant economic costs by reducing productive efficiency through traffic delays and increasing transport costs.

Road congestion imposes direct economic and environmental costs on road users and the broader community in the form of time and money wasted in slow moving traffic, particularly in the morning and afternoon peaks.

The additional road capacity offered by the project in conjunction with the travel demand management initiatives on Milton Road and Coronation Drive will have the objective of enhancing traffic flows on local and sub-arterial roads in the corridor.

There would be minor generated or induced traffic in the presence of additional capacity, with traffic modelling on a network basis suggesting less than 0.5% increase, but importantly the Project would divert existing surface traffic into the tunnel particularly in the peaks and away from existing local and sub-arterial surface roads.

### 15.4.2 Economic Development

Brisbane City Council's 2026 vision for Brisbane is to be "prosperous and sustainable with cohesive healthy communities...a leader in technology, driving a strong economy that provides job opportunities for all." The key themes that are articulated in this vision include an accessible city, a smart and prosperous city, an active and healthy city and a regional and world city.

Supporting this longer term vision and the pathway leading to short to medium enhanced economic performance, Brisbane City Council has recently adopted the Brisbane Economic Development Plan 2006–2011 (BEDP).

A number of key socio-economic aggregates have been forecast to 2026 in the BEDP that would need to be supported by economic infrastructure such as road investment. These forecasts include:

- The population of greater metropolitan area defined by the Brisbane Statistical Division will grow from 1.8 million persons in 2006 to 2.4 million.
- The residential population of the Brisbane Local Government Area (LGA) will grow from 980,000 persons in 2006 to 1.19 million in 2026.
- Employment in the Brisbane LGA will increase from 585,000 persons to 850,000 persons in 2026.

- With regard to forecast employment growth, the BEDP highlights that 80% of the Brisbane LGA growth in employment (ie: 212,000 persons) to 2026 will be concentrated in 20% of the city's suburbs.
- The suburbs or areas within the Northern Link catchment, namely the CBD, ATC, Milton and the inner west of Herston figure prominently in the top 10 centres of future employment growth. For example, employment in the CBD will increase from 120,000 in 2006 to 190,000 in 2026, while the ATC will increase from the existing 34,000 to 80,000 persons.
- Connectivity and accessibility to the CBD and ATC resulting from Northern Link will be a major factor in reducing journey time between the outer western suburbs of Brisbane and the CBD and ATC.

The BEDP has a key theme that Brisbane needs to have world class roads and other economic infrastructure to ensure the efficiency and competitiveness of the city's economic activity. This high quality infrastructure is required to attract and support high levels of productivity and export based private investment. The BEDP has set an annual export growth rate of 4% that will grow the city's value of exports from a current \$32 billion in 2004 to \$79 billion by 2026.

### 15.4.3 Future Freight Activity

The *South East Queensland Freight Strategy 2007 – 2012* provides direction for the future policy, planning, infrastructure design, operations and institutional arrangements to encourage the effective and efficient end to end delivery of freight in SEQ. The strategy supports the South East Queensland Regional Plan and in particular the plan's vision "to provide an efficient and integrated freight transport system for the SEQ region".

The existing freight network and demands as well as the region's future challenges that are articulated in the strategy and have significance for the Project are listed below:

- The SEQ region represents about 62% of the Queensland economy and has potential to assume an even greater role based on regional population forecasts growth of one million persons over the next 20 years.
- Assuming household consumption grows by 4.5%, existing freight volume will almost triple by 2026. Industrial production will grow and the volume of freight will increase to approximately 80 million tonnes in 2026.
- Growth in inter and intra urban freight movements is likely to significantly impact on the SEQ's priority freight costs and the local road network with the following key locations recognised as likely increases in freight activity:
  - Brisbane CBD.
  - ATC driven by expansion of the Brisbane Airport's passenger throughput and other commercial developments on airport land.
  - Existing and new industrial precincts within the region and requiring cross city travel including Acacia Ridge, Ipswich, Virginia and Brendale.

The ability of the metropolitan road network to meet the growing demand for cross city movement of people and freight will be critical to the long term development of Brisbane. Brisbane is the key location for interregional, interstate and international economic activity in Queensland and accounts for over 11% of national Gross Domestic Product (GDP). In Queensland, Brisbane accounts for around 60% of GDP.

## 15.5 Strategic Property Impact Assessment

The potential and actual impact of the Project on commercial and residential property values, investment and development within the project corridor has been considered. With the benefit of a buoyant economy driven by the resource and construction industries, the impact on the city and near city property market continues in the form of very low vacancy rates, high rental growth and difficulties for growing businesses looking for suitable accommodation.

Brisbane City Council and the State Government regional planning processes have identified the need to further develop urban centres outside the CBD, proposing a range of nodes or major centres around the city to relieve the pressure on CBD infrastructure, particularly transport infrastructure to and from the city.

The existing near city locations of the Urban Renewal Precinct (Fortitude Valley, Newstead and Bowen Hills), Milton/Toowong, Spring Hill and Inner South (South Brisbane/West End), are under accommodation pressure, with businesses choosing to locate in these areas for ease/access to parking, proximity to clients, lower rents and general amenity for staff and clients.

The impacts of the Northern Link project on private property have been detailed in Chapter 13 - Social Environment of this EIS, which identifies that a total of 116 properties would be acquired. In the context of the economic impact assessment therefore, the Project's stakeholders are those property and business owners whose properties or business premises are affected by the Project, and who may be caused to relocate as a result of the Project.

The Project would directly affect 85 residential properties and 11 commercial properties, comprising 24 individual businesses. In the Toowong precinct, the main commercial impacts would be at or near the northern side of Milton Road approaching the Toowong roundabout, with the Mitsubishi car dealership and the Woolworths Caltex service station being directly impacted. The commercial development on the south-east side of the Milton Road/Croydon Street intersection would also be impacted. This development comprises a real estate, health services (3), food/restaurant (2), retail (3), personnel services (2) and an office fit-out business. The bottle shop on the corner of Croydon Street and Sylvan Road would also be acquired.

The Kelvin Grove precinct would have minor commercial impacts with a take-away business on the corner of Kelvin Grove Road/Victoria Street impacted by this connection. This business is currently not operating.

