Airport Link

Phase 2 – Detailed Feasibility Study

CHAPTER 16

ECONOMIC IMPACT ANALYSIS

- October 2006

Contents

Appendix C – CBA Findings Summary Sheets

1. Scope

1.1 Environmental Impact Statement Terms of Reference

The economics section of the EIS report addresses the economic impact issues that are included in the Terms of Reference (TOR) for the Airport Link Environmental Impact Statement (EIS). The TOR have been prepared by the Co-ordinator General in accordance with the requirements of the State Development and Public Works Organisation Act 1971.

The objectives of the economics component of the EIS are:

- To identify potential economic impacts and to inform the Project Team so that the adverse impacts are avoided or mitigated and managed where possible; and
- To identify potential economic benefits from the Project that may accrue to the South East Queensland Region.

The TOR states that there should be sufficient detail in the EIS to enable readers to identify and understand the benefits of the Project, and to balance those against the impacts of the Project on the natural, social, economic and built environment with regard to mitigating the adverse impacts. There may well be specific capital costs that may be incurred to offset social and environmental impacts such as noise barriers, air filtering etc. Where possible, these impacts will be identified and reported in the Economics deliverables for the EIS.

The TOR also requires that the EIS should include analysis of the cumulative impacts on economic values directly caused by the Project. That is, the cumulative impacts must be considered over time and in conjunction with other major projects approved or known to be proceeding at the time of commencement of operations of the Project.

The TOR for the Airport Link EIS explicitly identifies which sections of the final EIS document should report the findings of the economic analysis namely:

- Background and Project Rationale including strategic economic context and economic justification including employment and business opportunities;
- Project description;
- Description of the existing economic environment; and
- Assessment of the future economic environment with the Airport Link Project within a framework that includes:
    - A clear definition of the economic objectives and scope of the Project, including the extent of the study corridor for the purpose of economic assessment;
    - Set and justify a timeframe for analysis that reflects the economic life of the principal asset;
    - Identify and justify an appropriate Project-specific discount rate;

- Identify and examine all costs and benefits of the Project including user benefits (such as travel time savings, reduced vehicle operating costs and safety improvements), benefits to the broader community through transport network effects (induced travel, modal shifts etc), socio-economic effects (employment) and environmental effects; and
- Appropriate testing of sensitivity of key parameters.

1.2 Project Definition

The Airport Link Project is the northern part of Project TransApex, which proposes a tri-axis based framework of strategic road connections that would allow Brisbane's cross-city travel movements to bypass the Central Business District and inner suburbs.

The proposed Airport Link Project comprises two 6 km long underground toll roads located 50 metres below the surface between Bowen Hills and Kedron/Toombul, with an estimated risk adjusted undiscounted construction cost of $2.3 billion.

Lutwyche Road, beneath which the Airport Link will be constructed, carries 65,000 vehicles per day. During the AM and PM peaks, and to a lesser extent other business hours, traffic on Lutwyche Rd is extremely congested. Latest traffic studies show that without Airport Link, this number will increase to more than 100,000 vehicles by 2026. With the Airport Link Project constructed, peak traffic on Lutwyche Road would be reduced by up to 30 percent.

The objective of the Project is to improve traffic conditions and flows to the northern suburbs of Brisbane and to improve road access to Brisbane's international and domestic airports. The Airport Link has proposed connections at Gympie Road (Kedron), Sandgate Road (Toombul), East-West Arterial (Toombul) in the north, and would link with the Inner City Bypass (ICB) and the planned North-South Bypass Tunnel (NSBT) at Bowen Hills in the south (**Figure 1-1**).

- **Figure 1-1 Proposed Airport Link Corridor**

In addition, there is a potential to later include a cross-link from Stafford Road and Gympie Road to Sandgate Road and the East-West Arterial at Toombul to cater for northern originating traffic to the airports. This later Project is not included in the scope of this economic impact analysis.

The concept design for the Airport Link Project will include the following features:

- Two separate, parallel road tunnels, one for north-bound traffic and one for south-bound traffic;
- Three lanes in each direction from North-South Bypass Tunnel connection to Gympie Road connection. Two lanes in each direction from Gympie Road connection to East West Arterial connection;
- One lane in each direction for the Interim Northern Busway;
- Tunnel portals at Bowen Hills, Gympie Road and East West Arterial for Airport Link;
- Tunnel portals at Stoneleigh Street, north of Norman Avenue, south of Stafford Road, at Sadlier Road (Northbound) and at Broughton Street (Southbound) for Interim Northern Busway;
- Safety systems including engineering egresses, fire protection and monitoring systems;
- A ventilation system to manage air quality in the tunnel and near portals including elevated outlets near the portals in Bowen Hills, Kedron and Toombul for Airport Link;
- Surface road changes to connect the tunnels to the existing road/bus network;
- Tunnel Control Centre which controls all aspects of the operation of the tunnel including traffic management, incident management, ventilation and other services, and interfaces with the broader road network;
- Traffic management systems including signage, lighting, CCTV and radio/mobile rebroadcast capability; and
- Electronic tolling, plant monitoring and control systems.

The Airport Link Project is strategically identified as a solution to road congestion in the north eastern inner Brisbane that provides:

- A continuation of the North-South Bypass Tunnel north to Wooloowin and Sandgate Road, Gympie Road and Airport Drive with an East-West Connection from Stafford / Gympie Road;
- A key connection between other elements of TransApex, such as the North-South Bypass Tunnel and the Northern Link, Brisbane Airport and other key travel generators in the Australia TradeCoast region;
- A degree of secondary connectivity for radial movements providing for city connections;
- An opportunity to free up service road space and thus provide for public transport initiatives such as the Interim Northern Busway, Transit Orientated Developments and urban renewal opportunities;
- More specifically, Airport Link would greatly improve access between Brisbane's CBD and the northern suburbs. In particular, the tunnels would provide a vital link to the Brisbane Airport and other north river sections of the Australia TradeCoast precinct (**Figure 1-2**).

- **Figure 1-2 Proposed Airport Link with Links to ICB and NSBT**

Latest traffic studies show that in 2012, motorists would receive benefits from the Airport Link including:

- Reduced travel time from Fortitude Valley to Hendra by about 8 minutes compared to the trip without Airport Link;

- Reduced traffic on Lutwyche Road and Sandgate Road by up to 25%. This would free up road space on these key arterials which would allow for improved public transport services;
- Reduced cross town travel between Chermside and Fortitude Valley by up to 45%; and
- Reduced travel time between Hendra and Fortitude Valley by up to 40%.

1.3 Interim Northern Busway Integration

The Interim Northern Busway Project is in the detailed feasibility stage and an analysis of whether or not the Interim Northern Busway Project should be procured with Airport Link has been considered in five sections. Each section of the Interim Northern Busway, and its likely interface with the Airport Link is shown in **Table 1.1**.

Table 1.1 Proposed Interim Northern Busway Likely Interface with Airport Link

Section	Section Details	Description
1	Royal Children's Hospital to Northey Street	Significant capital works, predominantly bridging structure, station near the hospital, insignificant interaction with Airport Link
2 and 3	Northey Street to Stoneleigh Street	Relatively smaller scale capital works consisting predominantly of at-grade bus prioritising works (i.e. interim works which should be replaced in time by the ultimate configuration). Section 2 may have physical interaction with North South Bypass Tunnel (NSBT) and Airport Link depending on how these projects interact with Lutwyche Road; and
4 and 5	Stoneleigh Street to Sadlier Road	Significant capital works, predominantly tunnel structure at Lutwyche and Kedron, significant physical local interaction with Airport Link particularly at the Kedron Brook end and at worksites.

There are significant benefits for joint delivery of the Interim Northern Busway Section 4 and 5 with Airport Link. This is due largely due to the considerable level of capital works in close proximity to Airport Link, the similarities of those works and the ramifications and benefits that this creates for both Projects. Drivers include innovative design, construction efficiencies, operational efficiencies, risk management and the management of impacts relating for example to work sites and spoil. These various benefits should lead to better outcomes for the community, better service outcomes and potential cost savings.

It is not envisaged that Sections 1, 2 or 3 would be integrated with Airport Link. Construction activity for Section 1 in the vicinity of Royal Brisbane / Womens Hospital (RBWH) is predominantly bridgework, and hence there is less potential for construction efficiencies with Airport Link. In addition, the physical locality of the two Projects is largely, if not totally separate (including potential worksites).

In relation to Sections 2 and 3 of the Interim Northern Busway Project, the nature of the work to be undertaken is quite different to Section 4 and 5. Sections 2 and 3 have comparatively very low capital costs and relatively large potential for community impacts from a traffic and land use perspective.

1.4 Approach

The overriding economic objective of the Airport Link Project is concerned with improving the economic efficiency of transport in the Brisbane road network. Increasing congestion and road network unreliability result in socio-economic disbenefits costs to the community and quantifiable additional costs to businesses.

From an economic perspective, the Airport Link should be aiming to achieve the following:

- Improved transport efficiency (i.e. 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 will enhance the competitiveness of regional and state economies;
- Wider economic impacts including better accessibility and corridor investment; and
- Noise, air quality, health (road safety) and other amenity improvements; and to obtain value for money from any public expenditure to be allocated to the Project.

The economics component of the Airport Link EIS addresses the above objectives and the TOR covers the following tasks:

- Identification of existing economic activities including a street-level survey along the proposed alignment;
- Description and assessment of future economic activities in the proposed Airport Link corridor;
- Review of public planning documents and the National Institute of Economic and Industry Research (NIEIR) Brisbane Long Term Planning Economic Indicators study;
- Development of an Airport 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 savings;
- Simulation of the Monash University's Centre of Policy Studies (COPS) CGE Model to assess the broader regional and state economic impacts of the Project;
- Strategic assessment of the corridor that identifies and assesses potential areas for future development; and
- Identification and assessment of other economic considerations that may be a result of the proposed Airport Link Project.

2. Economic Environment

2.1 Existing Economic Environment

2.1.1 Introduction

This section of the report presents the findings of an investigation of the existing and future economic environment for the area affected by the proposed Airport Link Project.

An analysis of the existing economic area affected by the proposed Airport Link Project includes the following tasks:

- Detailed analysis of the major economic centres that would have improved access as a result of the proposed tunnel;
- Street level survey of economic activities located within the core routes of the Airport Link corridor; and
- Assessment of the National Institute of Economic and Industry Research (NIEIR) Brisbane Long Term Planning Economic Indicators study (October 2005).

2.1.2 Major Economic Centres Impacted by the Proposed Airport Link

The proposed Airport Link tunnel would provide improved road network access and result in significant benefits to the following major economic centres:

- Brisbane Airport;
- Port of Brisbane;
- Australia TradeCoast including TradeCoast Central (northern side of Brisbane River);
- Centro Toombul Shopping Centre; and
- Westfield Chermside Shopping Centre.

Each of these centres depends for their success on high capacity transport access. Because of their geographic situation in relation to the tunnel alignment there can be little doubt that Airport Link will have an effect on each of them to greater or lesser degree. From an economic point of view it is important to understand the performance and projected future of each centre so as to understand the broader improvements to regional prosperity that may be able to be supported by Airport Link.

Other commercial and industrial land uses north of the Brisbane River within the influence of the Project are:

- Port of Brisbane's Eagle Farm Estate, comprising 26 hectares which accommodates industrial warehousing, commercial offices and distribution;
- Private commercial and industrial parks in the Gateway North area around Eagle Farm, Pinkenba, Hamilton and Hendra; and

- Other major industrial and commercial estates in the Outer North area including Geebung, Zillmere, Banyo, Brendale, Narangba and Burpengary.

The local shopping centres of Stafford City Shopping Centre and Centro Lutwyche Shopping Centre are also in the geographic catchment of the Airport Link tunnel. The latter has been addressed in the street level survey work.

2.1.3 Brisbane Airport

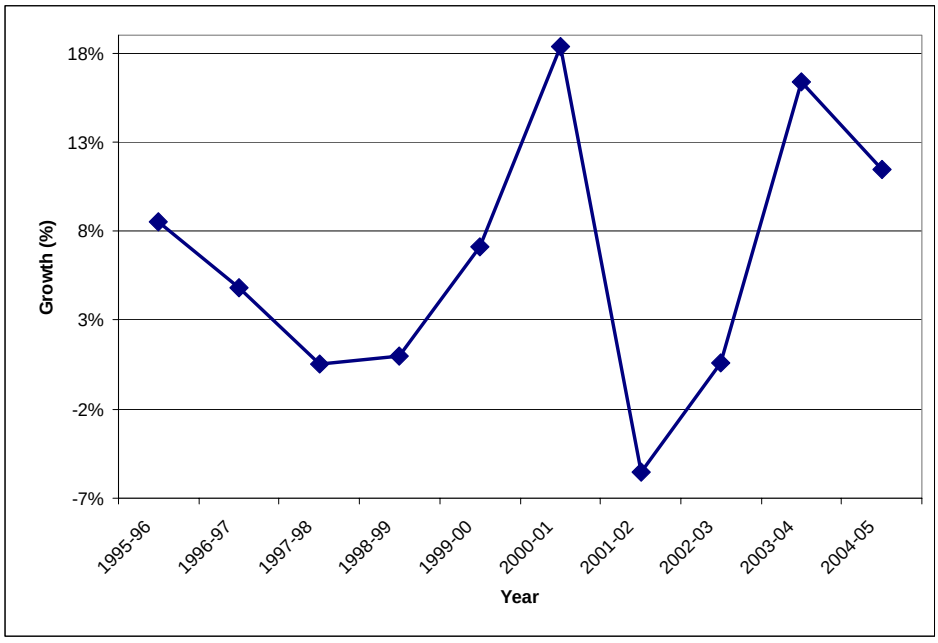
Background

The Brisbane Airport occupies a 2,700 hectare site to the north of the CBD and is Australia's third busiest airport in terms of passenger movement numbers. The Brisbane Airport is owned and operated by Brisbane Airport Corporation Limited (BACL) under a long term lease (50 year plus an option for an additional 40 years) from the Commonwealth of Australia. The new domestic terminal was opened in 1988 while the new international terminal was opened in 1995. Road access to the terminals and on-site airport businesses is via Airport Drive from the East-West Arterial and Gateway Motorway. The Airtrain rail link provides rail access from the domestic and international terminals to the Brisbane Citytrain network and onto the Gold Coast. The airport has 24 hour operations (no curfew) and contains approximately 130 businesses that employ in excess of 8,000 full time staff. More than 18,000 people (inclusive of full time employees) are directly dependent on the airport's activities for their income.

Passengers and Freight

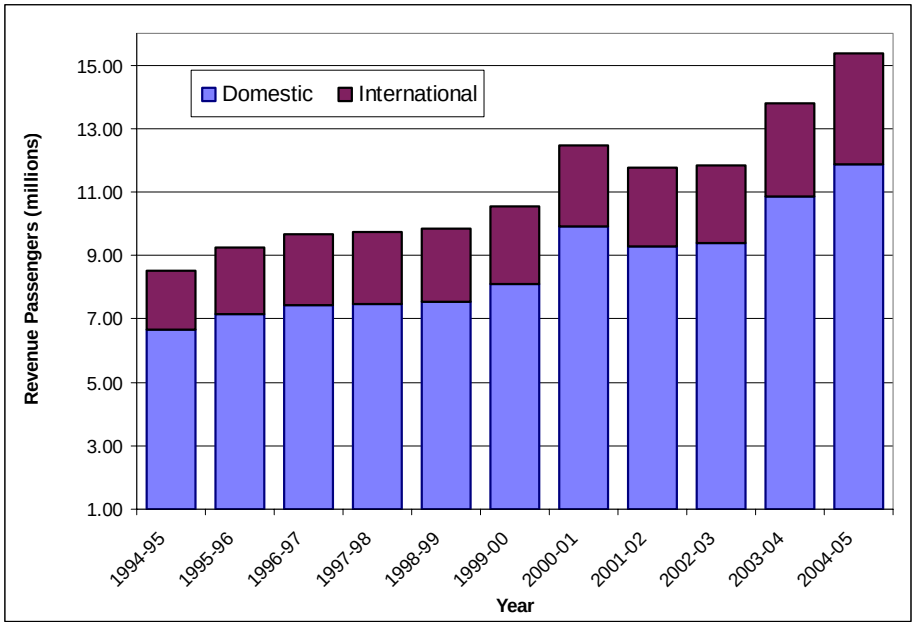
Total revenue passenger movements at Brisbane Airport were 15.4 million for the year ending 2004-05 comprising of 11.9 million domestic air passengers and 3.5 million international air passengers. Total passenger movements have increased from 9.2 million in 1995-2006 to 15.4 million in 2004-05 at an average annual growth rate of 6.7% (**refer Figure 2.1**).

Figure 2.1 Brisbane Total Revenue Passenger Growth (%) (1995-2005)



Over the same ten year same period, domestic passenger movements have increased from 7.2 million to 11.9 million (**refer Figure 2.2**) at an average annual growth rate of 6.6%. International passenger movements have also exhibited solid increases from 2.1 million to 3.5 million at an average annual growth rate of 6.9%.

- **Figure 2.2 Brisbane Airport Passenger Movements - International and Domestic (1995-2005)**



Since 2001-02, total air passenger movements through Brisbane Airport have increased from 11.8 million to 15.4 million at an average annual growth rate of 10.1%. The last two years have seen total movements increase by 16.4% and 11.5% respectively. Domestic passenger movements over the past three years have increased by a total of 27% or at an average annual rate of 9% while international passenger movements have exhibited an even higher increase of 40% or an average annual growth rate of 13.5%.

The increase in air passenger movements at Brisbane Airport over the past decade, and significantly over the past three years, has increased pressure on the road network that feeds to the airport. This is particularly evident during the local AM and PM traffic peaks in and around the network on the Gateway Arterial between Nudgee Road and the Kingsford Smith Drive that coincide with the peaks for domestic aircraft arrivals and departures.

There have been significant increases in both domestic and international passenger movements since 2001-02. The year immediately prior to 2001-02 saw a downturn in aviation activity in Australia that resulted from the aftermath of the September 11 terrorist attacks, the demise of Ansett, the SARS epidemic and the recessive economic conditions in Australia and internationally.

Air freight carried through Brisbane Airport was 152,710 tonnes in 2004/05 comprising of 98,694 tonnes in international air freight and 54,013 tonnes in domestic air freight.

Airport Development

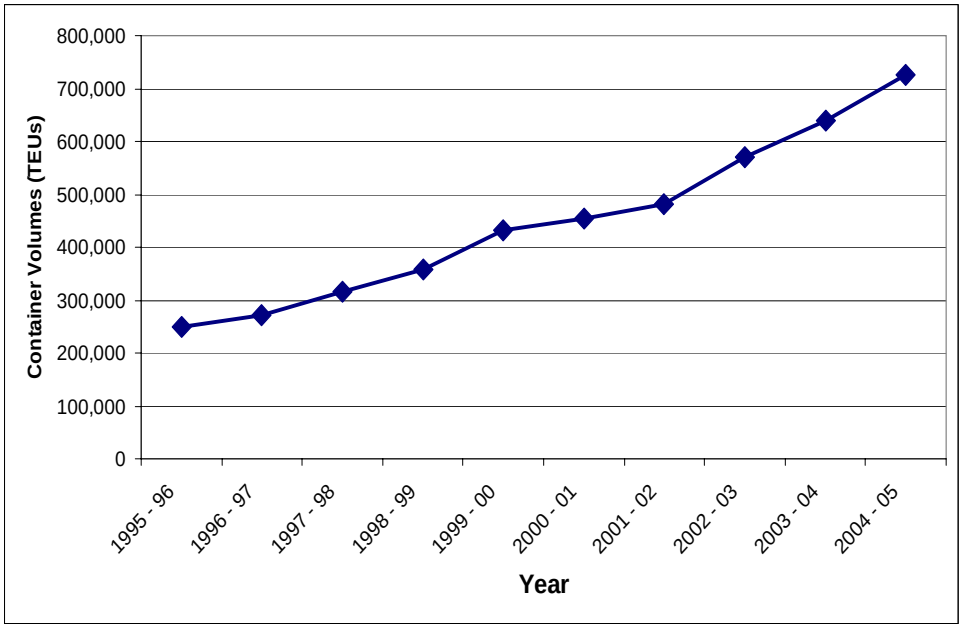
Over the past 9 years, BACL has invested over $450 million in significant development works as part of its strategic vision to transform Brisbane Airport from a traditional state capital air passenger hub to the Airport City concept. Most importantly, BACL has produced the Brisbane Airport 2003 Master Plan which contains the planning framework for the development of the airport to 2023. The implementation of the master plan has commenced and existing and future developments at the airport will create significant business, industry and employment opportunities for the Brisbane and the SEQ region.

2.1.4 Port of Brisbane

The Port of Brisbane, particularly its port facilities at Fisherman Islands, is a major driver of economic activity in South East Queensland and Queensland. The Port of Brisbane is Australia's fastest growing port and Australia's third largest container port. The port's trade provides a reliable barometer of broader economic activity in South East Queensland

While the port facilities will not have direct road connectivity via the Airport Link, heavy vehicle traffic will use the road network including the proposed Airport Link for origin and destination freight movements. Total cargo trade through the Port of Brisbane has been rising steadily over the past decade, increasing from 18.8 million tonnes in 1995/96 to 26 million tonnes in 2004/05 at an average annual growth rate of 3.8%. Container throughput at the port has increased significantly over the same period from 249,439 containers in 1995/96 to 726,145 containers in 2004/05 at an average annual growth rate of 19.1% (**refer Figure 2.3**). The port accounts for over $7 billion of total overseas commodity exports (91.4%) from South East Queensland.

- **Figure 2.3 Port of Brisbane – Trends in Container Volumes (1995-2005)**



The use of heavy vehicles to move containers into and out of the port from various industrial locations and depots in South East Queensland and beyond has a major impact on the local arterial road

network. This existing trade results in significant heavy vehicle traffic from the north and south via the Gateway Motorway to the Port's Fisherman Islands facilities and to a lesser extent via major arterials such as Lutwyche Road.

2.1.5 Australia TradeCoast (ATC)

The ATC is Brisbane and South East Queensland's (SEQ) primary trade and industrial area. Encompassing both the Port of Brisbane, Brisbane Airport and about 8,000 hectares of land, the area is now recognised one of Australia's leading industrial, commercial and logistics centres and a key existing and future generator of output and employment.

In addition to the port facilities, the Port of Brisbane Corporation has land that that has been and/or will be developed for industrial, commercial uses on both sides of the Brisbane River including Fisherman Islands Port of Brisbane Business Park, Whyte Island Industrial Estate, Colmslie Business Park and Eagle Farm Industrial Estate.

There are a number of other significant existing or planned industrial estates / business parks with the ATC including:

- Metroplex on Gateway (Murrarie);
- Gateway Business Park (Murrarie);
- Murrarie Business Park;
- Rivergate Marine and Industry Park (Murrarie);
- Portlink Industrial Park (Hemmant / Queensport); and
- Gateway Industrial Precinct (Pinkenba).

The Queensland Government, through the Department of State Development and Innovation (DSDI), has also been directly involved in developing three industrial estates within the ATC:

- The Lytton Industrial Estate which has recently seen the release of the final 28 lots;
- Hamilton Industrial Estate (now completed); and
- Murrarie Development Precinct.

Brisbane City Council's Trade Coast Central Stage 1 Project, covering 36 hectares of the 154 hectare old Brisbane Airport site is scheduled to come on line in late 2006. The remaining 110 hectares have been reserved for industrial and commercial use with lot sizes of 5,000 sqm to 10 hectares respectively.

The current limited supply of available industrial and commercial land has put pressure on leases with increases around 10 – 15% over 2005. Freehold land values have also increased significantly over the same period.

Outer North

Industry sources have identified that Brisbane's northern industrial activities are gradually shifting to the outskirts of the metropolitan area at Brendale, Narangba, Burpengary and some parcels of land at North Lakes. Further releases of industrial land have also occurred in the Banyo Industrial Estate, Northlink Business Park (Banyo) and in Zillmere. It is estimated that these Outer North additions to industrial land in 2005 were around 140,000 sqm or 18% of total industrial land released in the metropolitan area. Around 124,000 sqm of any new industrial land is proposed to be released in 2006 in this emerging area.

The significance of the Outer North Industrial land to this assessment is its link with the Gympie Road and Bruce Highway corridors. Further growth in the outer north will have impacts on the proposed Airport Link for cross-city commercial trips from the South and Western corridors. From a road network perspective, these developments in the Australia Trade Coast, and particularly future development in the Trade Coast Central and the Outer North, will generate increased traffic activity in the Airport Link Corridor.

Road infrastructure is vital to the effective and efficient operations of existing industrial estates and to the future development of new estates. The continued strength of the Queensland economy and substantial population growth in the SEQ of around 2.5% per annum will continue to drive the commercial and industrial property market and the employment that it generates.

2.1.6 Street level survey

Scope

A street survey was undertaken to identify economic establishments that comprise the existing economic environment located directly in the corridor. The following data was collected from the street level survey:

- Business Name;
- Location; and
- Business Type.

This analysis focused on the surface road areas in the Bowen Bridge Rd/Lutwyche Rd and Junction Rd areas between Herston to Kedron and Kedron to Toombul. To assist with the identification of the existing environment, the street level survey was conducted along two sections, namely:

- Bowen Bridge Road (Bowen Hills) to the corner of Gympie Road and Stafford Road (Kedron) - Bowen Hills heading north down Bowen Bridge / Lutwyche Road to the Gympie Road / Stafford Road intersection at Kedron; and
- Junction Road (Eagle Junction) to East-West Arterial (Toombul) - Eagle Junction train station at Eagle Junction down Junction Road to the Sandgate Road / East-West Arterial intersection at Toombul.

Data collected from the street level survey were coded according to the 3-Digit Australian New Zealand Standard Industry Classification (ANZSIC) and then aggregated to industry group level.

Economic Activity

A total of 483 businesses were identified from the street survey with the most common business type being "*Clothing and Soft Good Retailing*" at 9.7% (47 out of a total 483 businesses). This was particularly evident in the Junction Road to Toombul section with over 68% of this business type being located in this section (32 out of a possible 57). This was marginally higher than "*Furniture, Houseware and Appliance Retailing*" and "*Other Personal and Household Good Retailing*" which both represented 9.5% of the total sample (a combined 92 out of a possible 483).

"*Specialised Food Retailing*" and "*Cafes and Restaurants*" represented less than 15% of the total sample (combined 71 out of a total 483). 22 businesses classified as "*Specialised Food Retailing*" are located in the Centro Toombul Shopping Centre.

The major economic generators that would be impacted by the Airport Link Project that are located directly in the corridor are the combined Royal Children's Hospital (RCH), Royal Brisbane and Royal Women's Hospital (RBWH), Centro Lutwyche Shopping Centre and Centro Toombul Shopping Centre. Both will be discussed in more detail later in this report.

In addition to the major economic generators identified above, the following economic or community generators (including education) were identified from the street survey:

- RNA Show Grounds
- Citilink Business Centre;
- Royal Brisbane Professional Centre;
- Homemaker City;
- Office Works;
- Crown Hotel;
- Kedron Park Hotel;
- Department of Emergency Services Complex;
- Kedron State High School; and
- Windsor State School.

Table 2.1 highlights the Business Type by 3-Digit ANZSIC Business Classification with greater than 1% of the total sample located in the Airport Link corridor.

Table 2.1 Business Type by 3-Digit ANZSIC Business Classification with Greater than 1% of Total Sample)

Industry Code	Industry	Bowen Hills to Stafford Rd	Junction Rd to Toombul	Total by Industry	Percentage
522	Clothing and Soft Good Retailing	15	32	47	9.7%
523	Furniture, Houseware and Appliance Retailing	29	17	46	9.5%
525	Other Personal and Household Good Retailing	13	33	46	9.5%
512	Specialised Food Retailing	7	35	42	8.7%
524	Recreational Good Retailing	11	20	31	6.4%
573	Cafes and Restaurants	21	8	29	6.0%
951	Personal and Household Goods Hiring	12	11	23	4.8%
863	Other Health Services	11	6	17	3.5%
731	Central Bank	8	8	16	3.3%
862	Medical and Dental Services	6	6	12	2.5%
531	Motor Vehicle Retailing	11	0	11	2.3%
712	Telecommunication Services	3	8	11	2.3%
532	Motor Vehicle Services	10	0	10	2.1%
811	Government Administration	10	0	10	2.1%
952	Other Personal Services	9	0	9	1.9%
772	Real Estate Agents	6	2	8	1.7%
784	Legal and Accounting Services	7	1	8	1.7%
511	Supermarket and Grocery Stores	4	3	7	1.4%
733	Other Financiers	7	0	7	1.4%
872	Community Care Services	7	0	7	1.4%
571	Accommodation	6	0	6	1.2%
751	Services to Finance and Investment	0	6	6	1.2%
783	Computer Services	6	0	6	1.2%
933	Other Recreation Services	6	0	6	1.2%
871	Child Care Services	4	1	5	1.0%

Appendix A provides activity maps of the Business Types by 3-Digit ANZSIC Business Classification for the Airport Link corridor.

Bowen Bridge Road (Herston) to the corner of Gympie Road and Stafford Road (Kedron)

The Lutwyche Road Gympie Road corridor from Bowen Bridge Road (Herston) to the corner of Gympie Road and Stafford Road (Kedron) is a key health, retail, commercial, education and business corridor located in close proximity to the city. The proposed Airport Link tunnel could provide significant commercial and urban renewal opportunities in this section of Lutwyche Road if the tunnel was to proceed.

A total of 277 businesses were identified between Bowen Bridge Road (Bowen Hills) to the corner of Gympie Road and Stafford Road (Kedron). This does not include the specific services and retail activity located within the RCH and RBWH hospitals.

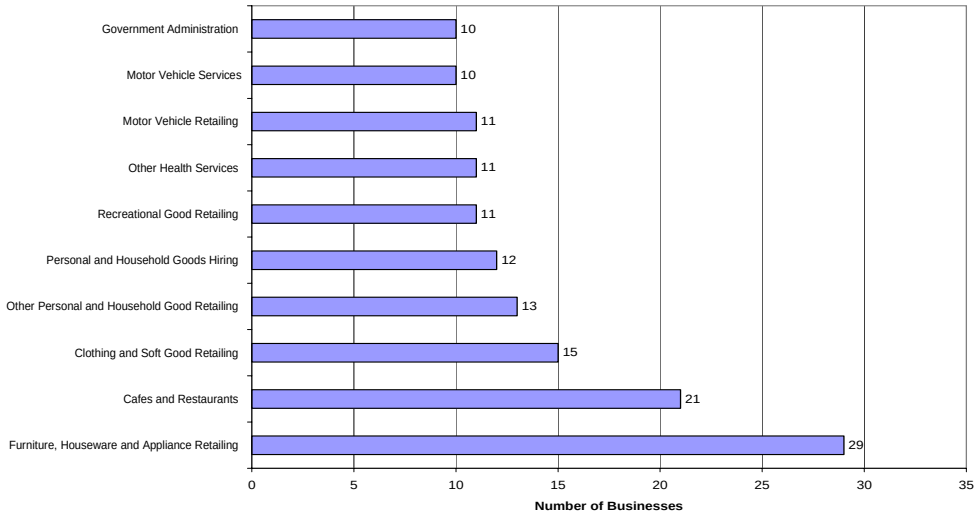
The combined Royal Childrens Hospital (RCH) and Royal Brisbane Womens Hospital (RBWH) employs over 5,000 staff and are key economic and community generators in the corridor. The complex is located on the western side of Bowen Bridge Road diagonally across from the Royal National Association (RNA) show grounds. It shares it grounds with the Queensland Institute of Medical Research and provides the campus for health professional education and conference facilities through the Clinical School of Faculty Medicine and the RBRW complex.

Some existing business activities opposite the hospital in Butterfield Street are zoned General Industry properties, which and are no longer supported by the current town plan. The Butterfield Street (Herston) precinct could represent a significant opportunity for future transport related development or hospital related development. The hospital is critical infrastructure for local, regional, and state economies, and will be instrumental in the future land use planning for the precinct.

Located diagonally across from the hospitals is the RNA showgrounds which hosts the historical annual Exhibition (EKKA) event, as well as trade shows and other events. Although no decisions or approvals for implementation are known to be in place, a 10 year capital works program could be involved across the 22 hectare site.

As shown if **Figure 2.5**, the most common business type between Bowen Bridge Road to the corner of Gympie Road and Stafford Road by ANZSIC Classification was *"Furniture, Houseware and Appliance Retailing"* which represented 29 businesses. This is the combined result of Homemaker City and Centro Lutwyche Shopping Centre.

- **Figure 2.5 Top 10 Business Types by ANZSIC Business Classification located in the section Bowen Bridge Road (Bowen Hills) to corner of Gympie Road and Stafford Road (Kedron)**



The Centro Lutwyche Shopping centre is located on the corner of Lutwyche Road and Chalk Street and accommodates over 50 retail businesses. The centre is located 5 km from the city in a strong residential, high density population centre. The centre has two levels of parking, one level of retail, and one level of suites. The Department of Employment & Training, Department of Emergency Services and Department of Families all have branches in the centre.

Homemaker City is located on the corner of the Newmarket Road and Gympie Road. Homemaker City has a range of stores including Freedom Furniture, Oz Design, Early Settler Furniture and Beacon Lighting. It has a total retail space of just over 9,463 square metres and car spaces located at the front for 180 vehicles.

The Department of Emergency Services has its head office located on the corner of Lutwyche Road and Kedron Park Road. The complex houses services including Queensland Fire and Rescue, Queensland Ambulance, Counter Disaster Rescue Services and the State Disaster Coordination Centre.

Stafford City Shopping Centre is located close by to the Airport Link corridor at 400 Stafford Road and has approximately 75 speciality retail stores including majors Woolworths, Action, Big W and Australian Multiples Cinemas. The centre is privately owned by Yu Feng and managed by RetailFirst. In 1997 the centre underwent a $14 million redevelopment, which included the opening of a cinema complex and expansion of the food court. The centre has taxi and bus service connections to both local areas and Brisbane city.

Westfield Chermside Shopping Centre

The Westfield Chermside Shopping Centre is a key north side retail and commercial centre located on the corner of Gympie Road and Hamilton Road Chermside. It provides easy access to both consumers and suppliers and is a key centre for public transport. It accommodates over 250 specialty stores

including major stores Myer, Target, Kmart, Coles, Bi Lo and Birch Carroll & Coyle Cinemas, and has approximately 3,800 car spaces.

The Westfield Chermside Shopping Centre is a planned mixed use area with medium density housing under the current City Plan. This centre is the largest retail complex on the north side of Brisbane and is a major generator of traffic. The centre is undergoing a $230 million expansion which will see it increase from approximately 79,000 m^2 to over 116,000m^2. Car parking will increase to 6,200 car spaces. Chermside Shopping Centre is a key location that could benefit significantly by the proposed Airport Link tunnel.

Junction Road (Eagle Junction) to East-West Arterial (Toombul)

The street level survey identified 206 businesses identified from Junction Road (Eagle Junction) to the East-West Arterial (Toombul) with *"specialised food retailing"* being the most common business type representing 8.7% of businesses in this section (35 out of a possible 206). Centro Toombul Shopping Centre is the primary retail complex that will contributes to the number of businesses in the eastern section of the proposed Airport Link's corridor catchment and would be a key beneficiary if the proposed tunnel was to proceed.

The Centro Toombul Shopping Centre is a regional shopping complex located on Sandgate Road, one of the key arterials leading to Brisbane City. There are over 150 retailers located in the shopping centre including major operators David Jones, Coles, Kmart, Bi Lo and Birch Carroll and Coyle Cinemas. The occupancy rate at the complex is very high at 99.6% with a weighted average lease expiry of 6 years. There are approximately 2,500 car parks which in certain sections are prone to flooding. The complex is undergoing refurbishments will provide extra leasing space of approximately 3,000m^2. Additional undercover car parking and deck car parking will be included as part of the redevelopment.

Aside from the Centro Toombul Shopping Centre, there is medium level of economic activity at the Junction Road/Sandgate Road intersections with 22 businesses being located in this area. This area could represent a future potential development due to the condition of several buildings especially in relation to the western side of Sandgate Road past the Junction Road intersection. The businesses are predominantly *"Specialised Food Retailing"* in this area.

2.1.7 Brisbane Long Term Planning Economic Indicators (NIEIR)

In October 2005, the National Institute of Economic and Industry Research (NIEIR) prepared a report for Brisbane City Council (BCC) titled the "Brisbane Long Term Planning Economic Indicators". The NIEIR report presented a range of economic indicators and forecasts that are of particular relevance to the Airport Link economic analysis. This section of the report includes a summary of these findings.

Total Manufacturing in the Brisbane City LGA produced $25 billion of output in the region in 2004 with Chemicals and Petroleum having the highest contribution of $7 billion. Total Manufacturing represents over 21% of output for the region and this sector is a major user of the Brisbane and regional road network for origin and destination freight movements.

Business Services had an output of $12 billion which represents approximately 10% of output for the Brisbane Urban Footprint and is the highest contributor to output. Property Services had an output of $11 billion dollars for the region which is not surprising considering the rapid growth in the residential, commercial and industrial property development and market activity over the past couple of years.

It is important to understand that the employment estimates for the NIEIR study are based on location of work, not where people live. In 2004, there was approximately 800,000 people employed in the Brisbane Urban Footprint with over 72% of these people being employed in the Brisbane LGA. Brisbane Inner City is the largest single employment generator in the region with an estimated 223,892 people being employed in and around the city. The Inner City also includes the suburbs of Herston, Highgate Hill, Kangaroo Point, Kelvin Grove, Milton, New Farm, Newstead, Paddington, Red Hill, South Brisbane, Spring Hill, West End and Woolloongabba.

Business Services and Manufacturing have the highest employment levels in the Brisbane LGA with an estimated 74,328 and 65,433 persons being employed in these industries respectively. There are nearly 90,000 employed in the Business Services industry in the Brisbane Urban Footprint which represents 11% of all workers. This is followed by Education at 8% and Health Services at 7% of all workers.

The major employment areas in Outer Brisbane City include the Outer North and Outer South which both have 8.6% of the Brisbane LGA employment population, a combined employment total of over 100,000 people. Growth in the Outer industrial regions may be facilitated by the proposed Airport Link as it will provide a pivotal cross city link for both private and freight carrying vehicles. The main areas of employment in the Other LGAs include Logan City and Ipswich City with 51,988 and 45,849 people employed in these areas respectively. Both of these LGAs are forecast to increase their employment contribution to the greater Brisbane area.

Business Services has the highest industry representation in the Inner City with over 43,570 people being employed in this industry. Not surprisingly, Manufacturing ranked the highest in Outer Brisbane with an estimated 43,813 people being employed in this industry.

The average car ownership in the Brisbane LGA is 1.58 cars per household. A key trend occurs with households closer to the Brisbane CBD having lower average car ownership than Outer suburbs. This is particularly evident in the Inner City which has an average household car ownership of 1.16. There is a higher reliance on private vehicles in the outer suburbs as a result of longer travel distances to work, reduced flexibility, generally poor access to public transport and a higher proportion of families as opposed to singles living in the outer suburbs.

Outer West had the highest level of car ownership with 2.1 vehicles on average per household while the Outer North which will impact significantly on the usage of the Airport Link has an average of 1.68 vehicles per household.

Cross city passenger vehicles for both private and business travel and heavy vehicle freight movements will continue to increase with the location of future industrial estates to the Outer North, Outer South and Outer West corridors and the ATC. The Brisbane CBD and other Inner City will

continue to be the primary location for Business and Property Services and corresponding employment location for the Brisbane City population and surrounding LGAs.

2.2 Future Economic Environment

2.2.1 Brisbane and South East Queensland Economic Trends

The Brisbane City Council and the Queensland Government have adopted key policy and planning directions to guide future land use and the provision of economic and social infrastructure in Brisbane city and South East Queensland. The *South East Queensland Regional Plan* and its complementary *SEQ Infrastructure Plan and Program (SEQIPP) 2006 – 2026* highlights that the population of the region will increase from the current 2.6 million people to about 3.7 million by 2026. The region's population is forecast to be 3 million by 2016. The Brisbane metropolitan area, which is the nucleus of the South East Queensland (SEQ) region, is projected to grow from 1.55 million to more than 2 million people by 2016. The region is predicted to have one of the fastest growth rates of any major urban regions in Australia.

Brisbane City Council's *Living in Brisbane 2010* presents a vision of Brisbane as a place to live and work and *Transport Plan for Brisbane 2002 – 2016* (under review) considers transport issues, challenges and solutions to 2016. While these plans have a shorter time horizon than the SEQ Regional Plan, they nevertheless present a compelling view of the future that Brisbane and its transport system are coming under pressure as more people choose to live and work in the Brisbane metropolitan area.

SEQIPP identifies that the increase in the region's population will generate an additional 425,000 jobs by 2026. The *Transport Plan for Brisbane* highlights that existing and future employment growth is becoming decentralised in the Brisbane metropolitan area. The significance of Brisbane in the region is exhibited by the fact that 90% of Brisbane's residents work within Brisbane City Council boundaries and approximately 50% of residents from surrounding local government areas (Pine Rivers, Redcliffe and Caboolture to the north, Logan and Redlands to the south east and Ipswich to the west) travel to work in Brisbane. This trend has significant implications for cross city travel particularly in the morning and afternoon peaks when congestion adversely affects the network. Employment growth in the Brisbane CBD and Brisbane City's outer areas is forecast to increase by 19% and 45% respectively between 2006 and 2016. The Australian TradeCoast's employment growth is forecast to increase by 95% over the same period.

Efficient freight movement is also a key element in the economic wellbeing of a city. The Transport Plan for Brisbane 2002-2016 states that about 90% of freight movement in SEQ originates or has its destination in Brisbane. Urban freight movements are estimated to be growing by 4% per annum. The SEQIPP highlights that the proposed increase in population and subsequent expansion of economic activity and employment in the region will increase the need for the timely provision of new transport infrastructure to support this forecast growth. Most importantly, the SEQIPP recognises this critical nexus between infrastructure and regional development as a key influence on the pattern and rate of economic development in the region and in Brisbane as is economic heart.

The Airport Link Detailed Feasibility study is a significant government planning initiative to support the SEQIPP key strategic directions and possible investment in the SEQ region.

2.2.2 Economic Growth

Brisbane City Council's report "*Brisbane Long Term Planning Economic Indicators*" has identified out of region exports as the key driver for determining the growth and geographical location of future economic activity in the region. Out of region exports in the region were $41 billion in 2004 and are estimated to grow by an average annual rate of 4% to $98 billion by 2026 for the (Trend Case).

In 2004, it is estimated that 29% of out of region exports were generated in the Inner City. This is forecast to decrease to 27% in 2026 as a result of an increase in residential and commercial growth and rising land values in the Inner City which will force some of these activities to Outer areas. The main beneficiaries in the Outer regions are Outer North East, Outer East and the Outer South East in the Brisbane City, Caboolture Shire and Ipswich City in the other LGAs. This movement of major industrial estates to outer metropolitan areas has already commenced.

Households that are highly skilled have higher disposable incomes and will contribute to a higher rate of economic growth. Professional and skilled households are expected to increase by 126% to 2031 which represents an annual growth rate of 2.7%. Low skilled households will increase by an estimated 58% over the same period.

The Inner City attracts a high proportion of young couple households less likely to have children. These households have high disposable incomes and are likely less price sensitive to a user-pay toll road. The further from the city the higher the rate of retired households as these types of households relocate to lower cost housing areas.

Real average household incomes in the Inner City are predicted to maintain their superiority over those in the Outer region. This is related to the higher levels of professionally skilled households in the Inner regions.

High levels of productivity normally coincide with areas with high levels of manufacturing and or transport services. The region is forecast to experience high growth rates and levels of productivity for all scenarios with the Outer regions are forecast to experience slightly higher levels due to the location of the Manufacturing industry in general.

Under a range of development scenarios, there will be approximately 1.2 million people employed in the Brisbane Urban Footprint by 2031, which represents a total increase of 67% over the 2004 population estimates. Brisbane City will continue to be the single largest employment generator in the region with between 330,000 to 375,000 people being employed in this area depending on the scenario.

The major employing sectors of Business Services, Manufacturing, Health Services and Household Goods Retailing will continue to be the strongest employers in 2026. Business Services continues to be the largest employer in the region with an estimated range of between 134,550 and 138,442 people by 2026. Manufacturing continues to be a major player employing over an estimated 107,000 in the Brisbane Urban Footprint, however actual growth is slow over the forecast period. General

Construction shows the biggest sub division increase and will be the second largest employer in most scenarios employing approximately 90,000 people.

The combined Inner City areas are expected to grow at slightly higher rates than the Outer regions. However, this does not reflect the disproportionate growth across the Inner City. The Inner City and Inner West are estimated to grow by 45% and 60% respectively. This is significantly higher than the remaining Inner regions which are estimated to grow by a combined estimated 15%. The demand in the Inner City will place additional pressure on our transport networks to and from the city.

The key economic growth centres in the Brisbane City LGA (aside from the CBD and Inner City) will be in the Outer areas. Subject to the availability of land, this will result in the continued growth and/or rationalisation of industrial areas including the Australia TradeCoast, Pinkenba, Hendra, Eagle Farm, Zillmere, Geebung, Banyo, Northgate and Acacia Ridge/Archerfield/Salisbury corridor. Adjacent LGAs including Ipswich City, Logan City, Caboolture Shire and Pine Rivers Shire will have the necessary land requirements and workforces to accommodate major industrial estates and therefore will be on the front foot in to attract manufacturing companies to their shires.

2.2.3 Brisbane Airport

The Brisbane Airport's current significant economic impact on South East Queensland is expected to continue with the planned future development of the Brisbane Airport City concept. Forecast growth in both domestic and international passenger numbers, air freight and increased aviation and other commercial development will fuel future economic activity at the airport precinct.

In particular, the Brisbane Airport's 2003 Master plan identifies unprecedented aviation and commercial and industrial development opportunities over the next 20 years. The Brisbane Airport Corporation Limited (BACL) has a vision in which the Brisbane Airport will:

- Capture land development opportunities that will maintain Brisbane Airport's position as one of Australia's premier domestic and international airports and a major centre for aviation maintenance and training; and
- Be a principal generator of economic growth and employment in the South East Queensland region through sustained commercial and industrial development.

From an airport's operations perspective, the increase in domestic and international aircraft capacity will be primarily achieved by the construction of the parallel runway 01/19 to the immediate north west of the existing main runway within the next ten years to meet air services demand and forecast aviation growth.

The Brisbane Airport will continue to operate as a 24 hour curfew free global trade and commercial centre. The development of seven master planned aviation, commercial and industrial precincts over an area of 970 hectares will serve as the cornerstone of the Airport City concept. These precincts are being developed in accordance with the Brisbane Airport Master Plan 2003. Existing and prospective businesses and industries that are being targeted to establish in each precinct include:

- **Number 1 Airport Drive** (80 hectares) – This precinct is identified as a key business, tourism, retail and entertainment centre and is zoned as business and leisure. It is located on the corner of Airport Drive and the Gateway Motorway and is expected to take 15 years to be fully developed. The first major off airport terminal retail development in the precinct is the Direct Factory Outlet (DFO) complex that has already meet generated considerable shopper interest and traffic impacts.
- **Export Park** (280 hectares) – This precinct covers three areas and is zoned as light industry and general industry precinct. Development is ongoing with DHL, Hellman Worldwide Logistics, Cellnet, Australia Post, Crazy Clarks, Qantas Air Freight and others already established as major tenants. The precinct will include airport handling, commercial office, warehouse and distribution activities and businesses.
- **Aerotech** Park (200 hectares) – This is the specialised aircraft and aerospace production and maintenance hub of the Brisbane Airport and is situated on the eastern side of the airport. It houses the maintenance hangars for Qantas, VirginBlue and National Jet Systems. The European Aeronautic Defence and Space (EADS) Company also operate a production and maintenance facility in the precinct.
- **Airport Industrial Park** (100 hectares) – The industrial precinct is zoned general industrial and will include manufacturing, warehousing and distribution companies.
- **Banksia Place** (100 hectares) – Commercial aviation, corporate offices, airline catering are some of the businesses will be located in this centre zoned for business and light industry. BAC has some of its corporate activities in office space in this precinct.
- **Brisbane International and Brisbane Domestic Terminal** (210 hectares) – This precinct is the heart of Brisbane Airport and is zoned for business and light industry and includes the domestic and international airport terminals, corporate office, duty free, retail, car rental, car parking and public transport (rail) facilities.
- **Northern Development Area**: Expansion of precinct in line with general aviation activity, airport support activities and proposed parallel airway development.

Most recent additions to the Brisbane Airport's Export Park precinct have been Australia Post (7,100 sqm), Repco (15,000 sqm), Fed Ex (2,500 sqm) and Jetstream (4,600 sqm). Qantas heavy aircraft maintenance facility commenced operating in 2005 and Virgin Blue 737 maintenance facility is being constructed.

BACL has indicated in its 2003 Master Plan that proposed developments will be staged to match future industry trends and demands and that the timing of aviation infrastructure investments may be subject to global influences outside the control of BACL. Proposed commercial and industrial developments at the airport are likely to proceed to meet regional demand planned over the next decade and that the Airport Link will be required to support this planned development and economic activity.

Port of Brisbane

In addition to Brisbane Airport, the Port of Brisbane is a primary driver for economic growth in South East Queensland. The port has experienced a decade of record trade growth and projections to 2025 forecast that this trend will continue.

To accommodate this projected future growth the Port of Brisbane Corporation has embarked on a 25 year plan to reclaim around 270 hectares of land at Fisherman Islands to provide an additional 1,800 metres of wharves and related infrastructure. Construction of an additional container wharf (wharf 10) has already commenced and is scheduled for completion in 2008.

The Port of Brisbane Corporation has identified that additional wharves and port land are required to support and facilitate projected trade growth and economic activity within the region. The Corporation's requirements are predicted on the following projections:

- Trade projections to the year 2025 show anticipated growth in all cargo types, with highest average annual growth in containers (6.9% p.a) and break bulk (2.9% p.a)
- Total trade volumes are projected to reach over 60 million tonnes by 2025
- Actual total container volumes for 1998 / 99 of 357,703 twenty foot equivalent units (TEUs) are 22% above the projections in the 1992 Strategic Plan and container volumes are projected to reach up to 1.9 million units by 2025.
- Demand for port land is projected to exceed existing supply at Fisherman Islands by the year 2007.
- Demand for quay line is projected to exceed available deep-water frontage on Fisherman Islands by the year 2009.
- By 2025, it is projected that an additional 222ha of land will be required for industrial and commercial development purposes at Fisherman Islands.

3. Strategic Assessment Property Economic Impacts

3.1 Introduction

The Queensland State Government and Brisbane City Council are in advanced planning stages of the Airport Link Project. As part of the Airport Link Detailed Feasibility Study including the EIS, Knight Frank has undertaken a comparative analysis of the associated property economic impacts that the Project may have before and after Project construction in 2012.

The Airport Link study corridor consists broadly from Bowen Bridge Road (Bowen Hills / Herston) to Kedron Brook and the East West Arterial at Toombul. The study is also cognisant that both the Airport Link and the proposed Interim Northern Busway share corridor between Bowen Hills / Herston and Kedron.

3.2 Classification of the benefits and impacts of the Preferred Location

The proposed location for the Airport Link tunnel has been determined provides a number of potential economic outcomes for land owners, business operators and both the local and broader community in general in the study corridor. All benefits and impacts have been broken down into two classifications, as follows:

- **Tangible effects** – are those effects that flow into individual land owners and/or the community to which a monetary value can be recognised with reference to the local market place; and
- **Intangible effects** – are those for which there is no market representative and which can only be valued from a subjective rather than an objective perspective.

The study focuses and reports on the tangible effects ascribed from the two separate, though closely located, Projects being in operation together. Any intangible effects that may arise due to the implementation of the Projects have not been included or identified in the analysis.

In assessing the level of positive and negative impacts that may be experienced, we have applied the following grading system as shown in **Table 3.1** and **Table 3.2** respectively.

For benefits:

Table 3.1 Benefits Impacts Grading System

+ 1	+ 1.5	+ 2	+ 2.5	+ 3	+ 3.5	+ 4
No Benefit	Minimal Benefit	Slight Benefit		Moderate Benefit		High Benefit

For negative impacts:

Table 3.2 Negative Impacts Grading System

- 1	- 1.5	- 2	- 2.5	- 3	- 3.5	- 4
No Impact	Minimal Impact	Slightly Impacted		Moderately Impacted		Highly Impacted

3.3 Study Environment

3.3.1 Current Tenure & Land Uses

The land contained within the study corridor consists of various permissible uses under current Brisbane City Council statutory planning instruments.

The study corridor comprises a mixture of commercial, retail and residential land uses. In Bowen Hills/Herston to Ferny Grove Rail Overpass there is a strong presence of fringe commercial office buildings, automotive service providers and ancillary businesses, short stay accommodation, restaurants and a number of large bulky goods retail outlets surrounded by smaller, fragmented retail premises. These commercial and retail businesses are all located along Lutwyche Road. This area also includes a significant number of residential properties which are located one street block back from Lutwyche Road.

The Ferny Grove Rail Overpass to Kedron area comprises a significant amount of strip retail shops housing a number of service industries, Lutwyche Shopping Centre, large retail bulky good outlets, hotels, fitness centres and a well established node of detached residential dwellings.

The Kedron to Toombul eastern area of the study corridor is made up of well established, detached one and two level residential dwellings. It is most likely that the predominant use and occupation of the residential properties in this section are owner occupied. This area also contains a large amount of retail premises. However, a predominant proportion of these retail businesses are located within Toombul Shopping Centre, which is one of three major shopping centres located in Brisbane's northern suburbs.

Scattered amongst the various land uses in all three areas of the study corridor are a number of community uses such as parks and schools located either adjacent to or directly above the proposed underground transport corridor.

3.3.2 Methodology

In assessing the impacts that may occur in the Airport Link study corridor, primary (most affected) and secondary (least affected) zones of impact have been established.

Primary Zone

The primary zone comprises mainly:

- Major redevelopments e.g. Homemaker Centre,
- By and large much of the outbound side of Lutwyche Road as it is the most highly developed,
- Restaurants and Hotel/Motel Accommodation,
- Residential and commercial properties affected by easement on title,
- Small automotive retail clusters with associated uses e.g. after market products and accessories, and
- Older retail strips which now comprise of service industries.

It is clear that the primary zone in any case will be most affected as businesses that are located along Lutwyche Road are heavily reliant upon the passing traffic for trade. Many of these businesses are destination businesses, which means, that people will travel extra distances for the non-mainstream services that they provide. Development and the types of businesses operating in the primary zone are predominantly non-complimentary and are fragmented due to:

- The inability for investors, developers and owner occupiers to secure reasonable sized parcels of land which enable redevelopment, and
- The fact that many of the commercial and retail properties have reached a point of obsolescence in their functional life, makes these properties desirable to businesses that require a reasonable level of exposure and cannot afford to pay premium retail and commercial rents for that exposure in other major locations of trade.

Secondary Zone

The secondary zone is where there becomes a clear transition to residential land uses. In some instances there may be some small commercial and retail businesses in the secondary zone. However the impacts from the Airport Link are considered to be minimal on these businesses. A visual inspection of the study corridor depicts that the secondary zone begins one street block east or west from Lutwyche Road.

3.3.3 Property Market Trends

Historically, certain land uses have been determined by the market place. The way in which development has occurred along Lutwyche Road and the operating nature of the businesses has been a result of natural market forces. The resultant development patterns that occur as a result to natural

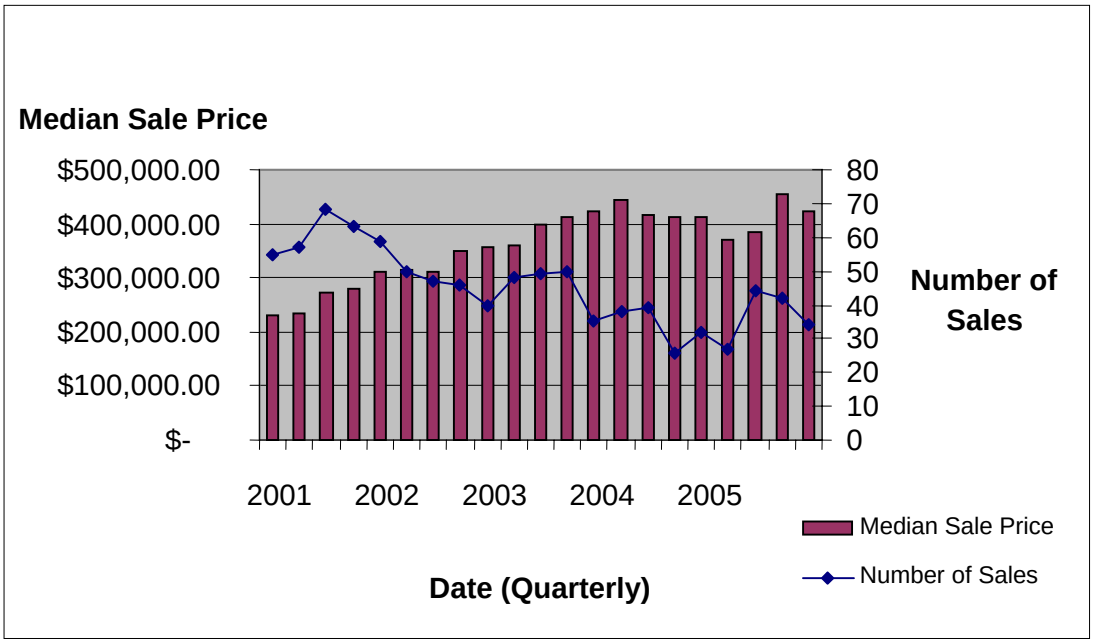
market forces can sometimes be fragmented and non-complimentary in the land uses. This type of fragmented development pattern is evident along Lutwyche Road and is explained in further detail below and throughout this report on a section by section basis.

Herston Road to Ferny Grove Rail overpass on Lutwyche Road.

Residential properties within this section are located one street block back from Lutwyche Road. The residential properties consist of improved sites and have a land size in the range of 400 to 820 square metres. Current average house prices are $464,000 which represents an increase of 58% (11% per annum) on average property prices since late 2001, when prices were around the $270,000 mark.

Figure 3.1 shows a graphical representation of the aggregated sales for residential properties in the three suburbs, Bowen Hills, Herston and Windsor. Detailed in the graph below is the median sale price for each quarter throughout the last five years with the corresponding number of sales which occurred for that quarter.