All property acquisitions would be conducted under the *Acquisition of Land Act 1967*, which entitles an affected landowner (residential or commercial) to be compensated for the full market value of a property that is acquired. In the case of commercial property, the Act differentiates between businesses that are operated on premises owned in freehold by the business proprietor, and businesses that are operated on premises under lease. In all cases, the business proprietor is entitled to compensation under the Act for the cost of relocating the business, or for the value of the business, whichever is the lower. Where the proprietor is also the owner of the freehold title to the premises, the proprietor is also entitled to be compensated for the full market value of the property.

It is generally expected that most of the businesses affected by the Project would find suitable alternative premises, notwithstanding that the motor vehicle dealership and the service station on Milton Road have specific location and land footprint requirements, which may impact on their capacity to find a suitable alternative site in the locality.

In the broader regional context, the Northern Link project would provide improved access to the expanding employment centres of the Brisbane CBD, Australia TradeCoast and the Western industrial corridor.

### 15.5.1 Commercial Property

#### Brisbane CBD

The effective vacancy rate of the CBD was 0.07% in January 2008. This is likely to tighten further during 2008. Despite a range of projects now underway, with 75,000m<sup>2</sup> to be added in 2008, no relief from the tight market is expected until at least the second half of 2009, with many of these spaces are already pre-committed to tenants.

Office rents are also at record highs, with over 100% increase since 2006, while capital values have increased by 150% over the same period. Business conditions suggest demand will continue to grow, with the continued strength of the mining and construction industries in particular.

Considering the CBD's extremely low vacancy rates and premium rents, as well as the heavy pre-commitment of proposed new developments, a large number of potential CBD tenants will continue to choose the Brisbane fringe or near city suburbs as an alternative. The Brisbane CBD's retail market has been strongly supported by the office market, with the expanded David Jones development and the Q Centre that opened recently, as well as a proposed upgrade for the Wintergarden complex, Hilton Hotel and the Multiplex construction on the old Regent Theatre site. Specialty store and national chain vacancies are both relatively low at approximately 3%, with relatively high rents.

#### Near City

Vacancy rates in the near city precincts have been falling steadily since 2002, when they sat at 14%. Vacancy rates for the total near city market were 2% at May 2008. Toowong had lowest vacancy rate of 0.1%, followed by Spring Hill and the Inner South (0.4%), Milton (0.9%) and the Urban Renewal precinct (3.4%).

These vacancy rates and parallel increasing rents are being driven by strong tenant demand, high business confidence, the state's resource boom and displacement from the CBD due to the extremely low vacancy rates there.

#### Spring Hill

Spring Hill is one of Brisbane's largest near city office markets, characterised by older office and residential buildings. Within close walking distance of the CBD, this area is attractive to established businesses. With approximately 175,000m<sup>2</sup> of total office space, it constitutes approximately 22% of the total office market. There is minimal new development planned, due to a lack of available land.

#### Toowong

Toowong is a mixed-use precinct with retail, commercial and residential developments and approximately 75,000m<sup>2</sup> of office space. This is a relatively small office market with approximately 10% of the total commercial space for Brisbane. Toowong's proximity to the University of Queensland, the Brisbane CBD and the Milton commercial precinct, along with the availability of transport infrastructure, makes this an extremely tight market with very limited vacancies and very few new developments planned.

#### Inner Northern

Kelvin Grove Urban Village is emerging as a new precinct, with Synergy and the Australian Red Cross Blood Service Headquarters as two new key developments. Other expanding near city areas include Hamilton, Herston and Albion, particularly with the Mill development, a new mixed-use precinct at the Albion train station.

This precinct, covering predominantly Fortitude Valley, Newstead and Bowen Hills, is the largest near city office precinct, with approximately 210,000m<sup>2</sup> of space, representing 25% of the total near city supply.



This precinct is significantly geographically dispersed and also takes in the suburbs of New Farm and Teneriffe. The Brisbane City Councils Urban Renewal Task Force was successful in encouraging the conversion of former industrial buildings into mixed use residential and commercial and this is now marketed effectively as a feature of the area.

## Milton

Milton has changed in the past 20 years because of its close proximity to the Brisbane CBD. Commercial developments and high density residential developments have arisen along Coronation Drive and Cribb Street (ie: Coronation Drive Business Park). Other key features of the corridor include the ongoing development of the Park Road commercial and retail strip and the redevelopment of Suncorp Stadium.

While these changes have transferred the suburb, there remain numerous locations within Milton earmarked for urban renewal over the next 20 years.

A Precinct Plan is currently being prepared to promote the Milton Railway Station area as a location for higher density mixed use development. A number of development applications have been lodged or approved in recent years for residential apartments, hotels and commercial buildings to capitalise on the current Milton Local Plan. In this regard, the new Milton Station development by FKP is proposed to encompass a 30 storey residential building, comprising 214 apartments, 127 room 4.5 star hotel and 10 storeys of office space.

The current Milton Local Plan recognises the following attributes.

- The suburb's close proximity to the CBD and the unique level of amenity associated with its closeness to the Brisbane River.
- A strong employment hub characterised by a range of office, commercial, retail and small scale light industrial activities.
- Diversity of a mixed use environment and the emergence of the Park Road Centre as a key entertainment area.

Based on National Institute of Economic Research forecasts, Milton is predicted to increase its current employment base of approximately 17,600 persons to 23,500 employment opportunities in 2026. Similarly, Brisbane City Council City Shape strategy proposes an increase of 1,000 residents by 2026.

The removal of unnecessary traffic from the Milton area would provide a positive impact on the attractiveness and safety of the suburb and provide opportunities for further appropriate commercial and residential developments.

### 15.5.2 Residential Property in the Inner City

After several decades of population decline, the inner suburbs are attracting people back to live, with some areas experiencing growth of over 25% in the last 10 to 15 years. This growth has been focused strongly on the 20 to 54 year age groups, and in particular students, young professional workers, and middle-aged professionals.

Development of the Urban Renewal Precinct has had a marked impact on the type and nature of housing in these areas, in particular the development of apartment buildings and complexes. At the same time, there has been a shift away from home ownership to private rental, with high investor interest in these areas and significantly high rents for residential property.

Both Brisbane City Council and the Queensland Government have been active in encouraging urban consolidation, with Brisbane City Council encouraging in-fill housing development, and the master-planned redevelopment led by the Urban Renewal Task Force with its redevelopment projects that include conversion of the Teneriffe Wool stores to housing and the construction of major new medium density apartment projects in areas such as Newstead and Fortitude Valley.

The Queensland Government's South East Queensland Regional Plan recommends a number of planning initiatives intended to reduce urban sprawl and consolidate urban density in appropriate locations, including the inner and near city suburbs referred to in this report. Plans include the removal of height restrictions in the CBD and improved bus, rail and mass transit transport to and from near city locations such as West End, Fortitude Valley and Spring Hill.

New residential developments, particularly in the higher end of the market, are to be completed over the next 12 months in the CBD, New Farm, Newstead (River Park and Gasworks) and West End.

### 15.5.3 Market Acceptance

#### Property issues and tunnel impacts

The existing projects underway in Brisbane such as the Clem Jones Tunnel or CLEM7 (formerly known as the North-South Bypass Tunnel) (under construction) and the Airport Link (nearing construction commencement) provide some basis for comparison for potential residential property issues and associated tunnel impacts. The impact of a large-scale project on residential property values is multi layered, with:

- direct impacts on affected properties that may be subject to compulsory acquisition resulting from the construction phase,
- indirect impacts on properties not subject to compulsory acquisition but nevertheless located in the vicinity of portals and/or ventilation stacks, and
- impact on resale value where a volumetric lot is recorded on the property's title resulting from the extent of a property's boundary above the tunnel.

Consultation processes relating to tunnel projects in Australia generally have identified the following issues of concern to property owners; the psychological impact of the 'feeling' of the tunnel below, the potential impact on resale value resulting from volumetric title or proximity to infrastructure, a reduction in passing traffic and therefore business and, conversely, traffic congestion as a result of traffic seeking to avoid the tolls.

Indirect impacts on local property may include reduced market value and reduced property appeal, although it would be difficult to directly attribute this to the Project. To date, there is limited evidence that the CLEM7 or the Airport Link Tunnel have negatively impacted property values, other than for those properties directly affected by resumption. This is discussed in detail in the following section.

#### Property Market Assessment

For comparison of market acceptance, the impact of the Airport Link project on property values over the last 10 years has been analysed. The suburbs of Windsor, Lutwyche and Woolloowin encompass the area affected by the Airport Link Project. This property value assessment does not include the direct impacts of the project, such as property resumption (full, partial or volumetric), change of title, and easements. The Airport Link Project has been used for comparison purposes because it represents a current project, with many similar issues as for Northern Link.

Property transaction data from the last 10 years (RP Data) has been analysed to identify if the announcement and subsequent approval of Airport Link in 2006 and 2007 respectively has had a direct impact on the property values in the Windsor, Lutwyche and Woolloowin suburbs. This data has then been compared to property sale values for the Brisbane City LGA dataset. The Brisbane City LGA dataset has been used as a benchmark for analysis as it encompasses the entire Brisbane area.

Residential property impacts are felt in the market as soon as an infrastructure project is announced. Usually the impacts are greatest at the early stage as existing residents fear the worst. In this regard, the assessment of property prices was done over 10 years and with particular emphasis on 2006 and 2008, the period from the release of the Airport Link EIS to the award of the construction tender and commencement of early construction works.

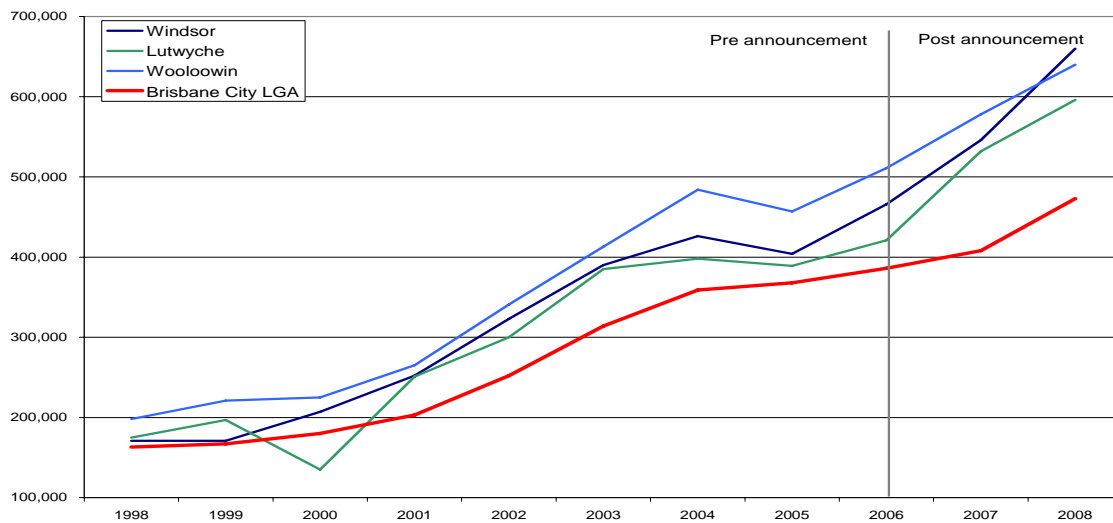
### *House and Unit Prices*

A statistical correlation was carried out to compare the trends in movement of median prices of houses and units in the Airport Link suburbs over 10 years with those for the Brisbane LGA. Correlation was also carried out for median house and unit prices in these suburbs from 2006 onwards.