- **Figure 3.1 Bowen Hills, Herston and Windsor Aggregated Residential Sales Cycle**

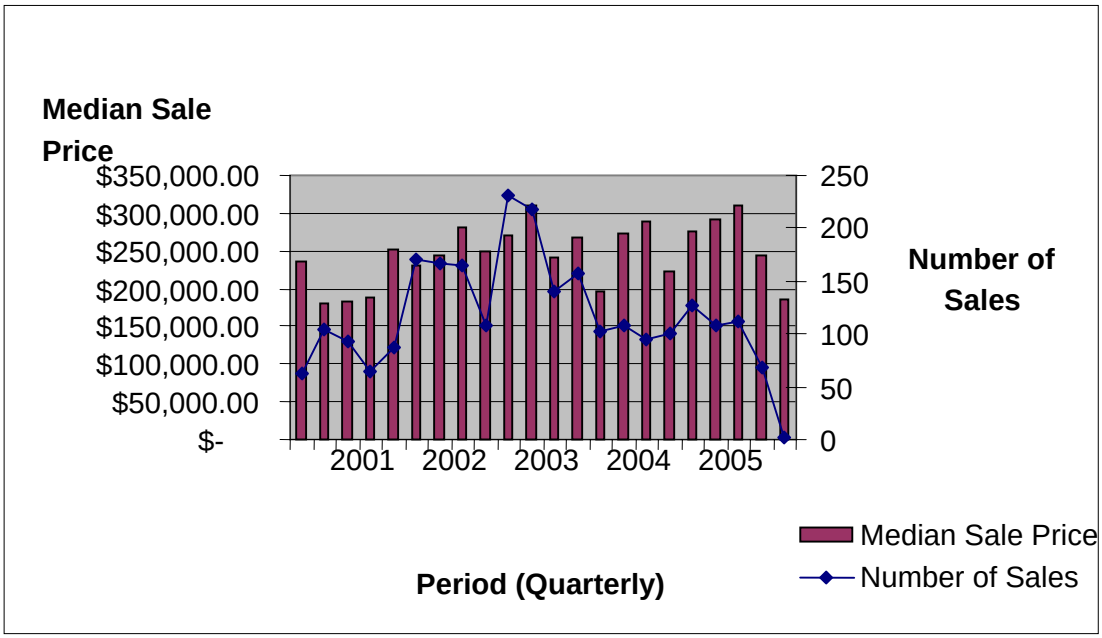


Source:

RP Data

For completeness of the study, a graphical representation of the aggregated sales cycle of multi-unit and building unit sales for the Bowen Hills, Herston and Spring Hill areas has been provided. This information shows the spread of higher residential developments throughout the inner northern part of the Brisbane CBD fringe area. However, the results depicted in **Figure 3.2** below are slightly skewed due to the inclusion of Spring Hill. However, as potential development sites become less available in the Spring Hill area, it is expected that developers will move closer towards the Royal Brisbane Women's Hospital and further north along the corridor in search of available development sites.

- **Figure 3.2 Aggregation of Building and Multi Unit Sales in Bowen Hills, Herston and Spring Hill**



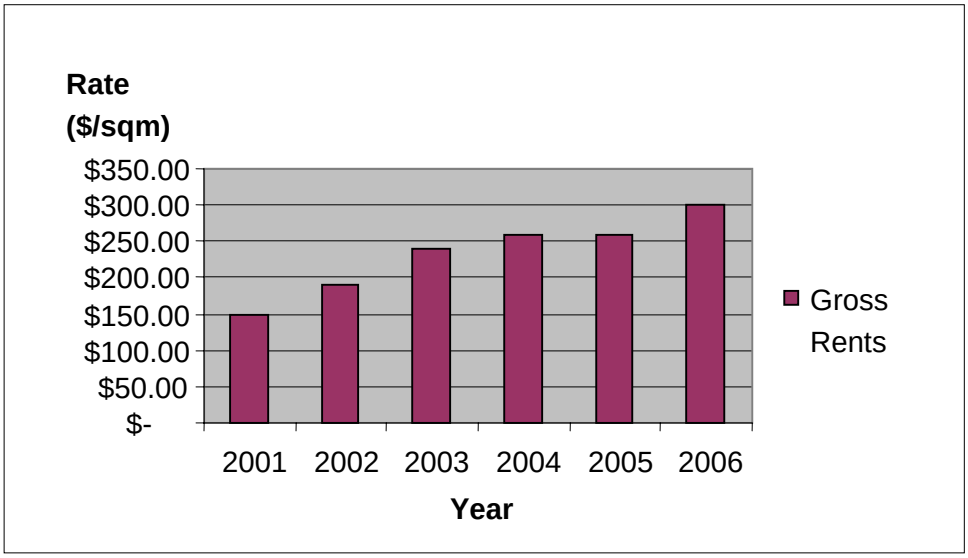
Source: RP Data

Commercial businesses within the Bowen Hills/Herston to Ferny Grove Rail Overpass area have been identified as car dealerships, service stations, hotels/motels and professional offices. Brisbane's fringe market has performed strongly throughout late 2005 and early 2006. This strong performance is due to solid market fundamentals including, rental growth due to tight leasing conditions in the CBD, white collar growth and low vacancy rates.

Tight leasing conditions with all time low vacancy rates of 4.2% within the fringe market has resulted in rental growth in the vicinity of 20% for high quality fringe properties due to landlord's new bargaining power in lease negotiations. As a result, this increase in demand has resulted in a decrease in the level of incentives offered to the market. Current leasing rates for commercial tenancies in this area are in the order of $240/sqm to $300/sqm gross for refurbished newer office space.

Figure 3.3 below depicts the movement of gross rents in the area over the last five years. Much of the increase in rental growth was due to the upgrades undertaken on the Royal Brisbane Women's Hospital in 2002, which displaced a number of office space users within the hospital premises to commercial premises in the surrounding area.

- **Figure 3.3 Gross Commercial Rents for Section One**



Source: RP Data

Increased investor competition for office property in a tightly held market, increasing construction costs which are limiting new construction and the small amount of new supply within the market is easily being outweighed by high levels of net absorption and demand have all contributed to this capital growth yield compression that has been experienced over the last five years.

Retail properties within the area include bulky good retail outlets such as those in the Windsor Homemaker Centre, various restaurants and strip retail outlets. Newer retail properties in the Section have seen significant increases in market values over the past five years, however due to the tightly held nature of properties in the section there have been very few significant sales occur over the past five years. This tightly held nature is also reflected in the commercial market, which has therefore made it difficult to find up to date sales data. The point made earlier about the fragmented nature of the properties located on Lutwyche Road, therefore limits the number of potential purchasers as the properties hold little redevelopment potential due to the unreasonable size of the allotments. Current asking rents for retail premises in the area are in the order of $200/sqm to $250/sqm.

Industrial properties are limited in this area and are located on sites close to the entrance of the Inner City Bypass. This is due to the fact that many sites previously occupied for industrial purposes have been converted into higher and better uses, as a result of the changing of major transport routes and the increased difficulty of access by larger vehicles.

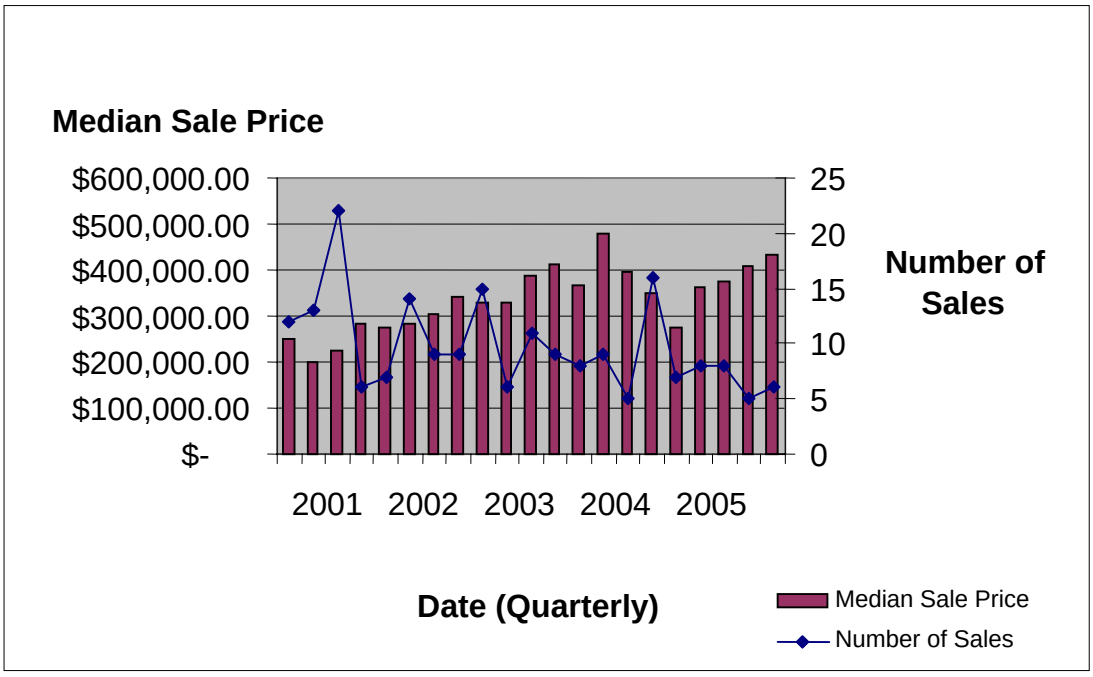
Ferny Grove Rail overpass to Kedron.

The general land uses in this area are mixed use developments, residential, commercial and retail outlets. The residential properties range in the size of 400 to 800 square metres and are producing average house prices in late 2005 of $390,000. This is a 70% (or 14% per annum) increase over a 5 year period where houses prices were $276,000 in early 2002. This increase is due to many factors

such as the Lutwyche's proximity to the city, location to other well established suburbs such as Albion and Clayfield, prolonged low interest rate environment and people's overall increased purchasing power due to increased wages and the first home owners grant.

Figure 3.4 shows the residential sales cycle graph for the suburb of Lutwyche over the last five years. Depicted in the graph is the median sale price for each quarter with the corresponding number of sales which occurred for each quarter.

- **Figure 3.4 Lutwyche Residential Sales Analysis**



Source:

RP Data

Commercial property within this area comprises of small one and two level professional offices used by legal, computer, accounting and financial firms. This area has seen strong growth in the office fringe market due to solid market fundamentals such as significant rental growth, tight leasing conditions, record low vacancy rates, and office demand outweighing supply. Recent sales in the study corridor are achieving a sales range of $1000 to $1400 per square metre.

Retail properties along Lutwyche Road in this area include Lutwyche Shopping Centre, ribbon development retail centres, restaurants and individual and conglomerated bulky goods retail outlets. Retail properties in this section control a significant proportion of the land along Lutwyche Road. These retail properties have all seen significant increases in market values over the past 5 years, especially sites which are large in size or where a developer is able to amalgamate a group of smaller allotments together and purchase them all in one line.

However, most the retail is contained in the form of strip centres and are fragmented in ownership and are non – complimentary in the services provided. Recent sales evidence depicts that the current

prices being paid for strip retail shops in the corridor ranges from $900 to $1200 per square metre. Current rents for the area are in the range of $220/sqm to $280/sqm gross.

Like the Bowen Hills/Herston to Ferny Grove Rail Overpass area, there have been very few significant sales over the past two to three years due to the fragmented nature in property ownership and development in the study corridor. Because of these effects, there appears to be little interest in properties in the area by investors and developers as it is difficult to secure reasonable sized portions of land which offer the potential for redevelopment.

There are very few vacant or improved sites left in these areas of the corridor which provide the potential for redevelopment. This lack of redevelopment potential is mainly due to the fragmented nature of the businesses located within these sectors. The fragmented nature of this area is a direct result of development patterns that have occurred over time. The lower quartile of the area around Lutwyche/Kedron to the east is included in the Clayfield/Wooloowin District Local Plan. This plan is discussed in further detail below.

Corner Kedron Park Road/ Lutwyche Road to East West Arterial adjacent to Toombul Shopping Centre.

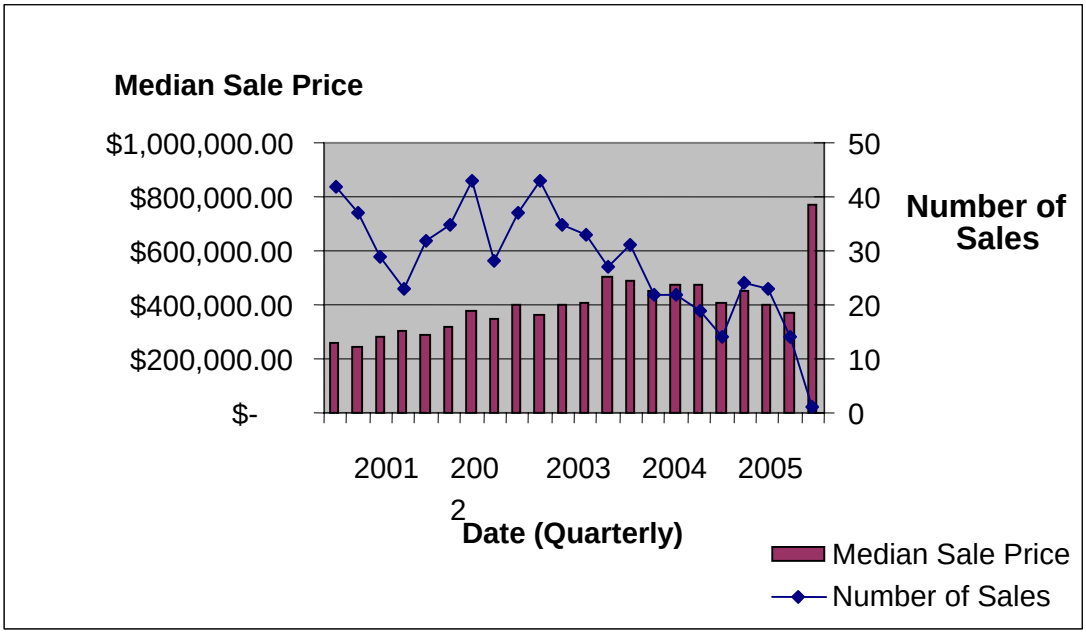
This component of the study corridor comprises predominantly improved residential sites and a significant amount of centrally located retail at Toombul Shopping Centre.

Residential properties within this area are presumed to be mainly owner occupied sites with blocks ranging between 400 and 850 square metres. The area has seen an average percentage increase of 67% (or 13% per annum) over the last 5 years, with the average house price in late 2001 of $320,000 increasing to $476,000 in late 2005. Much of this positive growth can be attributed to the proximity of other older well established suburbs on Brisbane's northside such as Clayfield, Nundah and Albion.

Depicted below is a graphical representation of the sales cycle which has occurred over the last five years in this eastern area of the corridor. Similar to the graphs included above, the information contained within this data set includes the median sale price for each quarter throughout the last five years along with the corresponding number of sales which occurred for that quarter.

The Airport Link Project may cause some uncertainty the market place in this area due to community consternation in some quarters and a decrease in buyer sentiment in the area in the short-term. However, this area is a well established suburb which has experienced a continuous level of nominal growth over the last five years as depicted in **Figure 3.5** below and it is expected that there will be no detrimental effects on the sales rate within the section. The sale in the second quarter of 2006 should be disregarded as it is representative of one sale only. As more and more sales a recorded as having occurred in quarter 2 of 2006, the median sale price should firm up graphically.

- **Figure 3.5 Wooloowin Residential Sales Analysis**



Source:

RP Data

As noted earlier, a large proportion of the retail premises in this area are centrally located within Toombul Shopping Centre. Due to the lack of available leasing information, it is difficult to provide current leasing rates being achieved in the centre. For the purposes of this assessment, rents have been estimated to be in the range of $800/sqm to $950/sqm gross. Since the subject property's purchase in mid 2003, it has undergone a significant amount of external refurbishment work. BCC has approved an application to undertake a further stage of refurbishment to increase car parking capacity and provide more retail space.

Strip retail comprising of local area uses such as bottle shops, bakeries, small grocery stores and professional services also exist along Junction Road and service the needs of the surrounding residential catchment area.

The predominant land use within the area is for residential and retail purposes. There appears to be no inherent development issues affecting the properties in this area as a large proportion of all available sites have been developed. There are however two Local plans which encompass this part of the study corridor. The first is the Clayfield/Wooloowin District Local Plan which contains specific additional local planning requirements. This plan looks at preserving the low and low-medium density housing in the area. This plan also includes the lower portion of land uses such as Lutwyche Shopping Centre and surrounding residential sites.

The second local plan is the Toombul-Nundah Major Centre Local Plan. This plan aims at preserving Toombul Shopping Centre as the main focus for retailing activity in the area and regulates the development of Nundah Village and other commercial sites just north of the Sandgate Road Nundah Village Bypass tunnel entrance.

3.4 Market Acceptance

Research by Knight Frank suggests that the flow-on effects from other similar underground and on or above ground infrastructure Projects that have been undertaken in Australia over the past few years does provide an overall generally positive outcome in the longer term.

Past Projects

3.4.1 Dandenong Industrial Region – Melbourne

Due to improvements in road infrastructure and increasing consumption of land, average land values across Melbourne have risen significantly over the past year. The conversion of industrial land to residential land, particularly within Melbourne's inner region, has resulted in significant increases in land values and strong capital growth in recent years.

The Mitcham – Frankston tollway is one such road infrastructure Project that is expected to provide a medium to long term positives impact the Dandenong industrial region. With the Mitcham-Frankston tollway not due for completion until 2008, its impact upon the Dandenong region as one of Melbourne's key industrial hubs is already being realised. Past completed Projects such as the CityLink Tollway in the late 1990's are the catalysts for the successful long-term property value growth created by major infrastructure Projects.

Industrial land values in the Dandenong region increased significantly over the six month period leading up January 2005. Smaller sized lots (0.25ha) grew by 12.5% to $135/sqm, whilst larger lots (1.6ha) increased by 11% to achieve $100/sqm. It is forecast that land values will continue to rise due to the shortage of serviced industrial land in the region, high demand for stock, and the completion of the Mitcham – Frankston tollway.

The impact from this Project in the short term provides a negative impact, however the benefits derived in the medium to longer term from having the Mitcham – Frankston Tollway in place will provide an uplift in capital values and demand for industrial property users to be located in the area.

3.4.2 Craigieburn Bypass Industrial Precinct (CBIP) – Melbourne

The Craigieburn Bypass is a 17km roadway linking the Hume Freeway near Mt Ridley Road at Craigieburn, to the Metropolitan Ring Road at Thomastown. The Craigieburn Bypass is the principle gateway to Melbourne from the north of Victoria.

The road has been designed to reduce travel times, provide fuel savings to motorists and the freight industry, reduce traffic congestion, enhance road safety on the Hume Highway, and remove traffic from local roads.

Construction of the bypass started in May 2002. The first four kilometres of the bypass from the Metropolitan Ring Road, at Thomastown to Cooper Street, Epping were opened to traffic in December 2004. More than 24,000 vehicles have been using this section of the bypass daily since then.

It is anticipated that the benefits derived from the construction of the Craigieburn Bypass will deliver close to $1 billion worth of safety and economic benefits to Victoria, including:

- Reduced traffic congestion – motorists will avoid 13 sets of traffic lights along the Hume Highway between the Metropolitan Ring Road, Campbellfield and Mt. Ridley Road, Craigieburn;
- Reduced travel times between Craigieburn and the Metropolitan Ring Road – it will now take approximately 10 minutes compared with 40 minutes;
- Improved road safety for motorists accessing businesses and homes along, and near the Hume Highway;
- Encouraging traffic to use the main road network rather than local roads;
- Improved access for the freight industry transporting goods to markets; and
- Reduced fuel and vehicle operating costs for private motorists and for freight industries.

During the construction of the bypass, much attention was drawn to the region from both investors, developers and tenants, which has resulted in considerable growth in the industrial localities of Craigieburn, Somerton, Epping, Broadmeadows and Thomastown. This pent-up demand for the area resulted in the increase of land values and prime rents, which inturn has further increased capital values for completed Projects.

Industrial land values in the CBIP as at September 2005, for smaller sized lots (0.25ha) has grown by 17.5% to average $155/sqm, with larger lots (1.6ha) jumping by 26.5% to average $103/sqm from the previous year. Before the Project's completion, it was anticipated that demand for industrial stock within the CBIP would further intensify in the short to medium term, encouraging further land value growth within the precinct.

Significant growth is also expected to occur due to the completion of other major infrastructure Projects such as P&O's inland rail port at Somerton. The intermodal facility is located within the Austrak Business Park which is located on the Hume Highway and it is expected to also fuel continual demand for the area throughout the medium term.

The CBIP is a project which has provided an overall neutral effect by its implementation in the short-term, however it has unlocked a large amount of the surrounding en-globo land which has had a positive effect on land values and will continue to do so into the longer term.

It can be concluded from these two examples, that as a result of infrastructure upgrades, the impact that efficient infrastructure has on industrial property is generally an overall above the line positive impact. Across Melbourne in general, these upgrades have resulted in major improvements in transportation efficiency, providing easier access to sea ports, airports, the CBD, and access to a broader employee catchment source.

3.4.3 Subiaco – Perth

In 1990 the proposed Subiaco 2000 concept plan was released. This plan addressed key issues that were evident in Subiaco's urban form and highlighted many opportunities for redevelopment in the area. Following the release of this proposal, the Institute for Sustainability and Technology Policy at Murdoch University prepared a report outlining the benefits for the development of Subiaco Urban Village centred on the Subiaco rail station and surrounding unused industrial land.

In order to ensure the success of an urban village, the undergrounding of the Fremantle Rail Line in Subiaco was deemed necessary by urban planners. With significant support from local businesses, government agencies, and the City of Subiaco, an application was made to the government for funding. In 1994 the Subiaco Redevelopment Authority was established to undertake works on the 80 hectare site. The $70 million project released under-utilised land and created an opportunity for the integrated urban land development of Subi Centro.

Since the project's inception, there has been a lack of empirical evidence to qualify the effect that the undergrounding of the rail line and having an easement in volumetric title, has had on land values in Subiaco. Knight Frank has undertaken its own research on this development to provide some qualitative evidence.

Knight Frank's Western Australian commercial sales department has been heavily involved in the marketing of commercial properties in the new redevelopment of Subiaco, which surrounds the train station. Since 1998, sales data has shown that achievable sale rates have nearly tripled, from $575/sqm in 1998 to $1607/sqm in 2005. This increase in sale rates reflects a yearly increase of approximately 15.6%. In the September 2005 Real Estate Institute of Western Australia (REIWA) market update, it made comment on the fact that Subiaco has had an average five year increase of 12% on established houses and 3.1% on land sales since the completion of Subi Centro.

This data indicates that there has been an increase due to the undergrounding of the railway, but also the redevelopment of the suburb of Subiaco has had a positive long-term flow-on effect, on the growth of sale rates for the area.

3.5 Property Impacts of the Project

A key objective of the Airport Link Project is to minimise impacts of the project on surrounding areas to protect people's livelihoods, lifestyle and local amenity. An advantage of tunnels over surface roads, which often require extensive acquisition of property along the entire corridor, is that tunnels generally only require acquisitions near where the tunnels connect to the surface. The more common requirement for tunnels is the subsurface land through the resumption of volumetric title, which refers to a person's rights to the space directly above or below their property. If Airport Link proceeds it would occupy a corridor up to 50 metres wide and up to 60 metres below ground level and would pass beneath some private properties. The Queensland Government and Brisbane City Council would need to acquire sub-surface volumetric titles for private properties above the tunnel. However, since there is virtually no conceivable way the earth, 30 to 60 metres beneath the ground level, could affect the surface property value in a highly developed urban environment, acquisition of this subterranean volumetric title is expected to have little if any effect on property values.

3.6 Impact Assessment

3.6.1 Comparative Analysis (Airport Link with Interim Northern Busway)

A comparative analysis has been undertaken and is not intended to draw absolute conclusions about dollar increases or decreases in value, probable realisations or compensation amounts.

Street level survey data of the land uses has been used for the corridor to analyse the effect of the probable after project completion impacts associated with the implementation of the Interim Northern Busway and Airport Link.

Table 3.3 shows the results from the Comparative Analysis with the Interim Northern Busway Project.

Table 3.3 Airport Link Comparative Assessment with Interim Northern Busway

Precinct/Study corridor	Zone	Negative Effect	Impact Rating	Benefit	Impact Rating	Total Unweighted Impact	Total Weighted Impact	Impact Effect Value Range
1. Herston Road to Ferny Grove overpass	Primary	'- Decrease in Traffic: Loss of Exposure or Trade	- 3	-Decrease in Traffic: reduced noise	+2	-1	-1.90	-10% to -18
	Secondary			- Decrease in Traffic: reduction in 'rat runners'	+2.5	+2.5	+2.5	+5% to + 12%
		Total:	**-3**	**Total**	**+4.5**	**0**	**+0.6**	
2. Ferny Grove Rail Overpass to just north of Stafford Rd/ Lutwyche Rd Intersection	Primary	- Decrease in Traffic	-3	-Decrease in Traffic: Reduction in noise	+2	-1	+1.2	+5% to +12%
		Total	**-3**	**Total**	**+2**	**-1**	**+1.2**	
3. Cnr Kedron Park Rd/Lutwyche Rd to East West Arterial on Sandgate Rd, Toombul	Primary	-Decrease in Traffic: loss of Exposure & Trade	-3	-Decrease in Traffic: reduction in noise & 'rat runners'	+2	-1	+0.25	+7% to +10%
	Secondary	No qualitative negative impacts	0	-Decrease in Traffic: reduction in 'rat runners'	+3	+3	+3	+7% to +12%
		Total	**-3**	**Total**	**+5**	**+2**	**+3.25**	

3.6.2 Herston Road to Ferny Grove Rail overpass on Lutwyche Road

The street level survey reveals that the primary zone in this area contains 101 retail and commercial properties and 27 residential properties. As Lutwyche Road carries a high volume of traffic everyday, both the inbound and outbound sides of Lutwyche Road contain an even spread of the commercial and retail businesses.

As these businesses are fast moving consumer goods businesses, they rely heavily upon the passing traffic for exposure. A reduction in the level of traffic passing their business in the short-term will result in a decreased level of exposure and possibly trade. A reduction in value of 10% to 18% in the Primary Zone could be expected. This reduction will be reflected in the rental rate for the property due to the reduction in trade that may occur as a result of the loss of exposure. However, it is anticipated that there will be an-uplift in values in the range of 5% to 12% for properties contained within the Secondary Zone due to the reduction in drivers trying to decrease their travel time to the city.

As noted earlier in this report, it may be expected that the volumetric acquisition of title will have an impact on the properties contained within the primary zone. The extent of the positive and negative impacts however, will need to be studied in further detail on a case by case basis.

3.6.3 Ferny Grove Rail overpass to just north of Stafford Rd/ Lutwyche Road intersection, Kedron

From the on ground survey, there are 67 commercial and retail premises and 38 residential properties situated along Lutwyche Road. A considerable amount of these commercial and retail properties are located on the outbound side of Lutwyche Road. It is therefore inferred that a larger proportion of the overall level of the impact by the Airport Link due to the reduction in traffic will occur on the outbound side compared to that of the inbound side of Lutwyche Road.

The impact that a reduction in traffic will have in the Primary Zone of this area is considered to be similar of that could possibly be experienced in the Bowen Hills/Herston to Ferny Grove Rail Overpass area which is in the range of 10% to 18%. Once again a majority of the businesses located within this section are fast moving consumer goods businesses and rely heavily upon the high level of exposure that they receive from passing traffic. In the Secondary Zone however, a potential uplift of 7% to 15% could be witnessed due to the reduction in drivers that regularly cut through the area during periods of peak traffic.

Once again, the true impact by the reductions in traffic on the Primary and Secondary Zone in the Ferny Grove Rail Overpass to Kedron area will be due to market forces over the medium to longer-term.

The effect of the volumetric acquisition of subterranean title in this area is considered not to be as detrimental as the section further north. The degree of the positive and negative impacts however, will need to be studied in further detail on a case by case basis.

3.6.4 Corner Kedron Park Road/ Lutwyche Road to East West Arterial adjacent to Toombul Shopping Centre

From the data information provided by Connell Wagner/SKM, Knight Frank concludes that there are 210 retail and commercial businesses located in this area. This figure is skewed as 144 of these businesses are located within Centro Toombul. Therefore, only the effect on the remaining 66 retail and commercial premises has been analysed. Centro Toombul is major retail centre and will not be adversely affected by the Airport Link as it is a destination that has existed for more than 20 years and it contains a number of shopping attractors such as larger chain food outlets, banking and finance services, theatres and clothing companies.

The on ground survey has indicated that there are 120 residential properties in this section that will be impacted upon by the Airport Link. The impact that the volumetric acquisition of subterranean title will have in the area may be perceived as more severe as purchaser's perceptions are greater when it comes to residential properties.

A reduction in traffic in the primary and secondary zones in this area is expected to provide an-uplift in value in the ranges of 7% to 10% and 7% to 12% respectively. Whilst a reduction in traffic in the primary zone will reduce the number of impulse buyers passing the existing strip retail located along

Junction Road and Rose Street, it will reduce the amount of 'rat runners' who travel through the area in peak periods of traffic to escape the pressures of Sandgate and Lutwyche Roads.

The extent of the positive and negative impacts however, will need to be studied in further detail on a case by case basis.

3.7 Future (post 2012 with both Projects in place)

Given the information obtained on other major transport infrastructure projects in Australia, both the Airport Link and Interim Northern Busway Projects appear that they can on balance, provide a substantial degree of benefit to the study corridor in the medium to long term.

Overall benefits that could be achieved in the long term are:

- Reduction in traffic along Sandgate and Lutwyche Roads;
- Reduction in air pollution;
- Potential uplift in residential streetscape and amenity;
- Increased redevelopment opportunities for more intensified land uses;
- Greater accessibility to major retail centres such as Centro Lutwyche via public transport, can potentially increase trade and revenue for businesses in the centre and locally;
- Greater efficiencies for transportation;
- Reduction in 'rat runners' through built up residential areas;
- Greater accessibility to other key infrastructure such as the Domestic and International Airports;
- Increase in social amenity; and
- Gradual long term growth of capital values and leasing rates in the study corridor above the base line.

Land around the Airport Link portals at Kedron and Toombul, in the future provides the opportunity for the development of medium to higher density residential developments and commercial buildings. There already exists a number of medium density residential buildings around the preferred portal site at the East-West Arterial Road transition area along Sandgate Road heading inbound to the city and a significant amount of pre-existing higher density residential units on the Nundah side of Toombul Train Station. Construction has nearly been completed on one of two new unit developments that are within 2 to 5 minutes walking distance of Toombul Train Station. There still exist a number of sites which provide the potential for higher and better use near Toombul Station and Ross Park for the development of higher density Transit Oriented Developments.