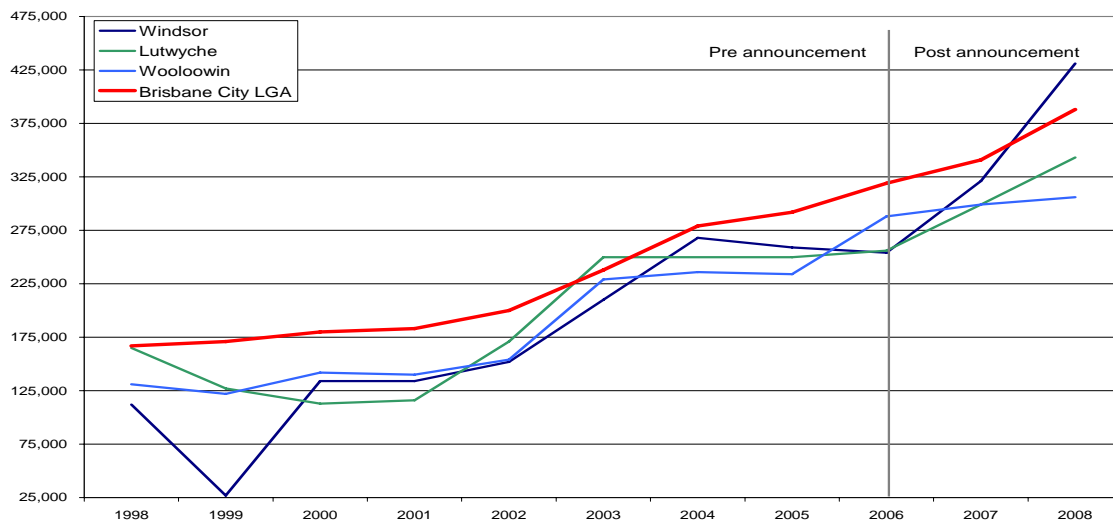
The results for house prices in Windsor, Lutwyche and Woolloowin showed a very strong statistical correlation with house prices for the Brisbane LGA. Results for the prices of units and apartments also showed a strong correlation, although slightly lower than for houses. This means that the movements in property values in the individual suburbs follow the trend of the Brisbane City LGA very closely. Therefore, it could be said that the Airport Link project has had no evident impact on house or unit prices in the suburbs affected by that project.

**Figure 15-2** below illustrates the movement in median house prices over the past 10 years, while **Figure 15-3** illustrates the same for the median price of units and apartments. It is of interest to note that pre-2006 and post-2006 growth trends for Windsor, Lutwyche and Woolloowin, for houses and units, follow closely that of the Brisbane City LGA. This demonstrates that the announcement of the project has had no evident impact on the property values for houses or units in the affected suburbs.

■ **Figure 15-2 Median House Prices, Airport Link Study Area (Past 10 Years)**



■ **Figure 15-3 Median Unit Prices, Airport Link Study Area (Past 10 Years)**



### 15.5.4 Effect of Volumetric Acquisition

Volumetric lots may be acquired under the *Acquisition of Land Act 1967* in the same way as part takes of surface allotments. The acquisition in effect creates a new lot similar to a subdivision, where ownership of the new lot would vest in Council. The volumetric acquisition does not involve any change in the ownership of the land at the surface, but the ‘surface’ property owner would no longer have an interest in the new subterranean lot created.

There may in some cases be a situation where, because of the shallow nature of the tunnel excavation works, there are some limitations over the use of the land at the surface where that use may impact on or damage the tunnel. However, given the depth of the sub-surface land normally required for road tunnels it would be unlikely that a volumetric acquisition would have any impact on a property owner’s rights to develop the land in accordance with Brisbane City Council’s prevailing town planning codes and policies.

Notwithstanding, there is little market evidence to guide the determination of the monetary value effect that a volumetric lot title may cause. Anecdotal evidence has been tendered that property owners perceive a loss in

property value and property appeal, compared with similar properties that are not subject to a volumetric title. The volumetric lot may discourage some buyers from bidding for a property containing a permanent subterranean title in a market where there are other properties available with no such title. In addition, it is likely that prospective purchasers of a property with a volumetric title in place would expect some form of price reduction. Acquisition of volumetric title under the *Acquisition of Land Act 1967* entitles the affected landowner to compensation based on a 'before and after' valuation of the land in accordance with the legislation. The monetary impact of a subterranean volumetric title would differ for each property depending on location, quality of the property and other specific factors directly attributable to the property.

## 15.6 Employment

The Project would create a large number of jobs in construction and operation. During construction, the Project would require a labour force equivalent of 450 full time people on-site for the full 45 month duration of the works. A breakdown of this figure is provided in Chapter 4, however it should be noted that the actual number of workers on site at any given time would vary depending upon the activities under way and the time of day.

The majority of the construction workforce would be drawn from the South East Queensland region. There may also be some specialist technical services/consultants who reside elsewhere in Australia who would work on the site for the duration of construction or as their services are required.

Surface works would generally be carried out during daytime hours only, except for infrequent tasks that require temporary or partial closure of main roads, which may be scheduled at night. Tunnelling work would continue 24 hours a day, seven days a week.

In its operational phase, the Project would generate the following ongoing employment:

■ Tunnel owner / operator	7 x full-time equivalents 4 x part-time equivalents
■ Owner / operator subcontractors / consultants	16 x full-time equivalents
■ Toll collection	49 x full time equivalents Increasing to 61 by 2026
■ Normal maintenance and operations	51 x full-time equivalents
■ Subcontractors	23 x full-time equivalents

## 15.7 Cost Benefit Analysis

The economic assessment uses a Cost Benefit Analysis (CBA) model that has been specifically developed for the Project. The reference project comprises twin parallel road tunnels connecting the Western Freeway west of the Toowong roundabout to the Inner City Bypass (ICB) east of Kelvin Grove Road. Connections to Milton Road at Toowong and Kelvin Grove Road at Kelvin Grove are included in the reference Project. The CBA Model provides investment results to assess the economic viability of the reference Project in terms of travel time savings, vehicle operating costs savings, road safety savings, environmental and externality benefits. An allocation of resources increases economic efficiency if the sum of the benefits accruing to those who gain by that allocation exceeds the sum of costs borne by those who lose. The quantification of the economic efficiency or alternatively economic viability can be expressed through calculation of the values in **Table 15-2**.

■ **Table 15-2 Northern Link CBA investment criteria**

Investment Criteria	Description
Net Present Value (NPV)	Calculation of net discounted value (ie: present value of benefits minus present value of costs) over the assessment period. A positive NPV indicates economic justification under the assumptions in the CBA.
Benefit Cost Ratio (BCR)	Ratio of the present value of benefits over the present value of costs. BCR > 1.0 indicates economic justification under the assumptions in the CBA.
Present Value of Costs (PVC)	Represents the capital and operating costs over the assessment period after allowance for discounting.
Present Value of Benefits (PVB)	Represents the discounted travel time, vehicle operating costs, road safety and externalities benefits over the assessment period.

The benefits and costs included in the Northern Link CBA model have been monetised using data from actual markets where available (ie: capital costs (CAPEX), labour prices, vehicle operating prices, etc). Austroads/DMR have provided road user costs while CAPEX project costs have been sourced from recent project cost schedules in 2008 prices. The CBA modelling is not the sole determining factor of the worthiness of the project. It should be considered alongside other major social, environmental and planning related project impacts that have been identified in other Project studies.

### 15.7.1 CBA Reference Project Description

From an economic perspective, Northern Link aims to achieve the following.

- Improved transport efficiency (ie: travel time savings, reduced vehicle operating costs, reducing congestion and enhancing road safety) for the community, business and transport suppliers.
- Improved journey time reliability of the network so that it would enhance the competitiveness of regional and state economies.
- Enhanced road connectivity to/from the western suburbs and Toowong and the CBD.
- Public transport benefits resulting from improved journey time for express buses using the tunnel.
- Wider economic impacts including better accessibility and corridor investment.
- Noise, air quality, health (road safety) and other amenity improvement.
- To obtain value for money from any public expenditure to be allocated to the Project.

Forecast traffic volumes are estimated at around 75,900 vehicles per average annual weekday in 2026. Some surface roads in Brisbane's inner west suburbs, for example Milton Road and Coronation Drive are forecast to experience traffic reductions, which would relieve congestion at key bottlenecks and improve urban amenity. Some feeder routes such as the Western Freeway and the ICB would experience traffic increases (see Chapter 5).

Northern Link with the Inner City Bypass and the soon to be constructed Airport Link, would provide an improved cross-city freight route from the western areas of Brisbane to the Airport and the ATC. The western industrial corridor and the ATC are the fastest growing industrial areas in the SEQ region. The combined projects would enable faster, shorter freight journeys between the Western Corridor, the Airport and ATC North, reducing travel times and operating costs for heavy vehicles serving these areas. Detailed analysis of traffic forecasts and local and regional transport benefits is provided in Chapter 5.

### 15.7.2 CBA Modelling Assumptions

The most significant data inputs that impact on the CBA modelling include:

- CAPEX and OPEX cost estimates;
- network traffic data for the 'With' and 'Without' Northern Link;
- discount rate of 6% assumed for the reference Project reporting; and
- sensitivity testing using 4% and 8% discount rates for risk adjusted P10 and P90 CAPEX.

CBAs of transport projects have limitations set by assumptions and by the range of factors that can be monetised. The CBA does not and cannot measure and/or monetise everything of importance to decision makers and the public.

### 15.7.3 Cost Inputs

#### Construction Costs (CAPEX)

The CAPEX cash flow (in June 2008 constant dollars) used in this CBA modelling extends from 2009 to late 2013 and includes:

- land acquisition costs;
- preconstruction costs;
- non-construction costs;
- construction costs; and
- risk.

The P50 CAPEX figure of \$2.7 billion represents the expected level and is adopted as Project CAPEX. The P10 (ie: best case) and P90 (ie: worst case) CAPEX estimates have been used in the CBA to model CAPEX sensitivity across the range of risk adjusted levels.

#### Operations and Maintenance Costs (OPEX)

Operations and maintenance (OPEX) costs over the 45 year assessment life of the Project total \$1,627 million. The OPEX schedule has been provided on an annual basis and is common to all the CBA modelling in the Project. The OPEX includes:

- tunnel traffic management facilities, signage, roadway lighting, CCTV, utilities and radio broadcast;
- fire and life safety, mechanical and electrical systems including tunnel ventilation, power supplies, fire response and protection facilities, communication and security systems and emergency egress; and
- plant management and control systems.

#### Traffic Modelling Inputs

The principal inputs into the Northern Link CBA model that are used to determine the net road user benefits and externalities over the assessment period result from the traffic modelling for the Project as described in Chapter 5 of the EIS.

The key assumptions that underpin the traffic demand are:

- the toll is set at \$3.93 (in constant 2008 prices);
- surface treatment includes the reinstatement of Coronation Drive bus lanes to Northern Link; and
- PIFU medium demographics have been adopted with enhanced mode choice.

An important feature of the traffic modelling is the differentiation in the outputs between users of Northern Link and non-users, namely all other network users. This approach accommodates the traffic impacts of induced demand resulting from the Project.

Induced demand is defined as the additional demand for travel that occurs as a result of a decrease in the generalised cost of travel including both travel time and out of pocket vehicle operating costs. With Northern Link, additional vehicle travel would result from the consequential freeing up of surface road capacity, thereby inducing people to take new vehicle trips, longer trips and, subject to availability of public transport alternatives, shift to other modes.

The traffic modelling output for Northern Link users has been developed on the basis of the “rule of half”. This rule is an accepted method to account for induced demand and is generally described for each trip benefit as being equal to half the difference in the cost of travel (generalised cost of travel comprising travel time costs and vehicle operating costs) between the Base Case and the Project. The non-users segment is the per trip benefit equal to the full difference between the Base Case and the Project.

Traffic demand for the ‘With’ and ‘Without’ the Project from 2014 to 2026 including the segmentation by users and non-users of the network is provided in Appendix B of the EIS.

#### 15.7.4 CBA Modelling Inputs and Assumptions

**Table 15-3** provides a comprehensive list of items and assumptions used in the development of the Northern Link CBA model.

##### ■ Table 15-3 Northern Link CBA model assumptions

Item	Assumptions
Price Terms	CAPEX and OPEX costs and benefits are presented in constant June 2008 dollars.
CAPEX	Up to \$2.7 billion <sup>1</sup> , which includes direct and indirect construction costs, transferable and retained risk, land, pre-construction and non-construction costs.
Operating and Maintenance (OPEX) Costs	OPEX cash flow has been provided and is presented from 2009 to 2053.
Benefit Assessment Period	CAPEX starts 2009 and ends in 2013. Road user operations commence in 2013 and the post construction assessment period extends over 40 years to 2053.
Discount Rate (Northern Link)	6% in line with current State guidelines. See also Sensitivity section below for other discount rates modelled.