At the transition zone where the Airport Link connects with the Interim Northern Busway, there could possibly be an opportunity for the development of not only higher density residential, but for smaller sized commercial buildings also. The area which would best suit developments of this type would be to the north around the Stafford Road and Gympie Road intersection. There exist a number of new bulky goods retail outlets surrounded by smaller fragmented and non-complimentary businesses such as adult stores and second hand car dealerships. All of these current land uses in the future may be deemed inferior by the market place and the development of these sites into higher and better uses may occur.

3.8 Conclusion

The diversity of property types in the study corridor will have a different scale of impact depending upon current land use. For example, a reduction in traffic will positively impact residential uses and negatively impact retail and some commercial uses. The provision of a more efficient transport hub for example will positively impact Toombul Shopping Centre as it is a destination and does not rely on passing trade or exposure.

The impacts on property can be can be summarised as follows in **Table 3.4**:

Table 3.4 Property Economic Impacts Summary

Use	Positive	Negative
Single Residential	- Reduced traffic - Lower noise levels - Less impacts from lights at night - Uplift in value above the base line over time - Potential upzoning of land surrounding Busway stations over time	Acquisition of volumetric title
Multi-Residential	- Higher positive impact on access due to reduced traffic - Improved access to public transport - Uplift in value above the base line over time	
Retail Strip Shops	- Reduced noise - Easier access - Improved transport - Uplift in value above the base line over time	- Reduced exposure - Reduced impulse buyers - Particularly impacted is high volume fast moving consumer goods. Eg. Take away food outlets, service stations etc.
Retail Centres	- Easier access by improved transport will have a positive impact on trade - Uplift in value above the base line over time	- Reduction in exposure
Commercial	- Easier access to places of work for employees - Reduced noise - Uplift in value above the base line over time	- Reduced exposure - Effect of easement on title and redevelopment opportunities

From the results derived from the impact assessment, there is an overall positive benefit to the study corridor in the future if the two separate though closely located, Airport Link and Interim Northern Busway Projects are to be implemented together. As mentioned through the analysis of previous infrastructure projects, the development of the Interim Northern Busway and Airport Link to alleviate current and future traffic problems is the first step of the process to unlocking under-utilised land within the study corridor. The second process will evolve due to natural market forces over time and the assistance by the government to improve the on-ground streetscape of the study corridor.

In the medium to longer-term, it is evident from the high level of research information and data commented on and used in this corridor analysis, there will be an-uplift in property values above the base line throughout this period. However, as previously noted, a large proportion of the achievable positive growth will occur as a result of natural market forces.

4. Airport Link Cost Benefit Analysis Modelling

4.1 Introduction

This section presents the Airport Link Cost Benefit Analysis (CBA) model that identifies and assesses the economic return of the Airport Link Project.

The measures of benefits and costs in the CBA reflect the concept of economic efficiency. 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 can be expressed as Net Present Value (NPV), which is the calculation of net benefits (Present Value of benefits minus Present Value of costs) over the concession period, and Benefit Cost Ratio (BCR), which is the ratio of the total Present Value of benefits over the Present Value of costs.

NPV and BCR can be used to assess the economic viability of the Airport Link Project and range of sensitivities in terms of the allocated efficiency of project costs and resulting road user and other societal benefits.

The benefits and costs that are included in the Airport Link CBA are those that have been monetised by using data from actual markets (i.e. capital costs (CAPEX), operating costs (OPEX), labour prices, vehicle operating prices etc). Austroads/DMR have provided draft road user costs parameter values for 2005 while CAPEX base costs and OPEX costs have been sourced from the Project's cost schedules. The Project CAPEX and OPEX costs that are used in the Airport Link Cost Benefit Analysis model are risk adjusted in real prices.

The CBA modelling results are not the sole determining factor of the worthiness of the Project, but considered alongside other major social, environmental and planning related Project impacts that may both difficult to measure and/or to monetise. The CBA model conforms to DMR standards and also to the Queensland Government's Project Evaluation Guidelines.

4.2 Scope

The benefits or disbenefits that accrue to motorised road transport users under the current and projected scenarios have been derived from the traffic modelling that has been undertaken for the Airport Link Detailed Feasibility Study. The Airport Link Project in risk adjusted real prices and as a stand alone Project over a 45 year concession period is the scope of this Airport Link CBA model and findings. A sensitivity test using a variety of parameter changes is detailed in the Sensitivity Analysis **Section 4.10**.

The CBA has the following scope as described in **Table 4.1**.

Table 4.1 Airport Link CBA Scope

Inclusions	Exclusions
▪ Changes in consumers and business journey times including freight and vehicle operating costs; ▪ Changes in the number of accidents as a result of VKT in the future network; ▪ Changes of Project or noise, local air quality and water quality; ▪ Accessibility impacts to the extent that behavioural responses to tolling are reflected in journey time and VKT on the network; and ▪ Includes sensitivity tests using the social discount rate.	▪ Any evidence of land use impacts in the form of land value capture in the corridor (refer section 3 Strategic Assessment Property Economic Impacts); ▪ Broader local, regional and state economic impacts (refer to section 5 Computable General Equilibrium Modelling Section); ▪ The impacts on broader integration with other government land use policies; ▪ No allowance was made for the costs of disruption during construction. Traffic modelling was not undertaken at this micro level and the traffic impacts were not quantified as a result of this; ▪ Cost of required upgrades in the Do Minimum case is not included in the analysis as these works have not been costed. (These costs could be offset against the Project CAPEX which would improve the Project BCR; ▪ Impacts on pedestrians and cyclists; and ▪ Net impacts on amenity biodiversity, landscape and heritage.

4.3 CBA Do Minimum (Base Case) and Project Case

4.3.1 Do Minimum (Base Case)

The CBA model provides for the Project Case as described in **Sections 1.2**, **4.3.2** and **4.4** of this report to be measured in comparison to the Base Case for the same network. The Base Case assumes a Do Minimum scenario, which includes some changes to the existing transport infrastructure network. The traffic modelling input data that has been used to assess the Airport Link Project uses the Brisbane Strategic Transport Model (BSTM) as its basis. The Do Minimum changes are documented in detail in the traffic section of the EIS and have assumed road network infrastructure improvements including the NSBT and the Gateway Upgrade Project.

4.3.2 Project Case

Description

The Airport Link Project is the northern part of Project TransApex which proposes a tri-axis based framework of strategic arterial road connections that would allow Brisbane's cross-city travel movements to bypass the Central Business District and inner suburbs.

Lutwyche Road, beneath which the Airport Link will be constructed, carries a total of 65,000 vehicles per day. The current AM and PM peaks and to a lesser extent other business hours traffic on Lutwyche Rd are extremely congested. Latest traffic studies show that without Airport Link, this number will increase to more than 100,000 by 2026. With the Airport Link Project constructed, traffic on Lutwyche Road would be reduced by up to 30 percent.

The proposed Airport Link is a 6 km long underground toll roads located 50 metres under the surface between Bowen Hills and Kedron/Toombul. The objective of the tunnel is to provide improved traffic conditions and flows to the northern suburbs of Brisbane and to improve road access to Brisbane's international and domestic airports.

The concept design for the Airport Link Project includes the following features:

- Two separate, parallel road tunnels, one north-bound and one south-bound;
- Three lanes in each direction from North-South Bypass Tunnel connection to the Gympie Road connection. Two lanes in each direction from Gympie Road connection to East West Arterial connection;
- Tunnel portals at Bowen Hills, Gympie Road and East West Arterial for Airport Link;
- Safety systems including emergency egresses, fire protection and monitoring systems;
- A ventilation system to manage air quality in the tunnel and near portals including elevated outlets near the portals in Bowen Hills, Kedron and Toombul for Airport Link;
- Surface road changes to connect the tunnels to the existing road/bus network;
- A Tunnel Control Centre;
- Traffic management systems including signage, lighting, CCTV and radio/mobile rebroadcast capability; and
- Electronic tolling, plant monitoring and other control systems.

Construction Costs (CAPEX) used in CBA Modelling

The CBA modelling uses undiscounted real risk adjusted CAPEX of $2.3 billion (raw costs of $1.7 billion plus risk adjusted CAPEX of approximately $500 million), with construction commencing in 2007 (land and preconstruction costs), and to be completed by August 2012. The total construction period is 50 months.

The CAPEX estimates are based on the Concept Design Report and include the following assumptions as shown in **Table 4.2**.

- **Table 4.2 CBA CAPEX Assumptions**

Inclusions	Exclusions
▪ All construction costs including land and pre construction costs; ▪ All costs are valued in real terms (constant January 2006 prices) as opposed to nominal prices. Therefore, the impact of inflation is eliminated from the CBA since it is assumed that the costs will remain constant in real terms; and ▪ All costs are risk adjusted costs (P50). Risk values were derived using Monte Carlo analysis.	▪ Capital charges and interest costs are financial transactions and are excluded from the CBA. (Financial transactions are resource transfers from one part of the economy to another and do not increase or decrease the supply of a resource in the economy); ▪ No allowance was made for the costs of disruption during construction. Traffic modelling was not undertaken at this micro level and the traffic impacts were not quantified as a result of this; and ▪ Toll technology costs are excluded from the CBA.

Table 4.3 lists the CAPEX cash flows used in the Airport Link CBA model.

- **Table 4.3 Risk Adjusted CAPEX Cash Flows used in Airport Link CBA Modelling**

Item	2007/08 Risk Adjusted (P50) Jan 06 $,000	2008/09 Risk Adjusted (P50) Jan 06 $,000	2009/10 Risk Adjusted (P50) Jan 06 $,000	2010/11 Risk Adjusted (P50) Jan 06 $,000	2011/12 Risk Adjusted (P50) Jan 06 $,000	2012/13 Risk Adjusted (P50) Jan 06 $,000	Total Risk Adjusted (P50) Jan 06 $,000
Land	109,815						109,815
Preconstruction	22000						22,000
Construction							
Council/State		11,778	11,778	11,778	11,778	5,889	53,000
Equipment		110,911	52,591	52,591	52,591	-	268,686
Materials		116,623	116,623	116,623	116,623	-	466,493
Labour		45,173	45,173	45,173	45,173	29,094	209,785
Subcontractor		109,640	109,640	82,015	167,085	166,243	634,624
Overheads		159,732	94,674	94,674	94,674	94,674	538,427
Subtotal		553,858	430,479	402,854	487,924	295,899	2,171,013
Total Capex	131,815	553,858	430,479	402,854	487,924	295,899	2,302,828

Operating Costs (OPEX) used in CBA Modelling

The OPEX estimates used in the CBA modelling are real risk adjusted costs and assume a 45 year concession period. The following cost items have been included in the CBA modelling:

- Major repairs and replacements;
- Power consumption;
- Routine maintenance;
- Salaries and wages;
- Insurances;
- Water treatment plant; and
- Other materials and services.

The estimated undiscounted risk adjusted OPEX over the 45 year concession period is approximately $1.3 billion inclusive of profit and overheads.

Special purpose vehicle costs for revenue and maintenance administration costs have been excluded from the CBA because they are predicated on the operator's toll expenditures and revenues. Tolls are regarded as transfer payments in the context of CBA and are generally excluded.

4.4 CBA Modelling Items and Assumptions

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

- CAPEX and OPEX cost estimates;
- Network traffic data for the Base Case and Airport Link Project Case (**refer to Appendix B**); and
- Discount rate.

Other critical inputs are the parameter values used in the determination of travel time savings, vehicle operating costs (saving), road safety (savings) and environmental/externality (benefits). The current DMR/AustRoads (draft) standards for these values are in 2005 prices and have been confidentiality released for use in the Airport Link CBA model.

Table 4.4 provides a comprehensive list of items and their assumptions that have been used in the development of the Airport Link CBA model.

Table 4.4 Airport Link CBA Model Assumptions

ITEM	ASSUMPTIONS
1. Price Terms	CAPEX, OPEX and benefits are recorded in real terms (i.e. constant January 2006 prices)
2. CAPEX	Construction cash flows commences in 2007 (land acquisition and preconstruction costs) and is to be completed by August 2012. The cost estimate is based on the Concept Design Report.
3. CAPEX Risk Adjustment (P50)	Construction costs risk estimates include values for retained and transferable risks.

ITEM	ASSUMPTIONS
	CAPEX risk values are expressed in real terms.
4. Operating and Expenditure (OPEX) Costs	OPEX cost schedule has been taken from the O&M Estimate Final Report. It excludes the Special Purpose Vehicle (SPV).
5. OPEX Risk Adjustment (P50)	The Project's OPEX is risk adjusted and includes retained and transferable risks over the operating period of the Project. OPEX risk values are provided in real terms.
6. Sunk Costs	Costs that have been incurred pre 2007 on feasibility and other studies are sunk costs and are **excluded** from the CBA.
7. Capital Charges including Interest	These items are **excluded** from the CBA because they are considered a transfer of resources from one part of the economy to another. Also these items are implicitly included in the discount rate.
8. Depreciation	Depreciation is excluded from the CBA because it does not have a direct economic effect. Depreciation in the form of replacement investment can generally be included in a CBA (but not in the case of the Airport Link Project) if the infrastructure asset has to be replaced during the period of analysis
9. Timing	The Project timing is as follows: ▪ Land acquisition and Preconstruction starts in 2007. ▪ Construction starts 1 July 2008. ▪ Construction ends August 2012. ▪ Operations start 1 September 2012.
10. Discount Rate	The discount rate as advised by Queensland Treasury is 6.8% in real terms. A social discount rate of 5.5% is to be used as part of a sensitivity test. The discount rate is used to convert CAPEX and OPEX that occur in different time periods to present values so that the values can be readily compared. The underlying principle is the social time preference in that society prefers to receive goods and services now rather than deferring to a later time period.
11. Concession Period	45 years including 50 month construction period.
12. Period of Analysis	45 years including 50 month construction period.
13. Benefit Assessment Period	40 years 9 months following the completion of construction in August 2012 and the commencement of operations of the link.

ITEM	ASSUMPTIONS
	Assessment period assumed is September 2012 to June 2053.
14. Traffic Data-Baseline	Future base traffic data without the Airport Link in place has been provided and includes the following: ▪ Traffic assignment years commencing in anticipated opening year 2012, 2016, 2022 and 2026. ▪ Network base case traffic data for assignment years by: - Vehicle Hours Travelled (VHT), Vehicle Kilometres Travelled (VKT), average speed etc); - AM peak, PM peak, business hours and other hours; and - Vehicle type (light and heavy vehicles) and road type (motorway, expressway, arterial, suburban, district and local). ▪ Base traffic network covers the Brisbane Metropolitan Area or Brisbane Statistical Division (BSD). ▪ Base traffic network includes impacts of: - Gateway Upgrade Project (GUP); and - North South Bypass Tunnel (NSBT).
15. Traffic Data (Future Network with Airport Link Project)	Future base traffic data with the Airport Link in place has been provided and includes the following: ▪ Traffic assignment years commencing in anticipated opening year 2012, 2016, 2022 and 2026. ▪ Network base case traffic data for assignment years by: - Vehicle Hours Travelled (VHT), Vehicle Kilometres Travelled (VKT), average speed etc; - AM peak, PM peak, business hours and other hours; and - Vehicle type (light and heavy vehicles) and road type (motorway, expressway, arterial, suburban, district and local). ▪ Future traffic network covers the Brisbane

ITEM	ASSUMPTIONS
	Metropolitan Area or Brisbane Statistical Division (BSD). ▪ Project Case has been based on one tolling situation. ▪ Base future network includes impacts of: - GUP;and - NSBT.
16. Vehicle Segmentation	Vehicle segmentation by: ▪ Light vehicles (Private cars); ▪ Light Vehicles (Business cars); ▪ Heavy vehicles.
17. Vehicle Occupancy	Vehicle occupancy rates for AM peak, PM peak, business hours and other hours are generally taken from the most current SEQ Travel Surveys.
18. Average Travel Speed	Calculated from VHT and VKT by vehicle category, time of day and assignment years.
19. Annualisation	330 for both light vehicles and heavy vehicles.
20. Inter Assignment Year Interpolation	Linear average annual growth between traffic assignment years.
21. Benefits Escalation beyond 2026	Assuming that the last traffic assignment year is 2026, annual traffic growth may be assumed to increase consistently with medium forecast population growth in the Brisbane Moreton Statistical Division
22. Travel Time Parameter Values	DMR/AustRoads draft values for Road User Costs (2005). Values are available for vehicle category/occupancy/freight for peak, business hour and other hours.
23. Vehicle Operating Cost (VOC) Models	Model coefficients taken from DMR/AustRoads 2005 draft standards. The Urban VOC Model has been used to determine VOC by vehicle category. Specific VOC coefficients have been used where average traffic speeds on arterial and local roads are less than 60 km/hr. The Freeway VOC coefficients have been used for speeds greater than 60 km/hr on Motorways and Expressway road categories.

ITEM	ASSUMPTIONS
24. Accident Benefits	Average accident costs by road types (local, district, sub arterial, arterial, expressway and freeway) in terms of cost per million vehicle kilometres of travel (MVKT) is used. Values in accident costs will be on 2005 prices.
25. Environment and Externalities	Environmental costs for noise, air and water pollution. Parameter values have been sourced from the Draft Austroads/DMR 2005 values.
26. Residual Value	The terminal value of the Airport Link Project after the end of the 45 year concession period is assumed to zero.
27. Sensitivity	Sensitivity testing parameters: ▪ Social discount rate variation at 5.5%; ▪ Risk adjusted CAPEX and OPEX at P10 estimate and P90 estimate; and ▪ Additional 1% population growth on benefits post 2026.
28. Decision Outputs	The following CBA decision outputs have been delivered for the Airport Link Project: ▪ Benefit Cost Ratio; ▪ Net Present Value; ▪ Present Value Costs; and ▪ Present Value Benefits segmented by travel time benefits, VOC benefits, road safety benefits and environmental benefits.
29. Treatment of Tolls in CBA	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 agency that operates the facility. Such transfer payments are considered outside the scope of the CBA model.

4.5 Airport Link CBA Model Results

4.5.1 CBA Findings

Major transport infrastructure projects such as the proposed Airport Link will improve socio economic opportunities in the study corridor by generating direct road user benefits to the users via improved travel times, reduced travel costs, improved travel comfort, safety and improved environmental externalities.

The results from the CBA for the Airport Link as a stand alone Project with risk adjusted CAPEX of approximately $2.3 billion and OPEX of around $1.3 billion over a 45 year concession period at a discount rate of 6.8% are shown in **Table 4.5**.

- **Table 4.5 Airport Link CBA Findings**

Output	**Present Value ($)**
Present Value of Costs (PV)	$2,239,429,888
Present Value Benefits (PV)	$2,370,540,594
Net Present Value (NPV)	$131,110,706
Benefit Cost Ratio (BCR)	**1.1**

Investment criteria that have been calculated for the Airport Link Project in this CBA are NPV and BCR. The PV Benefits has been segmented by benefit type, namely: Travel Time savings, Vehicle Operating Costs (VOC) savings, Road Safety savings and Environment / Externalities benefits. The PV Costs refers to the present value of the capital investment and the annual operating and maintenance costs in line with the 45 year whole of life concession period.

The NPV is the value of the discounted total future benefits minus discounted total future costs over the 45 year concession period for the Airport Link Project. On the basis of the assumptions that have been adopted, the CBA model returns a **NPV of $131 million** over the life of the Project. A positive NPV is an economic criterion for proceeding with the Project although other non CBA factors also need to be considered.

The BCR is equal to the discounted total benefits over the concession period divided by the discounted total costs (i.e. CAPEX and OPEX). A ratio greater than 1 indicates that the Project is economically viable in the context of the CBA although there maybe other non CBA factors (eg available program funding, social and environmental) which may also be considered to assess the full impact of the Project to fruition. The higher the BCR indicates that the Project has greater economic merit.

The BCR value that results from the Airport Link CBA model is 1.1. The **BCR of 1.1** indicates that the present value of benefits provides a 10% return in value over the concession period for the Project.

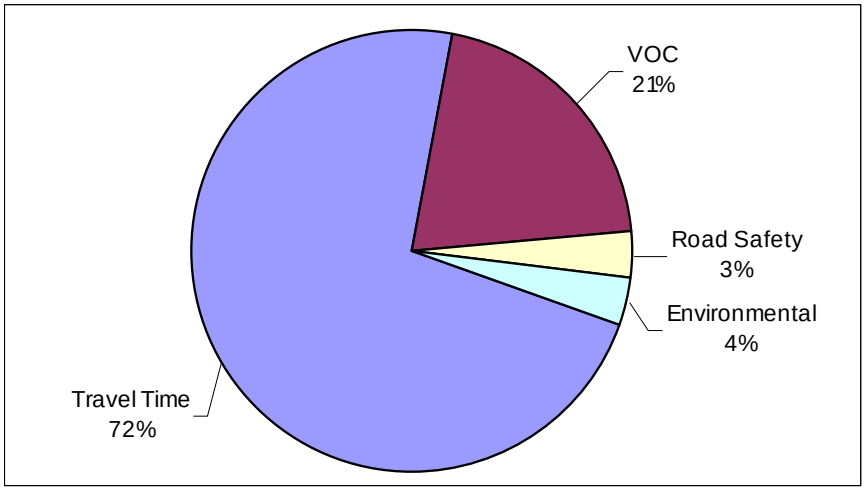
The breakdown of the road user benefits by type is provided in **Table 4.6**.

- **Table 4.6 Discounted Benefits by Type**

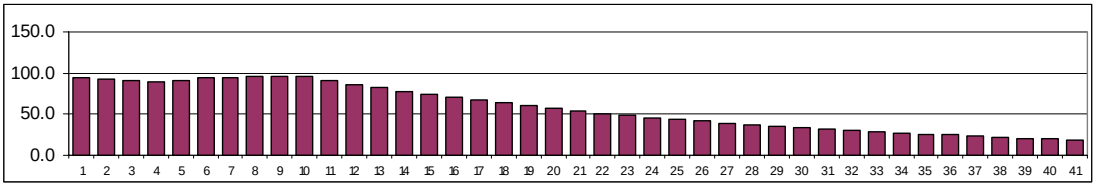
Benefit	Present Value ($)	% of Benefits
Travel Time	$1,716,703,984	72%
VOC	$487,311,107	21%
Road Safety	$81,875,458	3%
Environmental	$84,650,045	4%
Total Discounted Benefits	**$2,370,540,594**	**100%**

Table 4.6 and **Figure 4.1** highlight the importance of Travel Time savings at $1.7 billion or 72% of total discounted benefits that will accrue to the future road network with the construction of the Airport Link Project. VOC savings at $487 million or 21% of all discounted benefits are also very significant benefits to road users. Environmental benefits at $85 million and road safety benefits at $82 million are smaller but nevertheless important benefits. These latter benefits have been derived from forecast tunnel specific vehicle data and may understate the benefits accruing from the broader road network.

- **Figure 4.1: Total Benefits Segregation (%)**



- **Figure 4.2: Discounted Benefits Cash Flow Over 41 Year Concession Period ($ millions)**



4.6 Travel Time Savings

4.6.1 Approach

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 or as in the case of the Airport Link providing a new major road infrastructure link in the network. 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 benefits equate to the net difference in user travel time costs between the Do Minimum Base Case and the Airport Link Project Case. Travel time estimates 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 2012, 2016, 2022 and 2026.

This data has been segmented by vehicle class (passenger cars 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 vehicle class cars has been further delineated into cars (private), cars (business) and light commercial vehicles using revealed preferences data from 2001 BSTM VO1 model output.

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) and Light Commercial (peak/business hours), a higher assigned economic parameter value (value of time).

Table 4.7 provides value of travel time on a $ per person / hours by vehicle class, time of travel and private/business.

- **Table 4.7 AustRoads (2005) Estimated Values of Urban Travel Time – Occupant and Freight Payload Values**

Vehicle Type	Occupancy Rate	Value per occupant (person-hour)	Freight travel time Values per vehicle-hour
Cars – private	1.6	$10.74	-
Cars – business	1.4	$34.35	-
Rigid trucks			
- light commercial (2 axle, 4 tyre)	1.3	$21.05	$1.13
- medium (2 axle, 6 tyre)	1.3	$21.35	$3.06
- heavy (3 axle)	1.0	$21.80	$10.48
Articulated Trucks			
- 4 axle	1.0	$22.09	$22.56
- 5 axle	1.0	$22.39	$28.78
- 6 axle	1.0	$22.39	$31.03

4.6.2 Findings

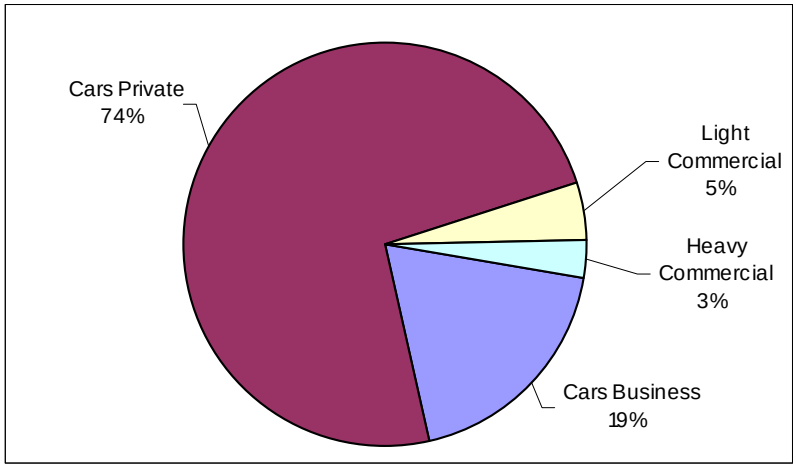
Table 4.8 shows travel time savings generated by the Airport Link Project segmented by vehicle type.

- **Table 4.8 Discounted Travel Time Savings by Vehicle Type**

Vehicle Segment	Present Value ($)	% of Travel Time Benefit
Cars (Business)	$319,494,571	18%
Cars (Private)	$1,262,776,995	74%
Light Commercial	$82,005,803	5%
Heavy Commercial	$52,426,616	3%
Travel Time Benefits Total	**$1,716,703,984**	**100%**

Travel time savings represent the largest economic net benefit to Airport Link and are valued at over $1.8 billion in net present value terms. As shown **Figure 4.3**, private cars are the largest contributor to travel time savings with over 73% or $1.2 billion value to the Airport Link Project over the 45 year concession period.

- **Figure 4.3: % Travel Time Savings by Vehicle Type**



4.7 Vehicle Operating Cost Savings

4.7.1 Approach

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 cost 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 Road User Costs (Draft), Austroads 2005.

Two journey speed vehicle operating cost models are generally used in this economic evaluation to determine VOC, namely the Urban Freeway Model and the Urban Stop Start Model. The Freeway Model is used to predict the effects of average journey speed on VOC in freeway conditions where average speeds are greater than 60km/hr, while the Urban Stop Start Model is used for more built up road conditions where average speeds are less than 60km/hr (**refer Table 4.9**).

- **Table 4.9 Parameter Values for Urban VOC Models**

Vehicle Type	Freeway Model				All Other Roads			
	A	**B**	**C**	**D**	**A**	**B**	**C**	**D**
Cars	15.331	141.5	0.00	0.00015	8.246	446.3	0.0	0.000609
LCV	24.311	826.0	0.00	0.00034	7.917	1387.6	0.2	0.001362
HCV & Buses	58.224	6317.0	0.00	0.00005	14.198	69254.3	0.2	0.002

The equation for both conditions is the same but the coefficients comprising the models are different and reflect the more efficient use of vehicles in the urban freeway driving conditions. The equation is as follows:

Urban Model: $c = A + B/V + C*V + D*V^2$

Where:

A, B, C and D = model coefficients (see tables below)

V represents all day average link speed (km/hr);

c = vehicle operating costs (cents/km)

The traffic modellers have provided Network Vehicle Kilometres Travelled (VKT) data and Average Speed data for the assignment years 2012, 2016, 2022 and 2026. The VKT data has been further delineated on the basis of vehicle classes namely cars, light commercials and heavy vehicles.

The VKT for these vehicle classes is subsequently multiplied by the respective cents / km to calculate the $ vehicle operating costs for the Do Minimum Base Case and the Airport Link Project Case Network VKT. The net difference in vehicle operating costs between the Base Case and the Project Case is the Vehicle Operating Cost (VOC) savings.

4.7.2 Findings

The following table shows the findings from the VOC analysis by road type and vehicle segment.

Table 4.10 highlights the considerable importance of VOC savings at $585 million with the construction of the Airport Link Project.

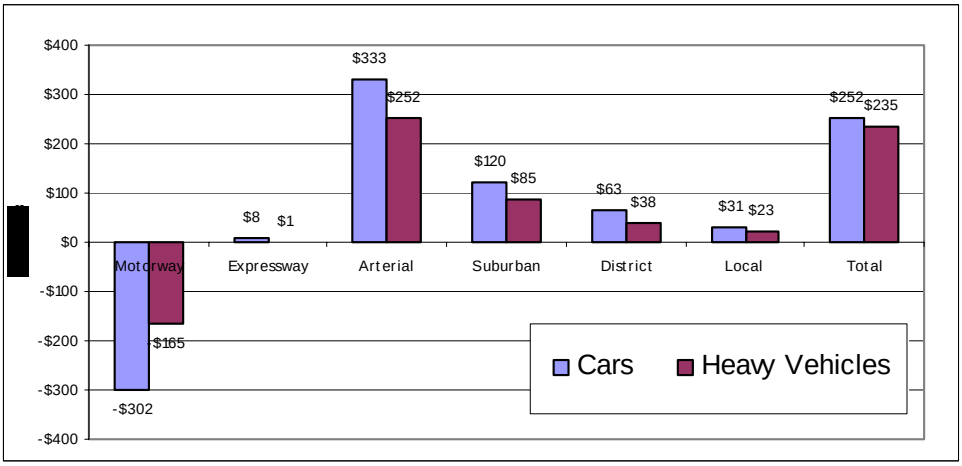
- **Table 4.10 Discounted VOC Savings by Road Type and Vehicle Segment**

Vehicle Type	**Cars**	**Heavy Vehicles**	**Total**
Road Type	**Present Value ($)**	**Present Value ($)**	**Present Value ($)**
Motorway	-$302,161,403	-$164,701,560	-$466,862,962
Expressway	$7,776,516	$643,889	$8,420,406
Arterial	$332,557,417	$252,453,613	$585,011,030
Suburban	$120,054,393	$84,825,918	$204,880,311
District	$63,325,153	$38,388,475	$101,713,628
Local	$30,763,537	$23,385,158	$54,148,695
Present Value ($)	**$252,315,614**	**$234,995,493**	**$487,311,107**

As shown in **Figure 4.4**, arterial roads represent the largest VOC savings at $605 million (cars $333 million and heavy vehicle $252 million).

Motorways showed a disbenefit of $467 million as a result of the Airport Link, which is the result of an increase in VKT and VHT on the Motorways for both cars and heavy vehicles in the Project Case over the Do Minimum (Base Case). Encouragingly, this indicates that more drivers are choosing to drive on the motorways which frees up space on the other types of road.

- **Figure 4.4: Discounted VOC Savings by Vehicle Segment and Road Type ($ Millions)**



4.8 Road Safety Benefits

4.8.1 Approach

Road related accidents result in a multitude of adverse socio-economic impacts on the community, government services and the private sector. Some of the more significant of these impacts are:

- Immediate and ongoing medical costs;
- Unquantifiable emotional suffering;
- Property damage;
- Police and emergency services response costs;
- Road safety infrastructure enhancements;
- Lost productivity;
- Higher insurance premiums; and
- Legal costs.

Since the road network that encompasses the traffic modelling for the Airport Link CBA is the geographic area of greater Brisbane, it is impractical to review each accident in the network to identify type of accident, severity of personal and property damage and location of accident.

The standard process for quantifying the accident reduction benefits arising from changes in the road network is to use an average accident cost measure per million VKT. As the number of VKT by road type on the network changes as a result of the Project, so will the monetisation of the accident reduction benefits. Therefore if the impact of the Project on the network results in a reduction in VKT for various road types then this will consequently reduce the number of accidents that occur in the network.

Similarly, if the Project causes a reduction in VKT on one road type but an increase in VKT in a second road type then the net impact of this on the number of accidents and in turn accident benefits will depend on the difference between average accident costs per million VKT for the two road types.

In summary, this accident benefit monetisation method uses net total VKT for two main road link class groupings (i.e. motorways, expressways, arterials, suburban, district and local) and an average accident cost per million VKT for each road grouping. The equation for monetising accident benefits is as follows.

Net $ Accident Benefits = The sum of (million VKT for each road grouping X Average Accident Cost per million VKT) for the Project Case less the same for the Do Minimum Base case.

The following **Table 4.11** presents average accident costs by road type, in terms of cost per million kilometres of travel (mVKT) undertaken, for all types of vehicle collisions (both minor and severe).

Table 4.11 Adverse Accidents by Road Type

Road Type	Crash Cost ($ per m VKT)
Motorway	$18,200
Expressway	$18,200
Arterial	$58,300
Suburban	$80,100
District	$80,000
Local	$80,100

The total VKT by Road type by assessment year and for the Do Minimum (Base Case) and two Project cases (namely the Airport Link and Interim Busway and Airport Link only) are provided in the following table:

The average accident costs per MVKT by road type have been applied to the net difference in annual VKT travelled for each road type in the assignment years of 2012, 2016, 2022 and 2026.

4.8.2 Findings

The discounted road safety savings by road type are shown in the **Table 4.12**.

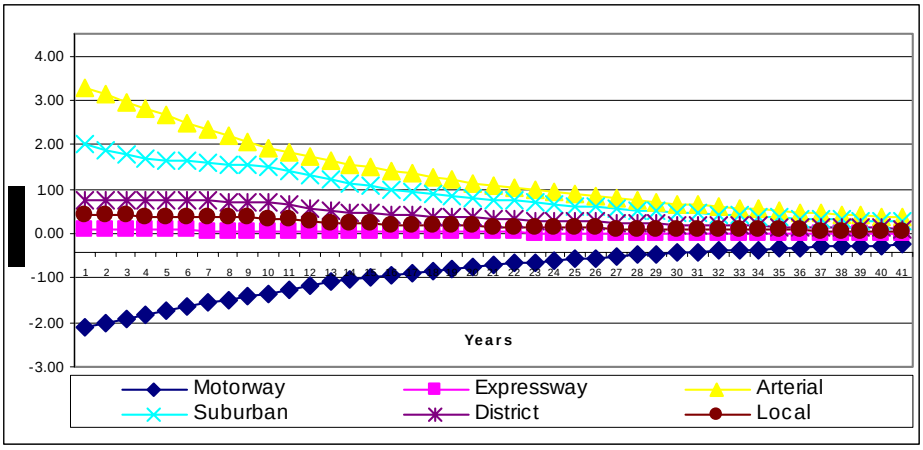
Table 4.12: Discounted Road Safety Benefits by Road Type

Road Type	Present Value ($)	% Road Safety Benefit
Motorway	-$36,008,606	-44%
Expressway	$1,394,225	2%
Arterial	$54,612,916	67%
Suburban	$37,383,946	46%
District	$16,355,126	20%
Local	$8,137,851	10%
Road Safety Total	**$81,875,458**	**100%**

Road safety savings contributed $82 million worth of the economic benefit, which is the lowest of the road user benefits. This is significantly lower than travel time savings and VOC savings although its value to the economy should not be understated.

As shown in **Figure 4.5**, arterial roads made the largest contribution to road safety benefits. Motorways resulted in a disbenefit to the Airport Link due to the increase in VKT on motorways in the Project Case over the Do Minimum (Base Case). This disbenefit could be the driver for the reduction in VKT on other types of roads as drivers choose motorways instead of other types of roads.

Figure 4.5 Discounted Road Safety Benefits by Road Type ($ millions)



4.9 Environment and Externality Benefits

4.9.1 Approach

There will be a range of direct and indirect impacts on the built and natural environments that need to be considered and assessed in the EIS process. The environmental impacts that can be monetised and subsequently have implications for the CBA model are as follows:

- Noise
- Local air quality; and
- Water quality.

Austroads in conjunction with the nation's government road agencies has recently developed draft parameter values for the above environmental and locality areas. Austroads have qualified these values by stating… "it must be emphasised that environmental valuation involves significant uncertainty and the values presented should be regarded as illustrative of the methodology rather than definitive unit cost" (Austroads, 2006).

For this section of the CBA model it is assumed that traffic using the proposed Airport Link tunnel will specifically generate noise, local air quality, greenhouse gases and water quality benefits. The basis for these benefits arises from the shifting of forecast at grade traffic from the existing road network to the road tunnel.

The following **Table 4.13** provides the 2005 Austroads externality unit cost for urban passenger vehicles and urban freight vehicles:

Table 4.13 Externality Unit Costs - Urban

Externality	Passenger Vehicle (cents per km)	Heavy vehicle ($ per 1000 tonne km)	Assumption
Noise	0.78	2.56	Tunnel infrastructure such as the Airport Link Project will eliminate surface traffic noise for those vehicles using the link but will result in a concentration of noise emissions at the portals. The primary assumption is that the Airport Link tunnel will remove around 331,000 VKT (2012) to 410,000 VKT (2026) daily from surface roads. This traffic displacement to subgrade will have beneficial traffic noise impacts along the length of the 6km tunnel. Notwithstanding this, there will be additional noise impacts on roads leading to portals.
Local Air Pollution	2.34	23.36	Similar to noise above where the Airport Link tunnel will generate sub surface VKT and the network will exhibit an easing of congestion and freer running at more efficient driving speeds. Vehicle emissions from surface roads are released at ground level and rely on atmospheric dispersion to reduce the pollutant concentrations. Ground level emissions realises adversely impact on populations in the corridor (See Chapter 9). The tunnel will employ a ventilation system where air in the tunnel is drawn into the tunnel from portals and ventilation inlets. Air will then be discharged from the tunnel through ventilations outlets. These outlets are at an elevated point above ground level that facilitates the dispersion of the filtered air into the atmosphere. The tunnels will have local air quality benefits because of the elevated points of emission from the ventilation outlets. In addition the reduction in surface traffic in the network will generate air quality benefits with the tunnel constructed.
Water Quality	0.34	2.22	Tunnel traffic will reduce surface traffic elsewhere in the network. Pollutants from vehicles have adverse impacts on the local water quality. Pollutants that are deposited on roadways include heavy metals, organic chemicals, particulants, tyre residue, oils, rust etc. These pollutants enter surface water at groundwater from runoff from the roadway. The increased impervious surface area associated with the road pavement also speeds the conveyance of water runoff into local creeks. Similar pollutants will be deposited on tunnel roads, walls and ceilings but will be treated as part of the water treatment service within the tunnel (See Chapter 8).

4.9.2 Findings

The following **Table 4.14** shows the environmental savings by environmental type and vehicle type as a result of the Airport Link Project.

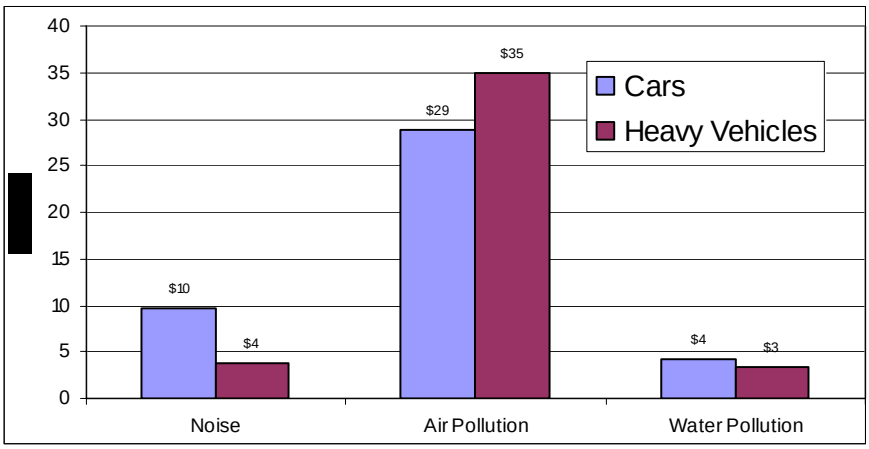
- **Table 4.14: Discounted environmental benefits by vehicle type ($)**

Vehicle Type	Cars	Heavy Vehicles	Total
Environmental Benefit	**Present Value ($)**	**Present Value ($)**	**Present Value ($)**
Noise	$9,605,330	$3,824,697	$13,430,027
Air Pollution	$28,815,990	$34,900,360	$63,716,350
Water Pollution	$4,186,939	$3,316,729	$7,503,668
Total Environmental Benefits	**$42,608,259**	**$42,041,786**	**$84,650,045**

Environmental benefits account for approximately 4% of the total economic benefits to the Project. In dollar terms, environmental savings were approximately $85 million (cars $ 43 million and heavy vehicles $42 million). As shown in **Figure 4.6**, this is due largely to the contribution of Air Pollution at approximately $64 million (cars $29 million and heavy vehicles $35 million), which represents 75% of environmental benefits.

Environmental cost savings generated by cars and heavy vehicles using Airport Link was relatively even return at $43 million and $42 million respectively. Interestingly, cars contributed higher savings than heavy vehicles regarding to noise and water pollution but lower air pollution savings.

- **Figure 4.6: Discounted environmental benefit by vehicle type ($ millions)**



4.10 Sensitivity Analysis

A sensitivity analysis was undertaken on the Airport Link Project Case to determine how different parameters affect the economic return of the Project Case. **Table 4.15** lists the additional parameters modelled in the Airport Link sensitivity analysis.

Table 4.15: Sensitivities modelled

Sensitivity	Details	Undiscounted CAPEX	Undiscounted OPEX	BCR
Project Case	P50 risk adjusted CAPEX/OPEX; 6.8% discount rate.	$2.3 billion	$1.3 billion	**1.1**
2	P50 risk adjusted CAPEX/OPEX; 5.5% discount rate.	$2.3 billion	$1.3 billion	**1.3**
3	P10 risk adjusted CAPEX/OPEX; 6.8% discount rate.	$2.2 billion	$1.2 billion	**1.1**
4	P90 risk adjusted CAPEX/OPEX; 6.8% discount rate.	$2.5 billion	$1.5 billion	**1.0**
5	P50 risk adjusted CAPEX/OPEX; 6.8% discount rate; Population growth plus 1% post 2026.	$2.3 billion	$1.3 billion	**1.1**

The summary results from the sensitivity analysis are shown in **Table 4.16**. For a detailed list of the sensitivity results refer to **Appendix C**.

Table 4.16 Discounted sensitivity results

Sensitivity	**1**	**2**	**3**	**4**	**5**
SUMMARY OUTPUT	**Project Case**	**Discount rate 5.5%**	**P10 Risk Estimate**	**P90 Risk Estimate**	**Plus 1% growth post 2026**
Present Value of Costs (PV)	2,239,429,888	2,378,393,731	2,127,099,157	2,433,612,632	2,239,429,888
Present Value Benefits (PV)	2,370,540,594	3,072,626,243	2,370,540,594	2,370,540,594	2,499,628,605
Net Present Value (NPV)	131,110,706	694,232,512	243,441,436	-63,072,038	260,198,717
Benefit Cost Ratio (BCR)	**1.1**	**1.3**	**1.1**	**1.0**	**1.1**

4.10.1 Findings

The key findings from the sensitivity analysis include:

- BCRs are in the range of 1.0 to 1.3, which is breakeven or a better investment result from an economic perspective. It should be noted however, that as a result of rounding, Sensitivity 4 achieved an NPV of -$63 million.
- The results of the sensitivity testing concluded little impact to BCRs with ranges of 1.0 to 1.3;

- There was however, a significant impact on the NPVs with returns in the range of $694 million (Sensitivity 2) and -$63 million (Sensitivity 4); and
- Sensitivity 2 (5.5% discount rate) achieved the best economic return with an NPV of $694 million and BCR of 1.3.

4.11 Induced Travel Demand

The operational phase of the Airport Link Project from 2012 may impact on travel behaviour in the corridor and broader road network.

Significant road infrastructure improvements such as the Airport Link will reduce congestion, improve network connectivity and thereby reduce the generalised cost of driving. The resulting increase in vehicle travel demand vis-à-vis demand that would have otherwise occurred without the Project consists of generated traffic of which “induced travel” is a subset.

Induced travel is that part of *generated traffic* that is the increase in vehicle demand (ie total VKT) due to increased motor vehicle trip frequency, relatively longer trip distances or shifts from other transport modes but excludes travel shifted from other times and routes.

The BSTM Base Demand Model that has been developed for the traffic modelling of the Airport Link Project has addressed induced demand into the model by applying an elasticity of demand of -0.2 to the forecasted traffic changes.

The traffic modelling identified that daily induced private vehicle demand is forecast to be approximately 20,600 additional daily trips in 2012 or a very minor 0.49% of the total daily network trips of 4,219,000. In 2026 the daily induced private vehicle demand is forecast to increase to 34,700 private vehicle trips or only 0.67% of total 5,180,800 private vehicle trips in the modelled network.

The traffic modelling concluded the relatively minor nature of daily induced private vehicle demand across all networks including cross river demand and with the NSBT, Airport Link and Hale Street link included in the model (see also Traffic Report section of the EIS .

4.12 Conclusion

The conclusions from the Airport Link CBA for the Project Case (risk adjusted CAPEX of $2.3 billion and a discount rate of 6.8%) and sensitivity analysis are as follows:

- The Airport Link Project case with risk adjusted CAPEX of $2.3 billion and a discount rate of 6.8% returns a BCR of 1.1 and a NPV of around $131 million over the 45 year concession period. These investment results provide an economic justification for the Project proceeding although not a compelling justification;
- For the Project Case, travel time savings at $1.7 billion (in present value terms) contribute the major of benefits at 73% of total benefits followed by VOC at $487 million (20%), road safety at $82 million (3%) and, environmental / externalities at $85 million (4%);

- Road Safety and environmental monetised benefits may be understated since they are driven by proposed tunnel VKT rather than network traffic data;
- The sensitivity testing of the Airport Link Project Case returned BCRs in the range of 1.0 to 1.3, which is breakeven or a better investment result from an economic perspective. It should be noted however, that as a result of rounding, Sensitivity 4 achieved an NPV of -$63 million; and
- The sensitivity analysis showed a significant impact on the NPVs with returns in the range of $694 million (Sensitivity 2) and -$63 million (Sensitivity 4).

5. Computable General Equilibrium Modelling

5.1 Introduction

The SKM / Connell Wagner Joint Venture commissioned the Centre of Policy Studies (CoPS) at Monash University to estimate the economic effects of the Brisbane Airport Link Project on the Queensland economy. This report details the method and results of this study.

The economy-wide effects of the proposed Airport Link have been estimated using the MONASH Multiregional Forecasting (MMRF-GREEN) model of the Australian economy. MMRF-GREEN is a dynamic multiregional computable general equilibrium (CGE) model that captures the behaviour of economic agents in each Australian state and territory. Results for Queensland are provided for the period 2007, when preconstruction activities are scheduled to commence, to 2052. For the construction period, 2007 to 2012, state results for Queensland are also decomposed into the effects on South East Queensland (SEQ) and the rest of Queensland. A brief overview of the key features of MMRF-GREEN is provided in Section 5.2.1. Section 5.2.2 provides a description of the set of simulations undertaken, including the computation of the economic shocks imposed (i.e. direct costs and benefits) for each year of the simulation, and the underlying macroeconomic assumptions.

The model results for the economic effects of the Airport Link are presented in Section 5.4.

5.2 Study Method

5.2.1 MMRF-GREEN

The MMRF-GREEN model divides Australia into eight regions (the six states and two territories) and eleven regions within Queensland (the state's statistical divisions). At the state level there is detailed modelling of the behaviour of five types of economic agents: industries, capital creators, households, governments, and foreigners. For a detailed description of MMRF see Adams, et al (2003). For a briefer overview, see Adams et al. (2000).

In the version of MMRF-GREEN used for the study, there are 50 industry sectors. All industries, except Petroleum Products, produce a single commodity. Investment is allocated across industries to maximise rates of returns to investors (households, firms). Capital creators assemble, in a cost-minimizing manner, units of industry-specific capital for each industry. Each state has a single household and a state government. There is also a federal government. Finally, there are foreigners, whose behaviour is summarised by export demand curves for the products of each state and by supply curves for international imports to each state.

As is standard in CGE models, MMRF-GREEN determines the supply and demand for each regionally-produced commodity as the outcome of optimising behaviour of economic agents. Regional industries are assumed to choose labour, capital and land so as to maximize their profits while operating in a competitive market. In each region a representative household purchases a particular bundle of goods in accordance with the household's preferences, relative prices and its amount of disposable income.

States are linked via interstate trade, interstate migration and capital movements and governments operate within a fiscal federal framework.

In the current study we make use of the dynamic features of MMRF-GREEN to generate a baseline forecasts for the Australian and Queensland economies. We then conduct simulations to examine the deviations away from the baseline that result from the Brisbane Airport Link.

MMRF-GREEN provides results for economic variables on a year-on-year basis. The results for a particular year are used to update the database for the commencement of the next year. In particular, the model contains a series of equations that connect capital stocks to past-year capital stocks and net investment. Similarly debt is linked to past and present borrowing/saving and regional population is related to natural growth and international and interstate migration.

5.2.2 The Simulations

Simulation Design

In the present study we first conduct MMRF-GREEN simulations to produce a baseline forecast for the Australian economy for the period 2004 to 2052[1]. The MMRF-GREEN forecasts, particularly for the earlier years[2], reflect a wide variety of information including: macroeconomic forecasts from the Commonwealth Treasury and other analysts; export volume and price forecasts from the Australian Bureau of Agricultural and Resource Economics; forecasts of tourist numbers from Bureau of Tourism Research; forecasts of tariff rates from the Productivity Commission; and forecasts of changes in technology and consumer tastes derived from trends calculated at CoPS. Using this information the model generated forecasts for a wide range of variables at the national, state and regional level.

We assume that our baseline forecast does not incorporate the Airport Link Project. We then repeat our forecast under the same assumptions as above, except that for this new forecast (which, for convenience we shall call the policy forecast) we incorporate additional economic shocks designed to represent the incorporation of the Airport Link Project. The new forecasts are then compared with the baseline forecasts. Results are reported as deviations (in percentage change terms) of the policy forecast from the baseline forecast for each year of the period 2007 to 2052. Thus the results show the effects on the economy of the construction and operation of the Airport Link over a 46 year period starting in 2007.

Exogenous Shocks

Estimates for direct costs and benefits of Airport Link for the period 2007 to 2052 were provided by Connell Wagner. These figures consisted of capital expenditure for each year of the construction phase, 2007 to 2012, operating costs for each year from 2013 to 2052, and annual estimates for four types of benefits. These benefits were for the value of travel-time savings (distinguished between

[1] We created the starting database for 2004 (i.e. the 2003 economy) by conducting historical simulations from the year 1998 with MMRF-GREEN.

[2] Forecasts for the later years are based on simple projections for the economic shocks which drive the model.

private and commercial cars), vehicle operating benefits, road safety benefits and environmental benefits.

These figures were used as the basis of the shocks imposed on the model over the simulation period. Capital expenditure was assumed to consist entirely of expenditure on the MMRF commodity, Construction, while operating expenses was assumed to consist entirely of expenditure on the commodity, Other transport[3].

It was assumed that the capital and operating expenditures were funded by tolls on vehicles using the Airport Link. It was further assumed that these tolls were levied on the operation of three industries, Road passenger transport, Road freight and Private transport services[4]. The third of these industries covers the operation of private motor cars by households. We assumed a single toll rate (in constant price terms) per vehicle using the Link (both commercial and private) over the entire operating phase to 2052. Passenger kilometre estimates for usage of the link, supplied to CoPS by Connell Wagner, was used as the basis for estimating the growth in annual tolled vehicle numbers over the operating period. The toll rate was computed so that the net present value of toll revenue would equal the net present value of capital and operating expenditures at a discount rate of 6.8 per cent (all revenue and expenditure at constant prices).

Only the commercial vehicles component of time savings was modeled. It was assumed that these time savings reduced labour costs by unit of output. The labour savings were spread between Road passenger transport and Road freight in accordance with their base year outputs. It is important when considering the results later in this report to keep in mind that we assume the bulk of time saving (i.e. that by private motorists) is not modeled in this study as affecting economic activity. That is, we assumed that private motorists will use all of the time they save as leisure. The increased leisure is, however, a gain to household welfare. Thus when considering the gains to household we should combine the value of increased leisure time with the change in real household consumption.

Vehicle operating benefits covers savings in repairs, parts and fuel. These cost savings were distributed to Road passenger transport, Road freight and Private transport services in proportion to their outputs. For each of these industries, their cost savings were spread across various categories of fuel saving (Petrol automotive, Diesel, LPG and Other petroleum), motor vehicle repairs (which falls to the industry Trade and hotels), and Cars & car parts, Other manufacturing, and Financial & business services in accordance with the particular industries base-year proportions for these purchases.

Time constraints on this study meant we did not model road safety or environmental benefits. Each of these two types of benefits is estimated to make up around 3½ per cent of total benefits. Both can be

[3] The MMRF commodity/industry, Other transport, covers the ANZSIC groups, Services to transport and Other transport. The former includes Services to Road transport that in turn includes Toll road operations.

[4] While Road passenger transport and Road freight make up a substantial portion of commercial vehicle operation, there are a number of other MMRF industries which include sizeable commercial transport activities (particularly, Trade & hotels and Financial & business services). However, time constraints of the project meant we restricted our shocks to commercial transport to the road passenger and freight industries.

expected to have some (small) effect on the composition of economic activity[5], but are unlikely to have any noticeable effect on major economic aggregates. But as with additional leisure, both represent an increase in household welfare.

5.2.3 Other Assumptions

Labour markets

During the construction phase, we allow the increased demand for labour to have some effect on the level of national employment. From 2012, as the construction phase winds down and the operation of the Link commences, we assume that national employment commences a gradual returns to its baseline path. At the regional level, we assume that inter-state wage-rate differentials are maintained at their base case levels. Accordingly, states that are favourably affected by the Brisbane Airport Link will experience increased in-migration[6].

Real Consumption

In each year of the deviation scenarios, aggregate real private consumption in state r diverges from its base case level by an amount reflecting the divergence in real income available to the residents of r.

The time path of real public consumption, both state and federal, is assumed to be unaffected by the Brisbane Airport Link Project.

Balance of Trade

It is assumed that the Airport Link has no affect on Australia's balance of trade in each year of the simulation period. Thus from the nation's point of view, it is assumed that macroeconomic settings are such that the Project is financed domestically (via an increase in private savings). It should be noted that this assumption does not exclude the possibility that the Link Project attracts foreign loans or equity capital, but simply that the Project has no overall effect on Australia's external liabilities, with Airport-Link construction being allowed to crowd out private consumption during the construction phase of the Project.

Investment and capital stocks

At the national level, we assume conservatively that the Brisbane Airport Link generates no induced effects on aggregate investment. Thus, the only effect on the country's capital stock is the addition of the new airport link. Together with our assumption of no deviation in the balance of trade from its

[5] For instance, there would be a decrease in vehicle repairs and health expenditure and a corresponding increase in other consumption. Clearly if repair or health expenditure can be avoided, due to lower pollution and less accidents, the expenditure on alternative goods which can be purchased within the same total budget represent an increase in household utility.

[6] Technically we assume labour is mobile between state economies. This would appear an appropriate long-run simulation, but may not be appropriate in the short-run. However, there is very little difference between this assumption and that of assuming that unemployment rate varies with both interstate wage relativities and interstate labour mobility held constant. The only difference is that our assumption does not take into account the (automatic stabilizing) impact of unemployment benefits.

baseline path, this assumption has the advantage of making real consumption a reasonable indicator of welfare (when combined with leisure, accident and environmental benefits). Short-run divergences in rates of return on regional industry capital stocks from the national average rate of return are allowed to occur. This in turn causes inter-industry and inter-regional divergences in investment and capital stocks. Divergences in capital stocks across regions and industry gradually erode the divergences in rates of return.

Production technologies

MMRF-Green contains many types of technical change variables. In the deviation simulations we assume that all technology variables have the same values as in the base case simulation, except for those variables that are used to implement shocks (namely material-saving and labour-saving technological improvements in the road transport industries).

5.3 Results

Overall results

Percentage deviations from the basecase forecast resulting from the Airport Link are shown for key macroeconomic variables for Queensland, the Rest of Australia (RoA) and Australia as a whole are shown in Table 1[7]. Queensland results are shown in Table 2 for both percentage deviations and absolute deviations (e.g. $ million, average-time jobs). Regional employment results are shown in Table 3.

Results are shown for 46 years of the Project. The years 2007 to 2011 can be thought of as the construction phase of the Project. The year 2012 can be thought of as a transition year in which the last eighth of the construction is completed and vehicles commence traveling on the Link. The years 2013 to 2052 will be referred to as the operating phase.

National results

It can be seen that during an average year of the construction phase the Project generates an increase in national employment of around 0.02 per cent (see Table 1 and Figure 1) which consequently generates an increase in Gross Domestic Product of about 0.01 per cent in a typical construction-phase year (Table 1 and Figure 2). However, national real household consumption is negatively affected by the Airport Link during the construction phase as resources are diverted towards investment (Figure 3). In a typical year of the period, national real consumption (with the airport link) is about 0.05 per cent below the baseline (without airport link) forecast.

During a typical year of the 40-year operating phase national real GDP is about $150 million above the baseline forecast. This is due mainly to the use of additional capital (i.e. that of the firm operating the Airport Link) plus a small technological improvement associated with the operation of the Link. This is accompanied by a slightly elevated national real household consumption.

Queensland results

[7] See Glossary at the end of this report for a definition of terms.

Queensland, however, displays a different pattern of results. During the construction phase there is an increase in Queensland employment and gross state product, generated by construction of the Link. While real consumption is squeezed Australia-wide, since we assume that the Project is financed in a macroeconomic sense from domestic savings, the residents of Queensland only contribute part of the saving (less than a fifth). This means that real household consumption increases in Queensland during the construction period. During the operating phase the results for Queensland are more complex. While the benefits of the new Airport Link flow through in this period, Queensland households are now subject to a toll that reduces their capacity to buy normal goods and services. This means that while Queensland real consumption (which includes expenditure on Other transport via tolls) is positively affected in the operating period, its employment declines as expenditure is switched towards paying for use of the new Airport Link. We now proceed to discuss the various elements of the impacts on the Queensland economy in more detail.