<sup>1</sup> Nominal values based on April 2008 costs escalated at relevant forecast inflation rates.



Item	Assumptions
Traffic Data	<p>Traffic assignment years for 2014, 2016, 2021 and 2026.</p> <p>Without Project (Base Case) and With Northern Link reference project vehicle data by assignment years (ie: Average Speed, VHT and VKT).</p> <p>'Without' and 'With' Northern Link traffic data segmented by AM peak, PM peak, other business hours and other hours. Using Daily Traffic Profile data on a 24 hour basis from the local network.</p> <p>Vehicle segmentation by Light Vehicles (composition comprising private vehicles 77% and business vehicles 23%) and heavy vehicles.</p>
Traffic Modelling	<ul style="list-style-type: none"> <li>■ Toll = \$3.93 (\$2008), HCV Toll multiplier = 2.0.</li> <li>■ Surface treatment = Coronation Drive Tidal Flow T3 lane.</li> <li>■ PIFU and NIEIR 2007-08 Medium demographics with enhanced mode choice.</li> <li>■ Modelled network based on SEQIPP, DMR and T&amp;T including WBTNI considerations.</li> </ul>
Average Travel Speed	Determined by traffic analysis for vehicle category and assignment years.
Annualisation	<ul style="list-style-type: none"> <li>■ 342 for light vehicles</li> <li>■ 300 for heavy vehicles</li> <li>■ Average 340 for all vehicles</li> </ul>
Inter Assignment Year Interpolation	Linear average annual growth between traffic assignment years.
Travel Time Parameter Values	<p>DMR/Austrroads endorsed values for Urban Travel Time 2007 has been used for CBA modelling. The values per occupant (person-hour) are as follows:</p> <ul style="list-style-type: none"> <li>■ Private Vehicle: \$11.62</li> <li>■ Business Light Vehicle: \$37.16</li> <li>■ Heavy Vehicle (3 axle): \$23.26</li> </ul>
Vehicle Occupancy Rates	<p>The vehicle occupancy rates are as follows:</p> <ul style="list-style-type: none"> <li>■ Private Vehicle: 1.6 passengers</li> <li>■ Business Light Vehicle: 1.4 passengers</li> <li>■ Heavy Vehicle (3 axle): 1 passenger.</li> </ul>
Vehicle Operating Cost (VOC)	The vehicle operating cost model is used to determine VOC by vehicle category for the future base case traffic network. Model coefficients were taken from DMR/Austrroads standards 2007.
Road Safety Benefits	<p>The inputs into the road safety benefits analysis are as follows:</p> <ul style="list-style-type: none"> <li>■ AADT VKT values used for 'With' and 'Without' the Project</li> <li>■ Accident cost values (2002 dollars) for local and freeway networks</li> </ul>
Residual Value	The residual value of the Northern link after 40 years of operation is assumed to be \$0.
Sensitivity	<p>Sensitivity testing of P10 and P90 risk adjusted CAPEX using:</p> <ul style="list-style-type: none"> <li>■ Discount rate of 4%</li> <li>■ Discount rate of 8%</li> </ul>
Decision Outputs	<p>The following CBA outputs have been delivered.</p> <ul style="list-style-type: none"> <li>■ Benefit Cost Ratio</li> <li>■ Net Present Value</li> <li>■ Present Value of costs</li> <li>■ Present Value of benefits segmented by travel time benefits, VOC benefits, road safety benefits and environmental benefits.</li> </ul>

## Tolls as Transfer Payments

Tolls represent a means by which some of the benefits to the users of the Project (as measured by their implicit willingness to pay for reduced travel time or improved safety) can be transferred in whole or in part (in the form of cash payments by the users) to the State or private company that operates the facility. When tolls are proposed for a project such as Northern Link, the CBA accounts for the effect of such charges on future use by using traffic modelling outputs that are underpinned by the setting of a toll (ie: \$3.93 in the case of Northern Link). In particular, the payment of a toll transfers the value of some of the time saving or other user benefit

including out of pocket vehicle operating costs from the road user to the facility operator, thereby reducing the value of benefits realised by the road user. Consequently, a road user would typically use the facility less often if it were tolled than if it were not tolled, affecting future traffic demand, congestion and user benefits on the surrounding surface road network. The consistent economic approach is to include tolls as both a cost to road users and a benefit to the operator thereby cancelling out each other in any analysis.

### 15.7.5 CBA Model Results

The Northern Link CBA with a risk adjusted (P50) CAPEX of approximately \$2,655 million and OPEX of around \$1,627 million over 45 years at a discount rate of 6% are shown in **Table 15-4**.

■ **Table 15-4 Northern Link P50 CBA findings (6% discount rate)**

Output	Value
Present Value of Costs (PVC)	\$2,311.1 m
Present Value of Benefits (PVB)	\$2,861.0 m
Net Present Value (NPV)	\$549.9 m
Benefit Cost Ratio (BCR)	1.2

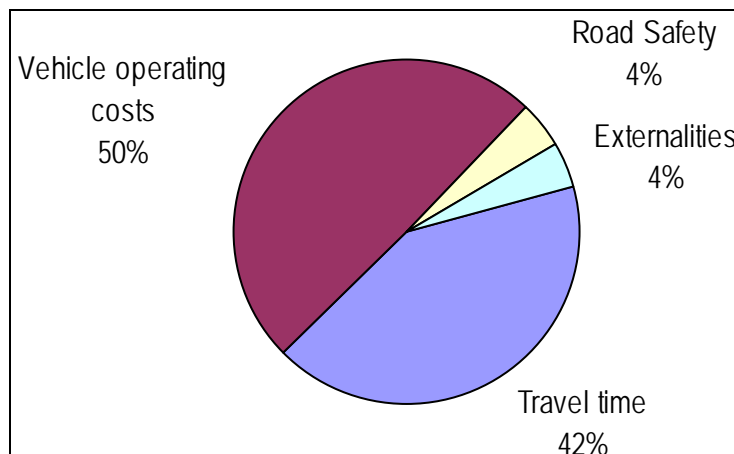
The Net Present Value (NPV) is the value of the discounted total future benefits minus discounted total future costs over the 45 year assessment period. On the basis of the assumptions that have been adopted, the CBA model returns a NPV of \$550 million over the life of the Project and represents a strong economic justification for proceeding with the Project.