Table 5.1 Macroeconomic Effects of Brisbane Airport Link (% deviations from Baseline)

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Real Gross State Product	Qld	0.01	0.31	0.25	0.24	0.29	0.22	0.08	0.07	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04
	ROA	0.00	-0.03	-0.04	-0.05	-0.05	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Real Gross Domestic Product	Aus	0.00	0.03	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Real consumption	Qld	0.01	0.17	0.15	0.14	0.17	0.25	0.07	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.06
	ROA	0.00	-0.10	-0.11	-0.12	-0.14	-0.09	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	Aus	0.00	-0.05	-0.07	-0.07	-0.08	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Real investment	Qld	0.08	1.86	1.42	1.30	1.55	0.70	-0.12	-0.11	-0.11	-0.11	-0.10	-0.10	-0.10	-0.09	-0.09	-0.08
	ROA	0.00	-0.10	-0.08	-0.07	-0.08	-0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment (hours)	Qld	0.02	0.39	0.28	0.26	0.31	0.13	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
	ROA	0.00	-0.01	-0.04	-0.05	-0.05	-0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Aus	0.00	0.06	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Real Gross State Product	Qld	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
	ROA	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Real Gross Domestic Product	Aus	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00
Real consumption	Qld	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
	ROA	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Aus	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Real investment	Qld	-0.10	-0.10	-0.10	-0.10	-0.09	-0.10	-0.10	-0.10	-0.09	-0.08	-0.10	-0.10	-0.10	-0.10	-0.05	-0.11
	ROA	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02
	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment (hours)	Qld	-0.03	-0.03	-0.04	-0.04	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.05	-0.03	-0.05
	ROA	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052
Real Gross State Product	Qld	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02
	ROA	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Real Gross Domestic Product	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Real consumption	Qld	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
	ROA	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	Aus	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Real investment	Qld	-0.11	-0.11	-0.10	-0.10	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11
	ROA	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment (hours)	Qld	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06
	ROA	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Aus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 5.2 Impact of Airport Link on Queensland Macroeconomic Variables (deviations from Baseline)

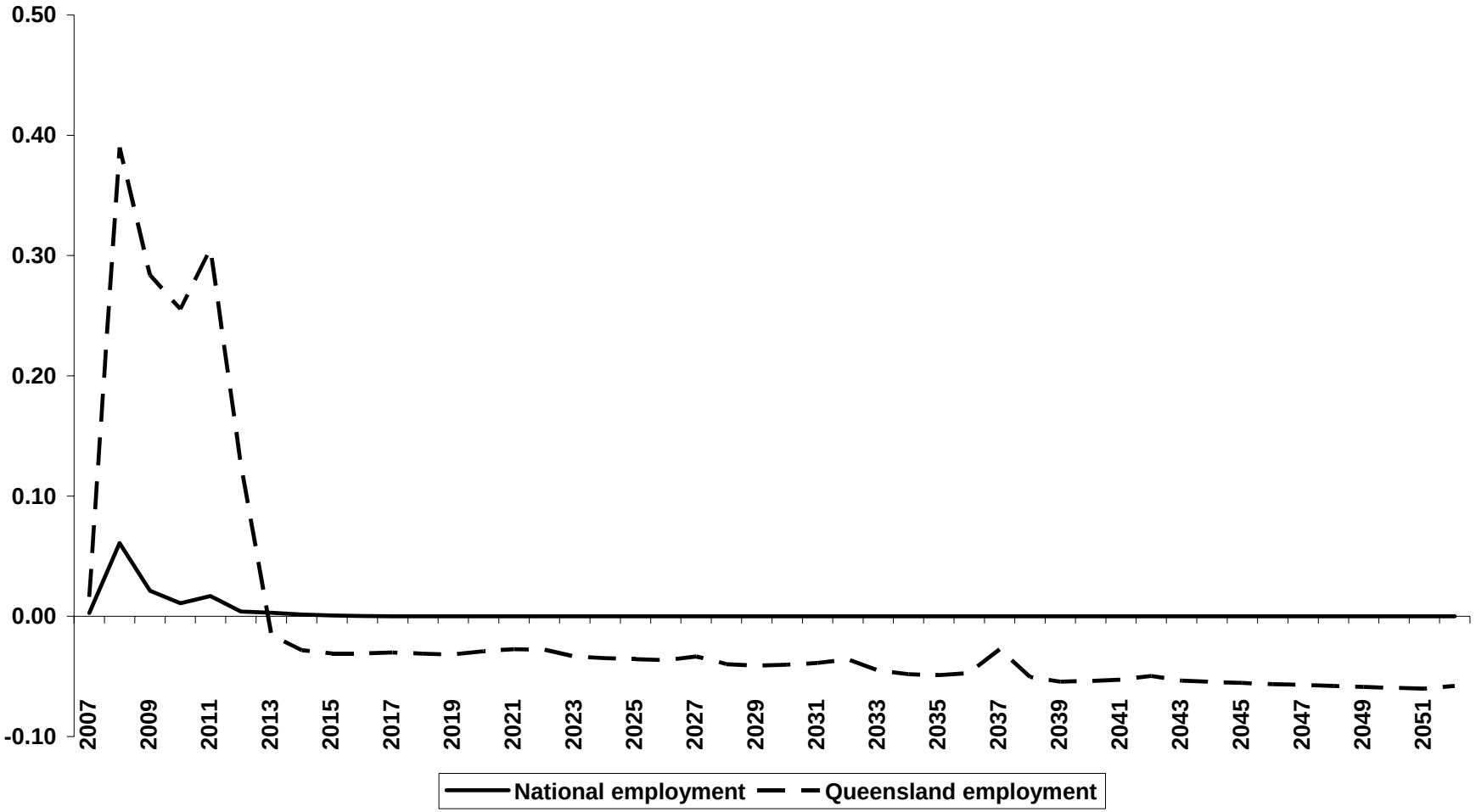
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Real Gross State Product	%	0.01	0.31	0.25	0.24	0.29	0.22	0.08	0.07	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04
	$m	20	499	410	403	500	402	153	129	117	109	104	99	95	92	89	87
Real consumption	%	0.01	0.17	0.15	0.14	0.17	0.25	0.07	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.06
	$m	7	175	156	155	191	283	84	67	61	58	56	54	52	51	51	87
Real investment	%	0.08	1.86	1.42	1.30	1.55	0.70	-0.12	-0.11	-0.11	-0.11	-0.10	-0.10	-0.10	-0.09	-0.09	-0.08
	$m	30	763	594	559	679	314	-54	-51	-52	-54	-52	-54	-54	-50	-47	-46
Employment*	%	0.02	0.39	0.28	0.26	0.31	0.13	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
	jobs	308	7,591	5,607	5,119	6,209	2,602	-325	-593	-659	-670	-660	-695	-714	-665	-634	-652

		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Real Gross State Product	%	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
	$m	82	76	70	64	59	53	47	42	37	32	25	19	14	8	5	-2
Real consumption	%	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
	$m	85	82	79	76	74	70	67	64	62	60	56	51	48	45	47	42
Real investment	%	-0.10	-0.10	-0.10	-0.10	-0.09	-0.10	-0.10	-0.10	-0.09	-0.08	-0.10	-0.10	-0.10	-0.10	-0.05	-0.11
	$m	-56	-58	-59	-60	-55	-64	-66	-64	-62	-57	-73	-77	-79	-76	-42	-87
Employment*	%	-0.03	-0.03	-0.04	-0.04	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.05	-0.03	-0.05
	jobs	-797	-840	-871	-906	-839	-1,013	-1,059	-1,053	-1,027	-964	-1,227	-1,322	-1,368	-1,331	-787	-1,459

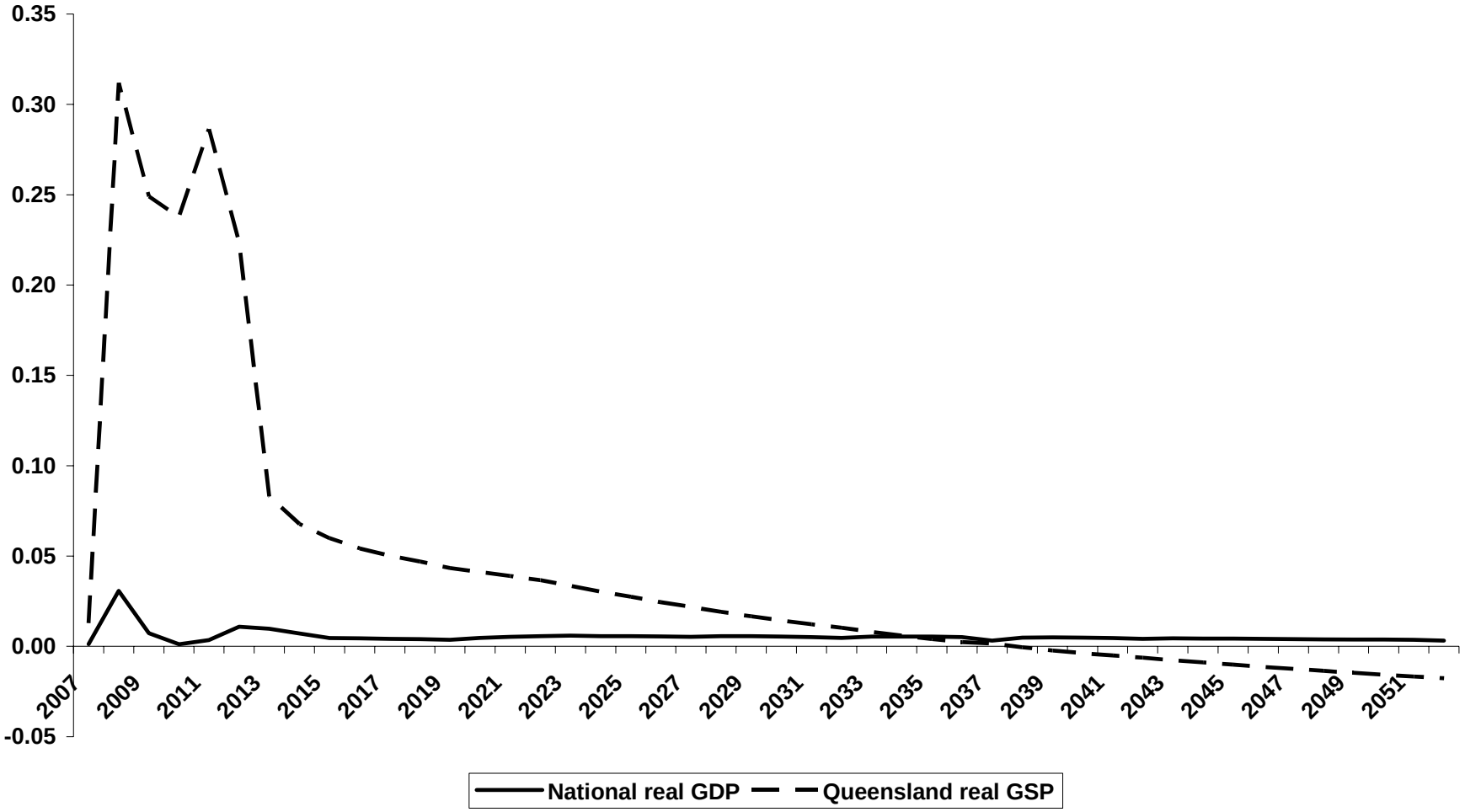
		2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052
Real Gross State Product	%	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02
	$m	-9	-14	-20	-25	-31	-38	-44	-50	-57	-64	-71	-77	-85	-91
Real consumption	%	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
	$m	35	31	28	26	22	18	13	9	5	0	-4	-9	-14	-19
Real investment	%	-0.11	-0.11	-0.10	-0.10	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11
	$m	-93	-91	-90	-86	-95	-98	-101	-104	-107	-111	-114	-118	-121	-118
Employment*	%	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06
	jobs	-1,596	-1,598	-1,588	-1,514	-1,655	-1,706	-1,757	-1,807	-1,857	-1,908	-1,959	-2,008	-2,058	-1,999

* Employment numbers are in terms of average-time jobs

- **Figure 5.1 Effects of Airport Link on Employment (% deviation from Baseline)**



- **Figure 5.2 Effect of Link on GDP / GSP (% deviation from Baseline)**


0.35
0.30
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2007
2009
2011
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2015
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2033
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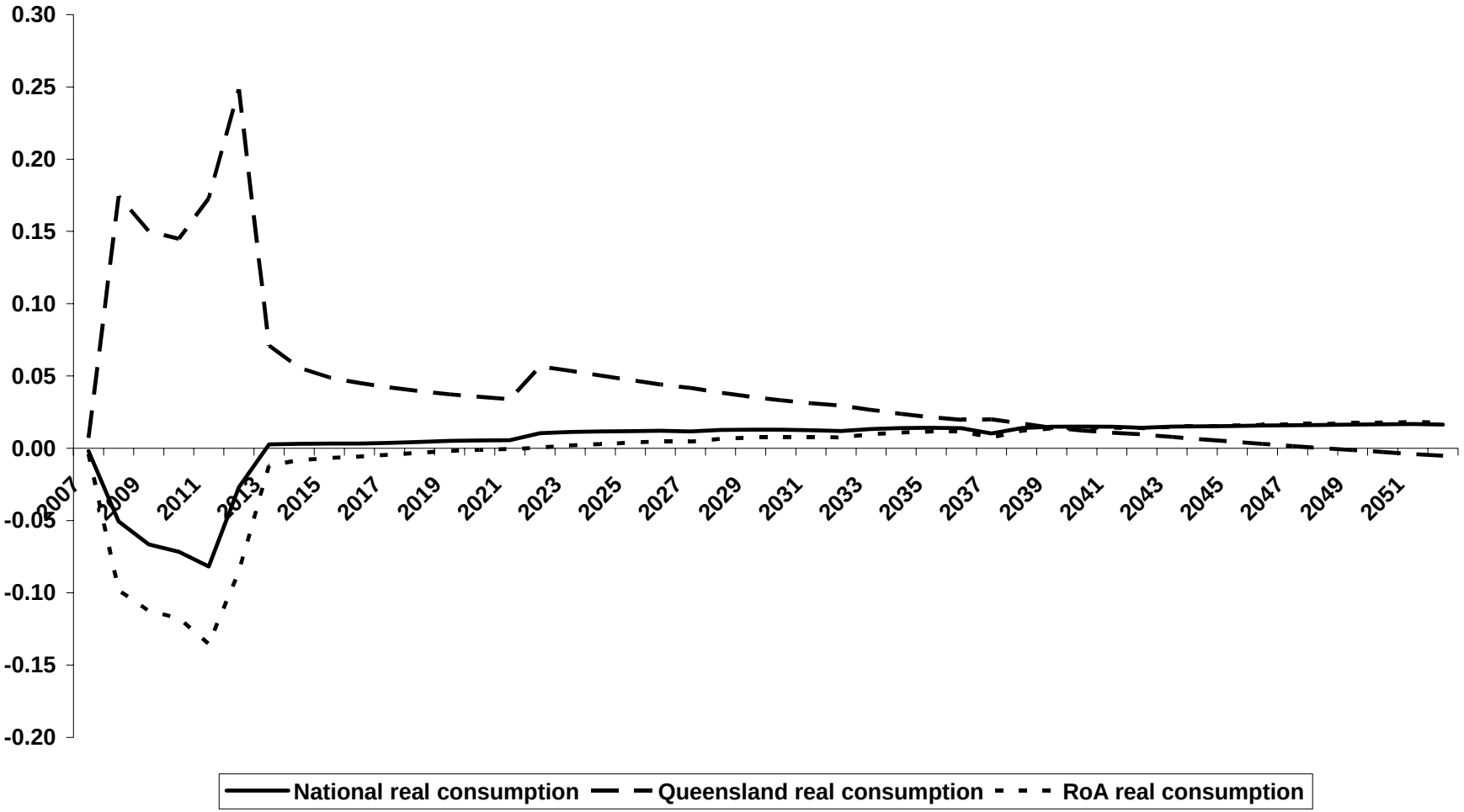
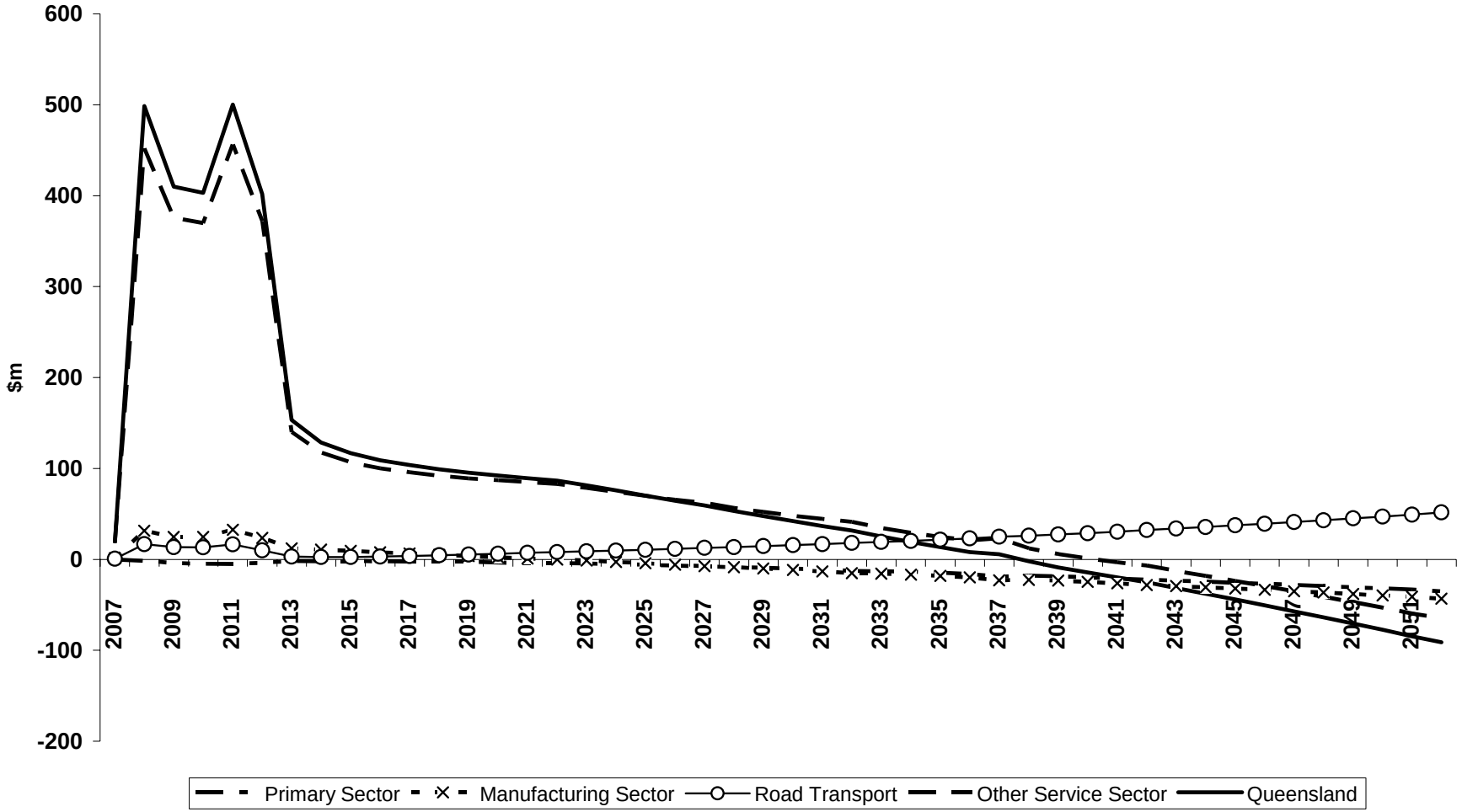
2051
National real GDP
Queensland real GSP

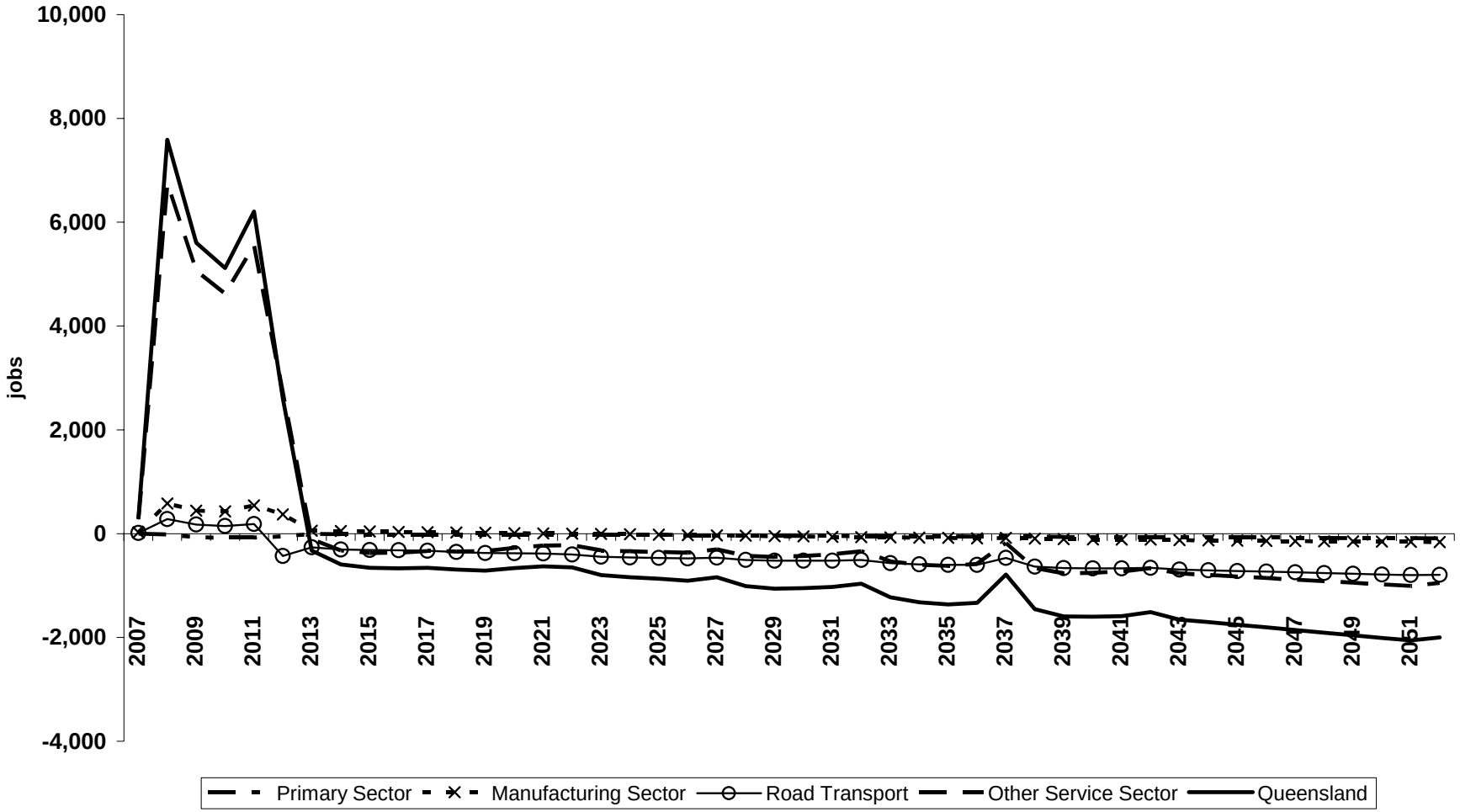
- **Figure 5.3 Effect of Link on Real Consumption (% deviation from Baseline)**



- **Figure 5.4 Impact of Airport Link on Queensland Value Added by Major Sector**



- **Figure 5.5 Impact on Queensland Employment by Major Sector**



Queensland Real GSP (Table 2, Figure 5.2 refers)

In a typical year of the construction phase[8], real gross state product for Queensland deviates around 0.22 per cent (or $366 million[9]) above its baseline forecast value. This results from the direct expenditure on construction of the Airport Link, plus local multiplier effects.

In a typical year of the operating phase Queensland real GSP is projected to be almost $26 million above the baseline forecast (or about 0.02 per cent) as a result of the Airport Link. This arises from the services of new Other transport (operators of the toll road) capital and increased productivity arising from faster transport. However, with a switch in Queensland consumption towards the highly capital-intensive Airport Link - and with lower labour requirements in the road transport industry (see section 3.3.4) - the requirement for Queensland labour inputs in aggregate declines. This has a dampening effect on the increase in a typical year's GSP.

Queensland Employment (Table 2, Figure 1 refers)

During a typical year of the construction phase, Queensland employment is projected to be around a quarter of a per cent above its baseline forecast value. However, as explained in the previous section, Queensland employment is slightly negatively affected in the operating phase (-0.04 per cent in a typical year).

Queensland Real Consumption

Queensland real household consumption is projected to be around $137 million (or 0.13 per cent) above baseline in a typical year of the construction phase. In a typical year of the operating phase Queensland real household consumption is projected to be around $44 million above the baseline forecast for this variable. However, household consumption of the Airport Link is estimated to be $151 million in a typical operating-phase year, meaning that household real expenditure on other goods is projected to be $107 million below what it would have been in a typical year of the phase.

Queensland Industry Sectors

The effects of the Airport Link on four Queensland industry sectors are shown in Figures 4 (value-added) and 5 (employment). During the construction phase it can be seen that all Queensland sectors are projected to experience positive effects from the Airport Link on value added and employment. The vast bulk of this is the contribution of the Other Services sector. In a typical year of the construction phase, two thirds of the positive deviation of $334 million in that sector's value-added comes from the Construction industry, while a further quarter comes from Trade & hotels and Finance & business services. Construction, however, makes up only 40 per cent of the positive effects on Other services employment (1,775 out of 4,450 jobs in a typical construction-phase year), while Trade & hotels (1,330) and Finance & business services (860) together make up half of the positive effect on that sector's employment.

[8] It should be recalled that the construction phase is defined as the 5-year period 2007 to 2011. The year 2012 is treated as a transition year, with the 40-year operating phase commencing in 2013.

[9] All dollar figures reported here are in 2007 prices.

During the operating phase there is a positive effect on the value-added of the Road transport sector ($21 million in a typical operating-phase year) due to the sector's improved productivity that arises from time-savings and reduced vehicle operating costs. However, the time savings mean that a particular transport task can be done with fewer labour inputs. The output of Road transport is not expanded nearly enough by the Airport Link to offset this effect, and there are some 550 less jobs in the Queensland Road Transport sector in a typical year of the phase as a result. The other sector to lose employment is Other services which in a typical year of the operating phase is about 540 jobs below the baseline forecast. This occurs basically through a local multiplier effect. Other services includes industries like Trade & hotels that are negatively affected by the reduction in employment in the transport industries. However, this sector's value added is, like Road transport, positively affected ($34 million in a typical operating year). However, the reason is different. It is due mainly to the expansion of a particular industry within Other services, namely Other transport that operates the capital-intensive Airport Link (which employs relatively little labour per dollar of revenue). However, as Figure 4 indicates, Other Services value added steadily declines over the period as the negative multiplier effect gets larger gradually outweighing the positive output effects of Other transport.

South-East Queensland

We turn now to considering the impacts in South-East Queensland (SEQ). MMRF models agents at the state level. While top-down decomposition methods allow sub-state regional results to be generated from MMRF state results, this methodology is really only suitable for shocks that occur fairly evenly across the state (Giesecke, 1999). To model a region-specific shock requires a bottom-up multiregional model that explicitly treats the behaviour of economic actors at the sub-state level. A model of this type has become available over the past few years. It is entitled TERM (Horridge, et al., 2005). However, this model is not sufficiently developed in terms of its dynamic properties and its handling of the transport sector for it to be used in the present study. We were thus able to produce SEQ results only for the construction phase, for which period a top-down decomposition, though not ideal, can reasonably be used. The decomposition is achieved under the simple assumption that all of the impact on the construction industry occurs in SEQ. This, together with local multiplier effects, implies that the vast bulk of the employment effect occurs in the south-east of the state.

- **Table 5.3 Impact of Airport Link on Employment in South East Queensland (average-time jobs_**

	2007	2008	2009	2010	2011	2012
Primary Sector	0	-4	-13	-13	-14	-9
Manufacturing	16	385	285	276	355	235
Utilities	1	18	10	7	8	1
Construction	104	2,577	2,029	1,897	2,267	1,443
Trade & hotels	56	1,378	992	889	1,075	297
Road transport	7	177	112	94	117	-274
Other transport	2	54	18	11	19	2
Other Services	58	1,427	1,082	983	1,178	590
Total SEQ	244	6,011	4,514	4,144	5,006	2,285
Rest Qld	65	1,580	1,093	975	1,203	317

References

Adams, P.D., M.J. Horridge and B.R. Parmenter (2000), "Forecasting for Australian Regions Using the MMRF-GREEN Model", *Australasian Journal of Regional Studies*, 6(3), pp. 293-322.

Adams, P.D., M.J. Horridge, G. Wittwer (2003), "MMRF-GREEN: A Dynamic Multi-Regional Applied General Equilibrium Model of the Australian Economy, Based on the MMR and MONASH Models", CoPS Working Paper G-140, Centre of Policy Studies and Impact Project, Monash University, Melbourne, pp. 70.

Giesecke, J.A. (1999) "Modelling the Regional Consequences of Commonwealth Policy – The Case of the Fringe Benefits Tax", *Australasian Journal of Regional Studies*, 5(3), pp. 365-376.

Horridge JM, Madden JR, Wittwer G (2005) "Impact of the 2002-03 Drought on Australia", *Journal of Policy Modeling* 27(3):285–308

Glossary

Deviation from the baseline means the percentage/dollar/job deviation from the baseline forecast result for that variable which comes about as a result of the construction and operation of the airport link. The baseline forecast assumes the airport link is not built.

Real values refer to economic aggregates that have been appropriately deflated for changes in price levels.

Gross State Product (GSP) is the value of final goods and services produced annually in a state (valued at market prices)

Value Added of an industry is equal to the value of the primary factors employed by the industry. That is, value added is the difference between an industry's total output and its bought-in inputs (materials and services).

Consumption refers to expenditure by households on goods and services (including the services of Other Transport which operates toll roads).

Investment refers to formation of capital (i.e. the production of physical assets such as infrastructure, plant, machinery and equipment).

An **average-time job** represents about 34 hours work a week (an average of part-time and full-time hours).

6. Project Justification – Economic Perspective

Traffic using the proposed Airport Link Project is a function of existing and forecast population and commercial and industrial land use and economic activity in the Airport Link geographic corridor, and the broader Brisbane metropolitan area and surrounding local authority services.

The South East Queensland Regional Plan highlights that the population of the region is forecast to increase from the current 2.6 million people to about 3.7 million in 2026. The Brisbane metropolitan area is forecast to increase from 1.55 million to more than 2 million by 2016.

Economic activity in the Brisbane metropolitan area is forecast to continue to expand with Brisbane Airport, the Port of Brisbane and other major commercial and industrial development in the outer North area likely to be a catalyst for substantial economic growth.

In particular, total revenue passenger movements of Brisbane Airport have increased from 9.2 million in 1995 / 96 to 15.4 million in 2004 / 05 at an average annual growth rate of 6.7%. This increase in passenger movements at Brisbane Airport over the past decade has placed heightened pressure on the road network that feeds into the airport from the Brisbane CBD and the broader Brisbane metropolitan area. The continued implementation of the Brisbane Airport 2003 Master Plan and the ongoing development of the seven master planned aviation, commercial and industrial precincts will also be a significant generator of additional traffic and employment.