The Benefit Cost Ratio (BCR) is equal to the discounted total benefits over the concession period divided by the discounted total costs (ie: CAPEX and OPEX). A ratio >1 indicates that Northern Link is economically viable in the context of the CBA although there may be other non CBA factors (eg: available program funding, social and environmental factors) which may also be pertinent to the assessment of the project. A higher BCR indicates greater economic merit for the Project.

The BCR for the Project as calculated from the CBA model is 1.2. The BCR of 1.2 indicates that the Project provides a 20% return over the discounted value of the investment for the 45 year assessment period for the Project.

**Figure 15-4** highlights the importance of VOC savings at 50% of total discounted benefits that would accrue to the future road network with the construction of Northern Link. Travel Time and Road Safety savings represent 42% and 4% of all discounted benefits respectively. Environmental/Externalities benefits at 4% of total discounted benefits are smaller but nevertheless important benefits.

■ **Figure 15-4 Total benefits segmentation (%)**



**Travel Time Savings**

Estimation of expected changes in travel times is a key element to consider when determining the economic effects of transport projects, including an expansion of capacity of the road network through the upgrading of the existing road. Projects which improve traffic flows provide motorists with reduced journey time, less congestion in the network and enhanced network reliability that may result in time savings. These travel related time savings are assessed as having economic value in the context of CBA.

Travel time savings accrue to occupants of light vehicles whose time savings are calculated by the following estimated values of travel time expressed in dollars per hour:

- private \$11.62 per hour per person; and
- business \$37.16 per hour per person

These values are multiplied by both the number of minutes saved per vehicle and the number of occupants per vehicle.

The same process is applicable to heavy vehicles segmentation with the driver/vehicle prescribed in travel time value per hour (ie: \$23.26) and the freight component (ie: \$11.27) similarly attracting a time value per hour because of the time dependent nature of the freight load. Values prescribed per hour to driver, other occupants and freight are based on average weekly wages and freight transport costs.

Travel time benefits equate to the net difference in user travel time costs between without and with Northern Link. Travel time estimates for local network traffic are calculated using aggregates of:

- travel speed for each vehicle class (motor vehicles, light commercial and heavy vehicle classes);
- average annual daily traffic by vehicle class (AADT);
- route distance;
- average occupancy by vehicle class; and
- value of time per occupant and for freight by vehicle class.

The approach applied in this study uses Network Vehicle Hours Travelled (VHT) data for assignment years 2014, 2016, 2021 and 2026. The data has been segmented by vehicle class (light vehicles and heavy vehicles) and by period of travel (morning peak 7am – 9am, afternoon peak 4pm – 6pm, business hours 9am – 4pm and other hours 6pm – 7am). The light vehicle class has been further delineated into private and business.

The significance of delineating by private/business purposes and peak and business/other hours is that each has a different occupancy rate per vehicle and, in the case of cars (business – peak/business hours) having a higher assigned economic parameter value of time.

Travel time benefits equate to the net difference in user travel time costs between the ‘With’ and ‘Without’ Project scenarios. Travel time estimates for local network are calculated using:

- travel speed for each vehicle class (light vehicles and heavy vehicle classes);
- average annual daily traffic by vehicle class (AADT);
- route distance;
- average occupancy by vehicle class; and
- value of time per occupant and for freight by vehicle class.

**Table 15-5** shows the travel time savings generated by Northern Link segmented by vehicle type.

■ **Table 15-5 Discounted travel time savings by vehicle type**

Vehicle Segment	Percent of travel time savings (%)
Private Light Vehicles	48
Business Light Vehicles	40
Heavy Vehicles	12
<b>Travel Time Benefits Total</b>	<b>100</b>

Travel time savings represent the second largest economic net benefit to Northern Link. Private light vehicles are the largest contributor to travel time savings with 48-51% of the total travel time savings.

Reducing road costs for business increases their productivity. The savings estimate includes the costs of operating freight vehicles (i.e. heavy freight) and business cars (i.e. business light vehicles) including the time costs of drivers, their passengers and the freight component in the case of heavy vehicles.

### Vehicle Operating Costs (VOC) Savings

Road projects can directly affect the cost to drivers of operating their vehicles by improving traffic flow conditions and by offering drivers better road conditions which optimise the running of their vehicles. VOC are based on a combination of variables including fuel and oil consumption, maintenance and repair, and capital depreciation, insurance costs, road condition and gradient and vehicle speed.

VOC parameter values and journey speed vehicle operating costs models which incorporate these values are periodically updated by ARRB with the latest being in the Austroads publication, Economic Evaluation of Road Investment Proposals – Unit Values for User Costs (Draft), Austroads 2007.

VOC savings, following the commencement of road use post 2013, represent the largest economic net benefit from Northern Link.

## Road Safety Benefits

Road safety benefits have been derived for users and non-users of the Project. Non-user road safety benefits from the Project are derived for all vehicles by modelling average accident costs by the weighted average of the road types (local/sub-arterial, arterial and freeway) in terms of cost per million vehicle kilometres of travel (MVKT). The net difference for non-user road safety between the 'Without' and 'With' Northern Link scenarios is the road safety savings. In addition, road safety benefits have been calculated for the users of the Project. The Project would be inherently safer because of the elimination of traffic controlled intersections and constant travel speed.

The generalised network road safety benefits for the Project are calculated to be 4% of the total discounted benefits.

## Externalities

There will be a range of direct and indirect impacts on the built and natural environments that can be considered and assessed in the CBA process. The direct and indirect impacts on the built and natural environments that can be monetised and have implications for the CBA model include:

- noise;
- local air quality;
- water quality;
- greenhouse gas emissions;
- nature and landscape;
- urban separation; and
- upstream and downstream costs.