The Port of Brisbane has experienced significant trade growth over the past decade which is forecast to continue in the medium to long term. The port is Australia's third largest container port and growth in container segment has increased from 249,438 containers in 1995 / 96 to 726,145 containers in 2004 / 05. Total container volumes are projected to reach around 1.9 million in 2025.

The Australia Trade Coast including Trade Coast Central and the Outer North, Outer South and Outer West areas will also be the location for future significant industrial and commercial development that will continue to fuel economic activity and economic growth in the broader Brisbane region.

Efficient freight movements will be required to support and facilitate this projected economic activity. The Transport Plan for Brisbane 2002 – 2016 states that about 90% of freight movements in South East Queensland originate or has its destination in Brisbane. Urban freight movements are estimated to be increasing at a rate of 4% annually.

The South East Queensland Regional Plan identifies that the increase in the region's population will generate an additional 425,000 jobs by 2026. The Transport Plan for Brisbane highlights that existing and future employment growth is becoming decentralised in the Brisbane Metropolitan area. The significance of Brisbane in the region is exhibited by the fact that 90% of Brisbane's residents work within Brisbane City Council boundaries and approximately 50% of residents from surrounding local government areas travel to work in Brisbane. This trend has significant implications for cross city travel particularly in the morning and afternoon peaks when congestion adversely affects the network. Employment growth in the Brisbane CBD and Brisbane City's outer areas is forecast to increase by 19% and 45% respectively between 2006 and 2016.

The proposed increase in the region's and Brisbane's population and the projected expansion of economic activity has increased the need for new road infrastructure such as the Airport Link to support the projected growth. The Airport Link Project will be a key influence on the future pattern and rate of economic development in the region and in Brisbane.

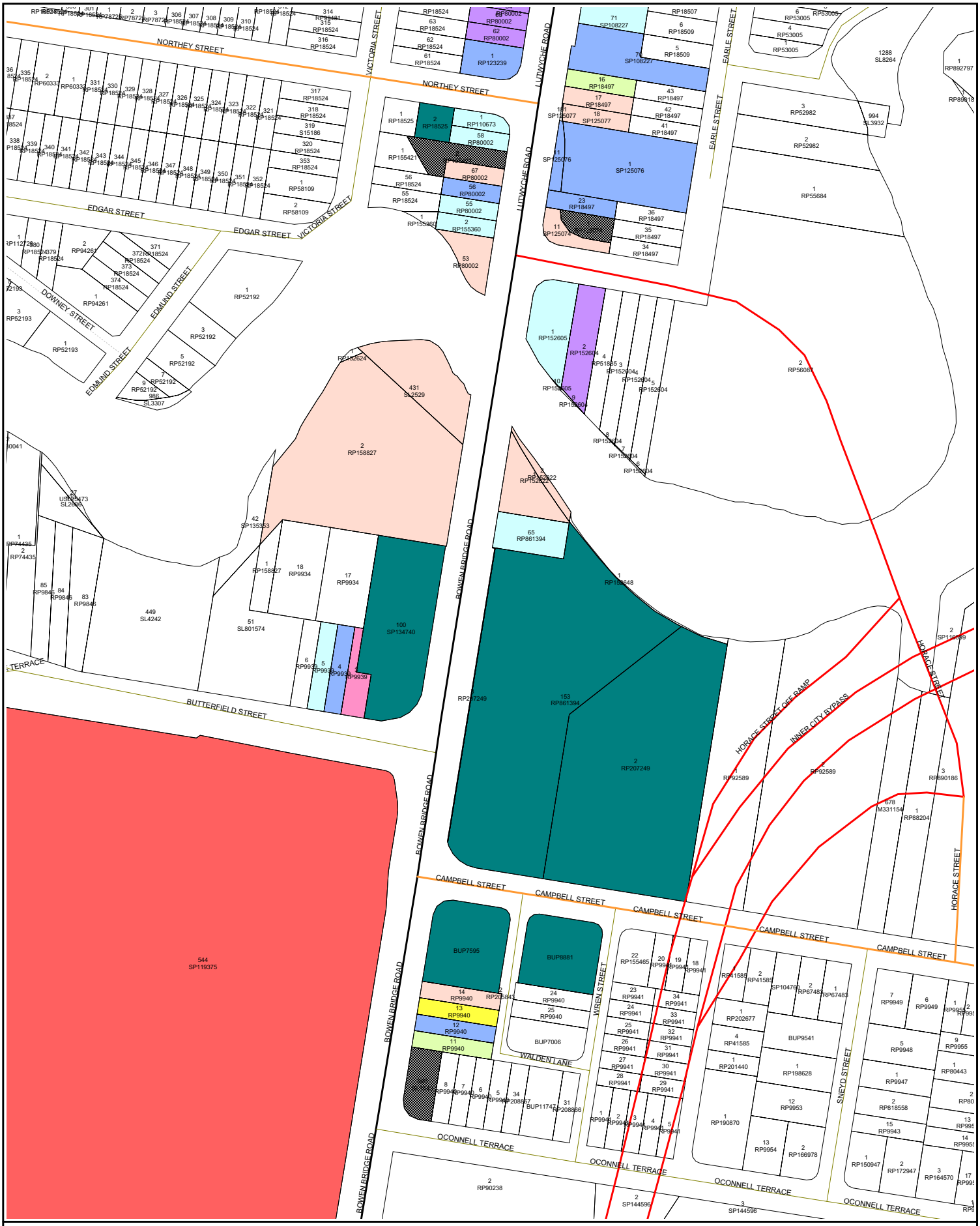
The major economic conclusions from the Airport Link CBA model and the Computable General Equilibrium Modelling are as follows:

- The Airport Link Project case with risk adjusted CAPEX of $2.3 billion and a discount rate of 6.8% returns a BCR of 1.1 and a NPV of around $131 million over the 45 year concession period. This investment results provide an economic justification for the Project proceeding although not a compelling justification.
- Travel time savings at $1.7 billion (in present value terms) contribute the major of benefits at 72% of total benefits followed by VOC at $488 million (21%), road safety at $82 million (3%) and, environmental / externalities at $85 million (4%).
- The sensitivity testing of the Airport Link Project Case returned BCRs in the range of 1.0 to 1.3, which is breakeven or a better investment result from an economic perspective. It should be noted however, that as a result of rounding, Sensitivity 4 achieved an NPV of -$63 million.
- The Airport Link CAPEX of $2.3 billion and OPEX of $1.3 billion over the 45 year concession period represents a significant investment catalyst that will result in significant direct and indirect benefits to the Brisbane, the South East Queensland and the Queensland economies.
- Queensland however, displays a different pattern of results. During the construction phase there is an increase in Queensland employment and gross state product, generated by construction of the Airport Link. The impact of the Airport Link on employment in South East Queensland will range from 6,011 FTE's when the construction starts in 2008 to 2,285 FTE's during the last year of construction in 2012. Real consumption is squeezed Australia-wide since the Project is financed in a macroeconomic sense from domestic savings and the residents of Queensland will only contribute part of the saving (less than a fifth). This means that real household consumption increases to around $137 million in Queensland during a typical year in the construction period.
- During the operating phase, Queensland residents pay for the Airport Link via a toll. Since it is assumed that a large portion of the benefits are consumed in the form of increased leisure time for Queensland households (and accident and environment savings are not modelled), Queensland real household expenditure falls relative to the baseline in this phase.

The Airport Link will be a very significant section of road infrastructure that will support and facilitate population and key economic growth areas in Brisbane and the region. The Airport Link CBA model results provide a moderate economic justification for proceeding with the Project, while the CGE modelling results in positive economic impacts for Queensland and South East Queensland from the construction and operations phase of the Project.

APPENDIX A

Street Level Survey Business Activity Maps



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- Non Metallic MineralProduct Manufacturing
- Other Manufacturing
- Machinery and Motor Vehicle Wholesaling
- Food Retailing
- Personal and Household Good Retailing
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- Accommodation Cafes and Restaurants
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AIRPOT LINK
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SH 1 of 10

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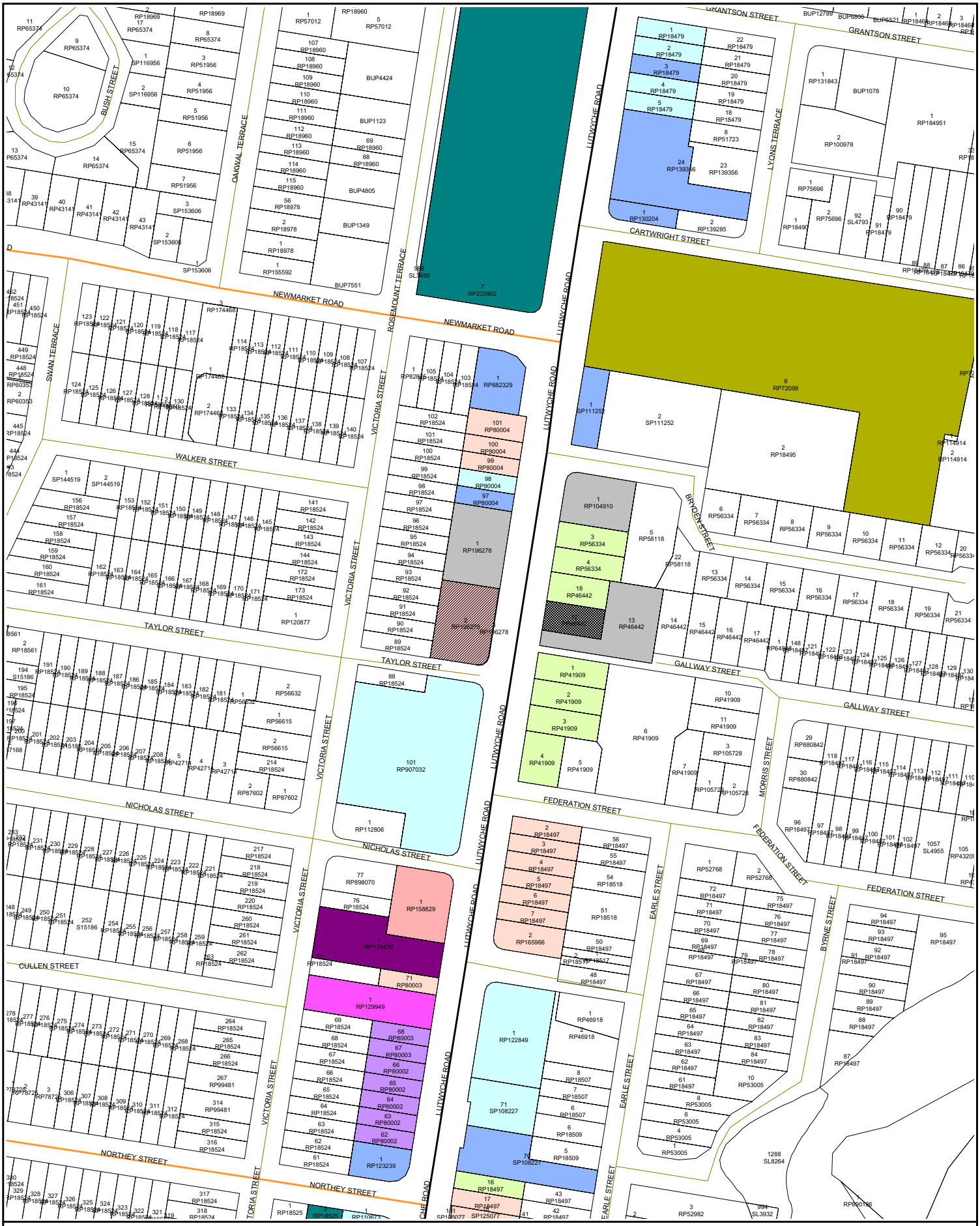

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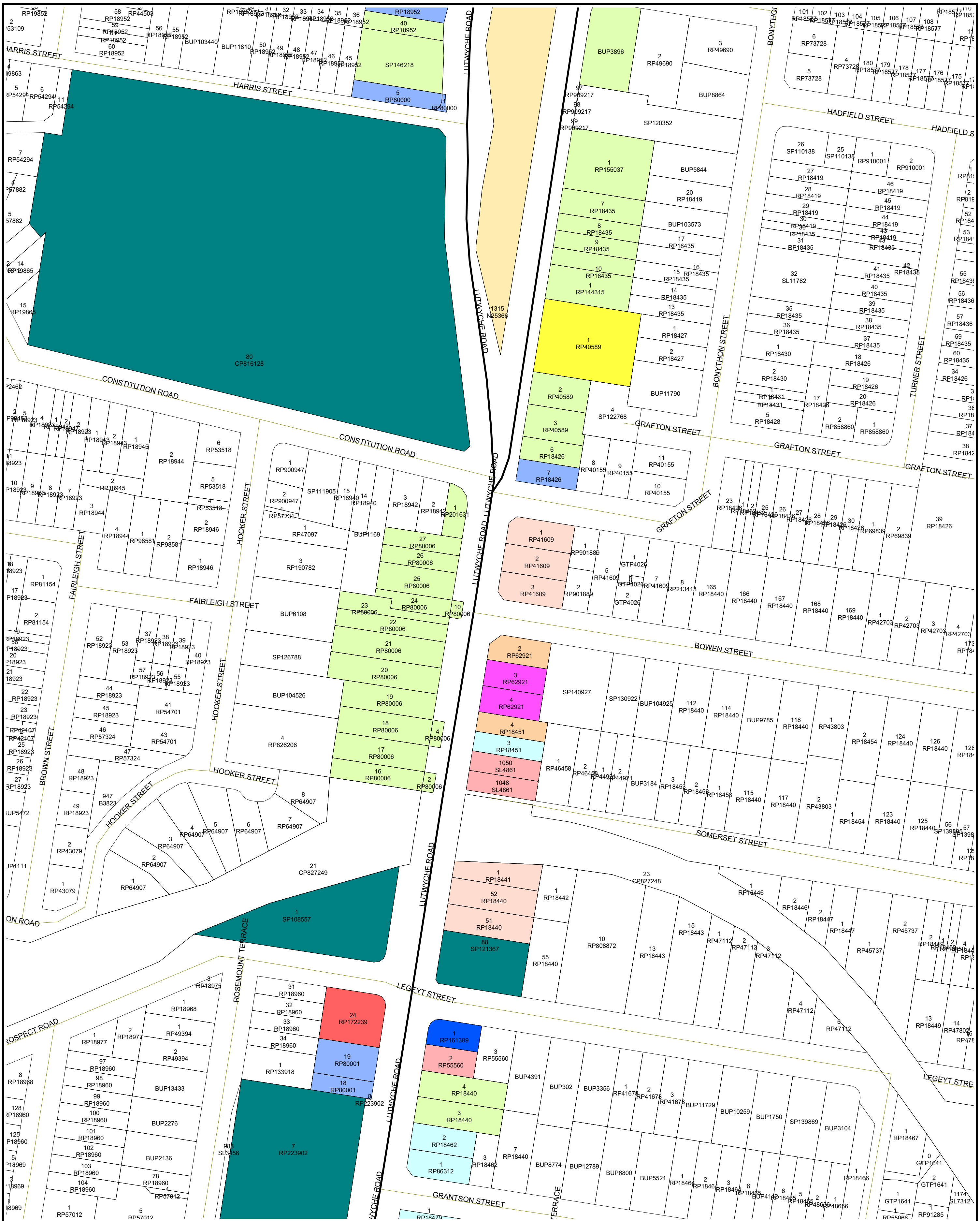

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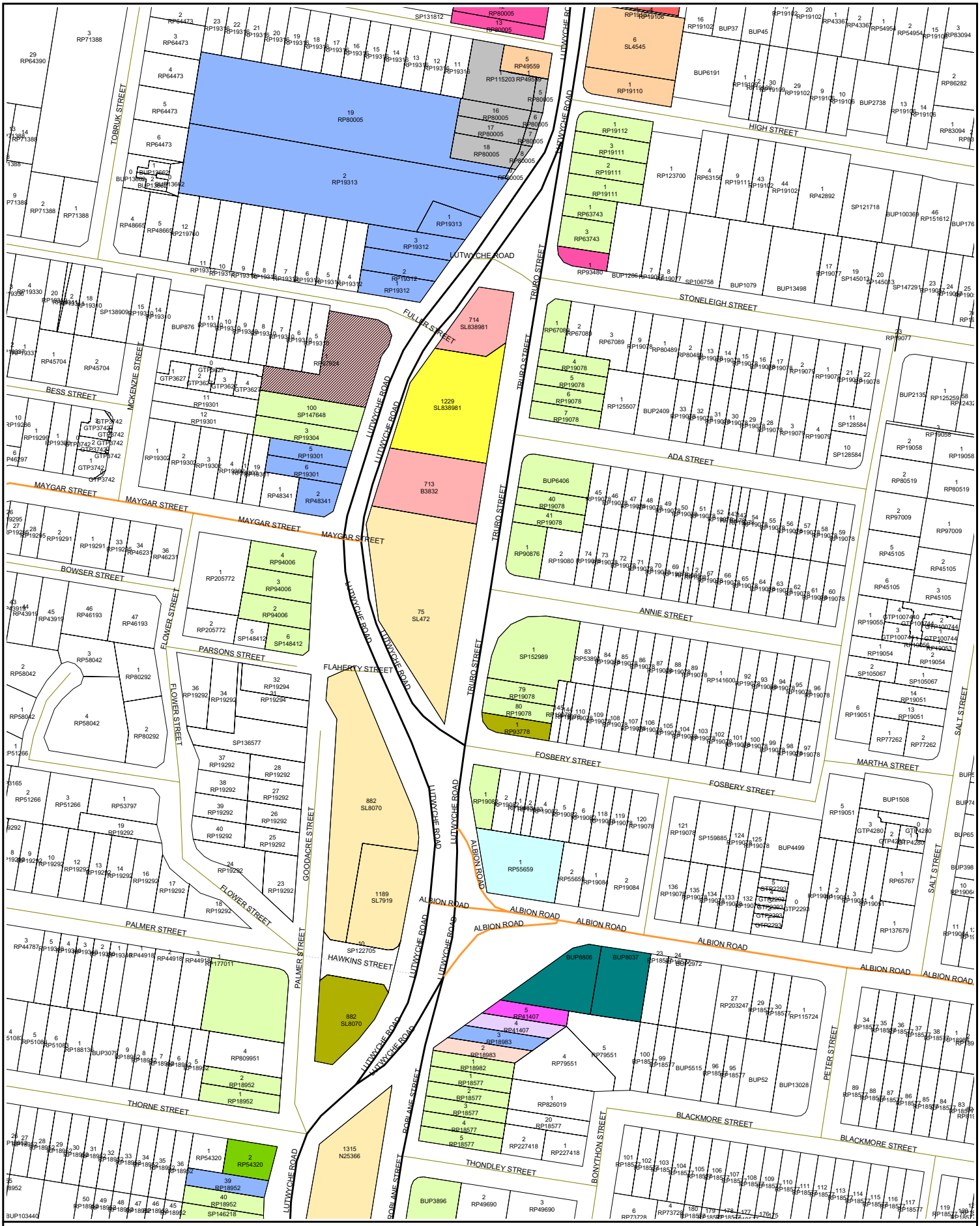

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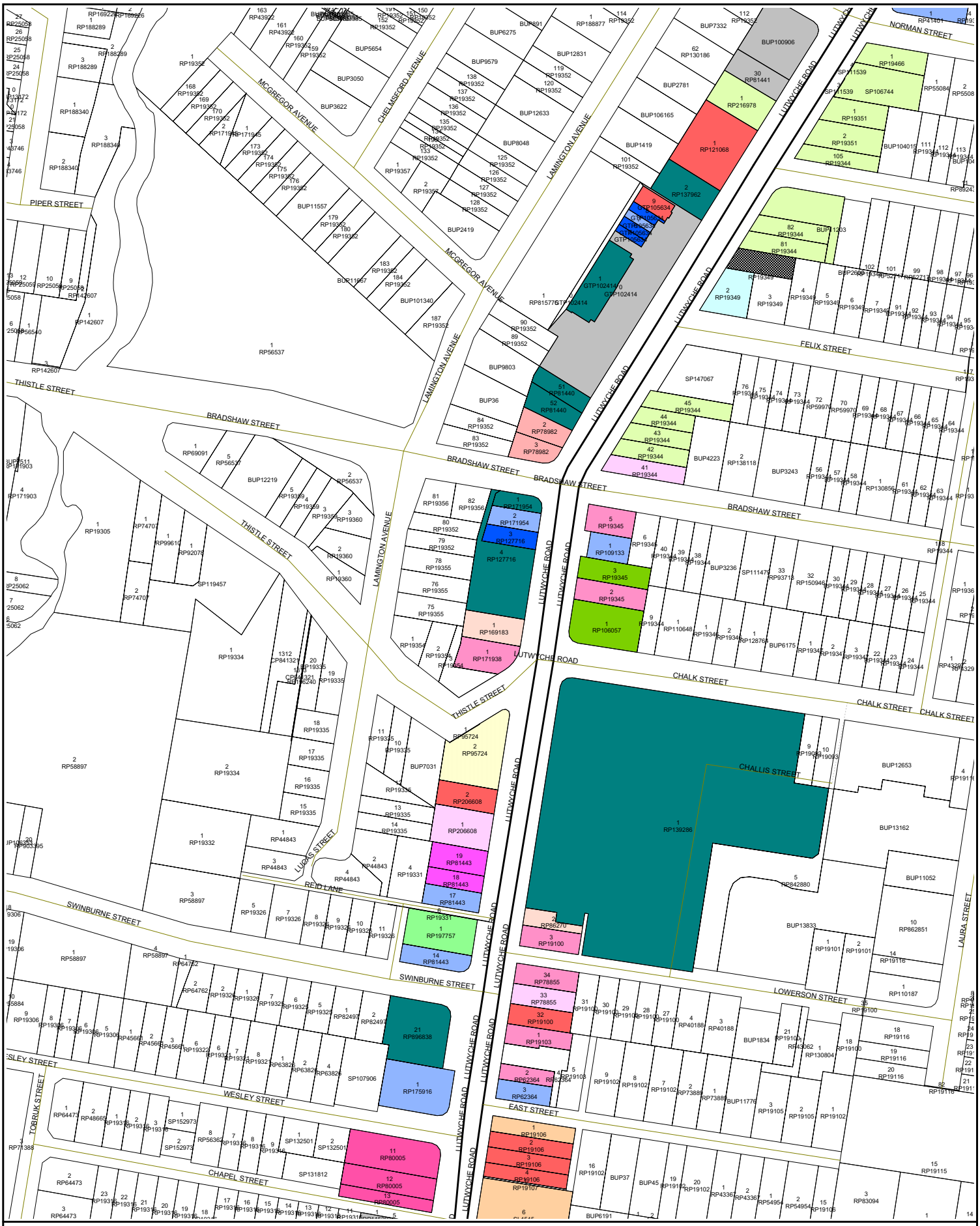

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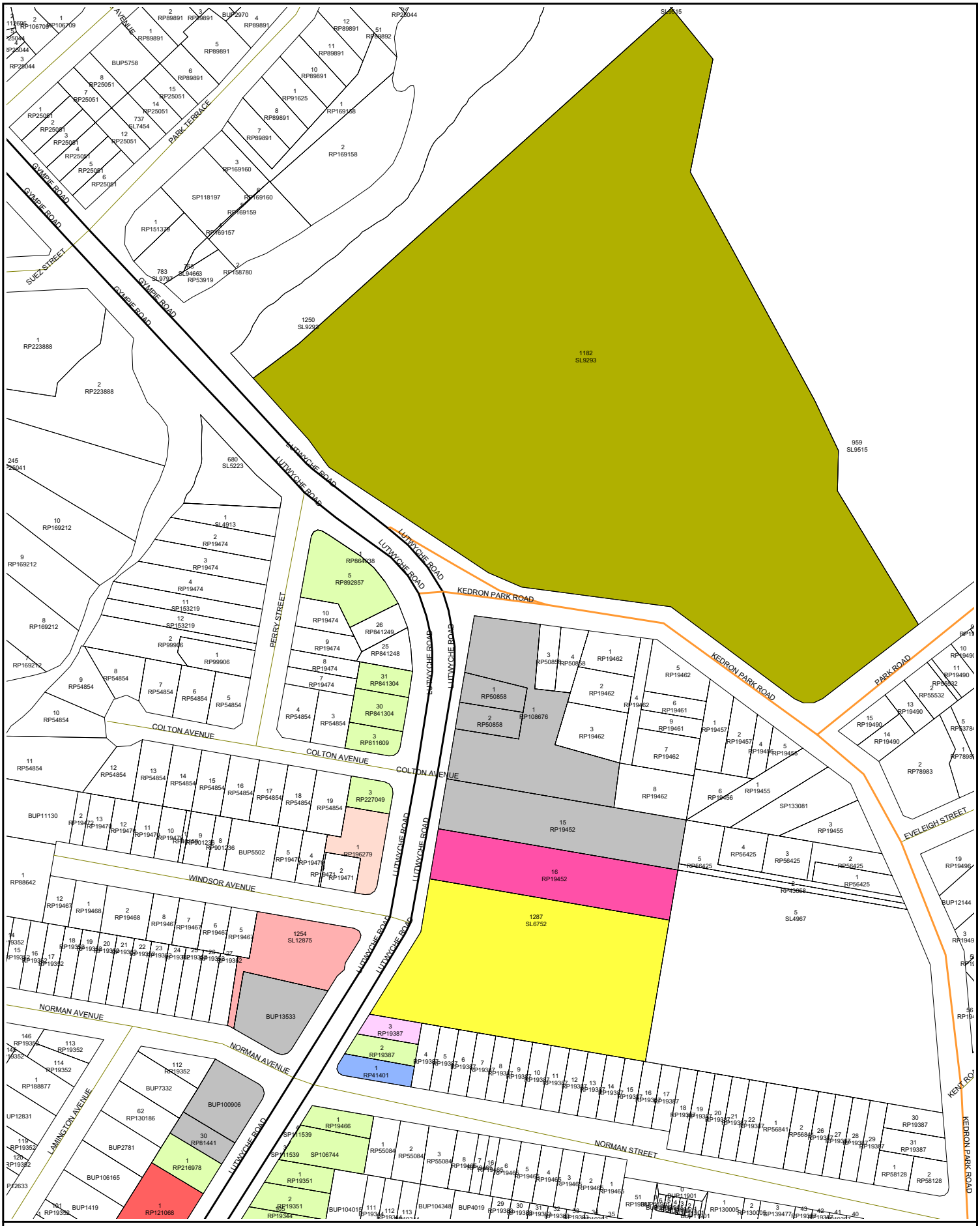

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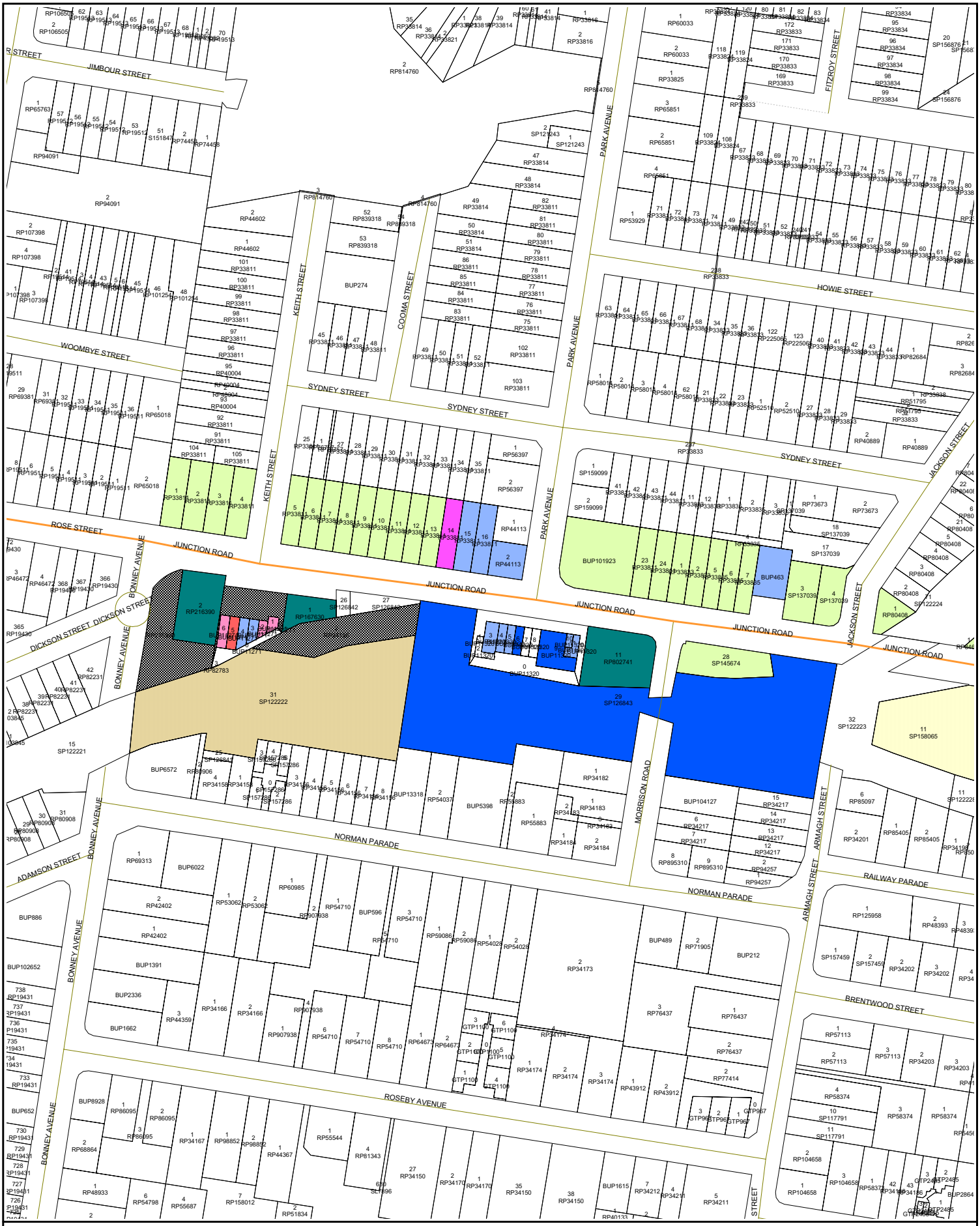

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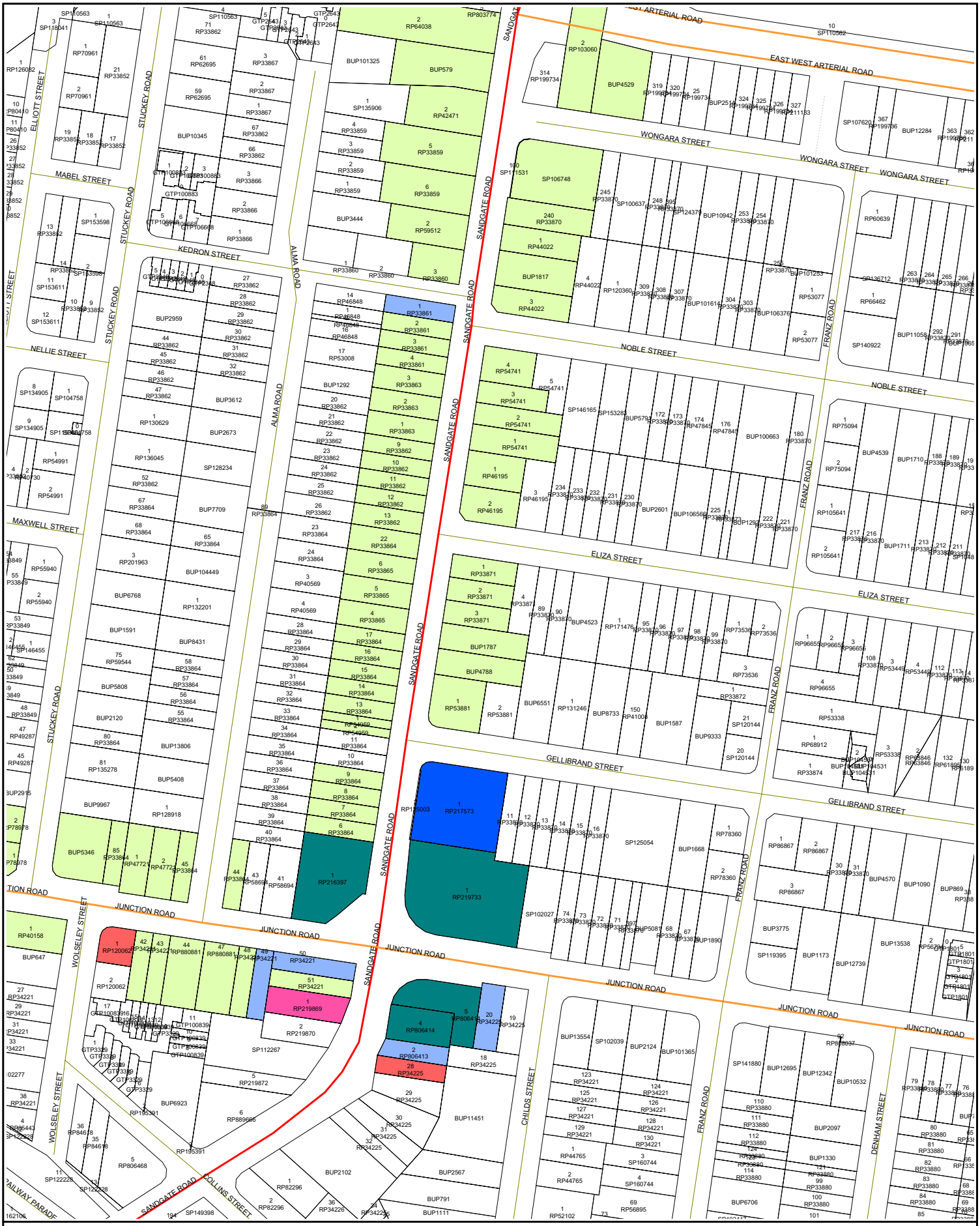

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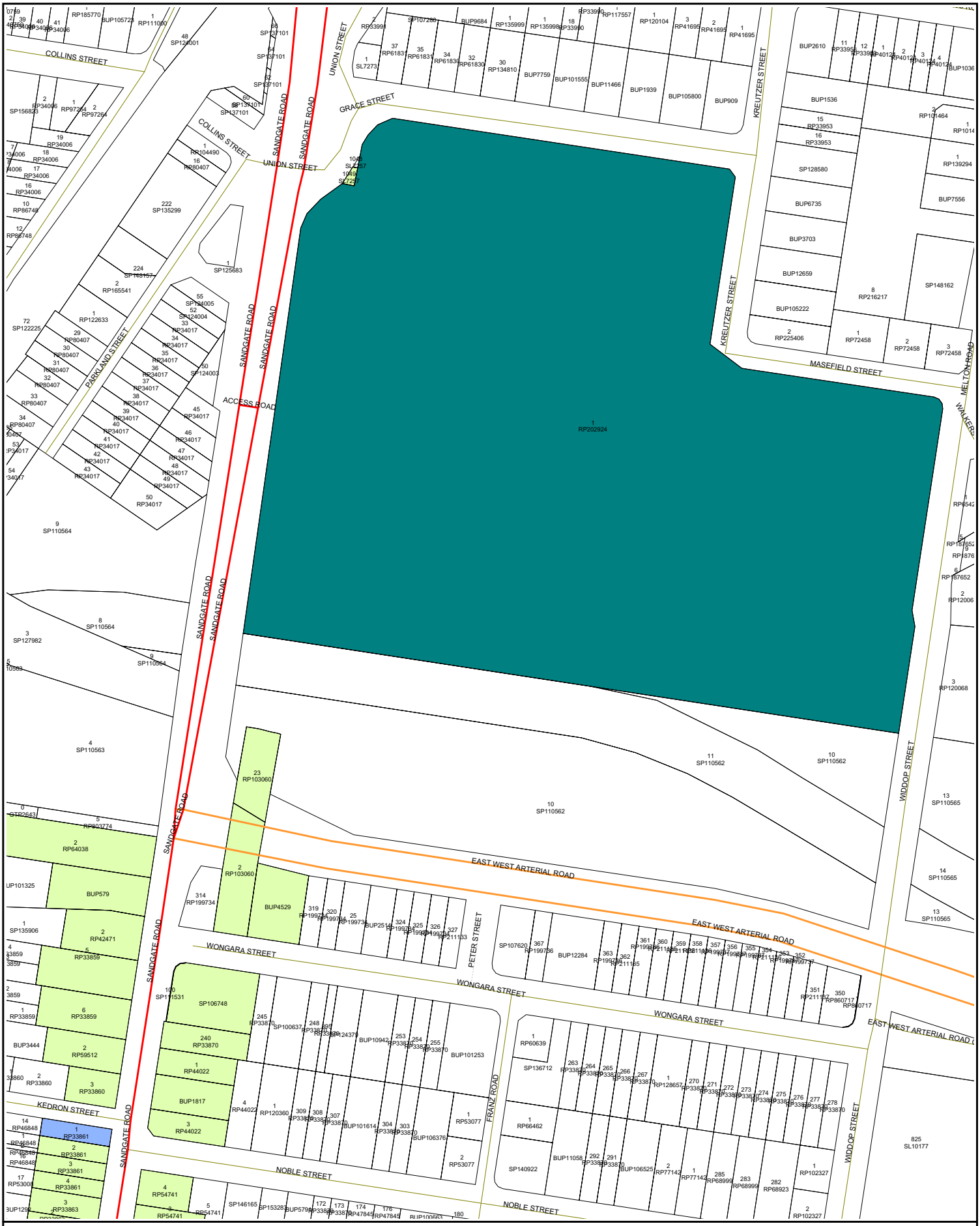

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APPENDIX B

Traffic Modelling Inputs in CBA

AL EIS : Network Statistics for Economic Assessment

Network Statistics - Base Case (Model Run 501)

Light Vehicles

Time Period	AM 2 hours (7 am - 9 pm)				Business Hours (9 am - 4 pm)				PM 2 hours (4 pm - 6 pm)				Night Off Peak (6 pm - 7 am)				24 Hours			
Model Year	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026
VKT	8,146,090	8,701,455	9,533,120	10,134,971	21,092,260	22,918,553	25,502,299	27,303,534	8,818,009	9,466,953	10,470,926	11,172,978	14,061,507	15,279,035	17,001,533	18,202,356	52,117,867	56,365,996	62,507,879	66,813,840
VHT	175,210	183,672	223,175	256,998	364,902	394,438	442,249	481,410	211,836	221,589	277,812	319,302	243,268	262,958	294,833	320,940	995,217	1,062,658	1,238,069	1,378,649
Average Speed	46.5	47.4	42.7	39.4	57.8	58.1	57.7	56.7	41.6	42.7	37.7	35.0	57.8	58.1	57.7	56.7	52.4	53.0	50.5	48.5

Heavy Vehicles

Time Period	AM 2 hours (7 am - 9 pm)				Business Hours (9 am - 4 pm)				PM 2 hours (7 PM - 9 pm)				Night Off Peak (6 pm - 7 am)				24 Hours			
Model Year	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026
VKT	700,136	754,497	814,321	857,341	1,531,336	1,653,914	1,783,625	1,875,936	383,930	412,814	447,143	471,487	1,020,891	1,102,609	1,189,083	1,250,624	3,636,293	3,923,833	4,234,172	4,455,389
VHT	14,278	14,816	17,979	21,205	25,349	27,460	30,626	33,571	8,156	8,492	10,556	12,386	16,899	18,307	20,417	22,381	64,682	69,076	79,578	89,543
Average Speed	49.0	50.9	45.3	40.4	60.4	60.2	58.2	55.9	47.1	48.6	42.4	38.1	60.4	60.2	58.2	55.9	56.2	56.8	53.2	49.8

Total Vehicles

Time Period	AM 2 hours (7 am - 9 pm)				Business Hours (9 am - 4 pm)				PM 2 hours (7 PM - 9 pm)				Night Off Peak (6 pm - 7 am)				24 Hours			
Model Year	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026
Model Run	TC_2012_501	TC_2016_501	TC_2022_501	TC_2026_501	TC_2012_501	TC_2016_501	TC_2022_501	TC_2026_501	TC_2012_501	TC_2016_501	TC_2022_501	TC_2026_501	TC_2012_501	TC_2016_501	TC_2022_501	TC_2026_501	TC_2012_501	TC_2016_501	TC_2022_501	TC_2026_501
VKT	8,846,227	9,455,951	10,347,441	10,992,312	22,623,597	24,572,466	27,285,924	29,179,470	9,201,939	9,879,767	10,918,069	11,644,465	15,082,398	16,381,644	18,190,616	19,452,980	55,754,160	60,289,829	66,742,050	71,269,228
VHT	189,488	198,488	241,154	278,203	390,251	421,898	472,875	514,981	219,992	230,082	288,368	331,688	260,168	281,265	315,250	343,321	1,059,899	1,131,733	1,317,647	1,468,192
Average Speed	46.7	47.6	42.9	39.5	58.0	58.2	57.7	56.7	41.8	42.9	37.9	35.1	58.0	58.2	57.7	56.7	52.6	53.3	50.7	48.5

NOTES

1) Traffic Growth Rates post 2022 (Whole of Model Number of Vehicles) Light Vehicles 1.31% p.a. Heavy Vehicles 1.35% p.a.
   (Based on Model Runs to 2026 for the latest ABS Medium Demographic Growth)
2) Projection of model results indicates that traffic volumes on Airport Link do not reach capacity by 2042.
3) No new information on vehicle fleet breakdown has been obtained.
4) The 2003/04 SEQ Travel Survey remains the most recent suitable source of vehicle occupancy data.
5) Current business case analysis uses an annualisation factor of 330, for both light and heavy vehicles.
6) Daytime traffic has been taken as 60% of total off-peak traffic, based on count analysis for a selection of Brisbane locations.

AL EIS : Network Statistics for Economic Assessment

Network Statistics - Airport Link Without Staged Busway (Project Option) (Mode Run 503)

Light Vehicles

Time Period	AM 2 hours (7 am - 9 pm)				Business Hours (9 am - 4 pm)				PM 2 hours (4 pm - 6 pm)				Night Off Peak (6 pm - 7 am)				24 Hours			
Model Year	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026
VKT	8,153,931	8,707,682	9,536,122	10,134,949	21,133,477	22,954,250	25,548,171	27,348,996	8,825,364	9,474,273	10,451,717	11,152,082	14,088,985	15,302,833	17,032,114	18,232,664	52,201,756	56,439,038	62,568,125	66,868,691
VHT	172,527	180,051	217,165	250,360	362,437	391,828	439,274	478,772	204,909	213,388	262,752	302,063	241,624	261,219	292,849	319,181	981,497	1,046,487	1,212,041	1,350,376
Average Speed	47.3	48.4	43.9	40.5	58.3	58.6	58.2	57.1	43.1	44.4	39.8	36.9	58.3	58.6	58.2	57.1	53.2	53.9	51.6	49.5

Heavy Vehicles

Time Period	AM 2 hours (7 am - 9 pm)				Business Hours (9 am - 4 pm)				PM 2 hours (7 PM - 9 pm)				Night Off Peak (6 pm - 7 am)				24 Hours			
Model Year	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026
VKT	697,940	752,470	811,747	855,204	1,530,716	1,652,621	1,781,402	1,873,979	381,987	411,206	444,612	469,585	1,020,477	1,101,747	1,187,601	1,249,320	3,631,119	3,918,044	4,225,362	4,448,087
VHT	14,087	14,581	17,515	20,714	25,247	27,276	30,365	33,355	7,916	8,198	10,021	11,814	16,832	18,184	20,244	22,237	64,081	68,239	78,145	88,120
Average Speed	49.5	51.6	46.3	41.3	60.6	60.6	58.7	56.2	48.3	50.2	44.4	39.7	60.6	60.6	58.7	56.2	56.7	57.4	54.1	50.5

Total Vehicles

Time Period	AM 2 hours (7 am - 9 pm)				Business Hours (9 am - 4 pm)				PM 2 hours (7 PM - 9 pm)				Night Off Peak (6 pm - 7 am)				24 Hours			
Model Year	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026	2012	2016	2022	2026
Model Run	TC_2012_503	TC_2016_503	TC_2022_503	TC_2026_503	TC_2012_503	TC_2016_503	TC_2022_503	TC_2026_503	TC_2012_503	TC_2016_503	TC_2022_503	TC_2026_503	TC_2012_503	TC_2016_503	TC_2022_503	TC_2026_503	TC_2012_503	TC_2016_503	TC_2022_503	TC_2026_503
VKT	8,851,871	9,460,153	10,347,869	10,990,153	22,664,192	24,606,870	27,329,573	29,222,975	9,207,351	9,885,478	10,896,329	11,621,666	15,109,462	16,404,580	18,219,715	19,481,984	55,832,875	60,357,082	66,793,487	71,316,778
VHT	186,614	194,633	234,681	271,074	387,684	419,104	469,639	512,127	212,825	221,586	272,773	313,876	258,456	279,403	313,093	341,418	1,045,579	1,114,726	1,290,186	1,438,496
Average Speed	47.4	48.6	44.1	40.5	58.5	58.7	58.2	57.1	43.3	44.6	39.9	37.0	58.5	58.7	58.2	57.1	53.4	54.1	51.8	49.6

NOTES

1) Traffic Growth Rates post 2022 (Whole of Model Number of Vehicles) Light Vehicles 1.31% p.a. Heavy Vehicles 1.35% p.a.
   (Based on Model Runs to 2026 for the latest ABS Medium Demographic Growth)
2) Projection of model results indicates that traffic volumes on Airport Link do not reach capacity by 2042.
3) No new information on vehicle fleet breakdown has been obtained.
4) The 2003/04 SEQ Travel Survey remains the most recent suitable source of vehicle occupancy data.
5) Current business case analysis uses an annualisation factor of 330, for both light and heavy vehicles.
6) Daytime traffic has been taken as 60% of total off-peak traffic, based on count analysis for a selection of Brisbane locations.

AL EIS : Light Vehicle VHT Data for Greenhouse Calculations

2012 Light Vehicle VHT Data for Brisbane

	TC_2012_501	TC_2012_503
	Do Minimum	Airport Link Only
Motorway	253,768	257,726
Expressway	11,095	11,342
Arterial	423,992	412,693
Suburban	161,297	157,051
District	94,240	92,595
Local	50,825	50,091
Total	**995,217**	**981,497**

2016 Light Vehicle VHT Data for Brisbane

	TC_2016_501	TC_2016_503
	Do Minimum	Airport Link Only
Motorway	279,866	284,498
Expressway	11,923	12,466
Arterial	442,667	428,394
Suburban	169,431	165,720
District	102,458	100,192
Local	56,311	55,218
Total	**1,062,658**	**1,046,487**

2022 Light Vehicle VHT Data for Brisbane

	TC_2022_501	TC_2022_503
	Do Minimum	Airport Link Only
Motorway	334,238	338,495
Expressway	12,709	13,104
Arterial	509,924	491,789
Suburban	193,825	187,754
District	114,487	110,187
Local	72,887	70,712
Total	**1,238,069**	**1,212,041**

2026 Light Vehicle VHT Data for Brisbane

	TC_2026_501	TC_2026_503
	Do Minimum	Airport Link Only
Motorway	382,656	384,857
Expressway	13,297	13,767
Arterial	556,266	536,847
Suburban	213,399	206,842
District	125,823	122,450
Local	87,209	85,612
Total	**1,378,649**	**1,350,376**

Notes: 330 x ADWT = Annual

AWDT = Average Week Day Traffic

Difference in KM Travelled = VHT With Project Scenario - VHT Without Project (A negative result represents a reduction in \

AL EIS : Heavy Vehicle VHT Data for Greenhouse Calculations

2012 Heavy Vehicle VHT Data for Brisbane

	TC_2012_501	TC_2012_503
	Do Minimum	Airport Link Only
Motorway	19,102	19,347
Expressway	1,008	1,006
Arterial	28,162	27,653
Suburban	8,820	8,609
District	4,656	4,579
Local	2,934	2,888
Total	**64,682**	**64,081**

2016 Heavy Vehicle VHT Data for Brisbane

	TC_2016_501	TC_2016_503
	Do Minimum	Airport Link Only
Motorway	20,960	21,314
Expressway	1,028	1,063
Arterial	28,822	27,954
Suburban	9,552	9,332
District	5,105	5,009
Local	3,610	3,568
Total	**69,076**	**68,239**

2022 Heavy Vehicle VHT Data for Brisbane

	TC_2022_501	TC_2022_503
	Do Minimum	Airport Link Only
Motorway	23,715	24,121
Expressway	1,224	1,228
Arterial	32,953	31,930
Suburban	10,843	10,495
District	6,100	5,784
Local	4,743	4,587
Total	**79,578**	**78,145**

2026 Heavy Vehicle VHT Data for Brisbane

	TC_2026_501	TC_2026_503
	Do Minimum	Airport Link Only
Motorway	26,175	26,531
Expressway	1,316	1,384
Arterial	37,114	35,914
Suburban	12,022	11,615
District	6,987	6,854
Local	5,929	5,822
Total	**89,543**	**88,120**

Notes: 330 x ADWT = Annual

AWDT = Average Week Day Traffic

Difference in KM Travelled = VHT With Project Scenario - VHT Without Project (A negative result represents a reduction in VHT)

AL EIS : Light Vehicle VKT Data for Economics Calculations

2012 Light Vehicle VKT Data for Brisbane

	TC_2012_501	TC_2012_503
	Do Minimum	Airport Link Only
Motorway	20,452,134	20,953,093
Expressway	561,902	546,251
Arterial	18,933,358	18,695,408
Suburban	7,768,928	7,662,163
District	3,155,309	3,119,139
Local	1,246,236	1,225,702
Total	**52,117,867**	**52,201,756**

2016 Light Vehicle VKT Data for Brisbane

	TC_2016_501	TC_2016_503
	Do Minimum	Airport Link Only
Motorway	22,900,480	23,424,339
Expressway	586,913	563,227
Arterial	20,060,462	19,814,608
Suburban	8,204,546	8,097,726
District	3,323,010	3,274,192
Local	1,290,584	1,264,946
Total	**56,365,996**	**56,439,038**

2022 Light Vehicle VKT Data for Brisbane

	TC_2022_501	TC_2022_503
	Do Minimum	Airport Link Only
Motorway	25,817,839	26,378,064
Expressway	583,655	569,733
Arterial	21,926,179	21,680,565
Suburban	9,086,288	8,945,031
District	3,669,687	3,603,782
Local	1,424,230	1,390,950
Total	**62,507,879**	**62,568,125**

2026 Light Vehicle VKT Data for Brisbane

	TC_2026_501	TC_2026_503
	Do Minimum	Airport Link Only
Motorway	28,007,679	28,564,732
Expressway	590,535	571,412
Arterial	23,086,370	22,826,649
Suburban	9,697,083	9,562,390
District	3,914,665	3,854,382
Local	1,517,509	1,489,126
Total	**66,813,840**	**66,868,691**

Notes: 330 x ADWT = Annual

AWDT = Average Week Day Traffic

Difference in KM Travelled = VKT With Project Scenario - VKT Without Project (A negative result represents a reduction in VKT)

AL EIS : Heavy Vehicle VKT Data for Economics Calculations

2012 Heavy Vehicle VKT Data for Brisbane

	TC_2012_501	TC_2012_503
	Do Minimum	Airport Link Only
Motorway	1,650,850	1,668,177
Expressway	53,895	50,124
Arterial	1,269,703	1,259,070
Suburban	417,507	412,631
District	173,416	171,451
Local	70,922	69,666
Total	**3,636,293**	**3,631,119**

2016 Heavy Vehicle VKT Data for Brisbane

	TC_2016_501	TC_2016_503
	Do Minimum	Airport Link Only
Motorway	1,818,577	1,847,251
Expressway	53,138	49,393
Arterial	1,336,263	1,317,019
Suburban	451,927	444,299
District	187,402	185,062
Local	76,526	75,019
Total	**3,923,833**	**3,918,044**

2022 Heavy Vehicle VKT Data for Brisbane

	TC_2022_501	TC_2022_503
	Do Minimum	Airport Link Only
Motorway	1,958,784	1,995,559
Expressway	59,984	55,289
Arterial	1,433,565	1,409,688
Suburban	494,670	484,371
District	203,794	199,233
Local	83,375	81,220
Total	**4,234,172**	**4,225,362**

2026 Heavy Vehicle VKT Data for Brisbane

	TC_2026_501	TC_2026_503
	Do Minimum	Airport Link Only
Motorway	2,062,653	2,100,554
Expressway	62,671	60,150
Arterial	1,498,437	1,473,650
Suburban	526,750	514,479
District	214,821	210,956
Local	90,056	88,298
Total	**4,455,389**	**4,448,087**

Notes: 330 x ADWT = Annual

AWDT = Average Week Day Traffic

Difference in KM Travelled = VKT With Project Scenario - VKT Without Project (A negative result represents a reduction in VKT)

AL EIS : Total VKT Data for Economics Calculations

2012 Total VKT Data for Brisbane

	TC_2012_501	TC_2012_503
	Do Minimum	Airport Link Only
Motorway	22,102,984	22,621,270
Expressway	615,797	596,376
Arterial	20,203,061	19,954,478
Suburban	8,186,435	8,074,794
District	3,328,725	3,290,590
Local	1,317,157	1,295,368
Total	**55,754,160**	**55,832,875**

2016 Total VKT Data for Brisbane

	TC_2016_501	TC_2016_503
	Do Minimum	Airport Link Only
Motorway	24,719,057	25,271,590
Expressway	640,050	612,619
Arterial	21,396,726	21,131,628
Suburban	8,656,473	8,542,025
District	3,510,412	3,459,255
Local	1,367,111	1,339,965
Total	**60,289,829**	**60,357,082**

2022 Total VKT Data for Brisbane

	TC_2022_501	TC_2022_503
	Do Minimum	Airport Link Only
Motorway	27,776,623	28,373,623
Expressway	643,639	625,022
Arterial	23,359,744	23,090,254
Suburban	9,580,958	9,429,403
District	3,873,481	3,803,015
Local	1,507,605	1,472,171
Total	**66,742,050**	**66,793,487**

2026 Total VKT Data for Brisbane

	TC_2026_501	TC_2026_503
	Do Minimum	Airport Link Only
Motorway	30,070,333	30,665,286
Expressway	653,206	631,562
Arterial	24,584,807	24,300,299
Suburban	10,223,833	10,076,869
District	4,129,485	4,065,338
Local	1,607,565	1,577,424
Total	**71,269,228**	**71,316,778**

Notes: 330 x ADWT = Annual

AWDT = Average Week Day Traffic

Difference in KM Travelled = VKT With Project Scenario - VKT Without Project (A negative result represents a reduction in VKT)

AL EIS : Total VHT Data for Greenhouse Calculations

2012 Total VHT Data for Brisbane

	TC_2012_501	TC_2012_503
	Do Minimum	Airport Link Only
Motorway	272,870	277,073
Expressway	12,103	12,348
Arterial	452,154	440,346
Suburban	170,117	165,660
District	98,897	97,174
Local	53,759	52,979
Total	**1,059,899**	**1,045,579**

2016 Total VHT Data for Brisbane

	TC_2016_501	TC_2016_503
	Do Minimum	Airport Link Only
Motorway	300,826	305,811
Expressway	12,951	13,529
Arterial	471,489	456,347
Suburban	178,982	175,052
District	107,563	105,201
Local	59,921	58,785
Total	**1,131,733**	**1,114,726**

2022 Total VHT Data for Brisbane

	TC_2022_501	TC_2022_503
	Do Minimum	Airport Link Only
Motorway	357,953	362,616
Expressway	13,933	14,332
Arterial	542,877	523,719
Suburban	204,668	198,248
District	120,587	115,971
Local	77,630	75,299
Total	**1,317,647**	**1,290,186**

2026 Total VHT Data for Brisbane

	TC_2026_501	TC_2026_503
	Do Minimum	Airport Link Only
Motorway	408,831	411,388
Expressway	14,613	15,151
Arterial	593,379	572,761
Suburban	225,421	218,458
District	132,810	129,305
Local	93,138	91,434
Total	**1,468,192**	**1,438,496**

Notes: 330 x ADWT = Annual

ADWT = Average Week Day Traffic

Difference in KM Travelled = VHT With Project Scenario - VHT Without Project (A negative result represents a reduction in VHT)

AL EIS : Total VKT Data for Economics

Total Average Weekday VKT on Airport Link Tunnel Sections

	TC...503 Airport Link Only
2012	
Light Vehicles	318,596
Heavy Vehicles	12,775
Total	331,372
2016	
Light Vehicles	339,687
Heavy Vehicles	21,969
Total	361,656
2022	
Light Vehicles	367,024
Heavy Vehicles	30,326
Total	397,350
2026	
Light Vehicles	375,349
Heavy Vehicles	34,395
Total	409,744

Notes: 330 x Average Weekday = Annual Total

APPENDIX C

CBA Findings Summary Sheets

Airport Link Cost Benefit Summary Analysis

	Name	Description
Active Scenario	1	Project Case
Discount Rate	6.8%	

	Light Vehicles	*Heavy Vehicles*
Benefits escalator	0.0131	0.0135

Discounted Cash flows

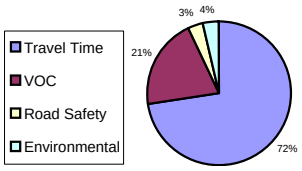
Present Value of Costs PV	2,239,429,888
Present Value Benefits PV	2,370,540,594
Net Present Value NPV	131,110,706
Benefit Cost Ratio (BCR)	1.1

Discounted Costs

CAPEX	$	1,946,500,707
OPEX	$	292,929,182
Total Discounted Costs	**$**	**2,239,429,888**

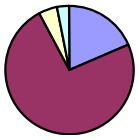
Discounted Benefits

Travel Time	$	1,716,703,984
VOC	$	487,311,107
Road Safety	$	81,875,458
Environmental	$	84,650,045
Total Discounted Benefits	**$**	**2,370,540,594**



1. Travel Time Benefits

	Present Value
Cars (Business)	$319,494,571
Cars (Private)	$1,262,776,995
Light Commercial	$82,005,803
Heavy Commercial	$52,426,616
Travel Time Benefits Total	**$1,716,703,984**



% Segment	% Total
19%	13%
74%	53%
5%	3%
3%	2%
100.0%	72%

2. Vehicle Operating Benefits (VOC)

Cars	Present Value
Motorway	-$302,161,403
Expressway	$7,776,516
Arterial	$332,557,417
Suburban	$120,054,393
District	$63,325,153
Local	$30,763,537
Total Light Vehicles	**$252,315,614**
Heavy Vehicles	
Motorway	-$164,701,560
Expressway	$643,889
Arterial	$252,453,613
Suburban	$84,825,918
District	$38,388,475
Local	$23,385,158
Total Heavy Vehicles	$234,995,493
VOC Benefits Total	**$487,311,107**

3. Road Safety Benefits

Motorway	-$36,008,606
Expressway	$1,394,225
Arterial	$54,612,916
Suburban	$37,383,946
District	$16,355,126
Local	$8,137,851
Road Safety Total	**$81,875,458**

4. Environmental Benefits

Cars	
Noise	$9,605,330
Air Pollution	$28,815,990
Water Pollution	$4,186,939
Total Cars	$42,608,259
Heavy Vehicles	
Noise	$3,824,697
Air Pollution	$34,900,360
Water Pollution	$3,316,729
Total Heavy Vehicles	$42,041,786
Total Environmental Benefits	**$84,650,045**