For this section of the CBA model it is assumed that both light vehicles and heavy vehicle traffic using the Northern Link would specifically generate noise, affect local air quality, water quality, greenhouse gases, nature and landscape, urban separation and upstream and downstream cost benefits.

**Table 15-6** provides the 2007 Austroads externality unit cost for urban passenger vehicles and urban freight vehicles. It is assumed that the average tonnage per heavy vehicle is 15 tonnes. Under the modelling parameter values for greenhouse gas emissions, the heavy vehicle unit cost (i.e. \$ per 1,000 tonne km) at \$49.50 is significantly greater than the passenger vehicle value, resulting in an aggregate negative impact for this externality.

### ■ Table 15-6 Externality unit costs - urban

Externality	Passenger vehicle (cents/per km)	Heavy vehicle (\$ per 1000 tonne/km)
Noise	0.82	27.1
Local Air Pollution	2.54	158.93
Water Quality	0.38	23.84
Greenhouse Gas Emissions	2.00	49.5
Nature and landscape	0.05	17.68
Urban separation	0.59	25.93
Upstream/Downstream costs	3.42	164.99

**Table 15-7** identifies the environmental savings by environmental type and vehicle type as a result of the Project.

■ **Table 15-7 Discounted externalities benefits**

Externalities benefit	Present value
Noise	\$6.1 m
Air Pollution	\$42.0 m
Water Pollution	\$6.3 m
Greenhouse Gas	\$9.9 m
Nature	\$5.3 m
Urban	\$6.4 m
Upstream/Downstream	\$41.6 m
<b>Total externalities benefits</b>	<b>\$117.6 m</b>

Externalities benefits account for approximately 4% of the total economic benefits to the Project. In discounted terms, externalities savings are approximately \$118 million.

### 15.7.6 Sensitivity Analysis

Sensitivity testing across all risk levels (P10, P50, and P90) using 4% and 8% discount rates is presented in **Table 15-8**. The reference project of CAPEX P50 at a discount rate of 6% has been included in the table to facilitate comparison of sensitivity test scenarios.

■ **Table 15-8 Sensitivity test of cost benefit analysis results (\$m)**

Sensitivity test	BCR: P10	BCR: P50	BCR: P90
4.0%	1.7	1.7	1.6
6.0%	1.3	1.2	1.2
8.0%	1.0	0.9	0.9

The sensitivity analysis shows that:

- the discount rate of 4% returns a BCR of 1.6-1.7 across all risk assessment levels, providing a sound economic justification for the Project; and
- the discount rate of 8% returns a BCR of 0.9 to 1.0 across all risk assessment levels, indicating an economic viability slightly under the break even level at this upper discount rate.

For all sensitivity test scenarios, the economic results are lessened by the range of assumptions that are adopted and the range of benefits that can be monetised. It is likely that the economic result would be further improved by land development and improved amenity within the corridor directly influenced by Northern Link.

### 15.7.7 Timing of Project Delivery

The issues of the timing of the Project's delivery and commercial viability have been addressed through the Business Case reporting process, which has been carried out separate to the EIS process. The EIS has included an economic evaluation of the Project that focuses on the road user related benefits that the Project will deliver as opposed to the commercial returns. Notwithstanding, the timing of the Project is being considered in recognition of a potential window of opportunity in late 2009/early 2010.

In addition, construction material prices have been increasing at a rate of 6% per annum in 2007/2008 while construction labour rates have been increasing by approximately 10% per annum. While forecasting on construction costs including materials and labour can be unpredictable due to unforeseen economic conditions, the total development costs for the Project could escalate between 5% and 10% per annum, making the Project considerably more expensive if put on hold. Most importantly, the early annual road user benefits, resulting in improved transport efficiency and enhanced road network connectivity that could be attributed to the project, would not be achieved, which would be to the detriment of Brisbane's and the region's economies.

## 15.8 Conclusions

The Northern Link Project Case is estimated to generate in excess of \$11 billion worth of undiscounted economic benefits over the life of the project in terms of travel time savings, vehicle operating costs, road safety savings and environmental savings.

The Northern Link Project Case with a risk adjusted P50 capital cost of approximately \$2,655 million and a discount rate of 6% is estimated to return a BCR of 1.2 over the 45 year assessment period.

The Northern Link Project Case at the P10 and P90 capital cost levels and a discount rate of 6% also returns an acceptable BCR at 1.3 and 1.2 respectively.

The discount rate of 8% returns a BCR of between 0.9 and 1.0 across all capital cost risk assessment levels indicating an economic viability slightly less than break even at this upper discount rate.

VOC savings are the primary economic justification for the Project, contributing at least 50% of the total discounted benefits. Travel time savings contribute significantly to the Project amounting to 42% of the total discounted benefits. Road safety and externalities comprised the remaining benefits, each at 4% of the total discounted benefits.

The impact of increases in the price of oil on VOC benefits would depend on the price elasticity of vehicle travel resulting from these higher vehicle running costs, and their ultimate impact on network and direct Northern Link traffic volumes that have been adopted in the traffic modelling.

An increased value of travel time would increase the Project CBA benefits. The private sector's view of time value savings is a key difference between traditional and PPP delivery. This implies that the BCR is likely to be conservative.

Other non monetised benefits include some public transport travel time and waiting savings, some bus fleet operational efficiencies, land value capture along the corridor and a number of other secondary benefits that would serve to improve the benefits of the Project and hence the BCR.

Under the modelling assumptions that have been adopted, the CBA results at the P10, P50 and P90 risk adjusted capital cost levels and across the range of discount rates from 4 percent to 6 percent provide an acceptable economic justification to proceed with the Northern Link Project Case.

The Monash University CGE modelling further highlights the economic effects of the NLRT on the Queensland economy. During a typical year of the construction phase (2009- 2013), additional real Gross State Product (GSP) for Queensland is estimated at \$355 million. Similarly, all Queensland sectors are projected to experience positive effects from the Northern Link on value added at \$313 million and employment of around 3800 average time jobs. In a typical year of the operating phase, Queensland real GSP is projected to be almost \$169 million extra as a result of the Northern Link.

In conclusion, the CBA and CGE modelling for the NLRT provide positive economic impacts and aggregates for the Queensland economy.